APR 0 1 1996 (21)

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 603238

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Tank Systems Integration	Nuclear Physics and Shielding	
5. Proj./Prog./Dept./Div.:	6. Cog. Engr.: H. J. Goldberg	7. Purchase Order No.:
8. Originator Remarks: Approval/Release		9. Equip./Component No.:
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11. Receiver Remarks:		12. Major Assm. Dwg. No.:
		13. Permit/Permit Application No.:
		14. Required Response Date:

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-ES-383		0	Shielding Requirements for K-Basin Waste Transfer Line	NA			

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. H. J. Goldberg			H0-35						
1		Cog. Mgr. J. Greenborg			H0-35						
		QA									
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
H. J. Goldberg Signature of EDT Originator Date 27 Mar 96	D. W. Crass Authorized Representative for Receiving Organization Date	J. Greenborg Cognizant Manager Date 3/26/96	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (04/94) GEF097

Shielding Requirements for K-Basin Waste Transfer Line

H. J. Goldberg
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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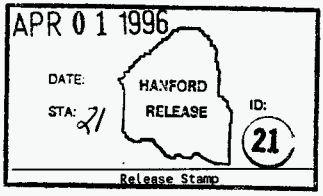
Key Words: Waste, Tank Farm, K-Basin

Abstract:

K-East Basin sludge, mixed with water, is to be transported to the tank farms using a high integrity container mounted on a trailer. Load considerations preclude driving the truck directly to the tank opening. Thus, it is envisioned that a transfer line will run from a tanker unloading point to a point where the waste can be injected into a waste tank. It is presently envisioned that the waste will be pumped from the truck to the tank in a three inch pipe which is encased inside a six inch pipe. The transfer line will be shielded by either berming earth with a density of approximately 2.00 g/cm3 (125 lb/ft3) around the line, or constructing a concrete raceway.



Release Approval Date

Approved for Public Release

SHIELDING REQUIREMENTS FOR K-BASIN WASTE TRANSFER LINE

Harvey Goldberg
8 March 1996

K-East Basin sludge, mixed with water, is to be transported to the tank farms using a high integrity container mounted on a trailer. Load considerations preclude driving the truck directly to the tank opening. Thus, it is envisioned that a transfer line will run from a tanker unloading point to a point where the waste can be injected into a waste tank.

It is presently envisioned that the waste will be pumped from the truck to the tank in a three inch pipe which is encased inside a six inch pipe. The transfer line will be shielded by either berming earth with a density of approximately 2.00 g/cm^3 (125 lb/ft^3) around the line, or constructing a concrete raceway.

An estimate of the worst case source term was culled from Schwarz (1996) and is incorporated in the Packaging Design Criteria (PDC) document which is presently in draft form. I went to the original memo because the PDC uses the total activity numbers from Schwarz, while the original memo also included the waste volume from which the activity density could be calculated. This quantity is more useful since the total source in this study will be limited by the volume of the inner pipe.

Table 1: Source Activity Concentration (Ci/m^3)

Isotope		Isotope	
^{60}Co	2.80 x 10^{-1}	^{242}Pu	5.50 x 10^{-4}
^{90}Sr	1.40 x 10^{1}	^{241}Am	6.35 x 10^{0}
^{90}Y	1.40 x 10^{1}	^{234}U	7.92 x 10^{-3}
^{137}Cs	1.07 x 10^{1}	^{235}U	3.23 x 10^{-4}
^{137m}Ba	1.01 x 10^{1}	^{236}U	1.17 x 10^{-3}
^{154}Eu	2.95 x 10^{-1}	^{238}U	5.88 x 10^{-3}
^{155}Eu	1.67 x 10^{-1}	^{231}Th	3.23 x 10^{-4}
^{238}Pu	8.35 x 10^{-1}	^{234}Th	5.90 x 10^{-3}
^{239}Pu	3.28 x 10^{0}	^{233}Pa	2.20 x 10^{-5}
^{240}Pu	1.80 x 10^{0}	^{234}Pa	7.67 x 10^{-6}
^{241}Pu	7.13 x 10^{1}	^{234m}Pa	5.90 x 10^{-3}

The computer code ISOSHLD 2.1 (Rittmann (1995)) was used to calculate the dose rates from the transfer line. The radii were taken from Crane (1979).

Table 2: Specifications for Schedule 40 Pipe

	Three inch pipe	Six inch pipe
O.D.	3.50"	6.625"
I.D.	3.068"	6.065"
Wall Thickness	0.216"	0.280"

A source length of 100' was arbitrarily selected. Essentially, this is an infinite source. The source was assumed to have the density of water. This is a conservative estimate.

The code was run for various thicknesses of either earth or concrete final shield. The dose point was placed three feet beyond the end of the final shield. This was done to model the body dose to a person standing on the top of the shield. The results are presented in Table 3 below. Note that there are three results for each distance.

The first result is the exposure rate in terms of Röntgens per hour (R/hr). This is actually what will be measured in the field using a "Cutie Pie" (CP) detector. The second and third are the dose rates in rem/hr. The second is the deep dose equivalent (DDE) rate, and the third is the effective dose equivalent (EDE) rate.

10CFR835 (1993), which is also reproduced in Hanford (1995) states:

> For purposes of compliance with this part, deep dose equivalent to the whole body may be used as effective dose equivalent for external exposure.

The DDE is the older methodology of dose calculation while the EDE is the newer methodology. All of the worker limits are expressed in terms of the EDE, but as stated above, one may be substituted for the other.

Table 3: ISOSHLD Results		
Shield Thickness	Earth Berm	Concrete Shield
0 ft	3.97×10^{-2} R/hr	3.97×10^{-2} R/hr
	4.30×10^{-2} rem/hr DDE	4.30×10^{-2} rem/hr DDE
	3.46×10^{-2} rem/hr EDE	3.46×10^{-2} rem/hr EDE
1"	2.96×10^{-2} R/hr	2.81×10^{-2} R/hr
	3.20×10^{-2} rem/hr DDE	3.04×10^{-2} rem/hr DDE
	2.57×10^{-2} rem/hr EDE	2.45×10^{-2} rem/hr EDE
2"	2.17×10^{-2} R/hr	1.96×10^{-2} R/hr
	2.35×10^{-2} rem/hr DDE	2.12×10^{-2} rem/hr DDE
	1.89×10^{-2} rem/hr EDE	1.71×10^{-2} rem/hr EDE
3" (¼')	1.58×10^{-2} R/hr	1.35×10^{-2} R/hr
	1.71×10^{-2} rem/hr DDE	1.46×10^{-2} rem/hr DDE
	1.38×10^{-2} rem/hr EDE	1.18×10^{-2} rem/hr EDE
6",(½')	5.92×10^{-3} R/hr	4.26×10^{-3} R/hr
	6.37×10^{-3} rem/hr DDE	4.58×10^{-3} rem/hr DDE
	5.15×10^{-3} rem/hr EDE	3.71×10^{-3} rem/hr EDE
9" (¾')	2.17×10^{-3} R/hr	1.32×10^{-3} R/hr
	2.33×10^{-3} rem/hr DDE	1.41×10^{-3} rem/hr DDE
	1.89×10^{-3} rem/hr EDE	1.14×10^{-3} rem/hr EDE
1'	7.91×10^{-4} R/hr	4.06×10^{-4} R/hr
	8.47×10^{-4} rem/hr DDE	4.33×10^{-4} rem/hr DDE
	6.87×10^{-4} rem/hr EDE	3.52×10^{-4} rem/hr EDE
1 ½'	1.07×10^{-4} R/hr	3.97×10^{-5} R/hr
	1.13×10^{-4} rem/hr DDE	4.19×10^{-5} rem/hr DDE
	9.22×10^{-5} rem/hr EDE	3.43×10^{-5} rem/hr EDE
2'	1.50×10^{-5} R/hr	4.17×10^{-6} R/hr
	1.57×10^{-5} rem/hr DDE	4.35×10^{-6} rem/hr DDE
	1.29×10^{-5} rem/hr EDE	3.59×10^{-6} rem/hr EDE

The question then arises as to what limit this system should be designed. WHC (1994), reflecting DOE (1994) sets a shielding design criterion of 0.25 mrem/hr for a controlled area which can be continuously occupied. In practice we have continued to set a target of 40% of this number, or 0.1 mrem/hr. This is a design criterion and not an operating criterion. The question arises as to whether the transfer line in question is a "facility". I cannot answer this question.

I am including the graphs of the three sets of numbers tabulated above. You can draw the lines to give the thickness of earth or concrete which will give you the dose rate you want. Note that the maximum thickness of earth needed to achieve the 0.1 mrem/hr level is approximately 1.5 ft and the thickness of concrete needed is approximately 1.3 ft.

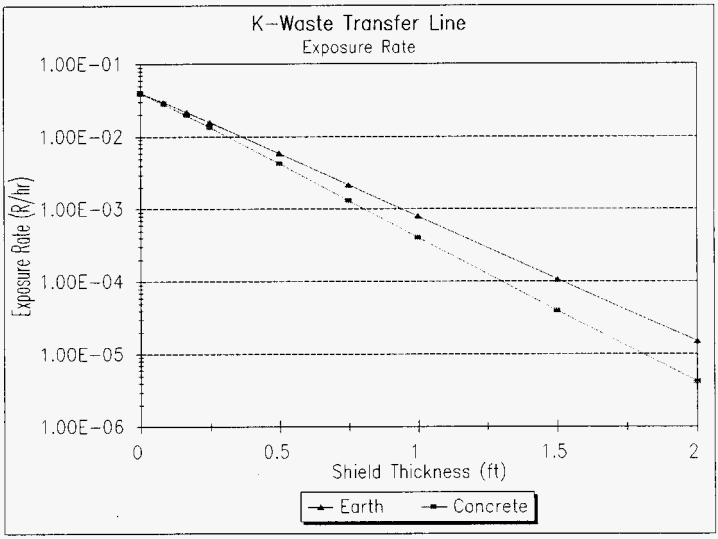


Figure 1: Variation of Exposure Rate (R/hr) with shield thickness

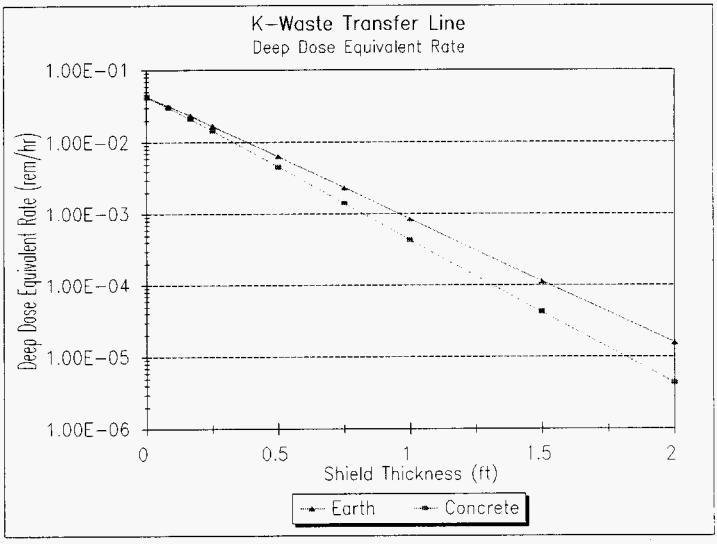


Figure 2: Variation of Deep Dose Equivalent Rate with shield thickness

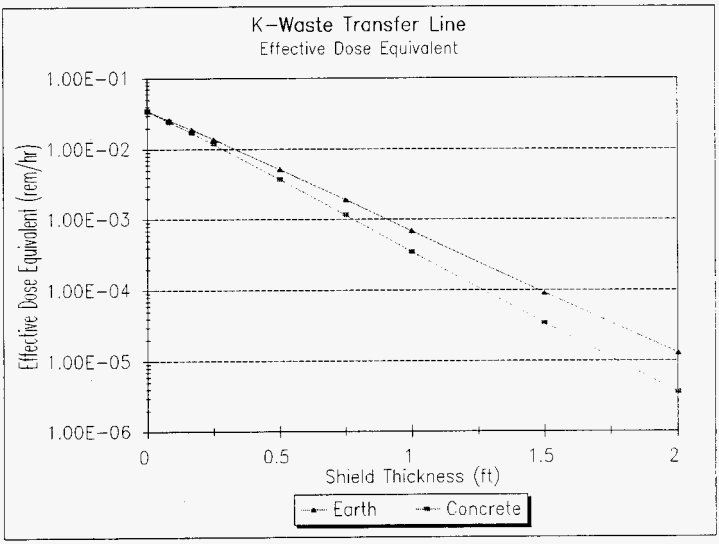


Figure 3: Variation of Effective Dose Equivalent with shield thickness

References

10CFR835 (1993) Title 10 of the Code of Federal Regulations, part 835, *Occupational Radiation Protection*, 1993

Crane (1979) Crane Technical Paper No 410, *Flow of Fluids through Valves, Fittings, and Pipes*, Crane Co., New York, N. Y., 1979

DOE (1994) DOE/EH-0256T (DOE N 5480.6), *U. S. Department of Energy Radiological Control Manual*, April 1994

Hanford (1995) HSRCM-1 Rev. 2, *Hanford Site Radiological Control Manual*, 5 July 1995

Rittmann (1995) WHC-SD-WM-UM-030 Rev 0, *ISO-PC Version 1.98 User's Guide*, P. D. Rittmann, May 1995, version 2.1 was issued in March 1996 and is in a beta testing stage at the moment. I ran several cases against the previous version and found the results comparable and the small differences (<10%) seem to be for the better.

Schwarz (1996), Internal Memo 8M730-RAS-96-001, *Source Term Description for the K Basin Sludge*, from R. A. Schwarz to J. R. Green, 29 January 1996

WHC (1994) WHC-SD-GN-DGS-30011, *Radiological Design Guide*, 1994

ISOSHLD Output File

Run started at 11:10:06 03/07/96

ISO-PC Version 2.1 February 1996
originally ISOSHLD-II; RIBD was removed
Please send questions or comments to:
Paul D. Rittmann, PhD CHP 509-376-8715
Westinghouse Hanford Company H6-06
PO Box 1970 Richland, WA 99352
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Title Line from Library File (ISO-PC.LIB):
Attenuation & Buildup for 30 Groups; Photon & Beta Production 2/14/96 PDR

Run Title: K-Waste Transfer Line

Earth Bermed - no Shield

Table of Source Activity:

Scale Factor = 1.000E+00

Isotope Wt.	Name	Initial Values Ci/m3	Final Ci/m3
472	CO- 60	2.800E-01	2.800E-01
82	SR- 90	1.400E+01	1.400E+01
84	Y - 90	1.400E+01	1.400E+01
335	CS-137	1.070E+01	1.070E+01
336	BA-137M	1.010E+01	1.010E+01
415	EU-154	2.950E-01	2.950E-01
418	EU-155	1.670E-01	1.670E-01
450	TH-231	3.230E-04	3.230E-04
530	TH-234	5.900E-03	5.900E-03
490	PA-233	2.200E-05	2.200E-05
533	PA-234M	5.900E-03	5.900E-03
441	PA-234	7.670E-06	7.670E-06
520	U -234	7.920E-03	7.920E-03
476	U -235	3.230E-04	3.230E-04
398	U -236	1.170E-03	1.170E-03
526	U -238	5.880E-03	5.880E-03
492	PU-238	8.350E-01	8.350E-01
493	PU-239	3.280E+00	3.280E+00
494	PU-240	1.800E+00	1.800E+00
495	PU-241	7.130E+01	7.130E+01
497	PU-242	5.500E-04	5.500E-04
496	AM-241	6.350E+00	6.350E+00

Earth Bermed - no Shield

Photon Production Rate for Each Radionuclide:
Note: The nuclide tables below are for 1 m3 only.

>>> CO- 60 (Z = 27) Weight(472) = 2.800E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0144	0.01	0.02	0.000E+00	1.829E+07	1.829E+07
2	0.0241	0.02	0.03	0.000E+00	6.410E+06	6.410E+06
3	0.0345	0.03	0.04	0.000E+00	3.499E+06	3.499E+06
4	0.0447	0.04	0.05	0.000E+00	2.071E+06	2.071E+06
5	0.0546	0.05	0.06	0.000E+00	1.343E+06	1.343E+06
6	0.0647	0.06	0.07	0.000E+00	9.387E+05	9.387E+05
7	0.0747	0.07	0.08	0.000E+00	6.517E+05	6.517E+05
8	0.0847	0.08	0.09	0.000E+00	4.676E+05	4.676E+05
9	0.0947	0.09	0.10	0.000E+00	3.410E+05	3.410E+05
10	0.1244	0.10	0.20	0.000E+00	9.059E+05	9.059E+05
11	0.2150	0.20	0.30	0.000E+00	2.653E+04	2.653E+04
12	0.3000	0.30	0.40	0.000E+00	1.260E+01	1.260E+01
14	0.6938	0.55	0.75	1.658E+06	0.000E+00	1.658E+06
17	1.2530	1.10	1.35	2.072E+10	0.000E+00	2.072E+10
	Total Photons/sec:			2.072E+10	3.494E+07	2.076E+10

>>> SR- 90 (Z = 38) Weight(82) = 1.400E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0142	0.01	0.02	0.000E+00	1.510E+09	1.510E+09
2	0.0246	0.02	0.03	0.000E+00	9.393E+08	9.393E+08
3	0.0344	0.03	0.04	0.000E+00	5.316E+08	5.316E+08
4	0.0447	0.04	0.05	0.000E+00	2.694E+08	2.694E+08
5	0.0547	0.05	0.06	0.000E+00	2.021E+08	2.021E+08
6	0.0647	0.06	0.07	0.000E+00	1.414E+08	1.414E+08
7	0.0748	0.07	0.08	0.000E+00	1.056E+08	1.056E+08
8	0.0848	0.08	0.09	0.000E+00	8.412E+07	8.412E+07
9	0.0948	0.09	0.10	0.000E+00	6.347E+07	6.347E+07
10	0.1336	0.10	0.20	0.000E+00	2.464E+08	2.464E+08
11	0.2356	0.20	0.30	0.000E+00	4.104E+07	4.104E+07
12	0.3329	0.30	0.40	0.000E+00	6.428E+06	6.428E+06
13	0.4091	0.40	0.55	0.000E+00	7.146E+05	7.146E+05
	Total Photons/sec:			0.000E+00	4.142E+09	4.142E+09

>>> Y - 90 (Z = 39) Weight(84) = 1.400E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0143	0.01	0.02	3.937E+07	9.727E+09	9.766E+09
2	0.0246	0.02	0.03	0.000E+00	4.956E+09	4.956E+09
3	0.0347	0.03	0.04	0.000E+00	3.104E+09	3.104E+09
4	0.0447	0.04	0.05	0.000E+00	2.251E+09	2.251E+09
5	0.0548	0.05	0.06	0.000E+00	1.634E+09	1.634E+09
6	0.0649	0.06	0.07	0.000E+00	1.429E+09	1.429E+09
7	0.0749	0.07	0.08	0.000E+00	1.322E+09	1.322E+09
8	0.0849	0.08	0.09	0.000E+00	1.215E+09	1.215E+09
9	0.0949	0.09	0.10	0.000E+00	1.109E+09	1.109E+09
10	0.1383	0.10	0.20	0.000E+00	5.678E+09	5.678E+09
11	0.2436	0.20	0.30	0.000E+00	1.841E+09	1.841E+09
12	0.3452	0.30	0.40	0.000E+00	9.232E+08	9.232E+08
13	0.4666	0.40	0.55	0.000E+00	7.221E+08	7.221E+08
14	0.6360	0.55	0.75	0.000E+00	4.500E+08	4.500E+08
15	0.8181	0.75	0.90	0.000E+00	1.676E+08	1.676E+08
16	0.9874	0.90	1.10	0.000E+00	1.173E+08	1.173E+08
17	1.2044	1.10	1.35	0.000E+00	6.255E+07	6.255E+07
18	1.4506	1.35	1.60	0.000E+00	2.150E+07	2.150E+07
19	1.7428	1.60	1.80	1.761E+07	5.079E+06	2.269E+07
20	1.8699	1.80	2.00	0.000E+00	1.158E+06	1.158E+06
21	2.1689	2.00	2.20	7.252E+05	1.000E+05	8.252E+05
22	2.2000	2.20	2.40	0.000E+00	1.487E+03	1.487E+03
	Total Photons/sec:			5.771E+07	3.674E+10	3.679E+10

>>> CS-137 (Z = 55) Weight(335) = 1.070E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0143	0.01	0.02	0.000E+00	1.197E+09	1.197E+09
2	0.0246	0.02	0.03	0.000E+00	7.011E+08	7.011E+08
3	0.0344	0.03	0.04	0.000E+00	3.758E+08	3.758E+08
4	0.0448	0.04	0.05	0.000E+00	2.249E+08	2.249E+08
5	0.0547	0.05	0.06	0.000E+00	1.701E+08	1.701E+08
6	0.0647	0.06	0.07	0.000E+00	1.196E+08	1.196E+08
7	0.0748	0.07	0.08	0.000E+00	9.220E+07	9.220E+07
8	0.0847	0.08	0.09	0.000E+00	6.719E+07	6.719E+07
9	0.0949	0.09	0.10	0.000E+00	5.152E+07	5.152E+07
10	0.1344	0.10	0.20	0.000E+00	2.104E+08	2.104E+08
11	0.2383	0.20	0.30	0.000E+00	4.231E+07	4.231E+07
12	0.3402	0.30	0.40	0.000E+00	1.154E+07	1.154E+07
13	0.4585	0.40	0.55	0.000E+00	5.359E+06	5.359E+06
14	0.6234	0.55	0.75	0.000E+00	1.848E+06	1.848E+06
15	0.8056	0.75	0.90	0.000E+00	2.739E+05	2.739E+05
16	0.9471	0.90	1.10	0.000E+00	4.266E+04	4.266E+04
17	1.1000	1.10	1.35	0.000E+00	3.362E+02	3.362E+02
	Total Photons/sec:			0.000E+00	3.271E+09	3.271E+09

>>> BA-137M (Z = 56) Weight(336) = 1.010E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
3	0.0329	0.03	0.04	2.721E+10	0.000E+00	2.721E+10
14	0.6616	0.55	0.75	3.363E+11	0.000E+00	3.363E+11
	Total Photons/sec:			3.635E+11	0.000E+00	3.635E+11

>>> EU-154 (Z = 63) Weight(415) = 2.950E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0141	0.01	0.02	0.000E+00	4.537E+07	4.537E+07
2	0.0246	0.02	0.03	0.000E+00	2.318E+07	2.318E+07
3	0.0346	0.03	0.04	0.000E+00	1.522E+07	1.522E+07
4	0.0440	0.04	0.05	2.786E+09	9.652E+06	2.795E+09
5	0.0548	0.05	0.06	0.000E+00	7.283E+06	7.283E+06
6	0.0648	0.06	0.07	0.000E+00	5.576E+06	5.576E+06
7	0.0749	0.07	0.08	0.000E+00	4.609E+06	4.609E+06
8	0.0849	0.08	0.09	0.000E+00	3.927E+06	3.927E+06
9	0.0948	0.09	0.10	0.000E+00	3.278E+06	3.278E+06
10	0.1234	0.10	0.20	4.441E+09	1.326E+07	4.455E+09
11	0.2479	0.20	0.30	7.204E+08	3.915E+06	7.243E+08
12	0.3436	0.30	0.40	0.000E+00	1.668E+06	1.668E+06
13	0.4428	0.40	0.55	1.015E+08	1.109E+06	1.026E+08
14	0.7008	0.55	0.75	3.695E+09	5.748E+05	3.695E+09
15	0.8723	0.75	0.90	1.531E+09	1.795E+05	1.532E+09
16	1.0020	0.90	1.10	3.091E+09	1.039E+05	3.091E+09
17	1.2717	1.10	1.35	4.051E+09	3.905E+04	4.051E+09
18	1.5764	1.35	1.60	3.853E+08	6.481E+03	3.853E+08
19	1.6395	1.60	1.80	0.000E+00	2.825E+02	2.825E+02
20	1.8000	1.80	2.00	0.000E+00	2.792E-01	2.792E-01
	Total Photons/sec:			2.080E+10	1.390E+08	2.094E+10

>>> EU-155 (Z = 63) Weight(418) = 1.670E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0138	0.01	0.02	0.000E+00	3.562E+06	3.562E+06
2	0.0243	0.02	0.03	0.000E+00	1.133E+06	1.133E+06
3	0.0344	0.03	0.04	0.000E+00	5.279E+05	5.279E+05
4	0.0440	0.04	0.05	1.484E+09	2.776E+05	1.484E+09
5	0.0545	0.05	0.06	0.000E+00	1.528E+05	1.528E+05
6	0.0613	0.06	0.07	8.033E+07	8.801E+04	8.042E+07
7	0.0746	0.07	0.08	0.000E+00	5.154E+04	5.154E+04
8	0.0865	0.08	0.09	1.919E+09	3.035E+04	1.919E+09
9	0.0946	0.09	0.10	0.000E+00	1.809E+04	1.809E+04
10	0.1053	0.10	0.20	1.277E+09	3.428E+04	1.277E+09
11	0.2000	0.20	0.30	0.000E+00	1.368E+02	1.368E+02
	Total Photons/sec:			4.760E+09	5.875E+06	4.766E+09

>>> TH-231 (Z = 90) Weight(450) = 3.230E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0133	0.01	0.02	8.480E+06	1.726E+04	8.498E+06
2	0.0256	0.02	0.03	1.751E+06	5.741E+03	1.757E+06
3	0.0345	0.03	0.04	0.000E+00	2.943E+03	2.943E+03
4	0.0446	0.04	0.05	0.000E+00	1.748E+03	1.748E+03
5	0.0585	0.05	0.06	5.736E+04	1.094E+03	5.846E+04
6	0.0647	0.06	0.07	0.000E+00	7.250E+02	7.250E+02
7	0.0728	0.07	0.08	2.988E+04	4.982E+02	3.038E+04
8	0.0838	0.08	0.09	9.214E+05	3.431E+02	9.218E+05
9	0.0926	0.09	0.10	2.354E+05	2.410E+02	2.357E+05
10	0.1405	0.10	0.20	2.761E+05	5.784E+02	2.766E+05
11	0.2236	0.20	0.30	9.680E+04	1.179E+01	9.681E+04
12	0.3120	0.30	0.40	6.573E+03	2.035E-05	6.573E+03
	Total Photons/sec:			1.185E+07	3.119E+04	1.189E+07

>>> TH-234 (Z = 90) Weight(530) = 5.900E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0133	0.01	0.02	2.089E+07	1.132E+05	2.100E+07
2	0.0242	0.02	0.03	0.000E+00	3.799E+04	3.799E+04
3	0.0344	0.03	0.04	0.000E+00	1.771E+04	1.771E+04
4	0.0445	0.04	0.05	0.000E+00	9.259E+03	9.259E+03
5	0.0545	0.05	0.06	0.000E+00	5.139E+03	5.139E+03
6	0.0633	0.06	0.07	8.317E+06	2.948E+03	8.320E+06
7	0.0768	0.07	0.08	2.838E+05	1.711E+03	2.855E+05
8	0.0846	0.08	0.09	0.000E+00	9.932E+02	9.932E+02
9	0.0926	0.09	0.10	1.181E+07	5.713E+02	1.181E+07
10	0.1128	0.10	0.20	5.239E+05	1.094E+03	5.250E+05
	Total Photons/sec:			4.183E+07	1.906E+05	4.202E+07

>>> PA-233 (Z = 91) Weight(490) = 2.200E-05 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	3.982E+05	1.184E+03	3.994E+05
2	0.0244	0.02	0.03	0.000E+00	4.200E+02	4.200E+02
3	0.0345	0.03	0.04	0.000E+00	2.146E+02	2.146E+02
4	0.0446	0.04	0.05	0.000E+00	1.164E+02	1.164E+02
5	0.0546	0.05	0.06	0.000E+00	7.295E+01	7.295E+01
6	0.0646	0.06	0.07	0.000E+00	4.704E+01	4.704E+01
7	0.0753	0.07	0.08	1.026E+04	3.073E+01	1.029E+04
8	0.0866	0.08	0.09	1.538E+04	2.108E+01	1.541E+04
9	0.0970	0.09	0.10	2.313E+05	1.442E+01	2.313E+05
10	0.1106	0.10	0.20	7.432E+04	3.839E+01	7.436E+04
11	0.2714	0.20	0.30	2.442E+03	3.380E+00	2.445E+03
12	0.3159	0.30	0.40	4.204E+05	5.421E-01	4.204E+05
13	0.4158	0.40	0.55	1.319E+04	5.857E-02	1.319E+04
14	0.5500	0.55	0.75	0.000E+00	1.297E-05	1.297E-05
	Total Photons/sec:			1.165E+06	2.164E+03	1.168E+06

>>> PA-234M (Z = 91) Weight(533) = 5.900E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0141	0.01	0.02	1.091E+06	3.690E+06	4.781E+06
2	0.0246	0.02	0.03	0.000E+00	1.889E+06	1.889E+06
3	0.0347	0.03	0.04	0.000E+00	1.192E+06	1.192E+06
4	0.0447	0.04	0.05	0.000E+00	8.538E+05	8.538E+05
5	0.0548	0.05	0.06	0.000E+00	6.150E+05	6.150E+05
6	0.0649	0.06	0.07	0.000E+00	5.348E+05	5.348E+05
7	0.0749	0.07	0.08	2.183E+04	4.944E+05	5.163E+05
8	0.0849	0.08	0.09	0.000E+00	4.540E+05	4.540E+05
9	0.0962	0.09	0.10	6.549E+05	4.138E+05	1.069E+06
10	0.1360	0.10	0.20	1.965E+05	2.122E+06	2.318E+06
11	0.2435	0.20	0.30	0.000E+00	6.764E+05	6.764E+05
12	0.3451	0.30	0.40	0.000E+00	3.348E+05	3.348E+05
13	0.4665	0.40	0.55	0.000E+00	2.588E+05	2.588E+05
14	0.6357	0.55	0.75	0.000E+00	1.585E+05	1.585E+05
15	0.7722	0.75	0.90	4.584E+05	5.829E+04	5.167E+05
16	1.0015	0.90	1.10	1.288E+06	4.021E+04	1.328E+06
17	1.1927	1.10	1.35	4.148E+04	2.105E+04	6.253E+04
18	1.4992	1.35	1.60	7.204E+04	7.136E+03	7.917E+04
19	1.7408	1.60	1.80	5.501E+04	1.675E+03	5.669E+04
20	1.8632	1.80	2.00	7.531E+04	3.802E+02	7.569E+04
21	2.0522	2.00	2.20	0.000E+00	3.751E+01	3.751E+01
22	2.2000	2.20	2.40	0.000E+00	8.638E-01	8.638E-01
	Total Photons/sec:			3.955E+06	1.382E+07	1.777E+07

>>> PA-234 (Z = 91) Weight(441) = 7.670E-06 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	3.224E+05	1.410E+03	3.238E+05
2	0.0246	0.02	0.03	0.000E+00	7.289E+02	7.289E+02
3	0.0347	0.03	0.04	0.000E+00	4.955E+02	4.955E+02
4	0.0440	0.04	0.05	3.405E+02	3.343E+02	6.748E+02
5	0.0547	0.05	0.06	0.000E+00	2.186E+02	2.186E+02
6	0.0635	0.06	0.07	9.933E+03	1.688E+02	1.010E+04
7	0.0783	0.07	0.08	3.405E+02	1.297E+02	4.703E+02
8	0.0847	0.08	0.09	0.000E+00	9.221E+01	9.221E+01
9	0.0973	0.09	0.10	1.307E+05	7.088E+01	1.307E+05
10	0.1344	0.10	0.20	1.324E+05	3.148E+02	1.327E+05
11	0.2423	0.20	0.30	6.709E+04	8.350E+01	6.717E+04
12	0.3574	0.30	0.40	1.836E+04	2.802E+01	1.839E+04
13	0.4884	0.40	0.55	2.940E+04	1.311E+01	2.941E+04
14	0.6511	0.55	0.75	1.509E+05	3.986E+00	1.509E+05
15	0.8487	0.75	0.90	1.772E+05	5.929E-01	1.772E+05
16	0.9486	0.90	1.10	1.641E+05	1.068E-01	1.641E+05
17	1.2396	1.10	1.35	1.890E+04	2.703E-03	1.890E+04
18	1.4510	1.35	1.60	1.984E+04	0.000E+00	1.984E+04
19	1.6924	1.60	1.80	1.334E+04	0.000E+00	1.334E+04
20	1.9110	1.80	2.00	3.235E+03	0.000E+00	3.235E+03
	Total Photons/sec:			1.258E+06	4.093E+03	1.262E+06

>>> U -234 (Z = 92) Weight(520) = 7.920E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	3.077E+07	1.451E+03	3.077E+07
2	0.0231	0.02	0.03	0.000E+00	1.336E+02	1.336E+02
3	0.0334	0.03	0.04	0.000E+00	1.610E+01	1.610E+01
4	0.0439	0.04	0.05	0.000E+00	3.147E+00	3.147E+00
5	0.0532	0.05	0.06	3.487E+05	9.982E-01	3.487E+05
6	0.0639	0.06	0.07	0.000E+00	2.999E-01	2.999E-01
7	0.0736	0.07	0.08	0.000E+00	7.024E-02	7.024E-02
8	0.0831	0.08	0.09	0.000E+00	1.014E-02	1.014E-02
9	0.0917	0.09	0.10	0.000E+00	4.886E-04	4.886E-04
10	0.1210	0.10	0.20	1.172E+05	2.068E-08	1.172E+05
13	0.4900	0.40	0.55	1.172E+04	0.000E+00	1.172E+04
14	0.5800	0.55	0.75	3.516E+01	0.000E+00	3.516E+01
	Total Photons/sec:			3.125E+07	1.605E+03	3.125E+07

>>> U -235 (Z = 92) Weight(476) = 3.230E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	3.694E+06	3.698E+02	3.694E+06
2	0.0241	0.02	0.03	0.000E+00	9.376E+01	9.376E+01
3	0.0342	0.03	0.04	0.000E+00	3.461E+01	3.461E+01
4	0.0443	0.04	0.05	0.000E+00	1.501E+01	1.501E+01
5	0.0544	0.05	0.06	0.000E+00	7.239E+00	7.239E+00
6	0.0645	0.06	0.07	0.000E+00	3.706E+00	3.706E+00
7	0.0727	0.07	0.08	1.315E+04	1.960E+00	1.315E+04
8	0.0845	0.08	0.09	0.000E+00	1.035E+00	1.035E+00
9	0.0921	0.09	0.10	8.593E+05	5.416E-01	8.593E+05
10	0.1729	0.10	0.20	8.858E+06	9.627E-01	8.858E+06
11	0.2071	0.20	0.30	7.242E+05	0.000E+00	7.242E+05
12	0.3685	0.30	0.40	1.554E+04	0.000E+00	1.554E+04
13	0.4457	0.40	0.55	1.434E+03	0.000E+00	1.434E+03
14	0.7425	0.55	0.75	4.780E+01	0.000E+00	4.780E+01
15	0.7947	0.75	0.90	7.171E+01	0.000E+00	7.171E+01
	Total Photons/sec:			1.417E+07	5.286E+02	1.417E+07

>>> U -236 (Z = 92) Weight(398) = 1.170E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0128	0.01	0.02	0.000E+00	1.373E+02	1.373E+02
2	0.0230	0.02	0.03	0.000E+00	1.123E+01	1.123E+01
3	0.0335	0.03	0.04	0.000E+00	1.331E+00	1.331E+00
4	0.0440	0.04	0.05	0.000E+00	3.280E-01	3.280E-01
5	0.0539	0.05	0.06	0.000E+00	9.754E-02	9.754E-02
6	0.0682	0.06	0.07	4.762E+04	2.340E-02	4.762E+04
7	0.0732	0.07	0.08	0.000E+00	3.627E-03	3.627E-03
8	0.0818	0.08	0.09	0.000E+00	1.996E-04	1.996E-04
9	0.0900	0.09	0.10	0.000E+00	1.209E-07	1.209E-07
	Total Photons/sec:			4.762E+04	1.503E+02	4.777E+04

>>> U -238 (Z = 92) Weight(526) = 5.880E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	1.921E+07	6.206E+02	1.921E+07
2	0.0230	0.02	0.03	0.000E+00	5.066E+01	5.066E+01
3	0.0335	0.03	0.04	0.000E+00	5.813E+00	5.813E+00
4	0.0440	0.04	0.05	0.000E+00	1.336E+00	1.336E+00
5	0.0538	0.05	0.06	0.000E+00	3.654E-01	3.654E-01
6	0.0664	0.06	0.07	2.176E+05	7.566E-02	2.176E+05
7	0.0729	0.07	0.08	0.000E+00	9.738E-03	9.738E-03
8	0.0808	0.08	0.09	0.000E+00	4.881E-04	4.881E-04
	Total Photons/sec:			1.943E+07	6.789E+02	1.943E+07

>>> PU-238 (Z = 94) Weight(492) = 8.350E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0154	0.01	0.02	3.012E+09	0.000E+00	3.012E+09
2	0.0203	0.02	0.03	3.553E+08	0.000E+00	3.553E+08
4	0.0435	0.04	0.05	1.205E+07	0.000E+00	1.205E+07
9	0.0999	0.09	0.10	2.224E+06	0.000E+00	2.224E+06
10	0.1527	0.10	0.20	3.089E+05	0.000E+00	3.089E+05
11	0.2055	0.20	0.30	1.359E+03	0.000E+00	1.359E+03
14	0.7406	0.55	0.75	2.564E+03	0.000E+00	2.564E+03
15	0.7786	0.75	0.90	1.328E+04	0.000E+00	1.328E+04
16	0.9807	0.90	1.10	8.960E+02	0.000E+00	8.960E+02
	Total Photons/sec:			3.382E+09	0.000E+00	3.382E+09

>>> PU-239 (Z = 94) Weight(493) = 3.280E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	5.340E+09	0.000E+00	5.340E+09
3	0.0332	0.03	0.04	2.427E+06	0.000E+00	2.427E+06
4	0.0460	0.04	0.05	6.918E+05	0.000E+00	6.918E+05
5	0.0538	0.05	0.06	3.519E+05	0.000E+00	3.519E+05
6	0.0683	0.06	0.07	4.005E+05	0.000E+00	4.005E+05
7	0.0780	0.07	0.08	3.762E+05	0.000E+00	3.762E+05
8	0.0896	0.08	0.09	1.578E+04	0.000E+00	1.578E+04
9	0.0984	0.09	0.10	3.277E+05	0.000E+00	3.277E+05
10	0.1318	0.10	0.20	9.102E+06	0.000E+00	9.102E+06
11	0.2328	0.20	0.30	6.189E+05	0.000E+00	6.189E+05
12	0.3645	0.30	0.40	4.369E+06	0.000E+00	4.369E+06
13	0.4185	0.40	0.55	2.063E+06	0.000E+00	2.063E+06
14	0.6526	0.55	0.75	7.767E+04	0.000E+00	7.767E+04
15	0.7702	0.75	0.90	1.820E+04	0.000E+00	1.820E+04
16	0.9854	0.90	1.10	2.549E+02	0.000E+00	2.549E+02
	Total Photons/sec:			5.361E+09	0.000E+00	5.361E+09

>>> PU-240 (Z = 94) Weight(494) = 1.800E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
4	0.0452	0.04	0.05	2.997E+07	0.000E+00	2.997E+07
10	0.1074	0.10	0.20	5.062E+06	0.000E+00	5.062E+06
14	0.6515	0.55	0.75	1.199E+04	0.000E+00	1.199E+04
	Total Photons/sec:			3.504E+07	0.000E+00	3.504E+07

>>> PU-241 (Z = 94) Weight(495) = 7.130E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0108	0.01	0.02	0.000E+00	2.578E+06	2.578E+06
2	0.0200	0.02	0.03	0.000E+00	2.344E+01	2.344E+01
4	0.0443	0.04	0.05	1.477E+05	0.000E+00	1.477E+05
5	0.0563	0.05	0.06	9.761E+04	0.000E+00	9.761E+04
7	0.0764	0.07	0.08	7.123E+05	0.000E+00	7.123E+05
10	0.1134	0.10	0.20	3.166E+07	0.000E+00	3.166E+07
	Total Photons/sec:			3.261E+07	2.578E+06	3.519E+07

>>> PU-242 (Z = 94) Weight(497) = 5.500E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0155	0.01	0.02	1.563E+06	0.000E+00	1.563E+06
2	0.0203	0.02	0.03	1.852E+05	0.000E+00	1.852E+05
4	0.0449	0.04	0.05	7.326E+03	0.000E+00	7.326E+03
10	0.1065	0.10	0.20	1.689E+03	0.000E+00	1.689E+03
	Total Photons/sec:			1.757E+06	0.000E+00	1.757E+06

>>> AM-241 (Z = 95) Weight(496) = 6.350E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0139	0.01	0.02	1.010E+11	2.673E+06	1.010E+11
2	0.0263	0.02	0.03	5.639E+09	2.745E+05	5.639E+09
3	0.0332	0.03	0.04	2.584E+08	3.221E+04	2.585E+08
4	0.0430	0.04	0.05	2.115E+08	3.534E+03	2.115E+08
5	0.0595	0.05	0.06	8.388E+10	5.425E+02	8.388E+10
6	0.0699	0.06	0.07	4.699E+06	1.031E+02	4.699E+06
7	0.0732	0.07	0.08	0.000E+00	1.489E+01	1.489E+01
8	0.0822	0.08	0.09	0.000E+00	1.011E+00	1.011E+00
9	0.0989	0.09	0.10	4.934E+07	7.426E-03	4.934E+07
10	0.1087	0.10	0.20	6.579E+07	0.000E+00	6.579E+07
11	0.2132	0.20	0.30	2.021E+06	0.000E+00	2.021E+06
12	0.3441	0.30	0.40	3.054E+06	0.000E+00	3.054E+06
13	0.4348	0.40	0.55	1.833E+05	0.000E+00	1.833E+05
14	0.6758	0.55	0.75	1.621E+06	0.000E+00	1.621E+06
15	0.7684	0.75	0.90	5.169E+04	0.000E+00	5.169E+04
	Total Photons/sec:			1.911E+11	2.984E+06	1.911E+11

Earth Bermed - no Shield

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4	Shield 5	Shield 6
WATER	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AIR	0.000E+00	0.000E+00	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ORD CONC	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00	7.800E+00	0.000E+00	0.000E+00
Totals:	1.000E+00	7.800E+00	1.290E-03	7.800E+00	2.000E+00	1.290E-03
E, MeV	Linear Attenuation, per cm (last region is air)					
0.0140	1.941E+00	5.615E+02	2.424E-03	5.615E+02	2.081E+01	2.424E-03
0.0252	4.893E-01	1.060E+02	6.053E-04	1.060E+02	3.875E+00	6.053E-04
0.0331	3.282E-01	4.855E+01	3.983E-04	4.855E+01	1.902E+00	3.983E-04
0.0442	2.426E-01	2.119E+01	2.886E-04	2.119E+01	9.777E-01	2.886E-04
0.0594	2.053E-01	9.625E+00	2.408E-04	9.625E+00	5.951E-01	2.408E-04
0.0647	1.982E-01	7.733E+00	2.318E-04	7.733E+00	5.286E-01	2.318E-04
0.0749	1.873E-01	5.424E+00	2.185E-04	5.424E+00	4.482E-01	2.185E-04
0.0858	1.788E-01	3.981E+00	2.083E-04	3.981E+00	3.965E-01	2.083E-04
0.0951	1.733E-01	3.209E+00	2.019E-04	3.209E+00	3.675E-01	2.019E-04
0.1289	1.583E-01	1.956E+00	1.841E-04	1.956E+00	3.120E-01	1.841E-04
0.2445	1.279E-01	9.782E-01	1.488E-04	9.782E-01	2.349E-01	1.488E-04
0.3451	1.124E-01	7.928E-01	1.305E-04	7.928E-01	2.044E-01	1.305E-04
0.4634	9.979E-02	6.803E-01	1.157E-04	6.803E-01	1.809E-01	1.157E-04
0.6620	8.556E-02	5.717E-01	9.929E-05	5.717E-01	1.547E-01	9.929E-05
0.8669	7.560E-02	5.008E-01	8.773E-05	5.008E-01	1.366E-01	8.773E-05
1.0015	7.053E-02	4.661E-01	8.188E-05	4.661E-01	1.274E-01	8.188E-05
1.2559	6.305E-02	4.154E-01	7.303E-05	4.154E-01	1.137E-01	7.303E-05
1.5697	5.617E-02	3.716E-01	6.508E-05	3.716E-01	1.013E-01	6.508E-05
1.7427	5.311E-02	3.534E-01	6.167E-05	3.534E-01	9.602E-02	6.167E-05
1.8696	5.113E-02	3.419E-01	5.940E-05	3.419E-01	9.261E-02	5.940E-05
2.1688	4.723E-02	3.198E-01	5.455E-05	3.198E-01	8.584E-02	5.455E-05
2.2000	4.686E-02	3.178E-01	5.408E-05	3.178E-01	8.521E-02	5.408E-05

Earth Bermed - no Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 9.986E+01 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 0.000E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 9.596E+01 cm (2) Next Layer: 9.541E+01 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	1.982E-23	1.418E-28
0.0442	1.061E+09	3.344E-06	7.307E-09	2.443E-14
0.0594	1.251E+10	2.028E-06	1.235E-01	2.505E-07
0.0647	2.608E+08	1.835E-06	2.091E-02	3.838E-08
0.0749	2.224E+08	1.665E-06	1.735E-01	2.890E-07
0.0858	4.793E+08	1.602E-06	1.570E+00	2.516E-06
0.0951	1.884E+08	1.592E-06	1.548E+00	2.465E-06
0.1289	1.746E+09	1.682E-06	3.927E+01	6.604E-05
0.2445	3.863E+08	1.926E-06	4.309E+01	8.297E-05
0.3451	1.385E+08	2.015E-06	2.483E+01	5.005E-05
0.4634	1.214E+08	2.041E-06	2.976E+01	6.074E-05
0.6620	4.958E+10	2.025E-06	1.702E+04	3.447E-02
0.8669	2.476E+08	1.967E-06	1.101E+02	2.165E-04
1.0015	4.675E+08	1.922E-06	2.379E+02	4.574E-04
1.2559	3.617E+09	1.840E-06	2.294E+03	4.220E-03
1.5697	5.926E+07	1.747E-06	4.691E+01	8.195E-05
1.7427	3.315E+06	1.700E-06	2.912E+00	4.952E-06
1.8696	1.801E+05	1.667E-06	1.698E-01	2.831E-07
2.1688	1.202E+05	1.606E-06	1.313E-01	2.108E-07
2.2000	2.166E+02	1.602E-06	2.400E-04	3.845E-10
Totals:	9.528E+10 photons/sec		1.985E+04	3.972E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	7.204E-29	4.056E-29	2.113E-29	3.773E-29	3.071E-29	2.871E-28
0.044	2.202E-14	1.400E-14	7.956E-15	1.241E-14	1.004E-14	5.324E-14
0.059	3.053E-07	2.110E-07	1.290E-07	1.836E-07	1.489E-07	5.522E-07
0.065	4.897E-08	3.460E-08	2.138E-08	2.994E-08	2.434E-08	8.388E-08
0.075	3.741E-07	2.742E-07	1.705E-07	2.347E-07	1.917E-07	5.982E-07
0.086	3.171E-06	2.404E-06	1.486E-06	2.036E-06	1.669E-06	4.855E-06
0.095	3.003E-06	2.333E-06	1.431E-06	1.961E-06	1.610E-06	4.493E-06
0.129	7.104E-05	5.878E-05	3.572E-05	4.906E-05	4.065E-05	1.017E-04
0.245	8.054E-05	6.657E-05	4.466E-05	5.792E-05	4.781E-05	1.087E-04
0.345	4.646E-05	3.902E-05	2.714E-05	3.429E-05	2.861E-05	6.238E-05
0.463	5.481E-05	4.700E-05	3.369E-05	4.164E-05	3.509E-05	7.055E-05
0.662	3.013E-02	2.659E-02	1.976E-02	2.376E-02	2.029E-02	3.759E-02
0.867	1.864E-04	1.680E-04	1.283E-04	1.509E-04	1.304E-04	2.265E-04
1.001	3.918E-04	3.567E-04	2.765E-04	3.212E-04	2.794E-04	4.706E-04
1.256	3.592E-03	3.318E-03	2.631E-03	2.997E-03	2.635E-03	4.251E-03
1.570	6.945E-05	6.491E-05	5.265E-05	5.881E-05	5.229E-05	8.126E-05
1.743	4.192E-06	3.936E-06	3.227E-06	3.571E-06	3.192E-06	4.882E-06
1.870	2.396E-07	2.257E-07	1.863E-07	2.049E-07	1.838E-07	2.783E-07
2.169	1.777E-07	1.681E-07	1.408E-07	1.529E-07	1.382E-07	2.050E-07
2.200	3.234E-10	3.062E-10	2.568E-10	2.785E-10	2.519E-10	3.730E-10
Totals	3.464E-02	3.072E-02	2.300E-02	2.748E-02	2.355E-02	4.298E-02

Fluence-to-Dose Factors, rem/hr per MeV/cm²/sec

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	3.635E-06	2.047E-06	1.066E-06	1.904E-06	1.550E-06	1.449E-05
0.044	3.013E-06	1.915E-06	1.089E-06	1.699E-06	1.373E-06	7.286E-06
0.059	2.471E-06	1.708E-06	1.044E-06	1.486E-06	1.205E-06	4.470E-06
0.065	2.342E-06	1.654E-06	1.022E-06	1.431E-06	1.164E-06	4.011E-06
0.075	2.156E-06	1.580E-06	9.823E-07	1.353E-06	1.105E-06	3.447E-06
0.086	2.019E-06	1.531E-06	9.465E-07	1.296E-06	1.063E-06	3.092E-06
0.095	1.940E-06	1.507E-06	9.242E-07	1.266E-06	1.040E-06	2.902E-06
0.129	1.809E-06	1.497E-06	9.094E-07	1.249E-06	1.035E-06	2.590E-06
0.245	1.869E-06	1.545E-06	1.037E-06	1.344E-06	1.110E-06	2.522E-06
0.345	1.871E-06	1.571E-06	1.093E-06	1.381E-06	1.152E-06	2.512E-06
0.463	1.842E-06	1.580E-06	1.132E-06	1.399E-06	1.179E-06	2.371E-06
0.662	1.770E-06	1.562E-06	1.161E-06	1.396E-06	1.192E-06	2.208E-06
0.867	1.694E-06	1.527E-06	1.166E-06	1.371E-06	1.185E-06	2.058E-06
1.001	1.647E-06	1.499E-06	1.162E-06	1.350E-06	1.174E-06	1.978E-06
1.256	1.566E-06	1.446E-06	1.147E-06	1.307E-06	1.149E-06	1.853E-06
1.570	1.480E-06	1.384E-06	1.122E-06	1.254E-06	1.115E-06	1.732E-06
1.743	1.439E-06	1.352E-06	1.108E-06	1.226E-06	1.096E-06	1.676E-06
1.870	1.412E-06	1.329E-06	1.097E-06	1.207E-06	1.083E-06	1.639E-06
2.169	1.353E-06	1.281E-06	1.072E-06	1.164E-06	1.052E-06	1.562E-06
2.200	1.348E-06	1.276E-06	1.070E-06	1.160E-06	1.049E-06	1.554E-06

1" Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.024E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 2.540E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 9.850E+01 cm (2) Next Layer: 9.795E+01 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	1.609E-25	1.152E-30
0.0442	1.061E+09	3.344E-06	6.517E-10	2.179E-15
0.0594	1.251E+10	2.028E-06	3.549E-02	7.197E-08
0.0647	2.608E+08	1.835E-06	7.879E-03	1.446E-08
0.0749	2.224E+08	1.665E-06	8.213E-02	1.368E-07
0.0858	4.793E+08	1.602E-06	8.012E-01	1.284E-06
0.0951	1.884E+08	1.592E-06	7.789E-01	1.240E-06
0.1289	1.746E+09	1.682E-06	2.176E+01	3.659E-05
0.2445	3.863E+08	1.926E-06	2.800E+01	5.392E-05
0.3451	1.385E+08	2.015E-06	1.702E+01	3.431E-05
0.4634	1.214E+08	2.041E-06	2.116E+01	4.318E-05
0.6620	4.958E+10	2.025E-06	1.258E+04	2.549E-02
0.8669	2.476E+08	1.967E-06	8.359E+01	1.645E-04
1.0015	4.675E+08	1.922E-06	1.831E+02	3.519E-04
1.2559	3.617E+09	1.840E-06	1.799E+03	3.309E-03
1.5697	5.926E+07	1.747E-06	3.740E+01	6.534E-05
1.7427	3.315E+06	1.700E-06	2.338E+00	3.976E-06
1.8696	1.801E+05	1.667E-06	1.369E-01	2.283E-07
2.1688	1.202E+05	1.606E-06	1.068E-01	1.715E-07
2.2000	2.166E+02	1.602E-06	1.954E-04	3.131E-10
Totals:	9.528E+10 photons/sec		1.478E+04	2.955E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	5.851E-31	3.294E-31	1.716E-31	3.064E-31	2.494E-31	2.331E-30
0.044	1.964E-15	1.248E-15	7.095E-16	1.107E-15	8.951E-16	4.748E-15
0.059	8.771E-08	6.062E-08	3.705E-08	5.273E-08	4.277E-08	1.586E-07
0.065	1.845E-08	1.304E-08	8.055E-09	1.128E-08	9.169E-09	3.160E-08
0.075	1.771E-07	1.298E-07	8.068E-08	1.111E-07	9.074E-08	2.831E-07
0.086	1.618E-06	1.226E-06	7.583E-07	1.039E-06	8.515E-07	2.477E-06
0.095	1.511E-06	1.174E-06	7.199E-07	9.862E-07	8.098E-07	2.260E-06
0.129	3.936E-05	3.257E-05	1.979E-05	2.718E-05	2.252E-05	5.636E-05
0.245	5.234E-05	4.326E-05	2.902E-05	3.764E-05	3.107E-05	7.062E-05
0.345	3.185E-05	2.675E-05	1.860E-05	2.350E-05	1.961E-05	4.276E-05
0.463	3.897E-05	3.342E-05	2.395E-05	2.960E-05	2.495E-05	5.016E-05
0.662	2.228E-02	1.966E-02	1.461E-02	1.757E-02	1.500E-02	2.779E-02
0.867	1.416E-04	1.276E-04	9.745E-05	1.146E-04	9.903E-05	1.720E-04
1.001	3.014E-04	2.745E-04	2.127E-04	2.471E-04	2.149E-04	3.621E-04
1.256	2.816E-03	2.601E-03	2.063E-03	2.350E-03	2.066E-03	3.333E-03
1.570	5.537E-05	5.175E-05	4.198E-05	4.689E-05	4.169E-05	6.479E-05
1.743	3.366E-06	3.161E-06	2.591E-06	2.867E-06	2.563E-06	3.920E-06
1.870	1.933E-07	1.820E-07	1.502E-07	1.652E-07	1.482E-07	2.244E-07
2.169	1.445E-07	1.368E-07	1.146E-07	1.244E-07	1.124E-07	1.668E-07
2.200	2.633E-10	2.493E-10	2.091E-10	2.268E-10	2.051E-10	3.037E-10
Totals	2.576E-02	2.286E-02	1.712E-02	2.045E-02	1.753E-02	3.195E-02

2" Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.049E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 5.080E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.010E+02 cm (2) Next Layer: 1.005E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	1.307E-27	9.349E-33
0.0442	1.061E+09	3.344E-06	5.755E-11	1.924E-16
0.0594	1.251E+10	2.028E-06	1.107E-02	2.245E-08
0.0647	2.608E+08	1.835E-06	2.646E-03	4.856E-09
0.0749	2.224E+08	1.665E-06	3.916E-02	6.521E-08
0.0858	4.793E+08	1.602E-06	4.519E-01	7.239E-07
0.0951	1.884E+08	1.592E-06	4.156E-01	6.616E-07
0.1289	1.746E+09	1.682E-06	1.194E+01	2.007E-05
0.2445	3.863E+08	1.926E-06	1.785E+01	3.437E-05
0.3451	1.385E+08	2.015E-06	1.143E+01	2.304E-05
0.4634	1.214E+08	2.041E-06	1.477E+01	3.014E-05
0.6620	4.958E+10	2.025E-06	9.170E+03	1.857E-02
0.8669	2.476E+08	1.967E-06	6.277E+01	1.235E-04
1.0015	4.675E+08	1.922E-06	1.395E+02	2.682E-04
1.2559	3.617E+09	1.840E-06	1.401E+03	2.577E-03
1.5697	5.926E+07	1.747E-06	2.970E+01	5.188E-05
1.7427	3.315E+06	1.700E-06	1.872E+00	3.183E-06
1.8696	1.801E+05	1.667E-06	1.102E-01	1.837E-07
2.1688	1.202E+05	1.606E-06	8.684E-02	1.394E-07
2.2000	2.166E+02	1.602E-06	1.590E-04	2.548E-10
Totals:	9.528E+10 photons/sec		1.086E+04	2.171E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	4.750E-33	2.674E-33	1.393E-33	2.488E-33	2.025E-33	1.893E-32
0.044	1.734E-16	1.102E-16	6.265E-17	9.776E-17	7.904E-17	4.193E-16
0.059	2.736E-08	1.891E-08	1.156E-08	1.645E-08	1.334E-08	4.949E-08
0.065	6.196E-09	4.377E-09	2.705E-09	3.787E-09	3.079E-09	1.061E-08
0.075	8.442E-08	6.187E-08	3.846E-08	5.297E-08	4.326E-08	1.350E-07
0.086	9.125E-07	6.917E-07	4.277E-07	5.857E-07	4.802E-07	1.397E-06
0.095	8.060E-07	6.262E-07	3.841E-07	5.262E-07	4.321E-07	1.206E-06
0.129	2.159E-05	1.787E-05	1.086E-05	1.491E-05	1.236E-05	3.092E-05
0.245	3.336E-05	2.757E-05	1.850E-05	2.399E-05	1.980E-05	4.501E-05
0.345	2.139E-05	1.797E-05	1.250E-05	1.579E-05	1.317E-05	2.872E-05
0.463	2.720E-05	2.333E-05	1.672E-05	2.066E-05	1.741E-05	3.501E-05
0.662	1.623E-02	1.433E-02	1.065E-02	1.280E-02	1.093E-02	2.025E-02
0.867	1.063E-04	9.583E-05	7.318E-05	8.607E-05	7.437E-05	1.292E-04
1.001	2.297E-04	2.092E-04	1.621E-04	1.883E-04	1.638E-04	2.760E-04
1.256	2.193E-03	2.026E-03	1.607E-03	1.831E-03	1.609E-03	2.596E-03
1.570	4.396E-05	4.109E-05	3.333E-05	3.723E-05	3.310E-05	5.144E-05
1.743	2.694E-06	2.530E-06	2.074E-06	2.295E-06	2.051E-06	3.138E-06
1.870	1.555E-07	1.465E-07	1.209E-07	1.330E-07	1.193E-07	1.806E-07
2.169	1.175E-07	1.112E-07	9.313E-08	1.011E-07	9.139E-08	1.356E-07
2.200	2.143E-10	2.029E-10	1.701E-10	1.845E-10	1.669E-10	2.471E-10
Totals	1.892E-02	1.679E-02	1.258E-02	1.502E-02	1.288E-02	2.345E-02

1/4' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.075E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 7.620E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.036E+02 cm (2) Next Layer: 1.030E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	1.021E-29	7.303E-35
0.0442	1.061E+09	3.344E-06	5.039E-12	1.685E-17
0.0594	1.251E+10	2.028E-06	3.181E-03	6.451E-09
0.0647	2.608E+08	1.835E-06	8.907E-04	1.635E-09
0.0749	2.224E+08	1.665E-06	1.920E-02	3.196E-08
0.0858	4.793E+08	1.602E-06	2.342E-01	3.753E-07
0.0951	1.884E+08	1.592E-06	2.486E-01	3.958E-07
0.1289	1.746E+09	1.682E-06	6.500E+00	1.093E-05
0.2445	3.863E+08	1.926E-06	1.123E+01	2.163E-05
0.3451	1.385E+08	2.015E-06	7.581E+00	1.528E-05
0.4634	1.214E+08	2.041E-06	1.018E+01	2.078E-05
0.6620	4.958E+10	2.025E-06	6.615E+03	1.340E-02
0.8669	2.476E+08	1.967E-06	4.676E+01	9.200E-05
1.0015	4.675E+08	1.922E-06	1.056E+02	2.030E-04
1.2559	3.617E+09	1.840E-06	1.086E+03	1.997E-03
1.5697	5.926E+07	1.747E-06	2.350E+01	4.105E-05
1.7427	3.315E+06	1.700E-06	1.494E+00	2.541E-06
1.8696	1.801E+05	1.667E-06	8.845E-02	1.475E-07
2.1688	1.202E+05	1.606E-06	7.050E-02	1.132E-07
2.2000	2.166E+02	1.602E-06	1.292E-04	2.071E-10
Totals:	9.528E+10 photons/sec		7.914E+03	1.580E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	3.710E-35	2.089E-35	1.088E-35	1.943E-35	1.582E-35	1.479E-34
0.044	1.518E-17	9.652E-18	5.486E-18	8.559E-18	6.921E-18	3.671E-17
0.059	7.861E-09	5.433E-09	3.321E-09	4.726E-09	3.833E-09	1.422E-08
0.065	2.086E-09	1.474E-09	9.106E-10	1.275E-09	1.037E-09	3.573E-09
0.075	4.138E-08	3.033E-08	1.886E-08	2.596E-08	2.121E-08	6.617E-08
0.086	4.730E-07	3.586E-07	2.217E-07	3.036E-07	2.489E-07	7.243E-07
0.095	4.821E-07	3.746E-07	2.297E-07	3.147E-07	2.584E-07	7.213E-07
0.129	1.176E-05	9.729E-06	5.911E-06	8.120E-06	6.729E-06	1.684E-05
0.245	2.099E-05	1.735E-05	1.164E-05	1.510E-05	1.246E-05	2.833E-05
0.345	1.418E-05	1.191E-05	8.285E-06	1.047E-05	8.734E-06	1.904E-05
0.463	1.875E-05	1.608E-05	1.153E-05	1.425E-05	1.201E-05	2.414E-05
0.662	1.171E-02	1.033E-02	7.679E-03	9.233E-03	7.886E-03	1.461E-02
0.867	7.921E-05	7.138E-05	5.451E-05	6.412E-05	5.540E-05	9.624E-05
1.001	1.739E-04	1.583E-04	1.227E-04	1.426E-04	1.240E-04	2.089E-04
1.256	1.700E-03	1.570E-03	1.245E-03	1.419E-03	1.247E-03	2.012E-03
1.570	3.479E-05	3.251E-05	2.638E-05	2.946E-05	2.619E-05	4.070E-05
1.743	2.151E-06	2.020E-06	1.656E-06	1.832E-06	1.638E-06	2.505E-06
1.870	1.249E-07	1.176E-07	9.706E-08	1.067E-07	9.575E-08	1.450E-07
2.169	9.540E-08	9.029E-08	7.561E-08	8.210E-08	7.420E-08	1.101E-07
2.200	1.742E-10	1.649E-10	1.383E-10	1.500E-10	1.356E-10	2.009E-10
Totals	1.377E-02	1.223E-02	9.168E-03	1.094E-02	9.381E-03	1.706E-02

1/2' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.151E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.524E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.112E+02 cm (2) Next Layer: 1.107E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	3.257E-15	1.089E-20
0.0594	1.251E+10	2.028E-06	5.258E-05	1.066E-10
0.0647	2.608E+08	1.835E-06	3.410E-05	6.258E-11
0.0749	2.224E+08	1.665E-06	1.303E-03	2.170E-09
0.0858	4.793E+08	1.602E-06	3.349E-02	5.365E-08
0.0951	1.884E+08	1.592E-06	4.423E-02	7.042E-08
0.1289	1.746E+09	1.682E-06	1.020E+00	1.715E-06
0.2445	3.863E+08	1.926E-06	2.676E+00	5.152E-06
0.3451	1.385E+08	2.015E-06	2.110E+00	4.252E-06
0.4634	1.214E+08	2.041E-06	3.196E+00	6.524E-06
0.6620	4.958E+10	2.025E-06	2.394E+03	4.849E-03
0.8669	2.476E+08	1.967E-06	1.874E+01	3.688E-05
1.0015	4.675E+08	1.922E-06	4.457E+01	8.568E-05
1.2559	3.617E+09	1.840E-06	4.946E+02	9.100E-04
1.5697	5.926E+07	1.747E-06	1.146E+01	2.003E-05
1.7427	3.315E+06	1.700E-06	7.506E-01	1.276E-06
1.8696	1.801E+05	1.667E-06	4.528E-02	7.550E-08
2.1688	1.202E+05	1.606E-06	3.746E-02	6.014E-08
2.2000	2.166E+02	1.602E-06	6.890E-05	1.104E-10
Totals:	9.528E+10 photons/sec		2.973E+03	5.920E-03 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	9.816E-21	6.240E-21	3.546E-21	5.533E-21	4.474E-21	2.373E-20
0.059	1.299E-10	8.980E-11	5.489E-11	7.812E-11	6.335E-11	2.350E-10
0.065	7.985E-11	5.641E-11	3.486E-11	4.881E-11	3.968E-11	1.368E-10
0.075	2.810E-09	2.059E-09	1.280E-09	1.763E-09	1.440E-09	4.493E-09
0.086	6.763E-08	5.127E-08	3.170E-08	4.341E-08	3.559E-08	1.036E-07
0.095	8.578E-08	6.665E-08	4.088E-08	5.600E-08	4.598E-08	1.283E-07
0.129	1.845E-06	1.527E-06	9.276E-07	1.274E-06	1.056E-06	2.642E-06
0.245	5.001E-06	4.134E-06	2.773E-06	3.597E-06	2.969E-06	6.748E-06
0.345	3.947E-06	3.315E-06	2.306E-06	2.913E-06	2.431E-06	5.299E-06
0.463	5.887E-06	5.049E-06	3.619E-06	4.473E-06	3.769E-06	7.578E-06
0.662	4.238E-03	3.740E-03	2.779E-03	3.341E-03	2.854E-03	5.287E-03
0.867	3.175E-05	2.861E-05	2.185E-05	2.570E-05	2.220E-05	3.858E-05
1.001	7.339E-05	6.682E-05	5.179E-05	6.017E-05	5.233E-05	8.816E-05
1.256	7.744E-04	7.154E-04	5.674E-04	6.463E-04	5.682E-04	9.167E-04
1.570	1.697E-05	1.586E-05	1.287E-05	1.437E-05	1.278E-05	1.986E-05
1.743	1.080E-06	1.015E-06	8.316E-07	9.203E-07	8.226E-07	1.258E-06
1.870	6.392E-08	6.019E-08	4.968E-08	5.464E-08	4.901E-08	7.422E-08
2.169	5.069E-08	4.797E-08	4.017E-08	4.362E-08	3.942E-08	5.849E-08
2.200	9.285E-11	8.792E-11	7.372E-11	7.995E-11	7.231E-11	1.071E-10
Totals	5.153E-03	4.582E-03	3.444E-03	4.101E-03	3.521E-03	6.374E-03

3/4' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.227E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 2.286E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.188E+02 cm (2) Next Layer: 1.183E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	2.030E-18	6.787E-24
0.0594	1.251E+10	2.028E-06	7.039E-07	1.427E-12
0.0647	2.608E+08	1.835E-06	8.485E-07	1.557E-12
0.0749	2.224E+08	1.665E-06	9.000E-05	1.499E-10
0.0858	4.793E+08	1.602E-06	3.041E-03	4.872E-09
0.0951	1.884E+08	1.592E-06	5.760E-03	9.170E-09
0.1289	1.746E+09	1.682E-06	1.563E-01	2.629E-07
0.2445	3.863E+08	1.926E-06	6.142E-01	1.183E-06
0.3451	1.385E+08	2.015E-06	5.650E-01	1.139E-06
0.4634	1.214E+08	2.041E-06	9.675E-01	1.975E-06
0.6620	4.958E+10	2.025E-06	8.393E+02	1.700E-03
0.8669	2.476E+08	1.967E-06	7.312E+00	1.439E-05
1.0015	4.675E+08	1.922E-06	1.836E+01	3.530E-05
1.2559	3.617E+09	1.840E-06	2.210E+02	4.065E-04
1.5697	5.926E+07	1.747E-06	5.508E+00	9.623E-06
1.7427	3.315E+06	1.700E-06	3.722E-01	6.328E-07
1.8696	1.801E+05	1.667E-06	2.291E-02	3.820E-08
2.1688	1.202E+05	1.606E-06	1.974E-02	3.169E-08
2.2000	2.166E+02	1.602E-06	3.644E-05	5.839E-11
Totals:	9.528E+10 photons/sec		1.094E+03	2.171E-03 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	6.116E-24	3.888E-24	2.210E-24	3.448E-24	2.788E-24	1.479E-23
0.059	1.739E-12	1.202E-12	7.349E-13	1.046E-12	8.482E-13	3.146E-12
0.065	1.987E-12	1.404E-12	8.674E-13	1.215E-12	9.874E-13	3.403E-12
0.075	1.940E-10	1.422E-10	8.840E-11	1.217E-10	9.943E-11	3.103E-10
0.086	6.141E-09	4.655E-09	2.878E-09	3.942E-09	3.232E-09	9.403E-09
0.095	1.117E-08	8.680E-09	5.323E-09	7.293E-09	5.988E-09	1.671E-08
0.129	2.827E-07	2.340E-07	1.422E-07	1.953E-07	1.618E-07	4.049E-07
0.245	1.148E-06	9.489E-07	6.366E-07	8.257E-07	6.815E-07	1.549E-06
0.345	1.057E-06	8.878E-07	6.175E-07	7.802E-07	6.510E-07	1.419E-06
0.463	1.782E-06	1.528E-06	1.095E-06	1.354E-06	1.141E-06	2.294E-06
0.662	1.486E-03	1.311E-03	9.744E-04	1.172E-03	1.001E-03	1.853E-03
0.867	1.239E-05	1.116E-05	8.524E-06	1.003E-05	8.662E-06	1.505E-05
1.001	3.023E-05	2.753E-05	2.133E-05	2.479E-05	2.156E-05	3.632E-05
1.256	3.459E-04	3.196E-04	2.535E-04	2.887E-04	2.538E-04	4.095E-04
1.570	8.154E-06	7.622E-06	6.183E-06	6.906E-06	6.140E-06	9.542E-06
1.743	5.357E-07	5.031E-07	4.124E-07	4.563E-07	4.079E-07	6.239E-07
1.870	3.234E-08	3.045E-08	2.514E-08	2.765E-08	2.480E-08	3.755E-08
2.169	2.671E-08	2.528E-08	2.117E-08	2.298E-08	2.077E-08	3.082E-08
2.200	4.911E-11	4.650E-11	3.899E-11	4.228E-11	3.824E-11	5.663E-11
Totals	1.887E-03	1.681E-03	1.267E-03	1.506E-03	1.294E-03	2.330E-03

1' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.303E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 3.048E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.264E+02 cm (2) Next Layer: 1.259E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	1.237E-21	4.135E-27
0.0594	1.251E+10	2.028E-06	8.650E-09	1.754E-14
0.0647	2.608E+08	1.835E-06	1.825E-08	3.350E-14
0.0749	2.224E+08	1.665E-06	4.191E-06	6.979E-12
0.0858	4.793E+08	1.602E-06	2.900E-04	4.646E-10
0.0951	1.884E+08	1.592E-06	6.859E-04	1.092E-09
0.1289	1.746E+09	1.682E-06	2.370E-02	3.985E-08
0.2445	3.863E+08	1.926E-06	1.384E-01	2.664E-07
0.3451	1.385E+08	2.015E-06	1.484E-01	2.990E-07
0.4634	1.214E+08	2.041E-06	2.873E-01	5.863E-07
0.6620	4.958E+10	2.025E-06	2.893E+02	5.859E-04
0.8669	2.476E+08	1.967E-06	2.810E+00	5.528E-06
1.0015	4.675E+08	1.922E-06	7.461E+00	1.434E-05
1.2559	3.617E+09	1.840E-06	9.759E+01	1.795E-04
1.5697	5.926E+07	1.747E-06	2.623E+00	4.582E-06
1.7427	3.315E+06	1.700E-06	1.831E-01	3.113E-07
1.8696	1.801E+05	1.667E-06	1.151E-02	1.919E-08
2.1688	1.202E+05	1.606E-06	1.034E-02	1.660E-08
2.2000	2.166E+02	1.602E-06	1.917E-05	3.072E-11
Totals:	9.528E+10 photons/sec		4.006E+02	7.914E-04 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	3.726E-27	2.369E-27	1.346E-27	2.101E-27	1.699E-27	9.010E-27
0.059	2.137E-14	1.477E-14	9.030E-15	1.285E-14	1.042E-14	3.866E-14
0.065	4.274E-14	3.020E-14	1.866E-14	2.613E-14	2.124E-14	7.320E-14
0.075	9.035E-12	6.622E-12	4.117E-12	5.669E-12	4.630E-12	1.445E-11
0.086	5.857E-10	4.440E-10	2.745E-10	3.760E-10	3.082E-10	8.968E-10
0.095	1.330E-09	1.034E-09	6.339E-10	8.685E-10	7.131E-10	1.990E-09
0.129	4.287E-08	3.547E-08	2.155E-08	2.960E-08	2.453E-08	6.138E-08
0.245	2.586E-07	2.138E-07	1.434E-07	1.860E-07	1.535E-07	3.490E-07
0.345	2.776E-07	2.331E-07	1.621E-07	2.049E-07	1.709E-07	3.727E-07
0.463	5.290E-07	4.537E-07	3.252E-07	4.019E-07	3.387E-07	6.810E-07
0.662	5.121E-04	4.520E-04	3.358E-04	4.038E-04	3.449E-04	6.388E-04
0.867	4.760E-06	4.289E-06	3.276E-06	3.853E-06	3.329E-06	5.783E-06
1.001	1.229E-05	1.119E-05	8.670E-06	1.007E-05	8.760E-06	1.476E-05
1.256	1.528E-04	1.411E-04	1.119E-04	1.275E-04	1.121E-04	1.809E-04
1.570	3.883E-06	3.629E-06	2.944E-06	3.288E-06	2.923E-06	4.544E-06
1.743	2.635E-07	2.475E-07	2.029E-07	2.245E-07	2.006E-07	3.069E-07
1.870	1.625E-08	1.530E-08	1.263E-08	1.389E-08	1.246E-08	1.887E-08
2.169	1.399E-08	1.324E-08	1.109E-08	1.204E-08	1.088E-08	1.615E-08
2.200	2.583E-11	2.446E-11	2.051E-11	2.224E-11	2.012E-11	2.979E-11
Totals	6.873E-04	6.134E-04	4.635E-04	5.496E-04	4.729E-04	8.466E-04

1 1/2' Earth Shield

Source Cylindrical | Shields Cylindrical | Distance to Detector, X = 1.456E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm | Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 4.572E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.417E+02 cm (2) Next Layer: 1.411E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	4.415E-28	1.476E-33
0.0594	1.251E+10	2.028E-06	1.162E-12	2.357E-18
0.0647	2.608E+08	1.835E-06	7.107E-12	1.304E-17
0.0749	2.224E+08	1.665E-06	6.298E-09	1.049E-14
0.0858	4.793E+08	1.602E-06	1.154E-06	1.849E-12
0.0951	1.884E+08	1.592E-06	5.308E-06	8.452E-12
0.1289	1.746E+09	1.682E-06	5.393E-04	9.070E-10
0.2445	3.863E+08	1.926E-06	6.844E-03	1.318E-08
0.3451	1.385E+08	2.015E-06	9.935E-03	2.002E-08
0.4634	1.214E+08	2.041E-06	2.460E-02	5.022E-08
0.6620	4.958E+10	2.025E-06	3.348E+01	6.781E-05
0.8669	2.476E+08	1.967E-06	4.054E-01	7.976E-07
1.0015	4.675E+08	1.922E-06	1.206E+00	2.318E-06
1.2559	3.617E+09	1.840E-06	1.869E+01	3.439E-05
1.5697	5.926E+07	1.747E-06	5.860E-01	1.024E-06
1.7427	3.315E+06	1.700E-06	4.373E-02	7.435E-08
1.8696	1.801E+05	1.667E-06	2.871E-03	4.787E-09
2.1688	1.202E+05	1.606E-06	2.814E-03	4.518E-09
2.2000	2.166E+02	1.602E-06	5.259E-06	8.426E-12
Totals:	9.528E+10 photons/sec		5.446E+01	1.065E-04 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	1.330E-33	8.458E-34	4.807E-34	7.500E-34	6.065E-34	3.217E-33
0.059	2.872E-18	1.985E-18	1.213E-18	1.727E-18	1.400E-18	5.194E-18
0.065	1.664E-17	1.176E-17	7.265E-18	1.017E-17	8.270E-18	2.850E-17
0.075	1.358E-14	9.951E-15	6.187E-15	8.519E-15	6.958E-15	2.171E-14
0.086	2.331E-12	1.767E-12	1.092E-12	1.496E-12	1.227E-12	3.568E-12
0.095	1.030E-11	8.000E-12	4.906E-12	6.722E-12	5.519E-12	1.540E-11
0.129	9.756E-10	8.072E-10	4.905E-10	6.737E-10	5.583E-10	1.397E-09
0.245	1.279E-08	1.057E-08	7.094E-09	9.200E-09	7.594E-09	1.726E-08
0.345	1.859E-08	1.561E-08	1.086E-08	1.372E-08	1.145E-08	2.496E-08
0.463	4.531E-08	3.886E-08	2.785E-08	3.443E-08	2.901E-08	5.833E-08
0.662	5.927E-05	5.230E-05	3.886E-05	4.673E-05	3.991E-05	7.393E-05
0.867	6.867E-07	6.188E-07	4.726E-07	5.559E-07	4.803E-07	8.344E-07
1.001	1.986E-06	1.808E-06	1.401E-06	1.628E-06	1.416E-06	2.385E-06
1.256	2.926E-05	2.703E-05	2.144E-05	2.442E-05	2.147E-05	3.464E-05
1.570	8.675E-07	8.108E-07	6.577E-07	7.346E-07	6.531E-07	1.015E-06
1.743	6.295E-08	5.911E-08	4.845E-08	5.362E-08	4.792E-08	7.331E-08
1.870	4.053E-09	3.816E-09	3.150E-09	3.465E-09	3.108E-09	4.706E-09
2.169	3.807E-09	3.603E-09	3.018E-09	3.277E-09	2.961E-09	4.394E-09
2.200	7.086E-12	6.710E-12	5.626E-12	6.102E-12	5.519E-12	8.173E-12
Totals	9.222E-05	8.271E-05	6.294E-05	7.419E-05	6.404E-05	1.130E-04

2' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.608E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 6.096E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.569E+02 cm (2) Next Layer: 1.564E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	1.450E-16	2.940E-22
0.0647	2.608E+08	1.835E-06	2.503E-15	4.593E-21
0.0749	2.224E+08	1.665E-06	7.966E-12	1.326E-17
0.0858	4.793E+08	1.602E-06	3.415E-09	5.471E-15
0.0951	1.884E+08	1.592E-06	2.588E-08	4.120E-14
0.1289	1.746E+09	1.682E-06	1.231E-05	2.071E-11
0.2445	3.863E+08	1.926E-06	3.344E-04	6.438E-10
0.3451	1.385E+08	2.015E-06	6.544E-04	1.319E-09
0.4634	1.214E+08	2.041E-06	2.071E-03	4.227E-09
0.6620	4.958E+10	2.025E-06	3.813E+00	7.723E-06
0.8669	2.476E+08	1.967E-06	5.766E-02	1.134E-07
1.0015	4.675E+08	1.922E-06	1.924E-01	3.698E-07
1.2559	3.617E+09	1.840E-06	3.540E+00	6.512E-06
1.5697	5.926E+07	1.747E-06	1.297E-01	2.266E-07
1.7427	3.315E+06	1.700E-06	1.036E-02	1.762E-08
1.8696	1.801E+05	1.667E-06	7.109E-04	1.185E-09
2.1688	1.202E+05	1.606E-06	7.613E-04	1.222E-09
2.2000	2.166E+02	1.602E-06	1.435E-06	2.299E-12
Totals:	9.528E+10 photons/sec		7.747E+00	1.497E-05 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	3.583E-22	2.476E-22	1.514E-22	2.154E-22	1.747E-22	6.481E-22
0.065	5.861E-21	4.141E-21	2.559E-21	3.583E-21	2.913E-21	1.004E-20
0.075	1.717E-17	1.259E-17	7.825E-18	1.077E-17	8.800E-18	2.746E-17
0.086	6.896E-15	5.228E-15	3.232E-15	4.427E-15	3.629E-15	1.056E-14
0.095	5.019E-14	3.900E-14	2.392E-14	3.277E-14	2.691E-14	7.510E-14
0.129	2.228E-11	1.843E-11	1.120E-11	1.538E-11	1.275E-11	3.190E-11
0.245	6.250E-10	5.165E-10	3.466E-10	4.495E-10	3.710E-10	8.433E-10
0.345	1.224E-09	1.028E-09	7.152E-10	9.036E-10	7.540E-10	1.644E-09
0.463	3.815E-09	3.272E-09	2.345E-09	2.898E-09	2.442E-09	4.910E-09
0.662	6.750E-06	5.957E-06	4.426E-06	5.322E-06	4.546E-06	8.420E-06
0.867	9.767E-08	8.801E-08	6.722E-08	7.906E-08	6.830E-08	1.187E-07
1.001	3.168E-07	2.884E-07	2.235E-07	2.597E-07	2.259E-07	3.805E-07
1.256	5.542E-06	5.119E-06	4.060E-06	4.625E-06	4.067E-06	6.560E-06
1.570	1.920E-07	1.795E-07	1.456E-07	1.626E-07	1.446E-07	2.247E-07
1.743	1.491E-08	1.400E-08	1.148E-08	1.270E-08	1.135E-08	1.737E-08
1.870	1.004E-09	9.450E-10	7.800E-10	8.579E-10	7.695E-10	1.165E-09
2.169	1.030E-09	9.750E-10	8.165E-10	8.865E-10	8.012E-10	1.189E-09
2.200	1.933E-12	1.831E-12	1.535E-12	1.665E-12	1.506E-12	2.230E-12
Totals	1.292E-05	1.165E-05	8.940E-06	1.047E-05	9.068E-06	1.573E-05

2 1/2' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.761E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 7.620E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.722E+02 cm (2) Next Layer: 1.716E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	1.746E-20	3.540E-26
0.0647	2.608E+08	1.835E-06	8.419E-19	1.545E-24
0.0749	2.224E+08	1.665E-06	9.399E-15	1.565E-20
0.0858	4.793E+08	1.602E-06	9.135E-12	1.463E-17
0.0951	1.884E+08	1.592E-06	1.105E-10	1.760E-16
0.1289	1.746E+09	1.682E-06	2.843E-07	4.780E-13
0.2445	3.863E+08	1.926E-06	1.633E-05	3.145E-11
0.3451	1.385E+08	2.015E-06	4.291E-05	8.648E-11
0.4634	1.214E+08	2.041E-06	1.734E-04	3.538E-10
0.6620	4.958E+10	2.025E-06	4.319E-01	8.748E-07
0.8669	2.476E+08	1.967E-06	8.161E-03	1.606E-08
1.0015	4.675E+08	1.922E-06	3.055E-02	5.874E-08
1.2559	3.617E+09	1.840E-06	6.679E-01	1.229E-06
1.5697	5.926E+07	1.747E-06	2.863E-02	5.002E-08
1.7427	3.315E+06	1.700E-06	2.449E-03	4.164E-09
1.8696	1.801E+05	1.667E-06	1.757E-04	2.929E-10
2.1688	1.202E+05	1.606E-06	2.057E-04	3.303E-10
2.2000	2.166E+02	1.602E-06	3.910E-07	6.265E-13
Totals:	9.528E+10 photons/sec		1.170E+00	2.234E-06 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	4.314E-26	2.981E-26	1.823E-26	2.594E-26	2.103E-26	7.803E-26
0.065	1.972E-24	1.393E-24	8.607E-25	1.205E-24	9.798E-25	3.377E-24
0.075	2.026E-20	1.485E-20	9.232E-21	1.271E-20	1.038E-20	3.240E-20
0.086	1.845E-17	1.398E-17	8.647E-18	1.184E-17	9.709E-18	2.825E-17
0.095	2.144E-16	1.666E-16	1.022E-16	1.400E-16	1.149E-16	3.208E-16
0.129	5.142E-13	4.254E-13	2.585E-13	3.551E-13	2.942E-13	7.362E-13
0.245	3.053E-11	2.523E-11	1.693E-11	2.195E-11	1.812E-11	4.119E-11
0.345	8.028E-11	6.742E-11	4.690E-11	5.925E-11	4.944E-11	1.078E-10
0.463	3.193E-10	2.738E-10	1.963E-10	2.426E-10	2.044E-10	4.110E-10
0.662	7.647E-07	6.748E-07	5.014E-07	6.029E-07	5.149E-07	9.539E-07
0.867	1.382E-08	1.246E-08	9.515E-09	1.119E-08	9.668E-09	1.680E-08
1.001	5.031E-08	4.581E-08	3.550E-08	4.125E-08	3.587E-08	6.043E-08
1.256	1.046E-06	9.659E-07	7.661E-07	8.727E-07	7.673E-07	1.238E-06
1.570	4.239E-08	3.962E-08	3.214E-08	3.590E-08	3.191E-08	4.960E-08
1.743	3.525E-09	3.310E-09	2.713E-09	3.003E-09	2.684E-09	4.106E-09
1.870	2.480E-10	2.335E-10	1.928E-10	2.120E-10	1.902E-10	2.880E-10
2.169	2.784E-10	2.635E-10	2.206E-10	2.396E-10	2.165E-10	3.213E-10
2.200	5.269E-13	4.989E-13	4.183E-13	4.537E-13	4.103E-13	6.077E-13
Totals	1.921E-06	1.743E-06	1.348E-06	1.568E-06	1.363E-06	2.324E-06

3' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.913E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 9.144E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.874E+02 cm (2) Next Layer: 1.869E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	2.060E-24	4.178E-30
0.0647	2.608E+08	1.835E-06	2.763E-22	5.071E-28
0.0749	2.224E+08	1.665E-06	1.070E-17	1.783E-23
0.0858	4.793E+08	1.602E-06	2.329E-14	3.732E-20
0.0951	1.884E+08	1.592E-06	4.451E-13	7.086E-19
0.1289	1.746E+09	1.682E-06	6.646E-09	1.118E-14
0.2445	3.863E+08	1.926E-06	8.017E-07	1.544E-12
0.3451	1.385E+08	2.015E-06	2.816E-06	5.675E-12
0.4634	1.214E+08	2.041E-06	1.450E-05	2.960E-11
0.6620	4.958E+10	2.025E-06	4.890E-02	9.905E-08
0.8669	2.476E+08	1.967E-06	1.155E-03	2.272E-09
1.0015	4.675E+08	1.922E-06	4.852E-03	9.328E-09
1.2559	3.617E+09	1.840E-06	1.260E-01	2.318E-07
1.5697	5.926E+07	1.747E-06	6.322E-03	1.105E-08
1.7427	3.315E+06	1.700E-06	5.792E-04	9.848E-10
1.8696	1.801E+05	1.667E-06	4.344E-05	7.243E-11
2.1688	1.202E+05	1.606E-06	5.565E-05	8.935E-11
2.2000	2.166E+02	1.602E-06	1.067E-07	1.709E-13
Totals:	9.528E+10 photons/sec		1.879E-01	3.547E-07 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	5.092E-30	3.519E-30	2.151E-30	3.061E-30	2.483E-30	9.210E-30
0.065	6.470E-28	4.571E-28	2.824E-28	3.955E-28	3.215E-28	1.108E-27
0.075	2.308E-23	1.691E-23	1.051E-23	1.448E-23	1.183E-23	3.690E-23
0.086	4.704E-20	3.566E-20	2.205E-20	3.019E-20	2.476E-20	7.202E-20
0.095	8.632E-19	6.707E-19	4.113E-19	5.635E-19	4.627E-19	1.291E-18
0.129	1.202E-14	9.947E-15	6.044E-15	8.302E-15	6.879E-15	1.721E-14
0.245	1.498E-12	1.239E-12	8.310E-13	1.078E-12	8.896E-13	2.022E-12
0.345	5.268E-12	4.425E-12	3.078E-12	3.888E-12	3.244E-12	7.073E-12
0.463	2.671E-11	2.291E-11	1.642E-11	2.029E-11	1.710E-11	3.438E-11
0.662	8.658E-08	7.640E-08	5.677E-08	6.826E-08	5.830E-08	1.080E-07
0.867	1.956E-09	1.763E-09	1.346E-09	1.584E-09	1.368E-09	2.377E-09
1.001	7.989E-09	7.274E-09	5.638E-09	6.550E-09	5.697E-09	9.597E-09
1.256	1.973E-07	1.823E-07	1.446E-07	1.647E-07	1.448E-07	2.336E-07
1.570	9.359E-09	8.748E-09	7.096E-09	7.926E-09	7.047E-09	1.095E-08
1.743	8.337E-10	7.829E-10	6.417E-10	7.102E-10	6.347E-10	9.710E-10
1.870	6.133E-11	5.775E-11	4.766E-11	5.242E-11	4.702E-11	7.121E-11
2.169	7.531E-11	7.127E-11	5.969E-11	6.481E-11	5.857E-11	8.690E-11
2.200	1.437E-13	1.361E-13	1.141E-13	1.238E-13	1.119E-13	1.658E-13
Totals	3.042E-07	2.774E-07	2.162E-07	2.498E-07	2.180E-07	3.656E-07

3 1/2' Earth Shield

Source Cylindrical | Shields Cylindrical | Distance to Detector, X = 2.065E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm | Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.067E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.026E+02 cm (2) Next Layer: 2.021E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	2.369E-28	4.803E-34
0.0647	2.608E+08	1.835E-06	8.934E-26	1.640E-31
0.0749	2.224E+08	1.665E-06	1.195E-20	1.989E-26
0.0858	4.793E+08	1.602E-06	5.783E-17	9.264E-23
0.0951	1.884E+08	1.592E-06	1.735E-15	2.763E-21
0.1289	1.746E+09	1.682E-06	1.573E-10	2.646E-16
0.2445	3.863E+08	1.926E-06	3.964E-08	7.634E-14
0.3451	1.385E+08	2.015E-06	1.855E-07	3.738E-13
0.4634	1.214E+08	2.041E-06	1.216E-06	2.482E-12
0.6620	4.958E+10	2.025E-06	5.548E-03	1.124E-08
0.8669	2.476E+08	1.967E-06	1.637E-04	3.222E-10
1.0015	4.675E+08	1.922E-06	7.720E-04	1.484E-09
1.2559	3.617E+09	1.840E-06	2.382E-02	4.383E-08
1.5697	5.926E+07	1.747E-06	1.399E-03	2.444E-09
1.7427	3.315E+06	1.700E-06	1.373E-04	2.334E-10
1.8696	1.801E+05	1.667E-06	1.076E-05	1.795E-11
2.1688	1.202E+05	1.606E-06	1.509E-05	2.422E-11
2.2000	2.166E+02	1.602E-06	2.916E-08	4.673E-14
Totals:	9.528E+10 photons/sec		3.187E-02	5.960E-08 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	5.853E-34	4.045E-34	2.473E-34	3.519E-34	2.854E-34	1.059E-33
0.065	2.092E-31	1.478E-31	9.133E-32	1.279E-31	1.040E-31	3.583E-31
0.075	2.575E-26	1.887E-26	1.173E-26	1.616E-26	1.320E-26	4.118E-26
0.086	1.168E-22	8.853E-23	5.474E-23	7.496E-23	6.146E-23	1.788E-22
0.095	3.366E-21	2.615E-21	1.604E-21	2.197E-21	1.804E-21	5.036E-21
0.129	2.846E-16	2.355E-16	1.431E-16	1.966E-16	1.629E-16	4.075E-16
0.245	7.410E-14	6.125E-14	4.109E-14	5.329E-14	4.399E-14	9.998E-14
0.345	3.470E-13	2.914E-13	2.027E-13	2.561E-13	2.137E-13	4.658E-13
0.463	2.239E-12	1.921E-12	1.377E-12	1.701E-12	1.434E-12	2.883E-12
0.662	9.822E-09	8.667E-09	6.440E-09	7.744E-09	6.614E-09	1.225E-08
0.867	2.774E-10	2.500E-10	1.909E-10	2.245E-10	1.940E-10	3.370E-10
1.001	1.271E-09	1.158E-09	8.971E-10	1.042E-09	9.065E-10	1.527E-09
1.256	3.730E-08	3.446E-08	2.733E-08	3.113E-08	2.737E-08	4.415E-08
1.570	2.071E-09	1.935E-09	1.570E-09	1.754E-09	1.559E-09	2.423E-09
1.743	1.976E-10	1.855E-10	1.521E-10	1.683E-10	1.504E-10	2.301E-10
1.870	1.520E-11	1.431E-11	1.181E-11	1.299E-11	1.165E-11	1.764E-11
2.169	2.042E-11	1.932E-11	1.618E-11	1.757E-11	1.588E-11	2.356E-11
2.200	3.930E-14	3.721E-14	3.120E-14	3.384E-14	3.061E-14	4.532E-14
Totals	5.098E-08	4.669E-08	3.661E-08	4.210E-08	3.682E-08	6.097E-08

4' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 2.218E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.219E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.179E+02 cm (2) Next Layer: 2.173E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	2.853E-29	5.237E-35
0.0749	2.224E+08	1.665E-06	1.316E-23	2.192E-29
0.0858	4.793E+08	1.602E-06	1.412E-19	2.263E-25
0.0951	1.884E+08	1.592E-06	6.639E-18	1.057E-23
0.1289	1.746E+09	1.682E-06	3.768E-12	6.337E-18
0.2445	3.863E+08	1.926E-06	1.977E-09	3.807E-15
0.3451	1.385E+08	2.015E-06	1.227E-08	2.474E-14
0.4634	1.214E+08	2.041E-06	1.023E-07	2.088E-13
0.6620	4.958E+10	2.025E-06	6.313E-04	1.279E-09
0.8669	2.476E+08	1.967E-06	2.329E-05	4.582E-11
1.0015	4.675E+08	1.922E-06	1.232E-04	2.369E-10
1.2559	3.617E+09	1.840E-06	4.517E-03	8.311E-09
1.5697	5.926E+07	1.747E-06	3.104E-04	5.422E-10
1.7427	3.315E+06	1.700E-06	3.262E-05	5.546E-11
1.8696	1.801E+05	1.667E-06	2.675E-06	4.460E-12
2.1688	1.202E+05	1.606E-06	4.102E-06	6.586E-12
2.2000	2.166E+02	1.602E-06	7.996E-09	1.281E-14
Totals:	9.528E+10 photons/sec		5.645E-03	1.048E-08 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.065	6.682E-35	4.721E-35	2.917E-35	4.085E-35	3.321E-35	1.144E-34
0.075	2.838E-29	2.080E-29	1.293E-29	1.780E-29	1.454E-29	4.538E-29
0.086	2.852E-25	2.162E-25	1.337E-25	1.831E-25	1.501E-25	4.367E-25
0.095	1.288E-23	1.000E-23	6.136E-24	8.406E-24	6.902E-24	1.926E-23
0.129	6.816E-18	5.640E-18	3.427E-18	4.707E-18	3.901E-18	9.760E-18
0.245	3.695E-15	3.054E-15	2.049E-15	2.658E-15	2.194E-15	4.986E-15
0.345	2.296E-14	1.929E-14	1.341E-14	1.695E-14	1.414E-14	3.083E-14
0.463	1.884E-13	1.616E-13	1.158E-13	1.431E-13	1.206E-13	2.425E-13
0.662	1.118E-09	9.863E-10	7.329E-10	8.812E-10	7.527E-10	1.394E-09
0.867	3.945E-11	3.555E-11	2.715E-11	3.193E-11	2.759E-11	4.794E-11
1.001	2.029E-10	1.848E-10	1.432E-10	1.664E-10	1.447E-10	2.437E-10
1.256	7.073E-09	6.534E-09	5.182E-09	5.903E-09	5.190E-09	8.372E-09
1.570	4.595E-10	4.294E-10	3.484E-10	3.891E-10	3.459E-10	5.376E-10
1.743	4.696E-11	4.409E-11	3.614E-11	4.000E-11	3.575E-11	5.469E-11
1.870	3.776E-12	3.556E-12	2.935E-12	3.228E-12	2.896E-12	4.385E-12
2.169	5.551E-12	5.253E-12	4.399E-12	4.777E-12	4.317E-12	6.405E-12
2.200	1.078E-14	1.020E-14	8.555E-15	9.278E-15	8.391E-15	1.243E-14
Totals	8.949E-09	8.223E-09	6.477E-09	7.420E-09	6.504E-09	1.066E-08

4 1/2' Earth Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 2.370E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.372E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.331E+02 cm (2) Next Layer: 2.326E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	0.000E+00	0.000E+00
0.0749	2.224E+08	1.665E-06	1.438E-26	2.395E-32
0.0858	4.793E+08	1.602E-06	3.414E-22	5.469E-28
0.0951	1.884E+08	1.592E-06	2.508E-20	3.994E-26
0.1289	1.746E+09	1.682E-06	9.118E-14	1.533E-19
0.2445	3.863E+08	1.926E-06	9.943E-11	1.915E-16
0.3451	1.385E+08	2.015E-06	8.167E-10	1.646E-15
0.4634	1.214E+08	2.041E-06	8.640E-09	1.763E-14
0.6620	4.958E+10	2.025E-06	7.211E-05	1.461E-10
0.8669	2.476E+08	1.967E-06	3.325E-06	6.542E-12
1.0015	4.675E+08	1.922E-06	1.974E-05	3.795E-11
1.2559	3.617E+09	1.840E-06	8.596E-04	1.581E-09
1.5697	5.926E+07	1.747E-06	6.909E-05	1.207E-10
1.7427	3.315E+06	1.700E-06	7.778E-06	1.322E-11
1.8696	1.801E+05	1.667E-06	6.669E-07	1.112E-12
2.1688	1.202E+05	1.606E-06	1.119E-06	1.796E-12
2.2000	2.166E+02	1.602E-06	2.199E-09	3.524E-15
Totals:	9.528E+10 photons/sec		1.033E-03	1.909E-09 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.075	3.100E-32	2.272E-32	1.413E-32	1.945E-32	1.589E-32	4.958E-32
0.086	6.893E-28	5.226E-28	3.231E-28	4.425E-28	3.628E-28	1.055E-27
0.095	4.865E-26	3.780E-26	2.318E-26	3.176E-26	2.608E-26	7.279E-26
0.129	1.649E-19	1.365E-19	8.292E-20	1.139E-19	9.438E-20	2.362E-19
0.245	1.858E-16	1.536E-16	1.031E-16	1.337E-16	1.103E-16	2.508E-16
0.345	1.528E-15	1.283E-15	8.926E-16	1.128E-15	9.409E-16	2.051E-15
0.463	1.591E-14	1.365E-14	9.781E-15	1.209E-14	1.019E-14	2.048E-14
0.662	1.277E-10	1.127E-10	8.372E-11	1.007E-10	8.598E-11	1.593E-10
0.867	5.632E-12	5.076E-12	3.876E-12	4.559E-12	3.939E-12	6.843E-12
1.001	3.251E-11	2.960E-11	2.294E-11	2.665E-11	2.318E-11	3.905E-11
1.256	1.346E-09	1.243E-09	9.860E-10	1.123E-09	9.875E-10	1.593E-09
1.570	1.023E-10	9.560E-11	7.755E-11	8.662E-11	7.701E-11	1.197E-10
1.743	1.120E-11	1.051E-11	8.618E-12	9.537E-12	8.524E-12	1.304E-11
1.870	9.415E-13	8.865E-13	7.317E-13	8.048E-13	7.219E-13	1.093E-12
2.169	1.514E-12	1.433E-12	1.200E-12	1.303E-12	1.177E-12	1.747E-12
2.200	2.964E-15	2.806E-15	2.353E-15	2.552E-15	2.308E-15	3.418E-15
Totals	1.628E-09	1.499E-09	1.185E-09	1.353E-09	1.188E-09	1.934E-09

5' Earth Shield

Source Shields Distance to Detector, X = 2.523E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.524E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.484E+02 cm (2) Next Layer: 2.478E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	0.000E+00	0.000E+00
0.0749	2.224E+08	1.665E-06	1.553E-29	2.586E-35
0.0858	4.793E+08	1.602E-06	8.191E-25	1.312E-30
0.0951	1.884E+08	1.592E-06	9.398E-23	1.496E-28
0.1289	1.746E+09	1.682E-06	2.226E-15	3.743E-21
0.2445	3.863E+08	1.926E-06	5.043E-12	9.710E-18
0.3451	1.385E+08	2.015E-06	5.465E-11	1.101E-16
0.4634	1.214E+08	2.041E-06	7.329E-10	1.496E-15
0.6620	4.958E+10	2.025E-06	8.271E-06	1.675E-11
0.8669	2.476E+08	1.967E-06	4.766E-07	9.376E-13
1.0015	4.675E+08	1.922E-06	3.175E-06	6.104E-12
1.2559	3.617E+09	1.840E-06	1.642E-04	3.020E-10
1.5697	5.926E+07	1.747E-06	1.543E-05	2.697E-11
1.7427	3.315E+06	1.700E-06	1.861E-06	3.164E-12
1.8696	1.801E+05	1.667E-06	1.668E-07	2.782E-13
2.1688	1.202E+05	1.606E-06	3.061E-07	4.915E-13
2.2000	2.166E+02	1.602E-06	6.069E-10	9.723E-16
Totals:	9.528E+10 photons/sec		1.939E-04	3.567E-10 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.075	3.347E-35	2.453E-35	1.525E-35	2.100E-35	1.715E-35	5.353E-35
0.086	1.654E-30	1.254E-30	7.753E-31	1.062E-30	8.705E-31	2.533E-30
0.095	1.823E-28	1.416E-28	8.686E-29	1.190E-28	9.771E-29	2.727E-28
0.129	4.026E-21	3.331E-21	2.024E-21	2.780E-21	2.304E-21	5.765E-21
0.245	9.426E-18	7.791E-18	5.227E-18	6.779E-18	5.596E-18	1.272E-17
0.345	1.022E-16	8.588E-17	5.973E-17	7.547E-17	6.297E-17	1.373E-16
0.463	1.350E-15	1.158E-15	8.297E-16	1.026E-15	8.642E-16	1.738E-15
0.662	1.464E-11	1.292E-11	9.602E-12	1.154E-11	9.860E-12	1.826E-11
0.867	8.073E-13	7.275E-13	5.556E-13	6.535E-13	5.646E-13	9.809E-13
1.001	5.228E-12	4.760E-12	3.689E-12	4.286E-12	3.728E-12	6.280E-12
1.256	2.570E-10	2.374E-10	1.883E-10	2.145E-10	1.886E-10	3.042E-10
1.570	2.285E-11	2.136E-11	1.733E-11	1.935E-11	1.720E-11	2.674E-11
1.743	2.679E-12	2.515E-12	2.062E-12	2.282E-12	2.039E-12	3.120E-12
1.870	2.355E-13	2.218E-13	1.830E-13	2.013E-13	1.806E-13	2.735E-13
2.169	4.142E-13	3.920E-13	3.283E-13	3.564E-13	3.222E-13	4.780E-13
2.200	8.178E-16	7.743E-16	6.493E-16	7.041E-16	6.369E-16	9.431E-16
Totals	3.039E-10	2.803E-10	2.221E-10	2.532E-10	2.225E-10	3.604E-10

Concrete Shield - no Shield

Photon Production Rate for Each Radionuclide:
Note: The nuclide tables below are for 1 m3 only.

>>> CO- 60 (Z = 27) Weight(472) = 2.800E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0144	0.01	0.02	0.000E+00	1.829E+07	1.829E+07
2	0.0241	0.02	0.03	0.000E+00	6.410E+06	6.410E+06
3	0.0345	0.03	0.04	0.000E+00	3.499E+06	3.499E+06
4	0.0447	0.04	0.05	0.000E+00	2.071E+06	2.071E+06
5	0.0546	0.05	0.06	0.000E+00	1.343E+06	1.343E+06
6	0.0647	0.06	0.07	0.000E+00	9.387E+05	9.387E+05
7	0.0747	0.07	0.08	0.000E+00	6.517E+05	6.517E+05
8	0.0847	0.08	0.09	0.000E+00	4.676E+05	4.676E+05
9	0.0947	0.09	0.10	0.000E+00	3.410E+05	3.410E+05
10	0.1244	0.10	0.20	0.000E+00	9.059E+05	9.059E+05
11	0.2150	0.20	0.30	0.000E+00	2.653E+04	2.653E+04
12	0.3000	0.30	0.40	0.000E+00	1.260E+01	1.260E+01
14	0.6938	0.55	0.75	1.658E+06	0.000E+00	1.658E+06
17	1.2530	1.10	1.35	2.072E+10	0.000E+00	2.072E+10
	Total Photons/sec:			2.072E+10	3.494E+07	2.076E+10

>>> SR- 90 (Z = 38) Weight(82) = 1.400E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0142	0.01	0.02	0.000E+00	1.510E+09	1.510E+09
2	0.0246	0.02	0.03	0.000E+00	9.393E+08	9.393E+08
3	0.0344	0.03	0.04	0.000E+00	5.316E+08	5.316E+08
4	0.0447	0.04	0.05	0.000E+00	2.694E+08	2.694E+08
5	0.0547	0.05	0.06	0.000E+00	2.021E+08	2.021E+08
6	0.0647	0.06	0.07	0.000E+00	1.414E+08	1.414E+08
7	0.0748	0.07	0.08	0.000E+00	1.056E+08	1.056E+08
8	0.0848	0.08	0.09	0.000E+00	8.412E+07	8.412E+07
9	0.0948	0.09	0.10	0.000E+00	6.347E+07	6.347E+07
10	0.1336	0.10	0.20	0.000E+00	2.464E+08	2.464E+08
11	0.2356	0.20	0.30	0.000E+00	4.104E+07	4.104E+07
12	0.3329	0.30	0.40	0.000E+00	6.428E+06	6.428E+06
13	0.4091	0.40	0.55	0.000E+00	7.146E+05	7.146E+05
	Total Photons/sec:			0.000E+00	4.142E+09	4.142E+09

>>> Y - 90 (Z = 39) Weight(84) = 1.400E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0143	0.01	0.02	3.937E+07	9.727E+09	9.766E+09
2	0.0246	0.02	0.03	0.000E+00	4.956E+09	4.956E+09
3	0.0347	0.03	0.04	0.000E+00	3.104E+09	3.104E+09
4	0.0447	0.04	0.05	0.000E+00	2.251E+09	2.251E+09
5	0.0548	0.05	0.06	0.000E+00	1.634E+09	1.634E+09
6	0.0649	0.06	0.07	0.000E+00	1.429E+09	1.429E+09
7	0.0749	0.07	0.08	0.000E+00	1.322E+09	1.322E+09
8	0.0849	0.08	0.09	0.000E+00	1.215E+09	1.215E+09
9	0.0949	0.09	0.10	0.000E+00	1.109E+09	1.109E+09
10	0.1383	0.10	0.20	0.000E+00	5.678E+09	5.678E+09
11	0.2436	0.20	0.30	0.000E+00	1.841E+09	1.841E+09
12	0.3452	0.30	0.40	0.000E+00	9.232E+08	9.232E+08
13	0.4666	0.40	0.55	0.000E+00	7.221E+08	7.221E+08
14	0.6360	0.55	0.75	0.000E+00	4.500E+08	4.500E+08
15	0.8181	0.75	0.90	0.000E+00	1.676E+08	1.676E+08
16	0.9874	0.90	1.10	0.000E+00	1.173E+08	1.173E+08
17	1.2044	1.10	1.35	0.000E+00	6.255E+07	6.255E+07
18	1.4506	1.35	1.60	0.000E+00	2.150E+07	2.150E+07
19	1.7428	1.60	1.80	1.761E+07	5.079E+06	2.269E+07
20	1.8699	1.80	2.00	0.000E+00	1.158E+06	1.158E+06
21	2.1689	2.00	2.20	7.252E+05	1.000E+05	8.252E+05
22	2.2000	2.20	2.40	0.000E+00	1.487E+03	1.487E+03
	Total Photons/sec:			5.771E+07	3.674E+10	3.679E+10

>>> CS-137 (Z = 55) Weight(335) = 1.070E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0143	0.01	0.02	0.000E+00	1.197E+09	1.197E+09
2	0.0246	0.02	0.03	0.000E+00	7.011E+08	7.011E+08
3	0.0344	0.03	0.04	0.000E+00	3.758E+08	3.758E+08
4	0.0448	0.04	0.05	0.000E+00	2.249E+08	2.249E+08
5	0.0547	0.05	0.06	0.000E+00	1.701E+08	1.701E+08
6	0.0647	0.06	0.07	0.000E+00	1.196E+08	1.196E+08
7	0.0748	0.07	0.08	0.000E+00	9.220E+07	9.220E+07
8	0.0847	0.08	0.09	0.000E+00	6.719E+07	6.719E+07
9	0.0949	0.09	0.10	0.000E+00	5.152E+07	5.152E+07
10	0.1344	0.10	0.20	0.000E+00	2.104E+08	2.104E+08
11	0.2383	0.20	0.30	0.000E+00	4.231E+07	4.231E+07
12	0.3402	0.30	0.40	0.000E+00	1.154E+07	1.154E+07
13	0.4585	0.40	0.55	0.000E+00	5.359E+06	5.359E+06
14	0.6234	0.55	0.75	0.000E+00	1.848E+06	1.848E+06
15	0.8056	0.75	0.90	0.000E+00	2.739E+05	2.739E+05
16	0.9471	0.90	1.10	0.000E+00	4.266E+04	4.266E+04
17	1.1000	1.10	1.35	0.000E+00	3.362E+02	3.362E+02
	Total Photons/sec:			0.000E+00	3.271E+09	3.271E+09

>>> BA-137M (Z = 56) Weight(336) = 1.010E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
3	0.0329	0.03	0.04	2.721E+10	0.000E+00	2.721E+10
14	0.6616	0.55	0.75	3.363E+11	0.000E+00	3.363E+11
	Total Photons/sec:			3.635E+11	0.000E+00	3.635E+11

>>> EU-154 (Z = 63) Weight(415) = 2.950E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0141	0.01	0.02	0.000E+00	4.537E+07	4.537E+07
2	0.0246	0.02	0.03	0.000E+00	2.318E+07	2.318E+07
3	0.0346	0.03	0.04	0.000E+00	1.522E+07	1.522E+07
4	0.0440	0.04	0.05	2.786E+09	9.652E+06	2.795E+09
5	0.0548	0.05	0.06	0.000E+00	7.283E+06	7.283E+06
6	0.0648	0.06	0.07	0.000E+00	5.576E+06	5.576E+06
7	0.0749	0.07	0.08	0.000E+00	4.609E+06	4.609E+06
8	0.0849	0.08	0.09	0.000E+00	3.927E+06	3.927E+06
9	0.0948	0.09	0.10	0.000E+00	3.278E+06	3.278E+06
10	0.1234	0.10	0.20	4.441E+09	1.326E+07	4.455E+09
11	0.2479	0.20	0.30	7.204E+08	3.915E+06	7.243E+08
12	0.3436	0.30	0.40	0.000E+00	1.668E+06	1.668E+06
13	0.4428	0.40	0.55	1.015E+08	1.109E+06	1.026E+08
14	0.7008	0.55	0.75	3.695E+09	5.748E+05	3.695E+09
15	0.8723	0.75	0.90	1.531E+09	1.795E+05	1.532E+09
16	1.0020	0.90	1.10	3.091E+09	1.039E+05	3.091E+09
17	1.2717	1.10	1.35	4.051E+09	3.905E+04	4.051E+09
18	1.5764	1.35	1.60	3.853E+08	6.481E+03	3.853E+08
19	1.6395	1.60	1.80	0.000E+00	2.825E+02	2.825E+02
20	1.8000	1.80	2.00	0.000E+00	2.792E-01	2.792E-01
	Total Photons/sec:			2.080E+10	1.390E+08	2.094E+10

>>> EU-155 (Z = 63) Weight(418) = 1.670E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0138	0.01	0.02	0.000E+00	3.562E+06	3.562E+06
2	0.0243	0.02	0.03	0.000E+00	1.133E+06	1.133E+06
3	0.0344	0.03	0.04	0.000E+00	5.279E+05	5.279E+05
4	0.0440	0.04	0.05	1.484E+09	2.776E+05	1.484E+09
5	0.0545	0.05	0.06	0.000E+00	1.528E+05	1.528E+05
6	0.0613	0.06	0.07	8.033E+07	8.801E+04	8.042E+07
7	0.0746	0.07	0.08	0.000E+00	5.154E+04	5.154E+04
8	0.0865	0.08	0.09	1.919E+09	3.035E+04	1.919E+09
9	0.0946	0.09	0.10	0.000E+00	1.809E+04	1.809E+04
10	0.1053	0.10	0.20	1.277E+09	3.428E+04	1.277E+09
11	0.2000	0.20	0.30	0.000E+00	1.368E+02	1.368E+02
	Total Photons/sec:			4.760E+09	5.875E+06	4.766E+09

>>> TH-231 (Z = 90) Weight(450) = 3.230E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0133	0.01	0.02	8.480E+06	1.726E+04	8.498E+06
2	0.0256	0.02	0.03	1.751E+06	5.741E+03	1.757E+06
3	0.0345	0.03	0.04	0.000E+00	2.943E+03	2.943E+03
4	0.0446	0.04	0.05	0.000E+00	1.748E+03	1.748E+03
5	0.0585	0.05	0.06	5.736E+04	1.094E+03	5.846E+04
6	0.0647	0.06	0.07	0.000E+00	7.250E+02	7.250E+02
7	0.0728	0.07	0.08	2.988E+04	4.982E+02	3.038E+04
8	0.0838	0.08	0.09	9.214E+05	3.431E+02	9.218E+05
9	0.0926	0.09	0.10	2.354E+05	2.410E+02	2.357E+05
10	0.1405	0.10	0.20	2.761E+05	5.784E+02	2.766E+05
11	0.2236	0.20	0.30	9.680E+04	1.179E+01	9.681E+04
12	0.3120	0.30	0.40	6.573E+03	2.035E-05	6.573E+03
	Total Photons/sec:			1.185E+07	3.119E+04	1.189E+07

>>> TH-234 (Z = 90) Weight(530) = 5.900E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0133	0.01	0.02	2.089E+07	1.132E+05	2.100E+07
2	0.0242	0.02	0.03	0.000E+00	3.799E+04	3.799E+04
3	0.0344	0.03	0.04	0.000E+00	1.771E+04	1.771E+04
4	0.0445	0.04	0.05	0.000E+00	9.259E+03	9.259E+03
5	0.0545	0.05	0.06	0.000E+00	5.139E+03	5.139E+03
6	0.0633	0.06	0.07	8.317E+06	2.948E+03	8.320E+06
7	0.0768	0.07	0.08	2.838E+05	1.711E+03	2.855E+05
8	0.0846	0.08	0.09	0.000E+00	9.932E+02	9.932E+02
9	0.0926	0.09	0.10	1.181E+07	5.713E+02	1.181E+07
10	0.1128	0.10	0.20	5.239E+05	1.094E+03	5.250E+05
	Total Photons/sec:			4.183E+07	1.906E+05	4.202E+07

>>> PA-233 (Z = 91) Weight(490) = 2.200E-05 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	3.982E+05	1.184E+03	3.994E+05
2	0.0244	0.02	0.03	0.000E+00	4.200E+02	4.200E+02
3	0.0345	0.03	0.04	0.000E+00	2.146E+02	2.146E+02
4	0.0446	0.04	0.05	0.000E+00	1.164E+02	1.164E+02
5	0.0546	0.05	0.06	0.000E+00	7.295E+01	7.295E+01
6	0.0646	0.06	0.07	0.000E+00	4.704E+01	4.704E+01
7	0.0753	0.07	0.08	1.026E+04	3.073E+01	1.029E+04
8	0.0866	0.08	0.09	1.538E+04	2.108E+01	1.541E+04
9	0.0970	0.09	0.10	2.313E+05	1.442E+01	2.313E+05
10	0.1106	0.10	0.20	7.432E+04	3.839E+01	7.436E+04
11	0.2714	0.20	0.30	2.442E+03	3.380E+00	2.445E+03
12	0.3159	0.30	0.40	4.204E+05	5.421E-01	4.204E+05
13	0.4158	0.40	0.55	1.319E+04	5.857E-02	1.319E+04
14	0.5500	0.55	0.75	0.000E+00	1.297E-05	1.297E-05
	Total Photons/sec:			1.165E+06	2.164E+03	1.168E+06

>>> PA-234M (Z = 91) Weight(533) = 5.900E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0141	0.01	0.02	1.091E+06	3.690E+06	4.781E+06
2	0.0246	0.02	0.03	0.000E+00	1.889E+06	1.889E+06
3	0.0347	0.03	0.04	0.000E+00	1.192E+06	1.192E+06
4	0.0447	0.04	0.05	0.000E+00	8.538E+05	8.538E+05
5	0.0548	0.05	0.06	0.000E+00	6.150E+05	6.150E+05
6	0.0649	0.06	0.07	0.000E+00	5.348E+05	5.348E+05
7	0.0749	0.07	0.08	2.183E+04	4.944E+05	5.163E+05
8	0.0849	0.08	0.09	0.000E+00	4.540E+05	4.540E+05
9	0.0962	0.09	0.10	6.549E+05	4.138E+05	1.069E+06
10	0.1360	0.10	0.20	1.965E+05	2.122E+06	2.318E+06
11	0.2435	0.20	0.30	0.000E+00	6.764E+05	6.764E+05
12	0.3451	0.30	0.40	0.000E+00	3.348E+05	3.348E+05
13	0.4665	0.40	0.55	0.000E+00	2.588E+05	2.588E+05
14	0.6357	0.55	0.75	0.000E+00	1.585E+05	1.585E+05
15	0.7722	0.75	0.90	4.584E+05	5.829E+04	5.167E+05
16	1.0015	0.90	1.10	1.288E+06	4.021E+04	1.328E+06
17	1.1927	1.10	1.35	4.148E+04	2.105E+04	6.253E+04
18	1.4992	1.35	1.60	7.204E+04	7.136E+03	7.917E+04
19	1.7408	1.60	1.80	5.501E+04	1.675E+03	5.669E+04
20	1.8632	1.80	2.00	7.531E+04	3.802E+02	7.569E+04
21	2.0522	2.00	2.20	0.000E+00	3.751E+01	3.751E+01
22	2.2000	2.20	2.40	0.000E+00	8.638E-01	8.638E-01
	Total Photons/sec:			3.955E+06	1.382E+07	1.777E+07

>>> PA-234 (Z = 91) Weight(441) = 7.670E-06 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	3.224E+05	1.410E+03	3.238E+05
2	0.0246	0.02	0.03	0.000E+00	7.289E+02	7.289E+02
3	0.0347	0.03	0.04	0.000E+00	4.955E+02	4.955E+02
4	0.0440	0.04	0.05	3.405E+02	3.343E+02	6.748E+02
5	0.0547	0.05	0.06	0.000E+00	2.186E+02	2.186E+02
6	0.0635	0.06	0.07	9.933E+03	1.688E+02	1.010E+04
7	0.0783	0.07	0.08	3.405E+02	1.297E+02	4.703E+02
8	0.0847	0.08	0.09	0.000E+00	9.221E+01	9.221E+01
9	0.0973	0.09	0.10	1.307E+05	7.088E+01	1.307E+05
10	0.1344	0.10	0.20	1.324E+05	3.148E+02	1.327E+05
11	0.2423	0.20	0.30	6.709E+04	8.350E+01	6.717E+04
12	0.3574	0.30	0.40	1.836E+04	2.802E+01	1.839E+04
13	0.4884	0.40	0.55	2.940E+04	1.311E+01	2.941E+04
14	0.6511	0.55	0.75	1.509E+05	3.986E+00	1.509E+05
15	0.8487	0.75	0.90	1.772E+05	5.929E-01	1.772E+05
16	0.9486	0.90	1.10	1.641E+05	1.068E-01	1.641E+05
17	1.2396	1.10	1.35	1.890E+04	2.703E-03	1.890E+04
18	1.4510	1.35	1.60	1.984E+04	0.000E+00	1.984E+04
19	1.6924	1.60	1.80	1.334E+04	0.000E+00	1.334E+04
20	1.9110	1.80	2.00	3.235E+03	0.000E+00	3.235E+03
	Total Photons/sec:			1.258E+06	4.093E+03	1.262E+06

>>> U -234 (Z = 92) Weight(520) = 7.920E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	3.077E+07	1.451E+03	3.077E+07
2	0.0231	0.02	0.03	0.000E+00	1.336E+02	1.336E+02
3	0.0334	0.03	0.04	0.000E+00	1.610E+01	1.610E+01
4	0.0439	0.04	0.05	0.000E+00	3.147E+00	3.147E+00
5	0.0532	0.05	0.06	3.487E+05	9.982E-01	3.487E+05
6	0.0639	0.06	0.07	0.000E+00	2.999E-01	2.999E-01
7	0.0736	0.07	0.08	0.000E+00	7.024E-02	7.024E-02
8	0.0831	0.08	0.09	0.000E+00	1.014E-02	1.014E-02
9	0.0917	0.09	0.10	0.000E+00	4.886E-04	4.886E-04
10	0.1210	0.10	0.20	1.172E+05	2.068E-08	1.172E+05
13	0.4900	0.40	0.55	1.172E+04	0.000E+00	1.172E+04
14	0.5800	0.55	0.75	3.516E+01	0.000E+00	3.516E+01
	Total Photons/sec:			3.125E+07	1.605E+03	3.125E+07

>>> U -235 (Z = 92) Weight(476) = 3.230E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	3.694E+06	3.698E+02	3.694E+06
2	0.0241	0.02	0.03	0.000E+00	9.376E+01	9.376E+01
3	0.0342	0.03	0.04	0.000E+00	3.461E+01	3.461E+01
4	0.0443	0.04	0.05	0.000E+00	1.501E+01	1.501E+01
5	0.0544	0.05	0.06	0.000E+00	7.239E+00	7.239E+00
6	0.0645	0.06	0.07	0.000E+00	3.706E+00	3.706E+00
7	0.0727	0.07	0.08	1.315E+04	1.960E+00	1.315E+04
8	0.0845	0.08	0.09	0.000E+00	1.035E+00	1.035E+00
9	0.0921	0.09	0.10	8.593E+05	5.416E-01	8.593E+05
10	0.1729	0.10	0.20	8.858E+06	9.627E-01	8.858E+06
11	0.2071	0.20	0.30	7.242E+05	0.000E+00	7.242E+05
12	0.3685	0.30	0.40	1.554E+04	0.000E+00	1.554E+04
13	0.4457	0.40	0.55	1.434E+03	0.000E+00	1.434E+03
14	0.7425	0.55	0.75	4.780E+01	0.000E+00	4.780E+01
15	0.7947	0.75	0.90	7.171E+01	0.000E+00	7.171E+01
	Total Photons/sec:			1.417E+07	5.286E+02	1.417E+07

>>> U -236 (Z = 92) Weight(398) = 1.170E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0128	0.01	0.02	0.000E+00	1.373E+02	1.373E+02
2	0.0230	0.02	0.03	0.000E+00	1.123E+01	1.123E+01
3	0.0335	0.03	0.04	0.000E+00	1.331E+00	1.331E+00
4	0.0440	0.04	0.05	0.000E+00	3.280E-01	3.280E-01
5	0.0539	0.05	0.06	0.000E+00	9.754E-02	9.754E-02
6	0.0682	0.06	0.07	4.762E+04	2.340E-02	4.762E+04
7	0.0732	0.07	0.08	0.000E+00	3.627E-03	3.627E-03
8	0.0818	0.08	0.09	0.000E+00	1.996E-04	1.996E-04
9	0.0900	0.09	0.10	0.000E+00	1.209E-07	1.209E-07
	Total Photons/sec:			4.762E+04	1.503E+02	4.777E+04

>>> U -238 (Z = 92) Weight(526) = 5.880E-03 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	1.921E+07	6.206E+02	1.921E+07
2	0.0230	0.02	0.03	0.000E+00	5.066E+01	5.066E+01
3	0.0335	0.03	0.04	0.000E+00	5.813E+00	5.813E+00
4	0.0440	0.04	0.05	0.000E+00	1.336E+00	1.336E+00
5	0.0538	0.05	0.06	0.000E+00	3.654E-01	3.654E-01
6	0.0664	0.06	0.07	2.176E+05	7.566E-02	2.176E+05
7	0.0729	0.07	0.08	0.000E+00	9.738E-03	9.738E-03
8	0.0808	0.08	0.09	0.000E+00	4.881E-04	4.881E-04
	Total Photons/sec:			1.943E+07	6.789E+02	1.943E+07

>>> PU-238 (Z = 94) Weight(492) = 8.350E-01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0154	0.01	0.02	3.012E+09	0.000E+00	3.012E+09
2	0.0203	0.02	0.03	3.553E+08	0.000E+00	3.553E+08
4	0.0435	0.04	0.05	1.205E+07	0.000E+00	1.205E+07
9	0.0999	0.09	0.10	2.224E+06	0.000E+00	2.224E+06
10	0.1527	0.10	0.20	3.089E+05	0.000E+00	3.089E+05
11	0.2055	0.20	0.30	1.359E+03	0.000E+00	1.359E+03
14	0.7406	0.55	0.75	2.564E+03	0.000E+00	2.564E+03
15	0.7786	0.75	0.90	1.328E+04	0.000E+00	1.328E+04
16	0.9807	0.90	1.10	8.960E+02	0.000E+00	8.960E+02
	Total Photons/sec:			3.382E+09	0.000E+00	3.382E+09

>>> PU-239 (Z = 94) Weight(493) = 3.280E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	5.340E+09	0.000E+00	5.340E+09
3	0.0332	0.03	0.04	2.427E+06	0.000E+00	2.427E+06
4	0.0460	0.04	0.05	6.918E+05	0.000E+00	6.918E+05
5	0.0538	0.05	0.06	3.519E+05	0.000E+00	3.519E+05
6	0.0683	0.06	0.07	4.005E+05	0.000E+00	4.005E+05
7	0.0780	0.07	0.08	3.762E+05	0.000E+00	3.762E+05
8	0.0896	0.08	0.09	1.578E+04	0.000E+00	1.578E+04
9	0.0984	0.09	0.10	3.277E+05	0.000E+00	3.277E+05
10	0.1318	0.10	0.20	9.102E+06	0.000E+00	9.102E+06
11	0.2328	0.20	0.30	6.189E+05	0.000E+00	6.189E+05
12	0.3645	0.30	0.40	4.369E+06	0.000E+00	4.369E+06
13	0.4185	0.40	0.55	2.063E+06	0.000E+00	2.063E+06
14	0.6526	0.55	0.75	7.767E+04	0.000E+00	7.767E+04
15	0.7702	0.75	0.90	1.820E+04	0.000E+00	1.820E+04
16	0.9854	0.90	1.10	2.549E+02	0.000E+00	2.549E+02
	Total Photons/sec:			5.361E+09	0.000E+00	5.361E+09

>>> PU-240 (Z = 94) Weight(494) = 1.800E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
4	0.0452	0.04	0.05	2.997E+07	0.000E+00	2.997E+07
10	0.1074	0.10	0.20	5.062E+06	0.000E+00	5.062E+06
14	0.6515	0.55	0.75	1.199E+04	0.000E+00	1.199E+04
	Total Photons/sec:			3.504E+07	0.000E+00	3.504E+07

>>> PU-241 (Z = 94) Weight(495) = 7.130E+01 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0108	0.01	0.02	0.000E+00	2.578E+06	2.578E+06
2	0.0200	0.02	0.03	0.000E+00	2.344E+01	2.344E+01
4	0.0443	0.04	0.05	1.477E+05	0.000E+00	1.477E+05
5	0.0563	0.05	0.06	9.761E+04	0.000E+00	9.761E+04
7	0.0764	0.07	0.08	7.123E+05	0.000E+00	7.123E+05
10	0.1134	0.10	0.20	3.166E+07	0.000E+00	3.166E+07
	Total Photons/sec:			3.261E+07	2.578E+06	3.519E+07

>>> PU-242 (Z = 94) Weight(497) = 5.500E-04 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0155	0.01	0.02	1.563E+06	0.000E+00	1.563E+06
2	0.0203	0.02	0.03	1.852E+05	0.000E+00	1.852E+05
4	0.0449	0.04	0.05	7.326E+03	0.000E+00	7.326E+03
10	0.1065	0.10	0.20	1.689E+03	0.000E+00	1.689E+03
	Total Photons/sec:			1.757E+06	0.000E+00	1.757E+06

>>> AM-241 (Z = 95) Weight(496) = 6.350E+00 Ci (1 m3)

Group No.	Photon Energy, MeV Mean	Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0139	0.01	0.02	1.010E+11	2.673E+06	1.010E+11
2	0.0263	0.02	0.03	5.639E+09	2.745E+05	5.639E+09
3	0.0332	0.03	0.04	2.584E+08	3.221E+04	2.585E+08
4	0.0430	0.04	0.05	2.115E+08	3.534E+03	2.115E+08
5	0.0595	0.05	0.06	8.388E+10	5.425E+02	8.388E+10
6	0.0699	0.06	0.07	4.699E+06	1.031E+02	4.699E+06
7	0.0732	0.07	0.08	0.000E+00	1.489E+01	1.489E+01
8	0.0822	0.08	0.09	0.000E+00	1.011E+00	1.011E+00
9	0.0989	0.09	0.10	4.934E+07	7.426E-03	4.934E+07
10	0.1087	0.10	0.20	6.579E+07	0.000E+00	6.579E+07
11	0.2132	0.20	0.30	2.021E+06	0.000E+00	2.021E+06
12	0.3441	0.30	0.40	3.054E+06	0.000E+00	3.054E+06
13	0.4348	0.40	0.55	1.833E+05	0.000E+00	1.833E+05
14	0.6758	0.55	0.75	1.621E+06	0.000E+00	1.621E+06
15	0.7684	0.75	0.90	5.169E+04	0.000E+00	5.169E+04
	Total Photons/sec:			1.911E+11	2.984E+06	1.911E+11

Concrete Shield - no Shield

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4	Shield 5	Shield 6
WATER	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AIR	0.000E+00	0.000E+00	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ORD CONC	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.350E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00	7.800E+00	0.000E+00	0.000E+00
Totals:	1.000E+00	7.800E+00	1.290E-03	7.800E+00	2.350E+00	1.290E-03
E, MeV	Linear Attenuation, per cm (last region is air)					
0.0140	1.941E+00	5.615E+02	2.424E-03	5.615E+02	2.445E+01	2.424E-03
0.0252	4.893E-01	1.060E+02	6.053E-04	1.060E+02	4.553E+00	6.053E-04
0.0331	3.282E-01	4.855E+01	3.983E-04	4.855E+01	2.235E+00	3.983E-04
0.0442	2.426E-01	2.119E+01	2.886E-04	2.119E+01	1.149E+00	2.886E-04
0.0594	2.053E-01	9.625E+00	2.408E-04	9.625E+00	6.993E-01	2.408E-04
0.0647	1.982E-01	7.733E+00	2.318E-04	7.733E+00	6.211E-01	2.318E-04
0.0749	1.873E-01	5.424E+00	2.185E-04	5.424E+00	5.266E-01	2.185E-04
0.0858	1.788E-01	3.981E+00	2.083E-04	3.981E+00	4.659E-01	2.083E-04
0.0951	1.733E-01	3.209E+00	2.019E-04	3.209E+00	4.318E-01	2.019E-04
0.1289	1.583E-01	1.956E+00	1.841E-04	1.956E+00	3.666E-01	1.841E-04
0.2445	1.279E-01	9.782E-01	1.488E-04	9.782E-01	2.761E-01	1.488E-04
0.3451	1.124E-01	7.928E-01	1.305E-04	7.928E-01	2.401E-01	1.305E-04
0.4634	9.979E-02	6.803E-01	1.157E-04	6.803E-01	2.126E-01	1.157E-04
0.6620	8.556E-02	5.717E-01	9.929E-05	5.717E-01	1.818E-01	9.929E-05
0.8669	7.560E-02	5.008E-01	8.773E-05	5.008E-01	1.605E-01	8.773E-05
1.0015	7.053E-02	4.661E-01	8.188E-05	4.661E-01	1.497E-01	8.188E-05
1.2559	6.305E-02	4.154E-01	7.303E-05	4.154E-01	1.336E-01	7.303E-05
1.5697	5.617E-02	3.716E-01	6.508E-05	3.716E-01	1.191E-01	6.508E-05
1.7427	5.311E-02	3.534E-01	6.167E-05	3.534E-01	1.128E-01	6.167E-05
1.8696	5.113E-02	3.419E-01	5.940E-05	3.419E-01	1.088E-01	5.940E-05
2.1688	4.723E-02	3.198E-01	5.455E-05	3.198E-01	1.009E-01	5.455E-05
2.2000	4.686E-02	3.178E-01	5.408E-05	3.178E-01	1.001E-01	5.408E-05

Concrete Shield - no Shield

Source Shields Distance to Detector, X = 9.986E+01 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 0.000E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 9.596E+01 cm (2) Next Layer: 9.541E+01 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	1.982E-23	1.418E-28
0.0442	1.061E+09	3.344E-06	7.307E-09	2.443E-14
0.0594	1.251E+10	2.028E-06	1.235E-01	2.505E-07
0.0647	2.608E+08	1.835E-06	2.091E-02	3.838E-08
0.0749	2.224E+08	1.665E-06	1.735E-01	2.890E-07
0.0858	4.793E+08	1.602E-06	1.570E+00	2.516E-06
0.0951	1.884E+08	1.592E-06	1.548E+00	2.465E-06
0.1289	1.746E+09	1.682E-06	3.927E+01	6.604E-05
0.2445	3.863E+08	1.926E-06	4.309E+01	8.297E-05
0.3451	1.385E+08	2.015E-06	2.483E+01	5.005E-05
0.4634	1.214E+08	2.041E-06	2.976E+01	6.074E-05
0.6620	4.958E+10	2.025E-06	1.702E+04	3.447E-02
0.8669	2.476E+08	1.967E-06	1.101E+02	2.165E-04
1.0015	4.675E+08	1.922E-06	2.379E+02	4.574E-04
1.2559	3.617E+09	1.840E-06	2.294E+03	4.220E-03
1.5697	5.926E+07	1.747E-06	4.691E+01	8.195E-05
1.7427	3.315E+06	1.700E-06	2.912E+00	4.952E-06
1.8696	1.801E+05	1.667E-06	1.698E-01	2.831E-07
2.1688	1.202E+05	1.606E-06	1.313E-01	2.108E-07
2.2000	2.166E+02	1.602E-06	2.400E-04	3.845E-10
Totals:	9.528E+10 photons/sec		1.985E+04	3.972E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	7.204E-29	4.056E-29	2.113E-29	3.773E-29	3.071E-29	2.871E-28
0.044	2.202E-14	1.400E-14	7.956E-15	1.241E-14	1.004E-14	5.324E-14
0.059	3.053E-07	2.110E-07	1.290E-07	1.836E-07	1.489E-07	5.522E-07
0.065	4.897E-08	3.460E-08	2.138E-08	2.994E-08	2.434E-08	8.388E-08
0.075	3.741E-07	2.742E-07	1.705E-07	2.347E-07	1.917E-07	5.982E-07
0.086	3.171E-06	2.404E-06	1.486E-06	2.036E-06	1.669E-06	4.855E-06
0.095	3.003E-06	2.333E-06	1.431E-06	1.961E-06	1.610E-06	4.493E-06
0.129	7.104E-05	5.878E-05	3.572E-05	4.906E-05	4.065E-05	1.017E-04
0.245	8.054E-05	6.657E-05	4.466E-05	5.792E-05	4.781E-05	1.087E-04
0.345	4.646E-05	3.902E-05	2.714E-05	3.429E-05	2.861E-05	6.238E-05
0.463	5.481E-05	4.700E-05	3.369E-05	4.164E-05	3.509E-05	7.055E-05
0.662	3.013E-02	2.659E-02	1.976E-02	2.376E-02	2.029E-02	3.759E-02
0.867	1.864E-04	1.680E-04	1.283E-04	1.509E-04	1.304E-04	2.265E-04
1.001	3.918E-04	3.567E-04	2.765E-04	3.212E-04	2.794E-04	4.706E-04
1.256	3.592E-03	3.318E-03	2.631E-03	2.997E-03	2.635E-03	4.251E-03
1.570	6.945E-05	6.491E-05	5.265E-05	5.881E-05	5.229E-05	8.126E-05
1.743	4.192E-06	3.936E-06	3.227E-06	3.571E-06	3.192E-06	4.882E-06
1.870	2.396E-07	2.257E-07	1.863E-07	2.049E-07	1.838E-07	2.783E-07
2.169	1.777E-07	1.681E-07	1.408E-07	1.529E-07	1.382E-07	2.050E-07
2.200	3.234E-10	3.062E-10	2.568E-10	2.785E-10	2.519E-10	3.730E-10
Totals	3.464E-02	3.072E-02	2.300E-02	2.748E-02	2.355E-02	4.298E-02

1" Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.024E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 2.540E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 9.850E+01 cm (2) Next Layer: 9.795E+01 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	6.958E-26	4.979E-31
0.0442	1.061E+09	3.344E-06	4.281E-10	1.431E-15
0.0594	1.251E+10	2.028E-06	2.893E-02	5.867E-08
0.0647	2.608E+08	1.835E-06	6.568E-03	1.205E-08
0.0749	2.224E+08	1.665E-06	7.192E-02	1.198E-07
0.0858	4.793E+08	1.602E-06	7.266E-01	1.164E-06
0.0951	1.884E+08	1.592E-06	6.945E-01	1.106E-06
0.1289	1.746E+09	1.682E-06	1.968E+01	3.309E-05
0.2445	3.863E+08	1.926E-06	2.601E+01	5.008E-05
0.3451	1.385E+08	2.015E-06	1.596E+01	3.216E-05
0.4634	1.214E+08	2.041E-06	1.997E+01	4.076E-05
0.6620	4.958E+10	2.025E-06	1.197E+04	2.423E-02
0.8669	2.476E+08	1.967E-06	7.989E+01	1.572E-04
1.0015	4.675E+08	1.922E-06	1.754E+02	3.372E-04
1.2559	3.617E+09	1.840E-06	1.729E+03	3.182E-03
1.5697	5.926E+07	1.747E-06	3.608E+01	6.303E-05
1.7427	3.315E+06	1.700E-06	2.259E+00	3.840E-06
1.8696	1.801E+05	1.667E-06	1.324E-01	2.207E-07
2.1688	1.202E+05	1.606E-06	1.035E-01	1.661E-07
2.2000	2.166E+02	1.602E-06	1.893E-04	3.033E-10
Totals:	9.528E+10 photons/sec		1.407E+04	2.814E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	2.530E-31	1.424E-31	7.421E-32	1.325E-31	1.079E-31	1.008E-30
0.044	1.290E-15	8.200E-16	4.661E-16	7.272E-16	5.880E-16	3.119E-15
0.059	7.149E-08	4.941E-08	3.020E-08	4.298E-08	3.486E-08	1.293E-07
0.065	1.538E-08	1.087E-08	6.714E-09	9.401E-09	7.643E-09	2.634E-08
0.075	1.551E-07	1.136E-07	7.065E-08	9.729E-08	7.946E-08	2.479E-07
0.086	1.467E-06	1.112E-06	6.877E-07	9.419E-07	7.722E-07	2.247E-06
0.095	1.347E-06	1.047E-06	6.419E-07	8.795E-07	7.221E-07	2.015E-06
0.129	3.559E-05	2.945E-05	1.790E-05	2.458E-05	2.037E-05	5.096E-05
0.245	4.862E-05	4.018E-05	2.696E-05	3.497E-05	2.886E-05	6.560E-05
0.345	2.986E-05	2.508E-05	1.744E-05	2.204E-05	1.839E-05	4.009E-05
0.463	3.678E-05	3.154E-05	2.261E-05	2.794E-05	2.355E-05	4.734E-05
0.662	2.118E-02	1.869E-02	1.389E-02	1.670E-02	1.426E-02	2.642E-02
0.867	1.353E-04	1.219E-04	9.313E-05	1.095E-04	9.464E-05	1.644E-04
1.001	2.888E-04	2.629E-04	2.038E-04	2.368E-04	2.059E-04	3.469E-04
1.256	2.708E-03	2.501E-03	1.984E-03	2.260E-03	1.987E-03	3.205E-03
1.570	5.341E-05	4.992E-05	4.050E-05	4.523E-05	4.021E-05	6.250E-05
1.743	3.251E-06	3.053E-06	2.503E-06	2.769E-06	2.475E-06	3.787E-06
1.870	1.869E-07	1.760E-07	1.452E-07	1.597E-07	1.433E-07	2.170E-07
2.169	1.400E-07	1.325E-07	1.109E-07	1.205E-07	1.089E-07	1.615E-07
2.200	2.551E-10	2.415E-10	2.025E-10	2.196E-10	1.987E-10	2.942E-10
Totals	2.453E-02	2.176E-02	1.630E-02	1.947E-02	1.669E-02	3.042E-02

2" Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.049E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 5.080E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.010E+02 cm (2) Next Layer: 1.005E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	2.437E-28	1.744E-33
0.0442	1.061E+09	3.344E-06	2.473E-11	8.271E-17
0.0594	1.251E+10	2.028E-06	7.297E-03	1.480E-08
0.0647	2.608E+08	1.835E-06	1.806E-03	3.315E-09
0.0749	2.224E+08	1.665E-06	3.101E-02	5.164E-08
0.0858	4.793E+08	1.602E-06	3.649E-01	5.845E-07
0.0951	1.884E+08	1.592E-06	3.477E-01	5.536E-07
0.1289	1.746E+09	1.682E-06	9.726E+00	1.636E-05
0.2445	3.863E+08	1.926E-06	1.531E+01	2.948E-05
0.3451	1.385E+08	2.015E-06	9.989E+00	2.013E-05
0.4634	1.214E+08	2.041E-06	1.308E+01	2.670E-05
0.6620	4.958E+10	2.025E-06	8.250E+03	1.671E-02
0.8669	2.476E+08	1.967E-06	5.711E+01	1.124E-04
1.0015	4.675E+08	1.922E-06	1.276E+02	2.454E-04
1.2559	3.617E+09	1.840E-06	1.292E+03	2.377E-03
1.5697	5.926E+07	1.747E-06	2.759E+01	4.820E-05
1.7427	3.315E+06	1.700E-06	1.744E+00	2.966E-06
1.8696	1.801E+05	1.667E-06	1.029E-01	1.715E-07
2.1688	1.202E+05	1.606E-06	8.139E-02	1.307E-07
2.2000	2.166E+02	1.602E-06	1.491E-04	2.389E-10
Totals:	9.528E+10 photons/sec		9.805E+03	1.959E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	8.861E-34	4.989E-34	2.599E-34	4.641E-34	3.778E-34	3.531E-33
0.044	7.453E-17	4.738E-17	2.693E-17	4.201E-17	3.397E-17	1.802E-16
0.059	1.803E-08	1.246E-08	7.618E-09	1.084E-08	8.792E-09	3.261E-08
0.065	4.230E-09	2.989E-09	1.847E-09	2.586E-09	2.102E-09	7.245E-09
0.075	6.686E-08	4.900E-08	3.046E-08	4.195E-08	3.426E-08	1.069E-07
0.086	7.368E-07	5.585E-07	3.453E-07	4.730E-07	3.878E-07	1.128E-06
0.095	6.744E-07	5.240E-07	3.214E-07	4.403E-07	3.615E-07	1.009E-06
0.129	1.759E-05	1.456E-05	8.845E-06	1.215E-05	1.007E-05	2.519E-05
0.245	2.861E-05	2.365E-05	1.587E-05	2.058E-05	1.699E-05	3.861E-05
0.345	1.869E-05	1.570E-05	1.092E-05	1.379E-05	1.151E-05	2.509E-05
0.463	2.409E-05	2.066E-05	1.481E-05	1.830E-05	1.542E-05	3.101E-05
0.662	1.461E-02	1.289E-02	9.578E-03	1.152E-02	9.836E-03	1.822E-02
0.867	9.675E-05	8.718E-05	6.658E-05	7.831E-05	6.766E-05	1.175E-04
1.001	2.102E-04	1.914E-04	1.483E-04	1.723E-04	1.499E-04	2.525E-04
1.256	2.023E-03	1.869E-03	1.482E-03	1.688E-03	1.484E-03	2.395E-03
1.570	4.084E-05	3.817E-05	3.097E-05	3.459E-05	3.075E-05	4.779E-05
1.743	2.511E-06	2.358E-06	1.932E-06	2.139E-06	1.911E-06	2.924E-06
1.870	1.452E-07	1.367E-07	1.129E-07	1.241E-07	1.113E-07	1.686E-07
2.169	1.101E-07	1.042E-07	8.728E-08	9.477E-08	8.565E-08	1.271E-07
2.200	2.009E-10	1.902E-10	1.595E-10	1.730E-10	1.565E-10	2.317E-10
Totals	1.707E-02	1.515E-02	1.136E-02	1.356E-02	1.163E-02	2.116E-02

1/4' Concrete Shield

Source Shields Distance to Detector, X = 1.075E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 7.620E+00, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.036E+02 cm (2) Next Layer: 1.030E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	5.075E-31	3.631E-36
0.0442	1.061E+09	3.344E-06	1.413E-12	4.725E-18
0.0594	1.251E+10	2.028E-06	1.613E-03	3.271E-09
0.0647	2.608E+08	1.835E-06	5.278E-04	9.687E-10
0.0749	2.224E+08	1.665E-06	1.259E-02	2.097E-08
0.0858	4.793E+08	1.602E-06	1.670E-01	2.675E-07
0.0951	1.884E+08	1.592E-06	1.874E-01	2.984E-07
0.1289	1.746E+09	1.682E-06	4.762E+00	8.008E-06
0.2445	3.863E+08	1.926E-06	8.868E+00	1.708E-05
0.3451	1.385E+08	2.015E-06	6.153E+00	1.240E-05
0.4634	1.214E+08	2.041E-06	8.439E+00	1.723E-05
0.6620	4.958E+10	2.025E-06	5.618E+03	1.138E-02
0.8669	2.476E+08	1.967E-06	4.042E+01	7.951E-05
1.0015	4.675E+08	1.922E-06	9.207E+01	1.770E-04
1.2559	3.617E+09	1.840E-06	9.589E+02	1.764E-03
1.5697	5.926E+07	1.747E-06	2.099E+01	3.668E-05
1.7427	3.315E+06	1.700E-06	1.342E+00	2.281E-06
1.8696	1.801E+05	1.667E-06	7.967E-02	1.329E-07
2.1688	1.202E+05	1.606E-06	6.390E-02	1.026E-07
2.2000	2.166E+02	1.602E-06	1.172E-04	1.878E-10
Totals:	9.528E+10 photons/sec		6.761E+03	1.349E-02 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.033	1.845E-36	1.039E-36	5.412E-37	9.663E-37	7.866E-37	7.352E-36
0.044	4.258E-18	2.707E-18	1.539E-18	2.400E-18	1.941E-18	1.030E-17
0.059	3.986E-09	2.755E-09	1.684E-09	2.396E-09	1.943E-09	7.209E-09
0.065	1.236E-09	8.732E-10	5.396E-10	7.555E-10	6.142E-10	2.117E-09
0.075	2.715E-08	1.990E-08	1.237E-08	1.703E-08	1.391E-08	4.341E-08
0.086	3.372E-07	2.556E-07	1.580E-07	2.164E-07	1.774E-07	5.163E-07
0.095	3.635E-07	2.825E-07	1.732E-07	2.373E-07	1.949E-07	5.439E-07
0.129	8.614E-06	7.128E-06	4.331E-06	5.949E-06	4.930E-06	1.233E-05
0.245	1.658E-05	1.370E-05	9.192E-06	1.192E-05	9.841E-06	2.237E-05
0.345	1.151E-05	9.668E-06	6.724E-06	8.496E-06	7.089E-06	1.545E-05
0.463	1.554E-05	1.333E-05	9.554E-06	1.181E-05	9.951E-06	2.001E-05
0.662	9.946E-03	8.778E-03	6.522E-03	7.842E-03	6.698E-03	1.241E-02
0.867	6.846E-05	6.169E-05	4.712E-05	5.542E-05	4.788E-05	8.318E-05
1.001	1.516E-04	1.380E-04	1.070E-04	1.243E-04	1.081E-04	1.821E-04
1.256	1.501E-03	1.387E-03	1.100E-03	1.253E-03	1.102E-03	1.777E-03
1.570	3.108E-05	2.905E-05	2.357E-05	2.632E-05	2.340E-05	3.637E-05
1.743	1.931E-06	1.814E-06	1.487E-06	1.645E-06	1.470E-06	2.249E-06
1.870	1.125E-07	1.059E-07	8.742E-08	9.615E-08	8.625E-08	1.306E-07
2.169	8.647E-08	8.184E-08	6.853E-08	7.441E-08	6.725E-08	9.978E-08
2.200	1.579E-10	1.495E-10	1.254E-10	1.360E-10	1.230E-10	1.822E-10
Totals	1.175E-02	1.044E-02	7.832E-03	9.342E-03	8.013E-03	1.456E-02

1/2' Concrete Shield

Source Shields Distance to Detector, X = 1.151E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.524E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.112E+02 cm (2) Next Layer: 1.107E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	2.516E-16	8.413E-22
0.0594	1.251E+10	2.028E-06	1.201E-05	2.436E-11
0.0647	2.608E+08	1.835E-06	9.795E-06	1.798E-11
0.0749	2.224E+08	1.665E-06	5.494E-04	9.148E-10
0.0858	4.793E+08	1.602E-06	1.480E-02	2.371E-08
0.0951	1.884E+08	1.592E-06	2.420E-02	3.853E-08
0.1289	1.746E+09	1.682E-06	5.404E-01	9.087E-07
0.2445	3.863E+08	1.926E-06	1.636E+00	3.149E-06
0.3451	1.385E+08	2.015E-06	1.362E+00	2.744E-06
0.4634	1.214E+08	2.041E-06	2.154E+00	4.396E-06
0.6620	4.958E+10	2.025E-06	1.698E+03	3.439E-03
0.8669	2.476E+08	1.967E-06	1.380E+01	2.715E-05
1.0015	4.675E+08	1.922E-06	3.344E+01	6.429E-05
1.2559	3.617E+09	1.840E-06	3.817E+02	7.023E-04
1.5697	5.926E+07	1.747E-06	9.073E+00	1.585E-05
1.7427	3.315E+06	1.700E-06	6.006E-01	1.021E-06
1.8696	1.801E+05	1.667E-06	3.649E-02	6.084E-08
2.1688	1.202E+05	1.606E-06	3.061E-02	4.915E-08
2.2000	2.166E+02	1.602E-06	5.638E-05	9.033E-11
Totals:	9.528E+10 photons/sec		2.142E+03	4.261E-03 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	7.581E-22	4.819E-22	2.739E-22	4.274E-22	3.456E-22	1.833E-21
0.059	2.968E-11	2.051E-11	1.254E-11	1.785E-11	1.447E-11	5.369E-11
0.065	2.294E-11	1.620E-11	1.001E-11	1.402E-11	1.140E-11	3.929E-11
0.075	1.184E-09	8.680E-10	5.396E-10	7.431E-10	6.069E-10	1.894E-09
0.086	2.989E-08	2.266E-08	1.401E-08	1.919E-08	1.573E-08	4.576E-08
0.095	4.693E-08	3.646E-08	2.236E-08	3.064E-08	2.516E-08	7.022E-08
0.129	9.775E-07	8.088E-07	4.915E-07	6.751E-07	5.594E-07	1.400E-06
0.245	3.057E-06	2.527E-06	1.695E-06	2.199E-06	1.815E-06	4.125E-06
0.345	2.548E-06	2.140E-06	1.488E-06	1.880E-06	1.569E-06	3.420E-06
0.463	3.966E-06	3.402E-06	2.438E-06	3.013E-06	2.539E-06	5.106E-06
0.662	3.006E-03	2.653E-03	1.971E-03	2.370E-03	2.024E-03	3.750E-03
0.867	2.337E-05	2.106E-05	1.609E-05	1.892E-05	1.635E-05	2.840E-05
1.001	5.506E-05	5.014E-05	3.886E-05	4.515E-05	3.926E-05	6.615E-05
1.256	5.977E-04	5.521E-04	4.379E-04	4.988E-04	4.385E-04	7.074E-04
1.570	1.343E-05	1.256E-05	1.018E-05	1.138E-05	1.011E-05	1.572E-05
1.743	8.646E-07	8.118E-07	6.655E-07	7.364E-07	6.582E-07	1.007E-06
1.870	5.151E-08	4.850E-08	4.003E-08	4.403E-08	3.950E-08	5.981E-08
2.169	4.142E-08	3.920E-08	3.283E-08	3.564E-08	3.222E-08	4.780E-08
2.200	7.598E-11	7.194E-11	6.032E-11	6.542E-11	5.917E-11	8.762E-11
Totals	3.707E-03	3.298E-03	2.481E-03	2.953E-03	2.536E-03	4.583E-03

3/4' Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.227E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 2.286E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.188E+02 cm (2) Next Layer: 1.183E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	4.288E-20	1.434E-25
0.0594	1.251E+10	2.028E-06	7.234E-08	1.467E-13
0.0647	2.608E+08	1.835E-06	1.175E-07	2.156E-13
0.0749	2.224E+08	1.665E-06	1.900E-05	3.163E-11
0.0858	4.793E+08	1.602E-06	9.729E-04	1.559E-09
0.0951	1.884E+08	1.592E-06	1.833E-03	2.918E-09
0.1289	1.746E+09	1.682E-06	5.974E-02	1.005E-07
0.2445	3.863E+08	1.926E-06	2.894E-01	5.572E-07
0.3451	1.385E+08	2.015E-06	2.886E-01	5.817E-07
0.4634	1.214E+08	2.041E-06	5.273E-01	1.076E-06
0.6620	4.958E+10	2.025E-06	4.948E+02	1.002E-03
0.8669	2.476E+08	1.967E-06	4.565E+00	8.981E-06
1.0015	4.675E+08	1.922E-06	1.180E+01	2.269E-05
1.2559	3.617E+09	1.840E-06	1.484E+02	2.730E-04
1.5697	5.926E+07	1.747E-06	3.849E+00	6.724E-06
1.7427	3.315E+06	1.700E-06	2.645E-01	4.498E-07
1.8696	1.801E+05	1.667E-06	1.646E-02	2.745E-08
2.1688	1.202E+05	1.606E-06	1.450E-02	2.328E-08
2.2000	2.166E+02	1.602E-06	2.683E-05	4.298E-11
Totals:	9.528E+10 photons/sec		6.649E+02	1.316E-03 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	1.292E-25	8.215E-26	4.669E-26	7.285E-26	5.890E-26	3.125E-25
0.059	1.788E-13	1.236E-13	7.553E-14	1.075E-13	8.717E-14	3.234E-13
0.065	2.751E-13	1.944E-13	1.201E-13	1.682E-13	1.367E-13	4.712E-13
0.075	4.095E-11	3.001E-11	1.866E-11	2.570E-11	2.099E-11	6.549E-11
0.086	1.965E-09	1.489E-09	9.209E-10	1.261E-09	1.034E-09	3.008E-09
0.095	3.555E-09	2.762E-09	1.694E-09	2.321E-09	1.906E-09	5.319E-09
0.129	1.081E-07	8.941E-08	5.433E-08	7.462E-08	6.184E-08	1.547E-07
0.245	5.409E-07	4.471E-07	3.000E-07	3.890E-07	3.211E-07	7.298E-07
0.345	5.400E-07	4.535E-07	3.155E-07	3.986E-07	3.326E-07	7.250E-07
0.463	9.712E-07	8.329E-07	5.970E-07	7.378E-07	6.218E-07	1.250E-06
0.662	8.760E-04	7.731E-04	5.745E-04	6.907E-04	5.899E-04	1.093E-03
0.867	7.732E-06	6.968E-06	5.322E-06	6.259E-06	5.408E-06	9.395E-06
1.001	1.944E-05	1.770E-05	1.372E-05	1.594E-05	1.386E-05	2.335E-05
1.256	2.324E-04	2.146E-04	1.702E-04	1.939E-04	1.705E-04	2.750E-04
1.570	5.698E-06	5.325E-06	4.320E-06	4.825E-06	4.290E-06	6.667E-06
1.743	3.808E-07	3.575E-07	2.931E-07	3.243E-07	2.899E-07	4.435E-07
1.870	2.324E-08	2.189E-08	1.807E-08	1.987E-08	1.782E-08	2.699E-08
2.169	1.962E-08	1.857E-08	1.555E-08	1.688E-08	1.526E-08	2.264E-08
2.200	3.615E-11	3.423E-11	2.870E-11	3.113E-11	2.815E-11	4.169E-11
Totals	1.144E-03	1.020E-03	7.696E-04	9.136E-04	7.856E-04	1.411E-03

1' Concrete Shield

Source Cylindrical
Shields Cylindrical
Source Length = 3.048E+03 cm
Distance to Detector, X = 1.303E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 3.048E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.264E+02 cm (2) Next Layer: 1.259E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	7.126E-24	2.383E-29
0.0594	1.251E+10	2.028E-06	4.003E-10	8.118E-16
0.0647	2.608E+08	1.835E-06	1.232E-09	2.261E-15
0.0749	2.224E+08	1.665E-06	4.611E-07	7.678E-13
0.0858	4.793E+08	1.602E-06	4.628E-05	7.414E-11
0.0951	1.884E+08	1.592E-06	1.450E-04	2.309E-10
0.1289	1.746E+09	1.682E-06	6.534E-03	1.099E-08
0.2445	3.863E+08	1.926E-06	5.020E-02	9.666E-08
0.3451	1.385E+08	2.015E-06	5.990E-02	1.207E-07
0.4634	1.214E+08	2.041E-06	1.265E-01	2.581E-07
0.6620	4.958E+10	2.025E-06	1.415E+02	2.866E-04
0.8669	2.476E+08	1.967E-06	1.485E+00	2.921E-06
1.0015	4.675E+08	1.922E-06	4.103E+00	7.887E-06
1.2559	3.617E+09	1.840E-06	5.694E+01	1.048E-04
1.5697	5.926E+07	1.747E-06	1.615E+00	2.821E-06
1.7427	3.315E+06	1.700E-06	1.154E-01	1.962E-07
1.8696	1.801E+05	1.667E-06	7.364E-03	1.228E-08
2.1688	1.202E+05	1.606E-06	6.820E-03	1.095E-08
2.2000	2.166E+02	1.602E-06	1.268E-05	2.031E-11
Totals:	9.528E+10 photons/sec		2.060E+02	4.057E-04 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	2.147E-29	1.365E-29	7.759E-30	1.211E-29	9.788E-30	5.192E-29
0.059	9.892E-16	6.837E-16	4.179E-16	5.948E-16	4.824E-16	1.789E-15
0.065	2.885E-15	2.039E-15	1.260E-15	1.764E-15	1.434E-15	4.942E-15
0.075	9.940E-13	7.285E-13	4.529E-13	6.237E-13	5.094E-13	1.589E-12
0.086	9.345E-11	7.084E-11	4.380E-11	5.999E-11	4.918E-11	1.431E-10
0.095	2.813E-10	2.186E-10	1.341E-10	1.837E-10	1.508E-10	4.209E-10
0.129	1.182E-08	9.780E-09	5.942E-09	8.162E-09	6.764E-09	1.692E-08
0.245	9.383E-08	7.755E-08	5.203E-08	6.748E-08	5.570E-08	1.266E-07
0.345	1.121E-07	9.412E-08	6.547E-08	8.271E-08	6.901E-08	1.505E-07
0.463	2.329E-07	1.997E-07	1.432E-07	1.769E-07	1.491E-07	2.998E-07
0.662	2.505E-04	2.211E-04	1.643E-04	1.975E-04	1.687E-04	3.125E-04
0.867	2.515E-06	2.267E-06	1.731E-06	2.036E-06	1.759E-06	3.056E-06
1.001	6.756E-06	6.151E-06	4.767E-06	5.539E-06	4.817E-06	8.115E-06
1.256	8.915E-05	8.235E-05	6.532E-05	7.441E-05	6.542E-05	1.055E-04
1.570	2.391E-06	2.235E-06	1.813E-06	2.025E-06	1.800E-06	2.797E-06
1.743	1.661E-07	1.560E-07	1.278E-07	1.415E-07	1.265E-07	1.934E-07
1.870	1.040E-08	9.789E-09	8.080E-09	8.887E-09	7.972E-09	1.207E-08
2.169	9.228E-09	8.734E-09	7.314E-09	7.942E-09	7.178E-09	1.065E-08
2.200	1.708E-11	1.618E-11	1.356E-11	1.471E-11	1.331E-11	1.970E-11
Totals	3.520E-04	3.147E-04	2.383E-04	2.820E-04	2.429E-04	4.328E-04

1 1/2' Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.456E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 4.572E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.417E+02 cm (2) Next Layer: 1.411E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	4.378E-32	1.464E-37
0.0594	1.251E+10	2.028E-06	1.093E-14	2.217E-20
0.0647	2.608E+08	1.835E-06	1.155E-13	2.119E-19
0.0749	2.224E+08	1.665E-06	2.011E-10	3.348E-16
0.0858	4.793E+08	1.602E-06	5.792E-08	9.279E-14
0.0951	1.884E+08	1.592E-06	3.485E-07	5.549E-13
0.1289	1.746E+09	1.682E-06	7.769E-05	1.306E-10
0.2445	3.863E+08	1.926E-06	1.473E-03	2.837E-09
0.3451	1.385E+08	2.015E-06	2.504E-03	5.047E-09
0.4634	1.214E+08	2.041E-06	7.057E-03	1.440E-08
0.6620	4.958E+10	2.025E-06	1.126E+01	2.280E-05
0.8669	2.476E+08	1.967E-06	1.532E-01	3.015E-07
1.0015	4.675E+08	1.922E-06	4.842E-01	9.309E-07
1.2559	3.617E+09	1.840E-06	8.214E+00	1.511E-05
1.5697	5.926E+07	1.747E-06	2.795E-01	4.884E-07
1.7427	3.315E+06	1.700E-06	2.162E-02	3.676E-08
1.8696	1.801E+05	1.667E-06	1.453E-03	2.422E-09
2.1688	1.202E+05	1.606E-06	1.492E-03	2.395E-09
2.2000	2.166E+02	1.602E-06	2.800E-06	4.486E-12
Totals:	9.528E+10 photons/sec		2.043E+01	3.970E-05 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.044	1.319E-37	8.385E-38	4.766E-38	7.436E-38	6.013E-38	3.190E-37
0.059	2.701E-20	1.867E-20	1.141E-20	1.624E-20	1.317E-20	4.886E-20
0.065	2.704E-19	1.910E-19	1.180E-19	1.653E-19	1.344E-19	4.631E-19
0.075	4.335E-16	3.177E-16	1.975E-16	2.720E-16	2.221E-16	6.932E-16
0.086	1.170E-13	8.867E-14	5.482E-14	7.508E-14	6.156E-14	1.791E-13
0.095	6.760E-13	5.252E-13	3.221E-13	4.413E-13	3.624E-13	1.011E-12
0.129	1.405E-10	1.163E-10	7.065E-11	9.705E-11	8.042E-11	2.012E-10
0.245	2.754E-09	2.276E-09	1.527E-09	1.980E-09	1.635E-09	3.715E-09
0.345	4.685E-09	3.935E-09	2.737E-09	3.458E-09	2.885E-09	6.290E-09
0.463	1.300E-08	1.115E-08	7.990E-09	9.875E-09	8.322E-09	1.673E-08
0.662	1.993E-05	1.759E-05	1.307E-05	1.572E-05	1.342E-05	2.486E-05
0.867	2.596E-07	2.339E-07	1.787E-07	2.101E-07	1.815E-07	3.154E-07
1.001	7.974E-07	7.260E-07	5.627E-07	6.537E-07	5.686E-07	9.578E-07
1.256	1.286E-05	1.188E-05	9.422E-06	1.073E-05	9.437E-06	1.522E-05
1.570	4.138E-07	3.868E-07	3.138E-07	3.504E-07	3.116E-07	4.842E-07
1.743	3.112E-08	2.922E-08	2.395E-08	2.651E-08	2.369E-08	3.624E-08
1.870	2.051E-09	1.931E-09	1.594E-09	1.753E-09	1.572E-09	2.381E-09
2.169	2.018E-09	1.910E-09	1.600E-09	1.737E-09	1.570E-09	2.329E-09
2.200	3.773E-12	3.572E-12	2.996E-12	3.249E-12	2.938E-12	4.351E-12
Totals	3.432E-05	3.087E-05	2.359E-05	2.771E-05	2.396E-05	4.191E-05

2' Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 1.608E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 6.096E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.569E+02 cm (2) Next Layer: 1.564E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	2.778E-19	5.634E-25
0.0647	2.608E+08	1.835E-06	9.850E-18	1.808E-23
0.0749	2.224E+08	1.665E-06	7.556E-14	1.258E-19
0.0858	4.793E+08	1.602E-06	5.755E-11	9.219E-17
0.0951	1.884E+08	1.592E-06	6.061E-10	9.650E-16
0.1289	1.746E+09	1.682E-06	9.319E-07	1.567E-12
0.2445	3.863E+08	1.926E-06	4.283E-05	8.247E-11
0.3451	1.385E+08	2.015E-06	1.031E-04	2.078E-10
0.4634	1.214E+08	2.041E-06	3.874E-04	7.906E-10
0.6620	4.958E+10	2.025E-06	8.818E-01	1.786E-06
0.8669	2.476E+08	1.967E-06	1.559E-02	3.067E-08
1.0015	4.675E+08	1.922E-06	5.640E-02	1.084E-07
1.2559	3.617E+09	1.840E-06	1.171E+00	2.154E-06
1.5697	5.926E+07	1.747E-06	4.790E-02	8.369E-08
1.7427	3.315E+06	1.700E-06	4.015E-03	6.826E-09
1.8696	1.801E+05	1.667E-06	2.842E-04	4.739E-10
2.1688	1.202E+05	1.606E-06	3.241E-04	5.203E-10
2.2000	2.166E+02	1.602E-06	6.143E-07	9.843E-13
Totals:	9.528E+10 photons/sec		2.178E+00	4.172E-06 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	6.865E-25	4.745E-25	2.900E-25	4.128E-25	3.348E-25	1.242E-24
0.065	2.307E-23	1.630E-23	1.007E-23	1.410E-23	1.146E-23	3.951E-23
0.075	1.629E-19	1.194E-19	7.422E-20	1.022E-19	8.348E-20	2.605E-19
0.086	1.162E-16	8.809E-17	5.447E-17	7.460E-17	6.116E-17	1.779E-16
0.095	1.176E-15	9.134E-16	5.602E-16	7.675E-16	6.302E-16	1.759E-15
0.129	1.686E-12	1.395E-12	8.475E-13	1.164E-12	9.646E-13	2.414E-12
0.245	8.006E-11	6.617E-11	4.439E-11	5.758E-11	4.753E-11	1.080E-10
0.345	1.929E-10	1.620E-10	1.127E-10	1.424E-10	1.188E-10	2.590E-10
0.463	7.134E-10	6.119E-10	4.385E-10	5.420E-10	4.567E-10	9.184E-10
0.662	1.561E-06	1.378E-06	1.024E-06	1.231E-06	1.051E-06	1.947E-06
0.867	2.641E-08	2.380E-08	1.818E-08	2.138E-08	1.847E-08	3.209E-08
1.001	9.286E-08	8.455E-08	6.553E-08	7.614E-08	6.622E-08	1.116E-07
1.256	1.833E-06	1.694E-06	1.343E-06	1.530E-06	1.345E-06	2.170E-06
1.570	7.092E-08	6.629E-08	5.377E-08	6.006E-08	5.340E-08	8.299E-08
1.743	5.779E-09	5.427E-09	4.448E-09	4.923E-09	4.400E-09	6.730E-09
1.870	4.012E-10	3.778E-10	3.118E-10	3.429E-10	3.076E-10	4.658E-10
2.169	4.385E-10	4.150E-10	3.475E-10	3.773E-10	3.410E-10	5.060E-10
2.200	8.278E-13	7.838E-13	6.573E-13	7.128E-13	6.447E-13	9.547E-13
Totals	3.592E-06	3.253E-06	2.510E-06	2.925E-06	2.540E-06	4.353E-06

2 1/2' Concrete Shield

Source Shields Distance to Detector, X = 1.761E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 7.620E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.722E+02 cm (2) Next Layer: 1.716E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	6.820E-24	1.383E-29
0.0647	2.608E+08	1.835E-06	8.049E-22	1.477E-27
0.0749	2.224E+08	1.665E-06	2.670E-17	4.446E-23
0.0858	4.793E+08	1.602E-06	5.254E-14	8.417E-20
0.0951	1.884E+08	1.592E-06	9.485E-13	1.510E-18
0.1289	1.746E+09	1.682E-06	1.135E-08	1.909E-14
0.2445	3.863E+08	1.926E-06	1.249E-06	2.406E-12
0.3451	1.385E+08	2.015E-06	4.235E-06	8.535E-12
0.4634	1.214E+08	2.041E-06	2.117E-05	4.321E-11
0.6620	4.958E+10	2.025E-06	6.878E-02	1.393E-07
0.8669	2.476E+08	1.967E-06	1.580E-03	3.109E-09
1.0015	4.675E+08	1.922E-06	6.545E-03	1.258E-08
1.2559	3.617E+09	1.840E-06	1.664E-01	3.062E-07
1.5697	5.926E+07	1.747E-06	8.189E-03	1.431E-08
1.7427	3.315E+06	1.700E-06	7.440E-04	1.265E-09
1.8696	1.801E+05	1.667E-06	5.549E-05	9.253E-11
2.1688	1.202E+05	1.606E-06	7.031E-05	1.129E-10
2.2000	2.166E+02	1.602E-06	1.346E-07	2.157E-13
Totals:	9.528E+10 photons/sec		2.524E-01	4.770E-07 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	1.685E-29	1.165E-29	7.121E-30	1.013E-29	8.218E-30	3.049E-29
0.065	1.885E-27	1.332E-27	8.228E-28	1.152E-27	9.367E-28	3.228E-27
0.075	5.756E-23	4.218E-23	2.622E-23	3.611E-23	2.950E-23	9.204E-23
0.086	1.061E-19	8.043E-20	4.973E-20	6.811E-20	5.584E-20	1.625E-19
0.095	1.840E-18	1.429E-18	8.766E-19	1.201E-18	9.861E-19	2.752E-18
0.129	2.053E-14	1.699E-14	1.032E-14	1.418E-14	1.175E-14	2.940E-14
0.245	2.335E-12	1.930E-12	1.295E-12	1.680E-12	1.386E-12	3.151E-12
0.345	7.924E-12	6.655E-12	4.629E-12	5.848E-12	4.879E-12	1.064E-11
0.463	3.899E-11	3.344E-11	2.397E-11	2.962E-11	2.496E-11	5.019E-11
0.662	1.218E-07	1.075E-07	7.984E-08	9.600E-08	8.200E-08	1.519E-07
0.867	2.677E-09	2.412E-09	1.842E-09	2.167E-09	1.872E-09	3.252E-09
1.001	1.078E-08	9.813E-09	7.605E-09	8.836E-09	7.685E-09	1.295E-08
1.256	2.606E-07	2.407E-07	1.909E-07	2.175E-07	1.912E-07	3.084E-07
1.570	1.212E-08	1.133E-08	9.192E-09	1.027E-08	9.128E-09	1.419E-08
1.743	1.071E-09	1.006E-09	8.243E-10	9.122E-10	8.153E-10	1.247E-09
1.870	7.834E-11	7.377E-11	6.089E-11	6.697E-11	6.007E-11	9.096E-11
2.169	9.514E-11	9.005E-11	7.541E-11	8.188E-11	7.400E-11	1.098E-10
2.200	1.814E-13	1.718E-13	1.440E-13	1.562E-13	1.413E-13	2.092E-13
Totals	4.092E-07	3.729E-07	2.904E-07	3.358E-07	2.929E-07	4.922E-07

3' Concrete Shield

Source Shields Distance to Detector, X = 1.913E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 9.144E+01, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 1.874E+02 cm (2) Next Layer: 1.869E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	1.602E-28	3.249E-34
0.0647	2.608E+08	1.835E-06	6.426E-26	1.179E-31
0.0749	2.224E+08	1.665E-06	9.139E-21	1.522E-26
0.0858	4.793E+08	1.602E-06	4.603E-17	7.375E-23
0.0951	1.884E+08	1.592E-06	1.413E-15	2.249E-21
0.1289	1.746E+09	1.682E-06	1.405E-10	2.363E-16
0.2445	3.863E+08	1.926E-06	3.676E-08	7.078E-14
0.3451	1.385E+08	2.015E-06	1.745E-07	3.517E-13
0.4634	1.214E+08	2.041E-06	1.158E-06	2.364E-12
0.6620	4.958E+10	2.025E-06	5.369E-03	1.087E-08
0.8669	2.476E+08	1.967E-06	1.603E-04	3.154E-10
1.0015	4.675E+08	1.922E-06	7.604E-04	1.462E-09
1.2559	3.617E+09	1.840E-06	2.368E-02	4.356E-08
1.5697	5.926E+07	1.747E-06	1.401E-03	2.448E-09
1.7427	3.315E+06	1.700E-06	1.380E-04	2.347E-10
1.8696	1.801E+05	1.667E-06	1.085E-05	1.809E-11
2.1688	1.202E+05	1.606E-06	1.528E-05	2.453E-11
2.2000	2.166E+02	1.602E-06	2.954E-08	4.734E-14
Totals:	9.528E+10 photons/sec		3.153E-02	5.894E-08 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.059	3.960E-34	2.737E-34	1.673E-34	2.381E-34	1.931E-34	7.162E-34
0.065	1.505E-31	1.063E-31	6.569E-32	9.199E-32	7.478E-32	2.577E-31
0.075	1.970E-26	1.444E-26	8.977E-27	1.236E-26	1.010E-26	3.151E-26
0.086	9.296E-23	7.047E-23	4.357E-23	5.967E-23	4.892E-23	1.423E-22
0.095	2.740E-21	2.129E-21	1.306E-21	1.789E-21	1.469E-21	4.100E-21
0.129	2.542E-16	2.103E-16	1.278E-16	1.755E-16	1.455E-16	3.639E-16
0.245	6.870E-14	5.678E-14	3.810E-14	4.941E-14	4.079E-14	9.270E-14
0.345	3.265E-13	2.742E-13	1.907E-13	2.409E-13	2.010E-13	4.383E-13
0.463	2.133E-12	1.830E-12	1.311E-12	1.621E-12	1.366E-12	2.746E-12
0.662	9.505E-09	8.388E-09	6.233E-09	7.494E-09	6.401E-09	1.186E-08
0.867	2.716E-10	2.447E-10	1.869E-10	2.198E-10	1.899E-10	3.299E-10
1.001	1.252E-09	1.140E-09	8.836E-10	1.027E-09	8.928E-10	1.504E-09
1.256	3.707E-08	3.424E-08	2.716E-08	3.094E-08	2.720E-08	4.388E-08
1.570	2.075E-09	1.939E-09	1.573E-09	1.757E-09	1.562E-09	2.428E-09
1.743	1.987E-10	1.866E-10	1.529E-10	1.692E-10	1.513E-10	2.314E-10
1.870	1.532E-11	1.442E-11	1.190E-11	1.309E-11	1.174E-11	1.778E-11
2.169	2.067E-11	1.957E-11	1.638E-11	1.779E-11	1.608E-11	2.386E-11
2.200	3.981E-14	3.769E-14	3.161E-14	3.428E-14	3.100E-14	4.591E-14
Totals	5.041E-08	4.618E-08	3.622E-08	4.164E-08	3.643E-08	6.027E-08

3 1/2' Concrete Shield

Source Cylindrical | Shields Cylindrical | Distance to Detector, X = 2.065E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm | Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.067E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.026E+02 cm (2) Next Layer: 2.021E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	4.951E-30	9.086E-36
0.0749	2.224E+08	1.665E-06	3.071E-24	5.114E-30
0.0858	4.793E+08	1.602E-06	3.940E-20	6.313E-26
0.0951	1.884E+08	1.592E-06	2.048E-18	3.261E-24
0.1289	1.746E+09	1.682E-06	1.765E-12	2.968E-18
0.2445	3.863E+08	1.926E-06	1.093E-09	2.104E-15
0.3451	1.385E+08	2.015E-06	7.230E-09	1.457E-14
0.4634	1.214E+08	2.041E-06	6.361E-08	1.298E-13
0.6620	4.958E+10	2.025E-06	4.205E-04	8.516E-10
0.8669	2.476E+08	1.967E-06	1.632E-05	3.210E-11
1.0015	4.675E+08	1.922E-06	8.862E-05	1.704E-10
1.2559	3.617E+09	1.840E-06	3.378E-03	6.215E-09
1.5697	5.926E+07	1.747E-06	2.405E-04	4.202E-10
1.7427	3.315E+06	1.700E-06	2.568E-05	4.366E-11
1.8696	1.801E+05	1.667E-06	2.127E-06	3.547E-12
2.1688	1.202E+05	1.606E-06	3.329E-06	5.345E-12
2.2000	2.166E+02	1.602E-06	6.502E-09	1.042E-14
Totals:	9.528E+10 photons/sec		4.175E-03	7.742E-09 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.065	1.159E-35	8.191E-36	5.061E-36	7.087E-36	5.761E-36	1.986E-35
0.075	6.621E-30	4.853E-30	3.017E-30	4.154E-30	3.393E-30	1.059E-29
0.086	7.957E-26	6.032E-26	3.730E-26	5.108E-26	4.188E-26	1.218E-25
0.095	3.972E-24	3.086E-24	1.893E-24	2.593E-24	2.129E-24	5.943E-24
0.129	3.193E-18	2.642E-18	1.605E-18	2.205E-18	1.827E-18	4.572E-18
0.245	2.042E-15	1.688E-15	1.133E-15	1.469E-15	1.212E-15	2.756E-15
0.345	1.353E-14	1.136E-14	7.902E-15	9.984E-15	8.330E-15	1.816E-14
0.463	1.172E-13	1.005E-13	7.202E-14	8.901E-14	7.501E-14	1.508E-13
0.662	7.444E-10	6.569E-10	4.881E-10	5.869E-10	5.013E-10	9.286E-10
0.867	2.764E-11	2.491E-11	1.902E-11	2.237E-11	1.933E-11	3.358E-11
1.001	1.459E-10	1.329E-10	1.030E-10	1.196E-10	1.041E-10	1.753E-10
1.256	5.289E-09	4.886E-09	3.875E-09	4.415E-09	3.881E-09	6.261E-09
1.570	3.561E-10	3.328E-10	2.700E-10	3.015E-10	2.681E-10	4.167E-10
1.743	3.696E-11	3.471E-11	2.845E-11	3.148E-11	2.814E-11	4.305E-11
1.870	3.003E-12	2.828E-12	2.334E-12	2.567E-12	2.303E-12	3.487E-12
2.169	4.505E-12	4.263E-12	3.570E-12	3.877E-12	3.504E-12	5.198E-12
2.200	8.762E-15	8.296E-15	6.956E-15	7.544E-15	6.823E-15	1.010E-14
Totals	6.608E-09	6.076E-09	4.790E-09	5.483E-09	4.808E-09	7.867E-09

4' Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 2.218E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.219E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.179E+02 cm (2) Next Layer: 2.173E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	0.000E+00	0.000E+00
0.0749	2.224E+08	1.665E-06	1.020E-27	1.699E-33
0.0858	4.793E+08	1.602E-06	3.325E-23	5.327E-29
0.0951	1.884E+08	1.592E-06	2.920E-21	4.650E-27
0.1289	1.746E+09	1.682E-06	2.246E-14	3.777E-20
0.2445	3.863E+08	1.926E-06	3.284E-11	6.323E-17
0.3451	1.385E+08	2.015E-06	3.016E-10	6.079E-16
0.4634	1.214E+08	2.041E-06	3.510E-09	7.165E-15
0.6620	4.958E+10	2.025E-06	3.308E-05	6.700E-11
0.8669	2.476E+08	1.967E-06	1.668E-06	3.282E-12
1.0015	4.675E+08	1.922E-06	1.037E-05	1.994E-11
1.2559	3.617E+09	1.840E-06	4.840E-04	8.904E-10
1.5697	5.926E+07	1.747E-06	4.144E-05	7.239E-11
1.7427	3.315E+06	1.700E-06	4.795E-06	8.153E-12
1.8696	1.801E+05	1.667E-06	4.186E-07	6.979E-13
2.1688	1.202E+05	1.606E-06	7.280E-07	1.169E-12
2.2000	2.166E+02	1.602E-06	1.436E-09	2.301E-15
Totals:	9.528E+10 photons/sec		5.765E-04	1.063E-09 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.075	2.200E-33	1.612E-33	1.002E-33	1.380E-33	1.127E-33	3.518E-33
0.086	6.715E-29	5.090E-29	3.147E-29	4.311E-29	3.534E-29	1.028E-28
0.095	5.664E-27	4.401E-27	2.699E-27	3.698E-27	3.036E-27	8.474E-27
0.129	4.063E-20	3.362E-20	2.043E-20	2.806E-20	2.325E-20	5.817E-20
0.245	6.138E-17	5.073E-17	3.404E-17	4.415E-17	3.644E-17	8.282E-17
0.345	5.643E-16	4.739E-16	3.296E-16	4.165E-16	3.475E-16	7.576E-16
0.463	6.465E-15	5.545E-15	3.974E-15	4.912E-15	4.139E-15	8.322E-15
0.662	5.856E-11	5.168E-11	3.840E-11	4.617E-11	3.943E-11	7.305E-11
0.867	2.826E-12	2.546E-12	1.945E-12	2.287E-12	1.976E-12	3.433E-12
1.001	1.708E-11	1.555E-11	1.205E-11	1.400E-11	1.218E-11	2.052E-11
1.256	7.578E-10	7.000E-10	5.552E-10	6.324E-10	5.561E-10	8.970E-10
1.570	6.134E-11	5.734E-11	4.651E-11	5.195E-11	4.619E-11	7.178E-11
1.743	6.902E-12	6.481E-12	5.313E-12	5.879E-12	5.255E-12	8.039E-12
1.870	5.909E-13	5.564E-13	4.593E-13	5.051E-13	4.531E-13	6.861E-13
2.169	9.850E-13	9.323E-13	7.807E-13	8.477E-13	7.661E-13	1.137E-12
2.200	1.935E-15	1.832E-15	1.536E-15	1.666E-15	1.507E-15	2.232E-15
Totals	9.061E-10	8.351E-10	6.607E-10	7.541E-10	6.623E-10	1.076E-09

4 1/2' Concrete Shield

Source Shields Distance to Detector, X = 2.370E+02 cm
Cylindrical Cylindrical Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.372E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.331E+02 cm (2) Next Layer: 2.326E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	0.000E+00	0.000E+00
0.0749	2.224E+08	1.665E-06	1.150E-31	1.915E-37
0.0858	4.793E+08	1.602E-06	2.780E-26	4.454E-32
0.0951	1.884E+08	1.592E-06	4.120E-24	6.559E-30
0.1289	1.746E+09	1.682E-06	2.889E-16	4.859E-22
0.2445	3.863E+08	1.926E-06	9.976E-13	1.921E-18
0.3451	1.385E+08	2.015E-06	1.267E-11	2.554E-17
0.4634	1.214E+08	2.041E-06	1.947E-10	3.975E-16
0.6620	4.958E+10	2.025E-06	2.615E-06	5.296E-12
0.8669	2.476E+08	1.967E-06	1.714E-07	3.371E-13
1.0015	4.675E+08	1.922E-06	1.220E-06	2.345E-12
1.2559	3.617E+09	1.840E-06	6.965E-05	1.281E-10
1.5697	5.926E+07	1.747E-06	7.168E-06	1.252E-11
1.7427	3.315E+06	1.700E-06	8.991E-07	1.529E-12
1.8696	1.801E+05	1.667E-06	8.270E-08	1.379E-13
2.1688	1.202E+05	1.606E-06	1.598E-07	2.566E-13
2.2000	2.166E+02	1.602E-06	3.183E-10	5.101E-16
Totals:	9.528E+10 photons/sec		8.197E-05	1.506E-10 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.075	2.479E-37	1.817E-37	1.129E-37	1.555E-37	1.270E-37	3.964E-37
0.086	5.614E-32	4.256E-32	2.631E-32	3.604E-32	2.955E-32	8.596E-32
0.095	7.991E-30	6.209E-30	3.808E-30	5.217E-30	4.283E-30	1.196E-29
0.129	5.226E-22	4.324E-22	2.628E-22	3.609E-22	2.991E-22	7.483E-22
0.245	1.865E-18	1.541E-18	1.034E-18	1.341E-18	1.107E-18	2.516E-18
0.345	2.371E-17	1.991E-17	1.385E-17	1.750E-17	1.460E-17	3.183E-17
0.463	3.587E-16	3.076E-16	2.205E-16	2.725E-16	2.296E-16	4.617E-16
0.662	4.629E-12	4.085E-12	3.036E-12	3.650E-12	3.117E-12	5.775E-12
0.867	2.903E-13	2.616E-13	1.998E-13	2.350E-13	2.030E-13	3.527E-13
1.001	2.009E-12	1.829E-12	1.418E-12	1.647E-12	1.432E-12	2.413E-12
1.256	1.091E-10	1.007E-10	7.990E-11	9.101E-11	8.002E-11	1.291E-10
1.570	1.061E-11	9.919E-12	8.047E-12	8.987E-12	7.990E-12	1.242E-11
1.743	1.294E-12	1.215E-12	9.962E-13	1.102E-12	9.853E-13	1.507E-12
1.870	1.167E-13	1.099E-13	9.074E-14	9.980E-14	8.952E-14	1.356E-13
2.169	2.162E-13	2.046E-13	1.714E-13	1.861E-13	1.682E-13	2.495E-13
2.200	4.290E-16	4.062E-16	3.406E-16	3.694E-16	3.341E-16	4.947E-16
Totals	1.282E-10	1.184E-10	9.385E-11	1.069E-10	9.401E-11	1.519E-10

5' Concrete Shield

Source Cylindrical
Shields Cylindrical
Distance to Detector, X = 2.523E+02 cm
Source Volume = 1.456E+05 cc
Source Mass = 1.456E+05 grams
Source Length = 3.048E+03 cm
Distance Along Cylinder, Y = 1.524E+03 cm
Integration Specs: NTHETA = 9 NPSI = 19 DELR computed internally
Total Intervals: 9.542E+04 (photon source is the 1st region)
Shield Thickness: 3.900E+00, 5.490E-01, 3.260E+00, 7.110E-01, 1.524E+02, 9.144E+01 cm
Distances from Dose Point to the Outside of
(1) Source Region: 2.484E+02 cm (2) Next Layer: 2.478E+02 cm
Dose Buildup Data for Shield 5 with Effective Atomic Number 9.39
Buildup Material is a Mixture of Water and Aluminum (BuifZ= 6.265E-01)
Source values are interpreted as Ci/m3
Fluence-to-Dose Conversion: Photons in Air

Average E, MeV	Source Total photons/sec	Fluence to Dose Factor	Energy Fluence MeV/cm²/s	Dose Rate R/hr
0.0140	1.777E+10	1.025E-04	0.000E+00	0.000E+00
0.0252	1.839E+09	1.612E-05	0.000E+00	0.000E+00
0.0331	4.587E+09	7.155E-06	0.000E+00	0.000E+00
0.0442	1.061E+09	3.344E-06	0.000E+00	0.000E+00
0.0594	1.251E+10	2.028E-06	0.000E+00	0.000E+00
0.0647	2.608E+08	1.835E-06	0.000E+00	0.000E+00
0.0749	2.224E+08	1.665E-06	0.000E+00	0.000E+00
0.0858	4.793E+08	1.602E-06	2.277E-29	3.648E-35
0.0951	1.884E+08	1.592E-06	5.770E-27	9.187E-33
0.1289	1.746E+09	1.682E-06	3.752E-18	6.309E-24
0.2445	3.863E+08	1.926E-06	3.061E-14	5.895E-20
0.3451	1.385E+08	2.015E-06	5.363E-13	1.081E-18
0.4634	1.214E+08	2.041E-06	1.086E-11	2.217E-17
0.6620	4.958E+10	2.025E-06	2.078E-07	4.208E-13
0.8669	2.476E+08	1.967E-06	1.769E-08	3.481E-14
1.0015	4.675E+08	1.922E-06	1.442E-07	2.772E-13
1.2559	3.617E+09	1.840E-06	1.007E-05	1.853E-11
1.5697	5.926E+07	1.747E-06	1.246E-06	2.176E-12
1.7427	3.315E+06	1.700E-06	1.693E-07	2.879E-13
1.8696	1.801E+05	1.667E-06	1.641E-08	2.736E-14
2.1688	1.202E+05	1.606E-06	3.522E-08	5.654E-14
2.2000	2.166E+02	1.602E-06	7.086E-11	1.135E-16
Totals:	9.528E+10 photons/sec		1.191E-05	2.181E-11 R/hr

Dose Equivalent Rates (rem/hr) for Other Fluence-to-Dose Factors

Average E, MeV	Anterior DUNIT = 1	Posterior DUNIT = 2	Lateral DUNIT = 3	Rotational DUNIT = 4	Isometric DUNIT = 5	Orig ANSI DUNIT = 6
0.086	4.599E-35	3.486E-35	2.156E-35	2.952E-35	2.420E-35	7.041E-35
0.095	1.119E-32	8.696E-33	5.333E-33	7.307E-33	5.999E-33	1.674E-32
0.129	6.786E-24	5.615E-24	3.412E-24	4.687E-24	3.884E-24	9.717E-24
0.245	5.722E-20	4.729E-20	3.173E-20	4.115E-20	3.397E-20	7.721E-20
0.345	1.003E-18	8.426E-19	5.861E-19	7.405E-19	6.178E-19	1.347E-18
0.463	2.000E-17	1.716E-17	1.230E-17	1.520E-17	1.281E-17	2.575E-17
0.662	3.678E-13	3.246E-13	2.412E-13	2.900E-13	2.477E-13	4.588E-13
0.867	2.997E-14	2.701E-14	2.063E-14	2.426E-14	2.096E-14	3.641E-14
1.001	2.374E-13	2.162E-13	1.676E-13	1.947E-13	1.693E-13	2.852E-13
1.256	1.577E-11	1.456E-11	1.155E-11	1.316E-11	1.157E-11	1.866E-11
1.570	1.844E-12	1.724E-12	1.398E-12	1.562E-12	1.388E-12	2.158E-12
1.743	2.437E-13	2.288E-13	1.876E-13	2.076E-13	1.855E-13	2.838E-13
1.870	2.316E-14	2.181E-14	1.800E-14	1.980E-14	1.776E-14	2.689E-14
2.169	4.765E-14	4.510E-14	3.777E-14	4.101E-14	3.706E-14	5.499E-14
2.200	9.548E-17	9.041E-17	7.581E-17	8.222E-17	7.436E-17	1.101E-16
Totals	1.856E-11	1.715E-11	1.362E-11	1.550E-11	1.364E-11	2.197E-11

Closing: DAT'S ALL PHOLQUES!!!!!!!

Finish run at 11:11:27 03/07/96

Input File (C:\ISOSHLD\INPUT\KWASTE.) is shown below:

```
0         2 K-Waste Transfer Line
Earth Bermed - no Shield
 &INPUT NEXT=1, IGEOM=7, NSHLD=5, JBUF=5, DUNIT=7,
  T(1)=3.90, T(2)=0.549, T(3)=3.26, T(4)=0.711, T(5)=0.0,
  X=99.86, SLTH=3048., Y=1524., IPRNT=0, OPTION=1,
  ISPEC=3, ICONC=2, NTHETA=9, NPSI=19, SRCPRFX=0,
  WEIGHT(472)=2.80E-01, WEIGHT(082)=1.40E+01,
WEIGHT(084)=1.40E+01,
  WEIGHT(335)=1.07E+01, WEIGHT(336)=1.01E+01,
WEIGHT(415)=2.95E-01,
  WEIGHT(418)=1.67E-01, WEIGHT(492)=8.35E-01,
WEIGHT(493)=3.28E+00,
  WEIGHT(494)=1.80E+00, WEIGHT(495)=7.13E+01,
WEIGHT(497)=5.50E-04,
  WEIGHT(496)=6.35E+00, WEIGHT(520)=7.92E-03,
WEIGHT(476)=3.23E-04,
  WEIGHT(398)=1.17E-03, WEIGHT(526)=5.88E-03,
WEIGHT(450)=3.23E-04,
  WEIGHT(530)=5.90E-03, WEIGHT(490)=2.20E-05,
WEIGHT(441)=7.67E-06,
  WEIGHT(533)=5.90E-03, &
  SOURCE 1 1.00
  STEEL  9            7.8                  7.8
  AIR    3                       0.00129
1 EARTH 16                                              2.00
1" Earth Shield
 &INPUT NEXT=2, T(5)=2.54, X=102.4, &
2" Earth Shield
 &INPUT NEXT=2, T(5)=5.08, X=104.94, &
1/4' Earth Shield
 &INPUT NEXT=2, T(5)=7.62, X=107.48, &
1/2' Earth Shield
 &INPUT NEXT=2, T(5)=15.24, X=115.1, &
3/4' Earth Shield
 &INPUT NEXT=2, T(5)=22.86, X=122.72, &
1' Earth Shield
 &INPUT NEXT=2, T(5)=30.48, X=130.34, &
1 1/2' Earth Shield
 &INPUT NEXT=2, T(5)=45.72, X=145.58, &
2' Earth Shield
 &INPUT NEXT=2, T(5)=60.96, X=160.82,&
2 1/2' Earth Shield
 &INPUT NEXT=2, T(5)=76.2, X=176.06, &
3' Earth Shield
 &INPUT NEXT=2, T(5)=91.44, X=191.3, &
3 1/2' Earth Shield
 &INPUT NEXT=2, T(5)=106.68, X=206.54, &
```

```
4' Earth Shield
 &INPUT NEXT=2, T(5)=121.92, X=221.78, &
4 1/2' Earth Shield
 &INPUT NEXT=2, T(5)=137.16, X=237.02, &
5' Earth Shield
 &INPUT NEXT=2, T(5)=152.4, X=252.26, &
Concrete Shield - no Shield
 &INPUT NEXT=1, IGEOM=7,NSHLD=5, JBUF=5, DUNIT=7,
  T(1)=3.90, T(2)=0.549, T(3)=3.26, T(4)=0.711, T(5)=0.0,
  X=99.86, SLTH=3048., Y=1524., IPRNT=0, OPTION=1,
  ISPEC=3, ICONC=2, NTHETA=9, NPSI=19, SRCPRFX=0,
  WEIGHT(472)=2.80E-01, WEIGHT(082)=1.40E+01,
WEIGHT(084)=1.40E+01,
  WEIGHT(335)=1.07E+01, WEIGHT(336)=1.01E+01,
WEIGHT(415)=2.95E-01,
  WEIGHT(418)=1.67E-01, WEIGHT(492)=8.35E-01,
WEIGHT(493)=3.28E+00,
  WEIGHT(494)=1.80E+00, WEIGHT(495)=7.13E+01,
WEIGHT(497)=5.50E-04,
  WEIGHT(496)=6.35E+00, WEIGHT(520)=7.92E-03,
WEIGHT(476)=3.23E-04,
  WEIGHT(398)=1.17E-03, WEIGHT(526)=5.88E-03,
WEIGHT(450)=3.23E-04,
  WEIGHT(530)=5.90E-03, WEIGHT(490)=2.20E-05,
WEIGHT(441)=7.67E-06,
  WEIGHT(533)=5.90E-03, &
  SOURCE 1 1.00
  STEEL  9            7.8                  7.8
  AIR    3                       0.00129
1 CONC  16                                          2.35
1" Concrete Shield
 &INPUT NEXT=2, T(5)=2.54, X=102.4, &
2" Concrete Shield
 &INPUT NEXT=2, T(5)=5.08, X=104.94, &
1/4' Concrete Shield
 &INPUT NEXT=2, T(5)=7.62, X=107.48, &
1/2' Concrete Shield
 &INPUT NEXT=2, T(5)=15.24, X=115.1, &
3/4' Concrete Shield
 &INPUT NEXT=2, T(5)=22.86, X=122.72, &
1' Concrete Shield
 &INPUT NEXT=2, T(5)=30.48, X=130.34, &
1 1/2' Concrete Shield
 &INPUT NEXT=2, T(5)=45.72, X=145.58, &
2' Concrete Shield
 &INPUT NEXT=2, T(5)=60.96, X=160.82,&
2 1/2' Concrete Shield
 &INPUT NEXT=2, T(5)=76.2, X=176.06, &
3' Concrete Shield
 &INPUT NEXT=2, T(5)=91.44, X=191.3, &
```

```
3 1/2' Concrete Shield
 &INPUT NEXT=2, T(5)=106.68, X=206.54, &
4' Concrete Shield
 &INPUT NEXT=2, T(5)=121.92, X=221.78, &
4 1/2' Concrete Shield
 &INPUT NEXT=2, T(5)=137.16, X=237.02, &
5' Concrete Shield
 &INPUT NEXT=2, T(5)=152.4, X=252.26, &
DAT'S ALL PHOLQUES!!!!!!!
 &INPUT NEXT=6, &
```

CHECKLIST FOR INDEPENDENT TECHNICAL REVIEW

DOCUMENT REVIEWED
NUMBER: WHC-SD-WM-ES-383
TITLE: Shielding Requirements for K-Basin Waste Transfer Line
AUTHOR(s): H. J. Goldberg

I. Method(s) of Review

(✓) Input data checked for accuracy
(✓) Independent calculation performed
( ) Hand calculation
(✓) Alternate computer code: Microshield*
( ) Comparison to experiment or previous results
( ) Alternate method (define)_____

II. Checklist (either check or enter NA if not applied)

(✓) Task completely defined
(✓) Activity consistent with task specification
(✓) Necessary assumptions explicitly stated and supported
(✓) Resources properly identified and referenced
(✓) Resource documentation appropriate for this application
(✓) Input data explicitly stated
(✓) Input data verified to be consistent with original source
(✓) Geometric model adequate representation of actual geometry
(✓) Material properties appropriate and reasonable
(✓) Mathematical derivations checked including dimensional consistency
(✓) Hand calculations checked for errors
(✓) Assumptions explicitly stated and justified
(✓) Computer software appropriate for task and used within range of validity
(NA) Use of resource outside range of established validity is justified
(✓) Software runstreams correct and consistent with results
(✓) Software output consistent with input
(✓) Results consistent with applicable previous experimental or analytical findings
(✓) Results and conclusions address all points and are consistent with task requirements and/or established limits or criteria
(✓) Conclusions consistent with analytical results and established limits
(✓) Uncertainty assesment appropriate and reasonable
( ) Other (define)_____

III. Comments:_____

IV. REVIEWER: _____ DATE: 25 Mar 96

*Microshield is a registered trademark of Grove Engineering, Inc., Rockville, MD

CHECKLIST FOR INDEPENDENT TECHNICAL REVIEW

DOCUMENT REVIEWED
NUMBER: WHC-SD-WM-ES-383
TITLE: Shielding Requirements for K-Basin Waste Transfer Line
AUTHOR(s): H. J. Goldberg

I. Method(s) of Review

(X) Input data checked for accuracy
( ) Independent calculation performed
( ) Hand calculation
( ) Alternate computer code: _____
( ) Comparison to experiment or previous results
( ) Alternate method (define) All aspects of the writing checked for correctness

II. Checklist (either check or enter NA if not applied)

(NA) Task completely defined
(NA) Activity consistent with task specification
(NA) Necessary assumptions explicitly stated and supported
(NA) Resources properly identified and referenced
(NA) Resource documentation appropriate for this application
(X) Input data explicitly stated
(X) Input data verified to be consistent with original source
(NA) Geometric model adequate representation of actual geometry
(NA) Material properties appropriate and reasonable
(NA) Mathematical derivations checked including dimensional consistency
(NA) Hand calculations checked for errors
(NA) Assumptions explicitly stated and justified
(X) Computer software appropriate for task and used within range of validity
(NA) Use of resource outside range of established validity is justified
(X) Software runstreams correct and consistent with results
(X) Software output consistent with input
(NA) Results consistent with applicable previous experimental or analytical findings
(NA) Results and conclusions address all points and are consistent with task requirements and/or established limits or criteria
(NA) Conclusions consistent with analytical results and established limits
(NA) Uncertainty assesment appropriate and reasonable
( ) Other (define) _____

III. Comments: _____

IV. REVIEWER: D. E. Larson DATE: 3-25-96

DISTRIBUTION SHEET

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Shielding Requirements for K-Basin Waste Transfer Line		ECN No.

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H. J. Goldberg	H0-35	X			
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