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Station 15

ENGINEERING DATA TRANSMITTAL

Page 1 of 1
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1	HNF-SD-WM-CN-091		0	Calculational Note in Support of Inventory Assessment of Three Tank Trailers Using Radiological Attenuation Calculations	NA	3	1	
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E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval	4. Review	1. Approved		4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment		5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment		6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
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		Design Authority									
		Design Agent									
1	1	Cog.Eng. H. J. Goldberg	<i>H. J. Goldberg</i>		H0-35						
1	1	Cog. Mgr. J. Greenberg	<i>J. Greenberg</i>		H0-35						
		QA									
		Safety									
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18. <i>H. J. Goldberg</i> Signature of EDT Originator <i>30/12/96</i> Date		19. _____ Authorized Representative Date for Receiving Organization		20. <i>J. Greenberg</i> Signature of Design Authority/ Cognizant Manager <i>12/30/96</i> Date		21. DOE APPROVAL (if required) Ctrl. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments	
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Calculational Note in Support of Inventory Assessment of Three Tank Trailers Using Radiological Attenuation Calculations

H. J. Goldberg

Fluor Daniel Northwest, Inc., Richland, WA 99352
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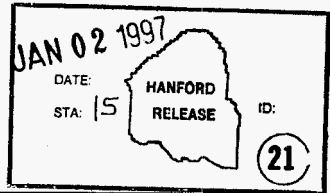
Key Words: Purex, UNH, Waste, Organic, Tanker

Abstract: An estimate of tanker inventory using radiological attenuation calculations.

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**Calculational Note
in support of
Inventory Assessment of Three Tank Trailers
using Radiological Attenuation Calculations**

Harvey Goldberg
21 December 1996

Purpose

The PUREX Plant wishes to ascertain the degree of radiological contamination inside three tank trailers which are, for all extent and purposes, empty. Dose/Exposure rate measurements have been performed on the outside of the tanks which, when combined with historical records of the isotopic composition of the waste that had been shipped in the tanks, provided an estimate of the present degree of contamination.

Methodology

The computer code ISOSHL D (References 1, 2, and 3) was used to calculate the dose rate on the outside of the tanks. Bremsstrahlung from the β -particle emitting radionuclides was accounted for. The fluence-to-dose conversion factors used in the calculation were the deep dose equivalent conversion factors from Reference 4. It was felt that these conversion factors corresponded best to the calibration of the Hanford hand-held survey instruments.

Assumptions

It was assumed that each tank could be modeled as a long, thin cylinder with cylindrical shields between it and the dose points. Dose points were chosen in the middle and the end of the side of the tank to correspond to the radiological survey provided by the customer. The first shield which is the source was modeled somewhat arbitrarily as aluminum.

The density used was the reported density of the original solutions although by this time evaporation most probably has resulted in a much denser solution. This is a conservative assumption with respect to the various fission products and uranium actually in the source. The second shield was chosen to be iron which is again a conservative assumption since stainless steel is slightly denser.

Input Data

There are three tanker trailers being investigated;

- H0-64-4278, formerly used for organic waste. This trailer is 1036 cm (~34 ft) long and has an outer diameter of 12.70 cm (~5 ft). It is constructed out of $\frac{1}{2}$ in 316 stainless steel. The tanker has a capacity of approximately 18,900 l (5,000 gal) although it is estimated that there is only 3.8 to 7.6 l (1 - 2 gal) of waste in the tanker.
- H0-64-5920, an older tanker used for Uranyl Nitrate Hexahydrate (UNH). This trailer is 701 cm (~23 ft) long and has an outer diameter of 145 cm (~57 in). It is constructed out of $\frac{1}{2}$ in 304L stainless steel. The tanker has a capacity of approximately 11,400 l (3,000 gal) although it is estimated that it is empty at the moment. However there may be a solid heel on the bottom.
- H0-64-5473, a newer tanker used for UNH. This trailer is 751 cm (~24 ft 7.5 in) long and has an outer diameter of 145 cm (~57 in). It is constructed out of $\frac{1}{2}$ in 304L stainless steel. The tanker has a capacity of approximately 11,400 l (3,000 gal) although it is estimated that there is only 7.6 to 11.4 l (2 - 3 gal) of waste in the tanker.

Surveys have been performed. The contact exposure rates measured were 170 mR/hr at the "belly" of the organic tank. It was assumed that this measurement was performed in the center of the tanker. In addition a measurement at the front yielded 3 mR/hr while one at the back yielded 4 mR/hr. These were also in contact with the surface of the tank. Exposure rates along the surface of both UNH tanks were below 0.5 mR/hr. For the purpose of this analysis, the conservative assumption was made that the exposure rates were at this limit.

An isotopic inventory of the solutions shipped in the tankers was used as the assumed isotopic inventory of the remaining contamination. In the case of the organic waste, two analyses were available. The worst case inventory was chosen. These inventories are presented below in Table 1.

Table 1: Isotopic Inventory ($\mu\text{Ci/l}$)		
Isotope	Organic Waste $\rho = 0.8122 \text{ g/cm}^3$	UNH $\rho = 1.665 \text{ g/cm}^3$
^{60}Co	1.45e-01	
^{95}Nb	1.84e-02	4.67e-01
^{95}Zr	2.08e-02	7.18e-02
^{103}Ru	1.46e-02	< 3.96e-02
^{106}Ru	6.82e+00	< 5.33e-01
^{106}Rh	6.82e+00	< 5.33e-01
^{125}Sb	1.20e-01	
^{134}Cs	1.93e-02	4.27e-02
^{137}Cs	8.45e-01	3.60e-02
$^{137\text{m}}\text{Ba}$	7.99e-01	3.41e-02
^{144}Ce	7.12e-01	< 5.81e-01
^{144}Pr	7.12e-01	< 5.81e-01
^{155}Eu	8.44e-02	
^{234}U	1.72e-09	2.69e+03
^{235}U	4.97e-08	9.80e-02
^{236}U	1.39e-08	2.17e-02
^{238}U	8.31e-06	1.59e+00
^{241}Am	1.50e-01	

Whenever the concentration is reported as less than an amount, the amount was used as a worst case. The Uranium numbers were calculated from the gram amounts as illustrated in Table 2. The UNH waste had 4.7905 $\text{g}_\text{U}/\text{l}$ while the Organic waste had $2.500 \times 10^{-6} \text{ g}_\text{U}/\text{l}$.

Table 2: Uranium Concentrations					
Isotope	S A * ($\mu\text{Ci/g}$)	Waste Type	weight fraction	Weight Concentration (g/l)	Activity Concentration ($\mu\text{Ci/l}$)
^{234}U	6.25e+03	Organic	0.00011	2.75e-10	1.72e-06
		UNH	0.00009	4.31e-04	2.69e+00
^{235}U	2.16e+00	Organic	0.00921	2.30e-08	4.97e-08
		UNH	0.00947	4.54e-02	9.80e-02
^{236}U	6.47e+01	Organic	0.00086	2.15e-09	1.39e-07
		UNH	0.0007	3.35e-03	2.17e-01
^{238}U	3.36e-01	Organic	0.98982	2.47e-06	8.31e-07
		UNH	0.98974	4.74e+00	1.59e+00

* Reference 5

Calculations

The computer code ISOSHLD (References 1, 2, and 3) was used to calculate the dose rate on the outside of the tanks. Bremsstrahlung from the β -particle emitting radionuclides was accounted for. The fluence-to-dose conversion factors used in the calculation were the deep dose equivalent conversion factors from Reference 4. It was felt that these conversion factors corresponded best to the calibration of the Hanford hand-held survey instruments.

The source was modeled as a long thin cylinder, corresponding to a solid heel or a few gallons of waste on the lowest portion of the tanker. An annular source was experimented with also which would correspond to a thin layer of contamination covering all of the inside surface of the tanker. However, it was felt that the results of this calculation were unbelievable.

The dose points were in contact with the outside surface of the tanker in the middle of its length and at the end of the side wall. More credence was placed in the midpoint readings than in the end readings since the effect of the end wall and of any additional hardware on the end of the tanker could not be taken into account.

The activity of one liter of original solution was used as a source. This source was multiplied by 1,000 in order to have the results in mR/hr rather than R/hr. These results are tabulated in Table 3.

Table 3: ISOSHL D Results and Measurements				
Source	Position	ISOSHL D (mR/hr)	Measurement (mR/hr)	Estimated Volume (l)
Organic Tanker	Middle	1.03×10^{-2}	17	1600
	End	7.20×10^{-3}	3 (back) 4 (Front)	420 560
Old UNH Tanker	Middle	6.65×10^{-3}	< 0.5	< 75
	End	4.79×10^{-3}	< 0.5	< 100
New UNH Tanker	Middle	6.21×10^{-3}	< 0.5	< 81
	End	4.48×10^{-3}	< 0.5	< 110

As I stated above, the middle reading is more believable than the end reading, and thus in my opinion, the best estimate of the amount of radionuclides in the tankers is 1600 l in the organic tanker, 75 l in the old UNH tanker, and 81 l in the new UNH tanker. It must be understood that this is the activity that was in those volumes of the original solution, not the actual volume of residue left in the tanks. This activity is definitely more concentrated due to evaporation of the original waste solutions and may be in the form of a solid residue.

Conclusions

Table 4 is a listing of the estimated activities of the various isotopes believed to be in each of the three tankers. In addition, the uranium estimates are given in terms of estimated mass as well as estimated activity.

Table 4: Estimated Contents μCi (g)			
Isotope	Organic Tanker	Old UNH Tanker	New UNH Tanker
⁶⁰ Co	2.32e+02	0.00e+00	0.00e+00
⁹⁵ Nb	2.94e+01	3.50e+01	3.78e+01
⁹⁵ Zr	3.33e+01	5.39e+00	5.82e+00
¹⁰³ Ru	2.34e+01	2.97e+00	3.21e+00
¹⁰⁶ Ru	1.09e+04	4.00e+01	4.32e+01
¹⁰⁶ Rh	1.09e+04	4.00e+01	4.32e+01
¹²⁵ Sb	1.92e+02	0.00e+00	0.00e+00
¹³⁴ Cs	3.09e+01	3.20e+00	3.46e+00
¹³⁷ Cs	1.35e+03	2.70e+00	2.92e+00
^{137m} Ba	1.28e+03	2.56e+00	2.76e+00
¹⁴⁴ Ce	1.14e+03	4.36e+01	4.71e+01
¹⁴⁴ Pr	1.14e+03	4.36e+01	4.71e+01
¹⁵⁵ Eu	1.35e+02	0.00e+00	0.00e+00
²³⁴ U μCi g	2.75e-06	2.02e+05	2.18e+05
	4.40e-10	3.23e+01	3.49e+01
²³⁵ U μCi g	7.95e-05	7.35e+00	7.94e+00
	3.68e-05	3.40e+00	3.68e+00
²³⁶ U μCi g	2.22e-05	1.63e+00	1.76e+00
	3.44e-07	2.52e-02	2.72e-02
²³⁸ U μCi g	1.33e-02	1.19e+02	1.29e+02
	3.96e-02	3.55e+02	3.83e+02
²⁴¹ Am	2.40e+02	0.00e+00	0.00e+00

The total uranium content of the three tankers is 4.0×10^{-2} g for the organic tanker, 3.9×10^2 g for the old UNH tanker, and 4.2×10^2 g. Note that these are worst case estimates. This is especially true for the UNH tanks. The survey sheets indicate that no readings were obtained and the readings are recorded as less than the lower limit of detection.

REFERENCES

- 1) ISOSHL D- A Computer Code for General Purpose Isotope Shielding Analysis, BNWL-236, R. L. Engel, J. Greenborg, M. M. Hendrickson, dated June 1966.
- 2) *ISOSHL D-II: Code Revision to Include Calculation of Dose Rate from Shielded Bremsstrahlung Sources*, G. L. Simmons, J. J. Regimbal, J. Greenborg, E. L. Kelly, Jr., H. H. van Tuyl, dated March 1967.
- 3) CCC-636, *ISO-PC Version 2.1*, WHC-SD-WM-UM-030, P. D. Rittmann, Radiation Safety Information Computational Center, Oak Ridge, Tennessee, 1996.
- 4) *Neutron and Gamma-ray Fluence-to-dose Factors*, ANSI/ANS-6.1.1-1977.
- 5) *Basis and Values for Specific Activity and Decay Heat Generation Rates for Selected Radionuclides*, SD-RE-TI-131, T. D. Kirkpatrick and R. C. Brown, Rockwell Hanford Operations, Richland, Washington, 1984

Computer Output

Run started at 11:54:57 12/20/96

ISO-PC Version 2.1 February 1996
originally ISOSHLD-II; RIBD was removed
Please send questions or comments to:
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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: PUREX Tank Trailers

Organic Tank (H0-64-4278) Line Source - Middle

Table of Source Activity:

Scale Factor = 1.000E+03

Isotope Wt.	Name	Initial Values	Final μ Ci
472	CO- 60	1.450E-01	1.450E+02
117	ZR- 95	2.080E-02	2.080E+01
119	NB- 95	1.840E-02	1.840E+01
155	RU-103	1.460E-02	1.460E+01
170	RU-106	6.820E+00	6.820E+03
172	RH-106	6.820E+00	6.820E+03
269	SB-125	1.200E-01	1.200E+02
319	CS-134	1.930E-02	1.930E+01
335	CS-137	8.450E-01	8.450E+02
336	BA-137M	7.990E-01	7.990E+02
376	CE-144	7.120E-01	7.120E+02
377	PR-144	7.120E-01	7.120E+02
418	EU-155	8.440E-02	8.440E+01
520	U -234	1.720E-09	1.720E-06
476	U -235	1.390E-08	1.390E-05
398	U -236	4.970E-08	4.970E-05
526	U -238	8.310E-06	8.310E-03
496	AM-241	2.150E-02	2.150E+01

Organic Tank (HO-64-4278) Line Source - Middle

Photon Production Rate for Each Radionuclide:

>>> CO- 60 (Z = 27) Weight(472) = 1.450E+02 μ Ci

Group No.	Photon Mean	Energy, MeV		Photon Production Rate		Total photon/s
		Low	High	Gamma&Xray	Bremss.	
1	0.0144	0.01	0.02	0.000E+00	1.701E+04	1.701E+04
2	0.0241	0.02	0.03	0.000E+00	5.881E+03	5.881E+03
3	0.0345	0.03	0.04	0.000E+00	3.187E+03	3.187E+03
4	0.0447	0.04	0.05	0.000E+00	1.877E+03	1.877E+03
5	0.0546	0.05	0.06	0.000E+00	1.211E+03	1.211E+03
6	0.0647	0.06	0.07	0.000E+00	8.433E+02	8.433E+02
7	0.0747	0.07	0.08	0.000E+00	5.828E+02	5.828E+02
8	0.0847	0.08	0.09	0.000E+00	4.164E+02	4.164E+02
9	0.0947	0.09	0.10	0.000E+00	3.022E+02	3.022E+02
10	0.1239	0.10	0.20	0.000E+00	7.872E+02	7.872E+02
11	0.2141	0.20	0.30	0.000E+00	2.098E+01	2.098E+01
12	0.3000	0.30	0.40	0.000E+00	8.216E-03	8.216E-03
14	0.6938	0.55	0.75	8.584E+02	0.000E+00	8.584E+02
17	1.2530	1.10	1.35	1.073E+07	0.000E+00	1.073E+07
Total Photons/sec:				1.073E+07	3.211E+04	1.076E+07

>>> ZR- 95 (Z = 40) Weight(117) = 2.080E+01 μ Ci

Group No.	Photon Mean	Energy, MeV		Photon Production Rate		Total photon/s
		Low	High	Gamma&Xray	Bremss.	
1	0.0145	0.01	0.02	0.000E+00	2.867E+03	2.867E+03
2	0.0242	0.02	0.03	0.000E+00	1.338E+03	1.338E+03
3	0.0347	0.03	0.04	0.000E+00	6.166E+02	6.166E+02
4	0.0446	0.04	0.05	0.000E+00	3.882E+02	3.882E+02
5	0.0547	0.05	0.06	0.000E+00	2.596E+02	2.596E+02
6	0.0647	0.06	0.07	0.000E+00	1.787E+02	1.787E+02
7	0.0748	0.07	0.08	0.000E+00	1.298E+02	1.298E+02
8	0.0847	0.08	0.09	0.000E+00	9.554E+01	9.554E+01
9	0.0948	0.09	0.10	0.000E+00	7.200E+01	7.200E+01
10	0.1288	0.10	0.20	0.000E+00	2.248E+02	2.248E+02
11	0.2290	0.20	0.30	0.000E+00	1.791E+01	1.791E+01
12	0.3347	0.30	0.40	0.000E+00	2.054E+00	2.054E+00
13	0.4551	0.40	0.55	0.000E+00	7.270E-01	7.270E-01
14	0.7242	0.55	0.75	3.363E+05	1.455E-01	3.363E+05
15	0.7567	0.75	0.90	4.256E+05	8.727E-03	4.256E+05
16	0.9332	0.90	1.10	0.000E+00	7.211E-04	7.211E-04
17	1.1000	1.10	1.35	0.000E+00	7.298E-08	7.298E-08
Total Photons/sec:				7.619E+05	6.190E+03	7.681E+05

>>> NB- 95 (Z = 41) Weight(119) = 1.840E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total
No.	Mean	Low	High	Gamma&Xray	Bremss.	photon/s
1	0.0136	0.01	0.02	0.000E+00	6.098E+02	6.098E+02
2	0.0244	0.02	0.03	0.000E+00	1.963E+02	1.963E+02
3	0.0344	0.03	0.04	0.000E+00	8.983E+01	8.983E+01
4	0.0444	0.04	0.05	0.000E+00	4.550E+01	4.550E+01
5	0.0545	0.05	0.06	0.000E+00	2.414E+01	2.414E+01
6	0.0645	0.06	0.07	0.000E+00	1.285E+01	1.285E+01
7	0.0745	0.07	0.08	0.000E+00	6.746E+00	6.746E+00
8	0.0844	0.08	0.09	0.000E+00	3.465E+00	3.465E+00
9	0.0944	0.09	0.10	0.000E+00	1.707E+00	1.707E+00
10	0.1003	0.10	0.20	0.000E+00	2.772E+00	2.772E+00
11	0.2144	0.20	0.30	0.000E+00	8.258E-04	8.258E-04
12	0.3000	0.30	0.40	0.000E+00	4.805E-07	4.805E-07
15	0.7658	0.75	0.90	6.795E+05	0.000E+00	6.795E+05
Total Photons/sec:				6.795E+05	9.931E+02	6.805E+05

>>> RU-103 (Z = 44) Weight(155) = 1.460E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total
No.	Mean	Low	High	Gamma&Xray	Bremss.	photon/s
1	0.0137	0.01	0.02	0.000E+00	7.374E+02	7.374E+02
2	0.0204	0.02	0.03	2.539E+03	2.863E+02	2.825E+03
3	0.0345	0.03	0.04	0.000E+00	1.551E+02	1.551E+02
4	0.0445	0.04	0.05	0.000E+00	8.891E+01	8.891E+01
5	0.0530	0.05	0.06	1.945E+03	5.052E+01	1.995E+03
6	0.0647	0.06	0.07	0.000E+00	3.336E+01	3.336E+01
7	0.0747	0.07	0.08	0.000E+00	2.256E+01	2.256E+01
8	0.0847	0.08	0.09	0.000E+00	1.501E+01	1.501E+01
9	0.0947	0.09	0.10	0.000E+00	1.055E+01	1.055E+01
10	0.1293	0.10	0.20	0.000E+00	3.251E+01	3.251E+01
11	0.2968	0.20	0.30	1.459E+03	5.263E+00	1.464E+03
12	0.3381	0.30	0.40	0.000E+00	1.251E+00	1.251E+00
13	0.4978	0.40	0.55	4.773E+05	2.963E-01	4.773E+05
14	0.6044	0.55	0.75	3.911E+04	1.611E-02	3.911E+04
Total Photons/sec:				5.223E+05	1.439E+03	5.238E+05

>>> RU-106 (Z = 44) Weight(170) = 6.820E+03 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total
No.	Mean	Low	High	Gamma&Xray	Bremss.	photon/s
1	0.0129	0.01	0.02	0.000E+00	8.662E+03	8.662E+03
2	0.0225	0.02	0.03	0.000E+00	5.734E+02	5.734E+02
3	0.0304	0.03	0.04	0.000E+00	1.579E+01	1.579E+01
Total Photons/sec:				0.000E+00	9.252E+03	9.252E+03

>>> RH-106 (Z = 45) Weight(172) = 6.820E+03 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0146	0.01	0.02	0.000E+00	1.305E+07	1.305E+07
2	0.0245	0.02	0.03	0.000E+00	7.016E+06	7.016E+06
3	0.0347	0.03	0.04	0.000E+00	4.627E+06	4.627E+06
4	0.0447	0.04	0.05	0.000E+00	3.296E+06	3.296E+06
5	0.0548	0.05	0.06	0.000E+00	2.498E+06	2.498E+06
6	0.0648	0.06	0.07	0.000E+00	2.041E+06	2.041E+06
7	0.0748	0.07	0.08	0.000E+00	1.633E+06	1.633E+06
8	0.0849	0.08	0.09	0.000E+00	1.375E+06	1.375E+06
9	0.0950	0.09	0.10	0.000E+00	1.242E+06	1.242E+06
10	0.1441	0.10	0.20	0.000E+00	8.888E+06	8.888E+06
11	0.2410	0.20	0.30	0.000E+00	3.453E+06	3.453E+06
12	0.3460	0.30	0.40	0.000E+00	1.687E+06	1.687E+06
13	0.5106	0.40	0.55	5.198E+07	1.362E+06	5.334E+07
14	0.6220	0.55	0.75	2.650E+07	9.304E+05	2.743E+07
15	0.8590	0.75	0.90	1.060E+06	3.905E+05	1.450E+06
16	1.0460	0.90	1.10	4.365E+06	3.157E+05	4.681E+06
17	1.1428	1.10	1.35	1.009E+06	2.185E+05	1.228E+06
18	1.4048	1.35	1.60	1.867E+06	1.135E+05	1.981E+06
19	1.6911	1.60	1.80	0.000E+00	5.022E+04	5.022E+04
20	1.8907	1.80	2.00	0.000E+00	2.943E+04	2.943E+04
21	2.0900	2.00	2.20	0.000E+00	1.666E+04	1.666E+04
22	2.2892	2.20	2.40	0.000E+00	8.946E+03	8.946E+03
23	2.4879	2.40	2.60	0.000E+00	4.455E+03	4.455E+03
24	2.6855	2.60	2.80	0.000E+00	1.983E+03	1.983E+03
25	2.9226	2.80	3.20	0.000E+00	9.684E+02	9.684E+02
26	3.2000	3.20	4.00	0.000E+00	7.528E+01	7.528E+01
Total Photons/sec:				8.678E+07	5.425E+07	1.410E+08

>>> SB-125 (Z = 51) Weight(269) = 1.200E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0142	0.01	0.02	0.000E+00	1.097E+04	1.097E+04
2	0.0287	0.02	0.03	2.180E+06	4.966E+03	2.185E+06
3	0.0345	0.03	0.04	0.000E+00	2.783E+03	2.783E+03
4	0.0445	0.04	0.05	0.000E+00	1.540E+03	1.540E+03
5	0.0547	0.05	0.06	0.000E+00	9.858E+02	9.858E+02
6	0.0647	0.06	0.07	0.000E+00	7.180E+02	7.180E+02
7	0.0747	0.07	0.08	0.000E+00	5.053E+02	5.053E+02
8	0.0848	0.08	0.09	0.000E+00	3.754E+02	3.754E+02
9	0.0948	0.09	0.10	0.000E+00	2.921E+02	2.921E+02
10	0.1740	0.10	0.20	3.255E+05	1.001E+03	3.265E+05
11	0.2101	0.20	0.30	3.108E+04	1.377E+02	3.122E+04
12	0.3675	0.30	0.40	8.480E+04	2.437E+01	8.483E+04
13	0.4371	0.40	0.55	1.784E+06	3.736E+00	1.784E+06
14	0.6161	0.55	0.75	1.595E+06	3.994E-02	1.595E+06
Total Photons/sec:				6.000E+06	2.430E+04	6.025E+06

>>> CS-134 (Z = 55) Weight(319) = 1.930E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0142	0.01	0.02	0.000E+00	3.383E+03	3.383E+03
2	0.0286	0.02	0.03	5.998E+03	1.948E+03	7.946E+03
3	0.0346	0.03	0.04	0.000E+00	1.333E+03	1.333E+03
4	0.0444	0.04	0.05	0.000E+00	7.481E+02	7.481E+02
5	0.0548	0.05	0.06	0.000E+00	4.366E+02	4.366E+02
6	0.0648	0.06	0.07	0.000E+00	3.477E+02	3.477E+02
7	0.0747	0.07	0.08	0.000E+00	2.600E+02	2.600E+02
8	0.0848	0.08	0.09	0.000E+00	1.910E+02	1.910E+02
9	0.0948	0.09	0.10	0.000E+00	1.585E+02	1.585E+02
10	0.1343	0.10	0.20	0.000E+00	6.324E+02	6.324E+02
11	0.2372	0.20	0.30	0.000E+00	1.232E+02	1.232E+02
12	0.3369	0.30	0.40	0.000E+00	2.700E+01	2.700E+01
13	0.4754	0.40	0.55	1.043E+04	5.312E+00	1.043E+04
14	0.5973	0.55	0.75	8.670E+05	1.797E-01	8.670E+05
15	0.7964	0.75	0.90	6.722E+05	4.976E-04	6.722E+05
16	0.9000	0.90	1.10	0.000E+00	7.385E-06	7.385E-06
17	1.1220	1.10	1.35	1.999E+04	0.000E+00	1.999E+04
18	1.3650	1.35	1.60	2.171E+04	0.000E+00	2.171E+04
Total Photons/sec:				1.597E+06	9.594E+03	1.607E+06

>>> CS-137 (Z = 55) Weight(335) = 8.450E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0143	0.01	0.02	0.000E+00	1.706E+05	1.706E+05
2	0.0246	0.02	0.03	0.000E+00	9.901E+04	9.901E+04
3	0.0344	0.03	0.04	0.000E+00	5.260E+04	5.260E+04
4	0.0448	0.04	0.05	0.000E+00	3.119E+04	3.119E+04
5	0.0547	0.05	0.06	0.000E+00	2.351E+04	2.351E+04
6	0.0647	0.06	0.07	0.000E+00	1.643E+04	1.643E+04
7	0.0748	0.07	0.08	0.000E+00	1.261E+04	1.261E+04
8	0.0847	0.08	0.09	0.000E+00	9.109E+03	9.109E+03
9	0.0949	0.09	0.10	0.000E+00	6.934E+03	6.934E+03
10	0.1340	0.10	0.20	0.000E+00	2.776E+04	2.776E+04
11	0.2379	0.20	0.30	0.000E+00	5.305E+03	5.305E+03
12	0.3400	0.30	0.40	0.000E+00	1.393E+03	1.393E+03
13	0.4580	0.40	0.55	0.000E+00	6.258E+02	6.258E+02
14	0.6219	0.55	0.75	0.000E+00	2.013E+02	2.013E+02
15	0.8048	0.75	0.90	0.000E+00	2.736E+01	2.736E+01
16	0.9459	0.90	1.10	0.000E+00	3.982E+00	3.982E+00
17	1.1000	1.10	1.35	0.000E+00	2.896E-02	2.896E-02
Total Photons/sec:				0.000E+00	4.573E+05	4.573E+05

>>> BA-137M (Z = 56) Weight(336) = 7.990E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
3	0.0329	0.03	0.04	2.152E+06	0.000E+00	2.152E+06
14	0.6616	0.55	0.75	2.660E+07	0.000E+00	2.660E+07
Total Photons/sec:				2.875E+07	0.000E+00	2.875E+07

>>> CE-144 (Z = 58) Weight(376) = 7.120E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0143	0.01	0.02	0.000E+00	6.951E+04	6.951E+04
2	0.0241	0.02	0.03	0.000E+00	2.382E+04	2.382E+04
3	0.0358	0.03	0.04	1.899E+06	1.267E+04	1.912E+06
4	0.0409	0.04	0.05	5.427E+05	7.357E+03	5.500E+05
5	0.0546	0.05	0.06	0.000E+00	4.675E+03	4.675E+03
6	0.0647	0.06	0.07	0.000E+00	3.197E+03	3.197E+03
7	0.0747	0.07	0.08	0.000E+00	2.177E+03	2.177E+03
8	0.0801	0.08	0.09	4.215E+05	1.533E+03	4.230E+05
9	0.0947	0.09	0.10	0.000E+00	1.097E+03	1.097E+03
10	0.1335	0.10	0.20	2.845E+06	2.792E+03	2.848E+06
11	0.2139	0.20	0.30	0.000E+00	6.976E+01	6.976E+01
12	0.3000	0.30	0.40	0.000E+00	2.692E-02	2.692E-02
Total Photons/sec:				5.709E+06	1.289E+05	5.838E+06

>>> PR-144 (Z = 59) Weight(377) = 7.120E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0145	0.01	0.02	0.000E+00	1.216E+06	1.216E+06
2	0.0246	0.02	0.03	0.000E+00	6.079E+05	6.079E+05
3	0.0346	0.03	0.04	0.000E+00	4.095E+05	4.095E+05
4	0.0448	0.04	0.05	0.000E+00	2.830E+05	2.830E+05
5	0.0548	0.05	0.06	0.000E+00	2.228E+05	2.228E+05
6	0.0648	0.06	0.07	0.000E+00	1.697E+05	1.697E+05
7	0.0749	0.07	0.08	0.000E+00	1.359E+05	1.359E+05
8	0.0850	0.08	0.09	0.000E+00	1.264E+05	1.264E+05
9	0.0949	0.09	0.10	0.000E+00	1.191E+05	1.191E+05
10	0.1424	0.10	0.20	0.000E+00	7.941E+05	7.941E+05
11	0.2418	0.20	0.30	0.000E+00	2.581E+05	2.581E+05
12	0.3447	0.30	0.40	0.000E+00	1.329E+05	1.329E+05
13	0.4668	0.40	0.55	0.000E+00	1.066E+05	1.066E+05
14	0.6876	0.55	0.75	3.899E+05	6.955E+04	4.594E+05
15	0.8186	0.75	0.90	0.000E+00	2.772E+04	2.772E+04
16	0.9894	0.90	1.10	0.000E+00	2.153E+04	2.153E+04
17	1.2095	1.10	1.35	0.000E+00	1.377E+04	1.377E+04
18	1.4867	1.35	1.60	7.903E+04	6.443E+03	8.547E+04
19	1.6891	1.60	1.80	0.000E+00	2.472E+03	2.472E+03
20	1.8874	1.80	2.00	0.000E+00	1.227E+03	1.227E+03
21	2.1857	2.00	2.20	2.028E+05	5.577E+02	2.034E+05
22	2.2828	2.20	2.40	0.000E+00	2.135E+02	2.135E+02
23	2.4759	2.40	2.60	0.000E+00	6.414E+01	6.414E+01
24	2.6672	2.60	2.80	0.000E+00	1.240E+01	1.240E+01
25	2.8000	2.80	3.20	0.000E+00	1.268E+00	1.268E+00
Total Photons/sec:				6.718E+05	4.726E+06	5.398E+06

>>> EU-155 (Z = 63) Weight(418) = 8.440E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0138	0.01	0.02	0.000E+00	3.222E+03	3.222E+03
2	0.0243	0.02	0.03	0.000E+00	1.017E+03	1.017E+03
3	0.0344	0.03	0.04	0.000E+00	4.734E+02	4.734E+02
4	0.0440	0.04	0.05	7.501E+05	2.485E+02	7.503E+05
5	0.0545	0.05	0.06	0.000E+00	1.365E+02	1.365E+02
6	0.0613	0.06	0.07	4.060E+04	7.836E+01	4.067E+04
7	0.0745	0.07	0.08	0.000E+00	4.568E+01	4.568E+01
8	0.0865	0.08	0.09	9.696E+05	2.674E+01	9.697E+05
9	0.0946	0.09	0.10	0.000E+00	1.582E+01	1.582E+01
10	0.1053	0.10	0.20	6.455E+05	2.953E+01	6.455E+05
11	0.2000	0.20	0.30	0.000E+00	1.036E-01	1.036E-01
Total Photons/sec:				2.406E+06	5.294E+03	2.411E+06

>>> U -234 (Z = 92) Weight(520) = 1.720E-06 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	6.682E-03	5.785E-07	6.683E-03
2	0.0231	0.02	0.03	0.000E+00	5.414E-08	5.414E-08
3	0.0334	0.03	0.04	0.000E+00	6.507E-09	6.507E-09
4	0.0439	0.04	0.05	0.000E+00	1.251E-09	1.251E-09
5	0.0532	0.05	0.06	7.573E-05	3.967E-10	7.573E-05
6	0.0639	0.06	0.07	0.000E+00	1.191E-10	1.191E-10
7	0.0736	0.07	0.08	0.000E+00	2.770E-11	2.770E-11
8	0.0830	0.08	0.09	0.000E+00	3.921E-12	3.921E-12
9	0.0916	0.09	0.10	0.000E+00	1.806E-13	1.806E-13
10	0.1210	0.10	0.20	2.546E-05	6.653E-18	2.546E-05
13	0.4900	0.40	0.55	2.546E-06	0.000E+00	2.546E-06
14	0.5800	0.55	0.75	7.637E-09	0.000E+00	7.637E-09
Total Photons/sec:				6.786E-03	6.409E-07	6.787E-03

>>> U -235 (Z = 92) Weight(476) = 1.390E-05 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Production Rate Bremss.	Total photon/s
1	0.0130	0.01	0.02	1.590E-01	2.866E-05	1.590E-01
2	0.0241	0.02	0.03	0.000E+00	7.255E-06	7.255E-06
3	0.0342	0.03	0.04	0.000E+00	2.674E-06	2.674E-06
4	0.0443	0.04	0.05	0.000E+00	1.156E-06	1.156E-06
5	0.0544	0.05	0.06	0.000E+00	5.548E-07	5.548E-07
6	0.0645	0.06	0.07	0.000E+00	2.828E-07	2.828E-07
7	0.0727	0.07	0.08	5.657E-04	1.489E-07	5.659E-04
8	0.0845	0.08	0.09	0.000E+00	7.816E-08	7.816E-08
9	0.0921	0.09	0.10	3.698E-02	4.064E-08	3.698E-02
10	0.1729	0.10	0.20	3.812E-01	7.181E-08	3.812E-01
11	0.2071	0.20	0.30	3.117E-02	0.000E+00	3.117E-02
12	0.3685	0.30	0.40	6.686E-04	0.000E+00	6.686E-04
13	0.4457	0.40	0.55	6.172E-05	0.000E+00	6.172E-05
14	0.7425	0.55	0.75	2.057E-06	0.000E+00	2.057E-06
15	0.7947	0.75	0.90	3.086E-06	0.000E+00	3.086E-06
Total Photons/sec:				6.096E-01	4.092E-05	6.097E-01

>>> U -236 (Z = 92) Weight(398) = 4.970E-05 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Production Rate Bremss.	Total photon/s
1	0.0128	0.01	0.02	0.000E+00	1.075E-05	1.075E-05
2	0.0230	0.02	0.03	0.000E+00	8.918E-07	8.918E-07
3	0.0335	0.03	0.04	0.000E+00	1.046E-07	1.046E-07
4	0.0440	0.04	0.05	0.000E+00	2.557E-08	2.557E-08
5	0.0539	0.05	0.06	0.000E+00	7.627E-09	7.627E-09
6	0.0682	0.06	0.07	2.023E-03	1.828E-09	2.023E-03
7	0.0731	0.07	0.08	0.000E+00	2.799E-10	2.799E-10
8	0.0817	0.08	0.09	0.000E+00	1.487E-11	1.487E-11
9	0.0900	0.09	0.10	0.000E+00	7.756E-15	7.756E-15
Total Photons/sec:				2.023E-03	1.179E-05	2.035E-03

>>> U -238 (Z = 92) Weight(526) = 8.310E-03 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	2.715E+01	1.617E-03	2.715E+01
2	0.0230	0.02	0.03	0.000E+00	1.339E-04	1.339E-04
3	0.0335	0.03	0.04	0.000E+00	1.523E-05	1.523E-05
4	0.0440	0.04	0.05	0.000E+00	3.472E-06	3.472E-06
5	0.0538	0.05	0.06	0.000E+00	9.529E-07	9.529E-07
6	0.0664	0.06	0.07	3.075E-01	1.968E-07	3.075E-01
7	0.0729	0.07	0.08	0.000E+00	2.496E-08	2.496E-08
8	0.0808	0.08	0.09	0.000E+00	1.207E-09	1.207E-09
Total Photons/sec:				2.746E+01	1.771E-03	2.746E+01

>>> AM-241 (Z = 95) Weight(496) = 2.150E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0139	0.01	0.02	3.421E+05	1.660E+01	3.421E+05
2	0.0263	0.02	0.03	1.909E+04	1.734E+00	1.909E+04
3	0.0332	0.03	0.04	8.751E+02	2.050E-01	8.753E+02
4	0.0430	0.04	0.05	7.160E+02	2.238E-02	7.160E+02
5	0.0595	0.05	0.06	2.840E+05	3.396E-03	2.840E+05
6	0.0699	0.06	0.07	1.591E+01	6.423E-04	1.591E+01
7	0.0732	0.07	0.08	0.000E+00	9.154E-05	9.154E-05
8	0.0821	0.08	0.09	0.000E+00	6.033E-06	6.033E-06
9	0.0989	0.09	0.10	1.671E+02	4.201E-08	1.671E+02
10	0.1087	0.10	0.20	2.227E+02	0.000E+00	2.227E+02
11	0.2132	0.20	0.30	6.841E+00	0.000E+00	6.841E+00
12	0.3441	0.30	0.40	1.034E+01	0.000E+00	1.034E+01
13	0.4348	0.40	0.55	6.205E-01	0.000E+00	6.205E-01
14	0.6758	0.55	0.75	5.489E+00	0.000E+00	5.489E+00
15	0.7684	0.75	0.90	1.750E-01	0.000E+00	1.750E-01
Total Photons/sec:				6.472E+05	1.856E+01	6.472E+05

Organic Tank (H0-64-4278) Line Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	8.122E-01	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	8.122E-01	7.800E+00	1.290E-03

E, MeV	Linear Attenuation, per cm (last region is air)		
0.0145	7.175E+00	5.015E+02	2.205E-03
0.0254	1.430E+00	1.038E+02	5.985E-04
0.0345	6.386E-01	4.319E+01	3.741E-04
0.0442	3.703E-01	2.131E+01	2.891E-04
0.0553	2.476E-01	1.155E+01	2.486E-04
0.0648	1.992E-01	7.729E+00	2.318E-04
0.0748	1.714E-01	5.439E+00	2.186E-04
0.0847	1.543E-01	4.095E+00	2.092E-04
0.0950	1.419E-01	3.215E+00	2.019E-04
0.1406	1.159E-01	1.698E+00	1.793E-04
0.2408	9.207E-02	9.921E-01	1.496E-04
0.3468	7.972E-02	7.904E-01	1.302E-04
0.5081	6.816E-02	6.501E-01	1.113E-04
0.6409	6.148E-02	5.808E-01	1.007E-04
0.8129	5.512E-02	5.170E-01	9.044E-05
1.0457	4.876E-02	4.559E-01	8.012E-05
1.2414	4.473E-02	4.178E-01	7.347E-05
1.4077	4.195E-02	3.922E-01	6.883E-05
1.6910	3.820E-02	3.584E-01	6.266E-05
1.8906	3.610E-02	3.402E-01	5.905E-05
2.1785	3.362E-02	3.192E-01	5.441E-05
2.2890	3.281E-02	3.123E-01	5.279E-05
2.4878	3.149E-02	3.016E-01	5.018E-05
2.6854	3.034E-02	2.926E-01	4.794E-05
2.9224	2.912E-02	2.835E-01	4.576E-05
3.2000	2.789E-02	2.751E-01	4.383E-05

Organic Tank (HO-64-4278) Annular Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	8.122E-01	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00
Totals:	1.290E-03	8.122E-01	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0145	2.205E-03	7.175E+00	5.015E+02	2.205E-03
0.0254	5.985E-04	1.430E+00	1.038E+02	5.985E-04
0.0345	3.741E-04	6.386E-01	4.319E+01	3.741E-04
0.0442	2.891E-04	3.703E-01	2.131E+01	2.891E-04
0.0553	2.486E-04	2.476E-01	1.155E+01	2.486E-04
0.0648	2.318E-04	1.992E-01	7.729E+00	2.318E-04
0.0748	2.186E-04	1.714E-01	5.439E+00	2.186E-04
0.0847	2.092E-04	1.543E-01	4.095E+00	2.092E-04
0.0950	2.019E-04	1.419E-01	3.215E+00	2.019E-04
0.1406	1.793E-04	1.159E-01	1.698E+00	1.793E-04
0.2408	1.496E-04	9.207E-02	9.921E-01	1.496E-04
0.3468	1.302E-04	7.972E-02	7.904E-01	1.302E-04
0.5081	1.113E-04	6.816E-02	6.501E-01	1.113E-04
0.6409	1.007E-04	6.148E-02	5.808E-01	1.007E-04
0.8129	9.044E-05	5.512E-02	5.170E-01	9.044E-05
1.0457	8.012E-05	4.876E-02	4.559E-01	8.012E-05
1.2414	7.347E-05	4.473E-02	4.178E-01	7.347E-05
1.4077	6.883E-05	4.195E-02	3.922E-01	6.883E-05
1.6910	6.266E-05	3.820E-02	3.584E-01	6.266E-05
1.8906	5.905E-05	3.610E-02	3.402E-01	5.905E-05
2.1785	5.441E-05	3.362E-02	3.192E-01	5.441E-05
2.2890	5.279E-05	3.281E-02	3.123E-01	5.279E-05
2.4878	5.018E-05	3.149E-02	3.016E-01	5.018E-05
2.6854	4.794E-05	3.034E-02	2.926E-01	4.794E-05
2.9224	4.576E-05	2.912E-02	2.835E-01	4.576E-05
3.2000	4.383E-05	2.789E-02	2.751E-01	4.383E-05

Organic Tank (HO-64-4278) Line Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	8.122E-01	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	8.122E-01	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0145	7.175E+00	5.015E+02	2.205E-03
0.0254	1.430E+00	1.038E+02	5.985E-04
0.0345	6.386E-01	4.319E+01	3.741E-04
0.0442	3.703E-01	2.131E+01	2.891E-04
0.0553	2.476E-01	1.155E+01	2.486E-04
0.0648	1.992E-01	7.729E+00	2.318E-04
0.0748	1.714E-01	5.439E+00	2.186E-04
0.0847	1.543E-01	4.095E+00	2.092E-04
0.0950	1.419E-01	3.215E+00	2.019E-04
0.1406	1.159E-01	1.698E+00	1.793E-04
0.2408	9.207E-02	9.921E-01	1.496E-04
0.3468	7.972E-02	7.904E-01	1.302E-04
0.5081	6.816E-02	6.501E-01	1.113E-04
0.6409	6.148E-02	5.808E-01	1.007E-04
0.8129	5.512E-02	5.170E-01	9.044E-05
1.0457	4.876E-02	4.559E-01	8.012E-05
1.2414	4.473E-02	4.178E-01	7.347E-05
1.4077	4.195E-02	3.922E-01	6.883E-05
1.6910	3.820E-02	3.584E-01	6.266E-05
1.8906	3.610E-02	3.402E-01	5.905E-05
2.1785	3.362E-02	3.192E-01	5.441E-05
2.2890	3.281E-02	3.123E-01	5.279E-05
2.4878	3.149E-02	3.016E-01	5.018E-05
2.6854	3.034E-02	2.926E-01	4.794E-05
2.9224	2.912E-02	2.835E-01	4.576E-05
3.2000	2.789E-02	2.751E-01	4.383E-05

Organic Tank (HO-64-4278) Annular Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	8.122E-01	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00
Totals:	1.290E-03	8.122E-01	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0145	2.205E-03	7.175E+00	5.015E+02	2.205E-03
0.0254	5.985E-04	1.430E+00	1.038E+02	5.985E-04
0.0345	3.741E-04	6.386E-01	4.319E+01	3.741E-04
0.0442	2.891E-04	3.703E-01	2.131E+01	2.891E-04
0.0553	2.486E-04	2.476E-01	1.155E+01	2.486E-04
0.0648	2.318E-04	1.992E-01	7.729E+00	2.318E-04
0.0748	2.186E-04	1.714E-01	5.439E+00	2.186E-04
0.0847	2.092E-04	1.543E-01	4.095E+00	2.092E-04
0.0950	2.019E-04	1.419E-01	3.215E+00	2.019E-04
0.1406	1.793E-04	1.159E-01	1.698E+00	1.793E-04
0.2408	1.496E-04	9.207E-02	9.921E-01	1.496E-04
0.3468	1.302E-04	7.972E-02	7.904E-01	1.302E-04
0.5081	1.113E-04	6.816E-02	6.501E-01	1.113E-04
0.6409	1.007E-04	6.148E-02	5.808E-01	1.007E-04
0.8129	9.044E-05	5.512E-02	5.170E-01	9.044E-05
1.0457	8.012E-05	4.876E-02	4.559E-01	8.012E-05
1.2414	7.347E-05	4.473E-02	4.178E-01	7.347E-05
1.4077	6.883E-05	4.195E-02	3.922E-01	6.883E-05
1.6910	6.266E-05	3.820E-02	3.584E-01	6.266E-05
1.8906	5.905E-05	3.610E-02	3.402E-01	5.905E-05
2.1785	5.441E-05	3.362E-02	3.192E-01	5.441E-05
2.2890	5.279E-05	3.281E-02	3.123E-01	5.279E-05
2.4878	5.018E-05	3.149E-02	3.016E-01	5.018E-05
2.6854	4.794E-05	3.034E-02	2.926E-01	4.794E-05
2.9224	4.576E-05	2.912E-02	2.835E-01	4.576E-05
3.2000	4.383E-05	2.789E-02	2.751E-01	4.383E-05

Old UNH Tank (HO-64-5920) Line Source - Middle

Table of Source Activity:

Scale Factor = 1.000E+03

Isotope Wt.	Name	Initial Values	Final μCi
117	ZR- 95	7.180E-02	7.180E+01
119	NB- 95	4.670E-01	4.670E+02
155	RU-103	3.960E-02	3.960E+01
170	RU-106	5.330E-01	5.330E+02
172	RH-106	5.330E-01	5.330E+02
319	CS-134	4.270E-02	4.270E+01
335	CS-137	3.600E-02	3.600E+01
336	BA-137M	3.410E-02	3.410E+01
376	CE-144	5.810E-01	5.810E+02
377	PR-144	5.810E-01	5.810E+02
520	U -234	2.690E-03	2.690E+00
476	U -235	9.800E-02	9.800E+01
398	U -236	2.170E-02	2.170E+01
526	U -238	1.590E+01	1.590E+04

Old UNH Tank (HO-64-5920) Line Source - Middle

Photon Production Rate for Each Radionuclide:

>>> ZR- 95 (Z = 40) Weight(117) = 7.180E+01 μ Ci

Group No.	Photon Mean	Energy, MeV		Photon Production Rate		Total photon/s
		Low	High	Gamma&Xray	Bremss.	
1	0.0145	0.01	0.02	0.000E+00	9.895E+03	9.895E+03
2	0.0242	0.02	0.03	0.000E+00	4.617E+03	4.617E+03
3	0.0347	0.03	0.04	0.000E+00	2.128E+03	2.128E+03
4	0.0446	0.04	0.05	0.000E+00	1.340E+03	1.340E+03
5	0.0547	0.05	0.06	0.000E+00	8.960E+02	8.960E+02
6	0.0647	0.06	0.07	0.000E+00	6.168E+02	6.168E+02
7	0.0748	0.07	0.08	0.000E+00	4.481E+02	4.481E+02
8	0.0847	0.08	0.09	0.000E+00	3.298E+02	3.298E+02
9	0.0948	0.09	0.10	0.000E+00	2.485E+02	2.485E+02
10	0.1288	0.10	0.20	0.000E+00	7.761E+02	7.761E+02
11	0.2290	0.20	0.30	0.000E+00	6.182E+01	6.182E+01
12	0.3347	0.30	0.40	0.000E+00	7.091E+00	7.091E+00
13	0.4551	0.40	0.55	0.000E+00	2.510E+00	2.510E+00
14	0.7242	0.55	0.75	1.161E+06	5.022E-01	1.161E+06
15	0.7567	0.75	0.90	1.469E+06	3.012E-02	1.469E+06
16	0.9332	0.90	1.10	0.000E+00	2.489E-03	2.489E-03
17	1.1000	1.10	1.35	0.000E+00	2.519E-07	2.519E-07
Total Photons/sec:				2.630E+06	2.137E+04	2.651E+06

>>> NB- 95 (Z = 41) Weight(119) = 4.670E+02 μ Ci

Group No.	Photon Mean	Energy, MeV		Photon Production Rate		Total photon/s
		Low	High	Gamma&Xray	Bremss.	
1	0.0136	0.01	0.02	0.000E+00	1.548E+04	1.548E+04
2	0.0244	0.02	0.03	0.000E+00	4.982E+03	4.982E+03
3	0.0344	0.03	0.04	0.000E+00	2.280E+03	2.280E+03
4	0.0444	0.04	0.05	0.000E+00	1.155E+03	1.155E+03
5	0.0545	0.05	0.06	0.000E+00	6.127E+02	6.127E+02
6	0.0645	0.06	0.07	0.000E+00	3.260E+02	3.260E+02
7	0.0745	0.07	0.08	0.000E+00	1.712E+02	1.712E+02
8	0.0844	0.08	0.09	0.000E+00	8.793E+01	8.793E+01
9	0.0944	0.09	0.10	0.000E+00	4.334E+01	4.334E+01
10	0.1003	0.10	0.20	0.000E+00	7.036E+01	7.036E+01
11	0.2144	0.20	0.30	0.000E+00	2.096E-02	2.096E-02
12	0.3000	0.30	0.40	0.000E+00	1.220E-05	1.220E-05
15	0.7658	0.75	0.90	1.725E+07	0.000E+00	1.725E+07
Total Photons/sec:				1.725E+07	2.521E+04	1.727E+07

>>> RU-103 (Z = 44) Weight(155) = 3.960E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0137	0.01	0.02	0.000E+00	2.000E+03	2.000E+03
2	0.0204	0.02	0.03	6.886E+03	7.766E+02	7.663E+03
3	0.0345	0.03	0.04	0.000E+00	4.206E+02	4.206E+02
4	0.0445	0.04	0.05	0.000E+00	2.412E+02	2.412E+02
5	0.0530	0.05	0.06	5.275E+03	1.370E+02	5.412E+03
6	0.0647	0.06	0.07	0.000E+00	9.047E+01	9.047E+01
7	0.0747	0.07	0.08	0.000E+00	6.118E+01	6.118E+01
8	0.0847	0.08	0.09	0.000E+00	4.071E+01	4.071E+01
9	0.0947	0.09	0.10	0.000E+00	2.861E+01	2.861E+01
10	0.1293	0.10	0.20	0.000E+00	8.818E+01	8.818E+01
11	0.2968	0.20	0.30	3.956E+03	1.428E+01	3.970E+03
12	0.3381	0.30	0.40	0.000E+00	3.394E+00	3.394E+00
13	0.4978	0.40	0.55	1.295E+06	8.038E-01	1.295E+06
14	0.6044	0.55	0.75	1.061E+05	4.370E-02	1.061E+05
Total Photons/sec:				1.417E+06	3.903E+03	1.421E+06

>>> RU-106 (Z = 44) Weight(170) = 5.330E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0129	0.01	0.02	0.000E+00	6.770E+02	6.770E+02
2	0.0225	0.02	0.03	0.000E+00	4.482E+01	4.482E+01
3	0.0304	0.03	0.04	0.000E+00	1.234E+00	1.234E+00
Total Photons/sec:				0.000E+00	7.230E+02	7.230E+02

>>> RH-106 (Z = 45) Weight(172) = 5.330E+02 μ Ci

Group No.	Photon Mean	Energy, MeV		Photon Production Rate		Total photon/s
		Low	High	Gamma&Xray	Bremss.	
1	0.0146	0.01	0.02	0.000E+00	1.020E+06	1.020E+06
2	0.0245	0.02	0.03	0.000E+00	5.483E+05	5.483E+05
3	0.0347	0.03	0.04	0.000E+00	3.616E+05	3.616E+05
4	0.0447	0.04	0.05	0.000E+00	2.576E+05	2.576E+05
5	0.0548	0.05	0.06	0.000E+00	1.952E+05	1.952E+05
6	0.0648	0.06	0.07	0.000E+00	1.595E+05	1.595E+05
7	0.0748	0.07	0.08	0.000E+00	1.276E+05	1.276E+05
8	0.0849	0.08	0.09	0.000E+00	1.074E+05	1.074E+05
9	0.0950	0.09	0.10	0.000E+00	9.709E+04	9.709E+04
10	0.1441	0.10	0.20	0.000E+00	6.946E+05	6.946E+05
11	0.2410	0.20	0.30	0.000E+00	2.698E+05	2.698E+05
12	0.3460	0.30	0.40	0.000E+00	1.319E+05	1.319E+05
13	0.5106	0.40	0.55	4.063E+06	1.064E+05	4.169E+06
14	0.6220	0.55	0.75	2.071E+06	7.271E+04	2.143E+06
15	0.8590	0.75	0.90	8.283E+04	3.052E+04	1.133E+05
16	1.0460	0.90	1.10	3.412E+05	2.467E+04	3.658E+05
17	1.1428	1.10	1.35	7.888E+04	1.708E+04	9.596E+04
18	1.4048	1.35	1.60	1.459E+05	8.871E+03	1.548E+05
19	1.6911	1.60	1.80	0.000E+00	3.925E+03	3.925E+03
20	1.8907	1.80	2.00	0.000E+00	2.300E+03	2.300E+03
21	2.0900	2.00	2.20	0.000E+00	1.302E+03	1.302E+03
22	2.2892	2.20	2.40	0.000E+00	6.991E+02	6.991E+02
23	2.4879	2.40	2.60	0.000E+00	3.482E+02	3.482E+02
24	2.6855	2.60	2.80	0.000E+00	1.550E+02	1.550E+02
25	2.9226	2.80	3.20	0.000E+00	7.568E+01	7.568E+01
26	3.2000	3.20	4.00	0.000E+00	5.883E+00	5.883E+00
Total Photons/sec:				6.782E+06	4.240E+06	1.102E+07

>>> CS-134 (Z = 55) Weight(319) = 4.270E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0142	0.01	0.02	0.000E+00	7.484E+03	7.484E+03
2	0.0286	0.02	0.03	1.327E+04	4.310E+03	1.758E+04
3	0.0346	0.03	0.04	0.000E+00	2.950E+03	2.950E+03
4	0.0444	0.04	0.05	0.000E+00	1.655E+03	1.655E+03
5	0.0548	0.05	0.06	0.000E+00	9.660E+02	9.660E+02
6	0.0648	0.06	0.07	0.000E+00	7.692E+02	7.692E+02
7	0.0747	0.07	0.08	0.000E+00	5.752E+02	5.752E+02
8	0.0848	0.08	0.09	0.000E+00	4.225E+02	4.225E+02
9	0.0948	0.09	0.10	0.000E+00	3.507E+02	3.507E+02
10	0.1343	0.10	0.20	0.000E+00	1.399E+03	1.399E+03
11	0.2372	0.20	0.30	0.000E+00	2.725E+02	2.725E+02
12	0.3369	0.30	0.40	0.000E+00	5.973E+01	5.973E+01
13	0.4754	0.40	0.55	2.307E+04	1.175E+01	2.308E+04
14	0.5973	0.55	0.75	1.918E+06	3.976E-01	1.918E+06
15	0.7964	0.75	0.90	1.487E+06	1.101E-03	1.487E+06
16	0.9000	0.90	1.10	0.000E+00	1.634E-05	1.634E-05
17	1.1220	1.10	1.35	4.424E+04	0.000E+00	4.424E+04
18	1.3650	1.35	1.60	4.803E+04	0.000E+00	4.803E+04
Total Photons/sec:				3.534E+06	2.123E+04	3.555E+06

>>> CS-137 (Z = 55) Weight(335) = 3.600E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0143	0.01	0.02	0.000E+00	7.268E+03	7.268E+03
2	0.0246	0.02	0.03	0.000E+00	4.218E+03	4.218E+03
3	0.0344	0.03	0.04	0.000E+00	2.241E+03	2.241E+03
4	0.0448	0.04	0.05	0.000E+00	1.329E+03	1.329E+03
5	0.0547	0.05	0.06	0.000E+00	1.002E+03	1.002E+03
6	0.0647	0.06	0.07	0.000E+00	7.001E+02	7.001E+02
7	0.0748	0.07	0.08	0.000E+00	5.370E+02	5.370E+02
8	0.0847	0.08	0.09	0.000E+00	3.881E+02	3.881E+02
9	0.0949	0.09	0.10	0.000E+00	2.954E+02	2.954E+02
10	0.1340	0.10	0.20	0.000E+00	1.183E+03	1.183E+03
11	0.2379	0.20	0.30	0.000E+00	2.260E+02	2.260E+02
12	0.3400	0.30	0.40	0.000E+00	5.935E+01	5.935E+01
13	0.4580	0.40	0.55	0.000E+00	2.666E+01	2.666E+01
14	0.6219	0.55	0.75	0.000E+00	8.576E+00	8.576E+00
15	0.8048	0.75	0.90	0.000E+00	1.166E+00	1.166E+00
16	0.9459	0.90	1.10	0.000E+00	1.696E-01	1.696E-01
17	1.1000	1.10	1.35	0.000E+00	1.234E-03	1.234E-03
Total Photons/sec:				0.000E+00	1.948E+04	1.948E+04

>>> BA-137M (Z = 56) Weight(336) = 3.410E+01 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate		Total photon/s
				Gamma&Xray	Bremss.	
3	0.0329	0.03	0.04	9.185E+04	0.000E+00	9.185E+04
14	0.6616	0.55	0.75	1.135E+06	0.000E+00	1.135E+06
Total Photons/sec:				1.227E+06	0.000E+00	1.227E+06

>>> CE-144 (Z = 58) Weight(376) = 5.810E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate		Total photon/s
				Gamma&Xray	Bremss.	
1	0.0143	0.01	0.02	0.000E+00	5.672E+04	5.672E+04
2	0.0241	0.02	0.03	0.000E+00	1.944E+04	1.944E+04
3	0.0358	0.03	0.04	1.550E+06	1.034E+04	1.560E+06
4	0.0409	0.04	0.05	4.428E+05	6.003E+03	4.488E+05
5	0.0546	0.05	0.06	0.000E+00	3.815E+03	3.815E+03
6	0.0647	0.06	0.07	0.000E+00	2.609E+03	2.609E+03
7	0.0747	0.07	0.08	0.000E+00	1.777E+03	1.777E+03
8	0.0801	0.08	0.09	3.440E+05	1.251E+03	3.452E+05
9	0.0947	0.09	0.10	0.000E+00	8.952E+02	8.952E+02
10	0.1335	0.10	0.20	2.322E+06	2.278E+03	2.324E+06
11	0.2139	0.20	0.30	0.000E+00	5.692E+01	5.692E+01
12	0.3000	0.30	0.40	0.000E+00	2.197E-02	2.197E-02
Total Photons/sec:				4.658E+06	1.052E+05	4.764E+06

>>> PR-144 (Z = 59) Weight(377) = 5.810E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate		Total photon/s
				Gamma&Xray	Bremss.	
1	0.0145	0.01	0.02	0.000E+00	9.927E+05	9.927E+05
2	0.0246	0.02	0.03	0.000E+00	4.960E+05	4.960E+05
3	0.0346	0.03	0.04	0.000E+00	3.341E+05	3.341E+05
4	0.0448	0.04	0.05	0.000E+00	2.309E+05	2.309E+05
5	0.0548	0.05	0.06	0.000E+00	1.818E+05	1.818E+05
6	0.0648	0.06	0.07	0.000E+00	1.385E+05	1.385E+05
7	0.0749	0.07	0.08	0.000E+00	1.109E+05	1.109E+05
8	0.0850	0.08	0.09	0.000E+00	1.031E+05	1.031E+05
9	0.0949	0.09	0.10	0.000E+00	9.720E+04	9.720E+04
10	0.1424	0.10	0.20	0.000E+00	6.480E+05	6.480E+05
11	0.2418	0.20	0.30	0.000E+00	2.106E+05	2.106E+05
12	0.3447	0.30	0.40	0.000E+00	1.085E+05	1.085E+05
13	0.4668	0.40	0.55	0.000E+00	8.697E+04	8.697E+04
14	0.6876	0.55	0.75	3.182E+05	5.676E+04	3.749E+05
15	0.8186	0.75	0.90	0.000E+00	2.262E+04	2.262E+04
16	0.9894	0.90	1.10	0.000E+00	1.757E+04	1.757E+04
17	1.2095	1.10	1.35	0.000E+00	1.124E+04	1.124E+04
18	1.4867	1.35	1.60	6.449E+04	5.257E+03	6.975E+04
19	1.6891	1.60	1.80	0.000E+00	2.017E+03	2.017E+03
20	1.8874	1.80	2.00	0.000E+00	1.002E+03	1.002E+03
21	2.1857	2.00	2.20	1.655E+05	4.551E+02	1.660E+05
22	2.2828	2.20	2.40	0.000E+00	1.742E+02	1.742E+02
23	2.4759	2.40	2.60	0.000E+00	5.234E+01	5.234E+01
24	2.6672	2.60	2.80	0.000E+00	1.012E+01	1.012E+01
25	2.8000	2.80	3.20	0.000E+00	1.035E+00	1.035E+00
Total Photons/sec:				5.482E+05	3.856E+06	4.405E+06

>>> U -234 (Z = 92) Weight(520) = 2.690E+00 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate		Total photon/s
				Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	1.045E+04	9.047E-01	1.045E+04
2	0.0231	0.02	0.03	0.000E+00	8.468E-02	8.468E-02
3	0.0334	0.03	0.04	0.000E+00	1.018E-02	1.018E-02
4	0.0439	0.04	0.05	0.000E+00	1.957E-03	1.957E-03
5	0.0532	0.05	0.06	1.184E+02	6.204E-04	1.184E+02
6	0.0639	0.06	0.07	0.000E+00	1.863E-04	1.863E-04
7	0.0736	0.07	0.08	0.000E+00	4.332E-05	4.332E-05
8	0.0830	0.08	0.09	0.000E+00	6.132E-06	6.132E-06
9	0.0916	0.09	0.10	0.000E+00	2.824E-07	2.824E-07
10	0.1210	0.10	0.20	3.981E+01	1.040E-11	3.981E+01
13	0.4900	0.40	0.55	3.981E+00	0.000E+00	3.981E+00
14	0.5800	0.55	0.75	1.194E-02	0.000E+00	1.194E-02
Total Photons/sec:				1.061E+04	1.002E+00	1.061E+04

>>> U -235 (Z = 92) Weight(476) = 9.800E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	1.121E+06	2.021E+02	1.121E+06
2	0.0241	0.02	0.03	0.000E+00	5.115E+01	5.115E+01
3	0.0342	0.03	0.04	0.000E+00	1.885E+01	1.885E+01
4	0.0443	0.04	0.05	0.000E+00	8.147E+00	8.147E+00
5	0.0544	0.05	0.06	0.000E+00	3.912E+00	3.912E+00
6	0.0645	0.06	0.07	0.000E+00	1.994E+00	1.994E+00
7	0.0727	0.07	0.08	3.989E+03	1.050E+00	3.990E+03
8	0.0845	0.08	0.09	0.000E+00	5.511E-01	5.511E-01
9	0.0921	0.09	0.10	2.607E+05	2.865E-01	2.607E+05
10	0.1729	0.10	0.20	2.688E+06	5.063E-01	2.688E+06
11	0.2071	0.20	0.30	2.197E+05	0.000E+00	2.197E+05
12	0.3685	0.30	0.40	4.714E+03	0.000E+00	4.714E+03
13	0.4457	0.40	0.55	4.351E+02	0.000E+00	4.351E+02
14	0.7425	0.55	0.75	1.450E+01	0.000E+00	1.450E+01
15	0.7947	0.75	0.90	2.176E+01	0.000E+00	2.176E+01
Total Photons/sec:				4.298E+06	2.885E+02	4.298E+06

>>> U -236 (Z = 92) Weight(398) = 2.170E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0128	0.01	0.02	0.000E+00	4.695E+00	4.695E+00
2	0.0230	0.02	0.03	0.000E+00	3.894E-01	3.894E-01
3	0.0335	0.03	0.04	0.000E+00	4.566E-02	4.566E-02
4	0.0440	0.04	0.05	0.000E+00	1.116E-02	1.116E-02
5	0.0539	0.05	0.06	0.000E+00	3.330E-03	3.330E-03
6	0.0682	0.06	0.07	8.832E+02	7.981E-04	8.832E+02
7	0.0731	0.07	0.08	0.000E+00	1.222E-04	1.222E-04
8	0.0817	0.08	0.09	0.000E+00	6.494E-06	6.494E-06
9	0.0900	0.09	0.10	0.000E+00	3.386E-09	3.386E-09
Total Photons/sec:				8.832E+02	5.146E+00	8.883E+02

>>> U -238 (Z = 92) Weight(526) = 1.590E+04 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	5.195E+07	3.094E+03	5.195E+07
2	0.0230	0.02	0.03	0.000E+00	2.563E+02	2.563E+02
3	0.0335	0.03	0.04	0.000E+00	2.914E+01	2.914E+01
4	0.0440	0.04	0.05	0.000E+00	6.644E+00	6.644E+00
5	0.0538	0.05	0.06	0.000E+00	1.823E+00	1.823E+00
6	0.0664	0.06	0.07	5.883E+05	3.766E-01	5.883E+05
7	0.0729	0.07	0.08	0.000E+00	4.775E-02	4.775E-02
8	0.0808	0.08	0.09	0.000E+00	2.309E-03	2.309E-03
Total Photons/sec:				5.254E+07	3.388E+03	5.254E+07

Old UNH Tank (HO-64-5920) Line Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.004E+01	6.779E+02	2.838E-03
0.0245	3.229E+00	1.146E+02	6.409E-04
0.0354	1.236E+00	4.037E+01	3.627E-04
0.0429	8.096E-01	2.318E+01	2.979E-04
0.0548	5.145E-01	1.182E+01	2.497E-04
0.0659	4.008E-01	7.416E+00	2.302E-04
0.0748	3.516E-01	5.442E+00	2.186E-04
0.0819	3.254E-01	4.420E+00	2.117E-04
0.0933	2.947E-01	3.335E+00	2.030E-04
0.1522	2.284E-01	1.508E+00	1.749E-04
0.2310	1.920E-01	1.031E+00	1.518E-04
0.3458	1.636E-01	7.918E-01	1.304E-04
0.5068	1.399E-01	6.509E-01	1.114E-04
0.6423	1.259E-01	5.802E-01	1.006E-04
0.7680	1.160E-01	5.316E-01	9.281E-05
1.0434	1.001E-01	4.565E-01	8.021E-05
1.1417	9.565E-02	4.360E-01	7.665E-05
1.4187	8.565E-02	3.906E-01	6.855E-05
1.6904	7.831E-02	3.585E-01	6.267E-05
1.8897	7.401E-02	3.402E-01	5.906E-05
2.1850	6.883E-02	3.188E-01	5.431E-05
2.2879	6.728E-02	3.124E-01	5.280E-05
2.4864	6.458E-02	3.017E-01	5.019E-05
2.6844	6.221E-02	2.926E-01	4.795E-05
2.9209	5.971E-02	2.836E-01	4.577E-05
3.2000	5.717E-02	2.751E-01	4.383E-05

Old UNH Tank (HO-64-5920) Annular Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00
Totals:	1.290E-03	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.838E-03	2.004E+01	6.779E+02	2.838E-03
0.0245	6.409E-04	3.229E+00	1.146E+02	6.409E-04
0.0354	3.627E-04	1.236E+00	4.037E+01	3.627E-04
0.0429	2.979E-04	8.096E-01	2.318E+01	2.979E-04
0.0548	2.497E-04	5.145E-01	1.182E+01	2.497E-04
0.0659	2.302E-04	4.008E-01	7.416E+00	2.302E-04
0.0748	2.186E-04	3.516E-01	5.442E+00	2.186E-04
0.0819	2.117E-04	3.254E-01	4.420E+00	2.117E-04
0.0933	2.030E-04	2.947E-01	3.335E+00	2.030E-04
0.1522	1.749E-04	2.284E-01	1.508E+00	1.749E-04
0.2310	1.518E-04	1.920E-01	1.031E+00	1.518E-04
0.3458	1.304E-04	1.636E-01	7.918E-01	1.304E-04
0.5068	1.114E-04	1.399E-01	6.509E-01	1.114E-04
0.6423	1.006E-04	1.259E-01	5.802E-01	1.006E-04
0.7680	9.281E-05	1.160E-01	5.316E-01	9.281E-05
1.0434	8.021E-05	1.001E-01	4.565E-01	8.021E-05
1.1417	7.665E-05	9.565E-02	4.360E-01	7.665E-05
1.4187	6.855E-05	8.565E-02	3.906E-01	6.855E-05
1.6904	6.267E-05	7.831E-02	3.585E-01	6.267E-05
1.8897	5.906E-05	7.401E-02	3.402E-01	5.906E-05
2.1850	5.431E-05	6.883E-02	3.188E-01	5.431E-05
2.2879	5.280E-05	6.728E-02	3.124E-01	5.280E-05
2.4864	5.019E-05	6.458E-02	3.017E-01	5.019E-05
2.6844	4.795E-05	6.221E-02	2.926E-01	4.795E-05
2.9209	4.577E-05	5.971E-02	2.836E-01	4.577E-05
3.2000	4.383E-05	5.717E-02	2.751E-01	4.383E-05

Old UNH Tank (HO-64-5920) Line Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.004E+01	6.779E+02	2.838E-03
0.0245	3.229E+00	1.146E+02	6.409E-04
0.0354	1.236E+00	4.037E+01	3.627E-04
0.0429	8.096E-01	2.318E+01	2.979E-04
0.0548	5.145E-01	1.182E+01	2.497E-04
0.0659	4.008E-01	7.416E+00	2.302E-04
0.0748	3.516E-01	5.442E+00	2.186E-04
0.0819	3.254E-01	4.420E+00	2.117E-04
0.0933	2.947E-01	3.335E+00	2.030E-04
0.1522	2.284E-01	1.508E+00	1.749E-04
0.2310	1.920E-01	1.031E+00	1.518E-04
0.3458	1.636E-01	7.918E-01	1.304E-04
0.5068	1.399E-01	6.509E-01	1.114E-04
0.6423	1.259E-01	5.802E-01	1.006E-04
0.7680	1.160E-01	5.316E-01	9.281E-05
1.0434	1.001E-01	4.565E-01	8.021E-05
1.1417	9.565E-02	4.360E-01	7.665E-05
1.4187	8.565E-02	3.906E-01	6.855E-05
1.6904	7.831E-02	3.585E-01	6.267E-05
1.8897	7.401E-02	3.402E-01	5.906E-05
2.1850	6.883E-02	3.188E-01	5.431E-05
2.2879	6.728E-02	3.124E-01	5.280E-05
2.4864	6.458E-02	3.017E-01	5.019E-05
2.6844	6.221E-02	2.926E-01	4.795E-05
2.9209	5.971E-02	2.836E-01	4.577E-05
3.2000	5.717E-02	2.751E-01	4.383E-05

Old UNH Tank (HO-64-5920) Annular Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00
Totals:	1.290E-03	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.838E-03	2.004E+01	6.779E+02	2.838E-03
0.0245	6.409E-04	3.229E+00	1.146E+02	6.409E-04
0.0354	3.627E-04	1.236E+00	4.037E+01	3.627E-04
0.0429	2.979E-04	8.096E-01	2.318E+01	2.979E-04
0.0548	2.497E-04	5.145E-01	1.182E+01	2.497E-04
0.0659	2.302E-04	4.008E-01	7.416E+00	2.302E-04
0.0748	2.186E-04	3.516E-01	5.442E+00	2.186E-04
0.0819	2.117E-04	3.254E-01	4.420E+00	2.117E-04
0.0933	2.030E-04	2.947E-01	3.335E+00	2.030E-04
0.1522	1.749E-04	2.284E-01	1.508E+00	1.749E-04
0.2310	1.518E-04	1.920E-01	1.031E+00	1.518E-04
0.3458	1.304E-04	1.636E-01	7.918E-01	1.304E-04
0.5068	1.114E-04	1.399E-01	6.509E-01	1.114E-04
0.6423	1.006E-04	1.259E-01	5.802E-01	1.006E-04
0.7680	9.281E-05	1.160E-01	5.316E-01	9.281E-05
1.0434	8.021E-05	1.001E-01	4.565E-01	8.021E-05
1.1417	7.665E-05	9.565E-02	4.360E-01	7.665E-05
1.4187	6.855E-05	8.565E-02	3.906E-01	6.855E-05
1.6904	6.267E-05	7.831E-02	3.585E-01	6.267E-05
1.8897	5.906E-05	7.401E-02	3.402E-01	5.906E-05
2.1850	5.431E-05	6.883E-02	3.188E-01	5.431E-05
2.2879	5.280E-05	6.728E-02	3.124E-01	5.280E-05
2.4864	5.019E-05	6.458E-02	3.017E-01	5.019E-05
2.6844	4.795E-05	6.221E-02	2.926E-01	4.795E-05
2.9209	4.577E-05	5.971E-02	2.836E-01	4.577E-05
3.2000	4.383E-05	5.717E-02	2.751E-01	4.383E-05

New UNH Tank (HO-64-5473) Line Source - Middle

Photon Production Rate for Each Radionuclide:

>>> ZR- 95 (Z = 40) Weight(117) = 7.180E+01 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0145	0.01	0.02	0.000E+00	9.895E+03	9.895E+03
2	0.0242	0.02	0.03	0.000E+00	4.617E+03	4.617E+03
3	0.0347	0.03	0.04	0.000E+00	2.128E+03	2.128E+03
4	0.0446	0.04	0.05	0.000E+00	1.340E+03	1.340E+03
5	0.0547	0.05	0.06	0.000E+00	8.960E+02	8.960E+02
6	0.0647	0.06	0.07	0.000E+00	6.168E+02	6.168E+02
7	0.0748	0.07	0.08	0.000E+00	4.481E+02	4.481E+02
8	0.0847	0.08	0.09	0.000E+00	3.298E+02	3.298E+02
9	0.0948	0.09	0.10	0.000E+00	2.485E+02	2.485E+02
10	0.1288	0.10	0.20	0.000E+00	7.761E+02	7.761E+02
11	0.2290	0.20	0.30	0.000E+00	6.182E+01	6.182E+01
12	0.3347	0.30	0.40	0.000E+00	7.091E+00	7.091E+00
13	0.4551	0.40	0.55	0.000E+00	2.510E+00	2.510E+00
14	0.7242	0.55	0.75	1.161E+06	5.022E-01	1.161E+06
15	0.7567	0.75	0.90	1.469E+06	3.012E-02	1.469E+06
16	0.9332	0.90	1.10	0.000E+00	2.489E-03	2.489E-03
17	1.1000	1.10	1.35	0.000E+00	2.519E-07	2.519E-07
Total Photons/sec:				2.630E+06	2.137E+04	2.651E+06

>>> NB- 95 (Z = 41) Weight(119) = 4.670E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0136	0.01	0.02	0.000E+00	1.548E+04	1.548E+04
2	0.0244	0.02	0.03	0.000E+00	4.982E+03	4.982E+03
3	0.0344	0.03	0.04	0.000E+00	2.280E+03	2.280E+03
4	0.0444	0.04	0.05	0.000E+00	1.155E+03	1.155E+03
5	0.0545	0.05	0.06	0.000E+00	6.127E+02	6.127E+02
6	0.0645	0.06	0.07	0.000E+00	3.260E+02	3.260E+02
7	0.0745	0.07	0.08	0.000E+00	1.712E+02	1.712E+02
8	0.0844	0.08	0.09	0.000E+00	8.793E+01	8.793E+01
9	0.0944	0.09	0.10	0.000E+00	4.334E+01	4.334E+01
10	0.1003	0.10	0.20	0.000E+00	7.036E+01	7.036E+01
11	0.2144	0.20	0.30	0.000E+00	2.096E-02	2.096E-02
12	0.3000	0.30	0.40	0.000E+00	1.220E-05	1.220E-05
15	0.7658	0.75	0.90	1.725E+07	0.000E+00	1.725E+07
Total Photons/sec:				1.725E+07	2.521E+04	1.727E+07

>>> RU-103 (Z = 44) Weight(155) = 3.960E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0137	0.01	0.02	0.000E+00	2.000E+03	2.000E+03
2	0.0204	0.02	0.03	6.886E+03	7.766E+02	7.663E+03
3	0.0345	0.03	0.04	0.000E+00	4.206E+02	4.206E+02
4	0.0445	0.04	0.05	0.000E+00	2.412E+02	2.412E+02
5	0.0530	0.05	0.06	5.275E+03	1.370E+02	5.412E+03
6	0.0647	0.06	0.07	0.000E+00	9.047E+01	9.047E+01
7	0.0747	0.07	0.08	0.000E+00	6.118E+01	6.118E+01
8	0.0847	0.08	0.09	0.000E+00	4.071E+01	4.071E+01
9	0.0947	0.09	0.10	0.000E+00	2.861E+01	2.861E+01
10	0.1293	0.10	0.20	0.000E+00	8.818E+01	8.818E+01
11	0.2968	0.20	0.30	3.956E+03	1.428E+01	3.970E+03
12	0.3381	0.30	0.40	0.000E+00	3.394E+00	3.394E+00
13	0.4978	0.40	0.55	1.295E+06	8.038E-01	1.295E+06
14	0.6044	0.55	0.75	1.061E+05	4.370E-02	1.061E+05
Total Photons/sec:				1.417E+06	3.903E+03	1.421E+06

>>> RU-106 (Z = 44) Weight(170) = 5.330E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0129	0.01	0.02	0.000E+00	6.770E+02	6.770E+02
2	0.0225	0.02	0.03	0.000E+00	4.482E+01	4.482E+01
3	0.0304	0.03	0.04	0.000E+00	1.234E+00	1.234E+00
Total Photons/sec:				0.000E+00	7.230E+02	7.230E+02

>>> RH-106 (Z = 45) Weight(172) = 5.330E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0146	0.01	0.02	0.000E+00	1.020E+06	1.020E+06
2	0.0245	0.02	0.03	0.000E+00	5.483E+05	5.483E+05
3	0.0347	0.03	0.04	0.000E+00	3.616E+05	3.616E+05
4	0.0447	0.04	0.05	0.000E+00	2.576E+05	2.576E+05
5	0.0548	0.05	0.06	0.000E+00	1.952E+05	1.952E+05
6	0.0648	0.06	0.07	0.000E+00	1.595E+05	1.595E+05
7	0.0748	0.07	0.08	0.000E+00	1.276E+05	1.276E+05
8	0.0849	0.08	0.09	0.000E+00	1.074E+05	1.074E+05
9	0.0950	0.09	0.10	0.000E+00	9.709E+04	9.709E+04
10	0.1441	0.10	0.20	0.000E+00	6.946E+05	6.946E+05
11	0.2410	0.20	0.30	0.000E+00	2.698E+05	2.698E+05
12	0.3460	0.30	0.40	0.000E+00	1.319E+05	1.319E+05
13	0.5106	0.40	0.55	4.063E+06	1.064E+05	4.169E+06
14	0.6220	0.55	0.75	2.071E+06	7.271E+04	2.143E+06
15	0.8590	0.75	0.90	8.283E+04	3.052E+04	1.133E+05
16	1.0460	0.90	1.10	3.412E+05	2.467E+04	3.658E+05
17	1.1428	1.10	1.35	7.888E+04	1.708E+04	9.596E+04
18	1.4048	1.35	1.60	1.459E+05	8.871E+03	1.548E+05
19	1.6911	1.60	1.80	0.000E+00	3.925E+03	3.925E+03
20	1.8907	1.80	2.00	0.000E+00	2.300E+03	2.300E+03
21	2.0900	2.00	2.20	0.000E+00	1.302E+03	1.302E+03
22	2.2892	2.20	2.40	0.000E+00	6.991E+02	6.991E+02
23	2.4879	2.40	2.60	0.000E+00	3.482E+02	3.482E+02
24	2.6855	2.60	2.80	0.000E+00	1.550E+02	1.550E+02
25	2.9226	2.80	3.20	0.000E+00	7.568E+01	7.568E+01
26	3.2000	3.20	4.00	0.000E+00	5.883E+00	5.883E+00
Total Photons/sec:				6.782E+06	4.240E+06	1.102E+07

>>> CS-134 (Z = 55) Weight(319) = 4.270E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0142	0.01	0.02	0.000E+00	7.484E+03	7.484E+03
2	0.0286	0.02	0.03	1.327E+04	4.310E+03	1.758E+04
3	0.0346	0.03	0.04	0.000E+00	2.950E+03	2.950E+03
4	0.0444	0.04	0.05	0.000E+00	1.655E+03	1.655E+03
5	0.0548	0.05	0.06	0.000E+00	9.660E+02	9.660E+02
6	0.0648	0.06	0.07	0.000E+00	7.692E+02	7.692E+02
7	0.0747	0.07	0.08	0.000E+00	5.752E+02	5.752E+02
8	0.0848	0.08	0.09	0.000E+00	4.225E+02	4.225E+02
9	0.0948	0.09	0.10	0.000E+00	3.507E+02	3.507E+02
10	0.1343	0.10	0.20	0.000E+00	1.399E+03	1.399E+03
11	0.2372	0.20	0.30	0.000E+00	2.725E+02	2.725E+02
12	0.3369	0.30	0.40	0.000E+00	5.973E+01	5.973E+01
13	0.4754	0.40	0.55	2.307E+04	1.175E+01	2.308E+04
14	0.5973	0.55	0.75	1.918E+06	3.976E-01	1.918E+06
15	0.7964	0.75	0.90	1.487E+06	1.101E-03	1.487E+06
16	0.9000	0.90	1.10	0.000E+00	1.634E-05	1.634E-05
17	1.1220	1.10	1.35	4.424E+04	0.000E+00	4.424E+04
18	1.3650	1.35	1.60	4.803E+04	0.000E+00	4.803E+04
Total Photons/sec:				3.534E+06	2.123E+04	3.555E+06

>>> CS-137 (Z = 55) Weight(335) = 3.600E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0143	0.01	0.02	0.000E+00	7.268E+03	7.268E+03
2	0.0246	0.02	0.03	0.000E+00	4.218E+03	4.218E+03
3	0.0344	0.03	0.04	0.000E+00	2.241E+03	2.241E+03
4	0.0448	0.04	0.05	0.000E+00	1.329E+03	1.329E+03
5	0.0547	0.05	0.06	0.000E+00	1.002E+03	1.002E+03
6	0.0647	0.06	0.07	0.000E+00	7.001E+02	7.001E+02
7	0.0748	0.07	0.08	0.000E+00	5.370E+02	5.370E+02
8	0.0847	0.08	0.09	0.000E+00	3.881E+02	3.881E+02
9	0.0949	0.09	0.10	0.000E+00	2.954E+02	2.954E+02
10	0.1340	0.10	0.20	0.000E+00	1.183E+03	1.183E+03
11	0.2379	0.20	0.30	0.000E+00	2.260E+02	2.260E+02
12	0.3400	0.30	0.40	0.000E+00	5.935E+01	5.935E+01
13	0.4580	0.40	0.55	0.000E+00	2.666E+01	2.666E+01
14	0.6219	0.55	0.75	0.000E+00	8.576E+00	8.576E+00
15	0.8048	0.75	0.90	0.000E+00	1.166E+00	1.166E+00
16	0.9459	0.90	1.10	0.000E+00	1.696E-01	1.696E-01
17	1.1000	1.10	1.35	0.000E+00	1.234E-03	1.234E-03
Total Photons/sec:				0.000E+00	1.948E+04	1.948E+04

>>> BA-137M (Z = 56) Weight(336) = 3.410E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
3	0.0329	0.03	0.04	9.185E+04	0.000E+00	9.185E+04
14	0.6616	0.55	0.75	1.135E+06	0.000E+00	1.135E+06
Total Photons/sec:				1.227E+06	0.000E+00	1.227E+06

>>> CE-144 (Z = 58) Weight(376) = 5.810E+02 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0143	0.01	0.02	0.000E+00	5.672E+04	5.672E+04
2	0.0241	0.02	0.03	0.000E+00	1.944E+04	1.944E+04
3	0.0358	0.03	0.04	1.550E+06	1.034E+04	1.560E+06
4	0.0409	0.04	0.05	4.428E+05	6.003E+03	4.488E+05
5	0.0546	0.05	0.06	0.000E+00	3.815E+03	3.815E+03
6	0.0647	0.06	0.07	0.000E+00	2.609E+03	2.609E+03
7	0.0747	0.07	0.08	0.000E+00	1.777E+03	1.777E+03
8	0.0801	0.08	0.09	3.440E+05	1.251E+03	3.452E+05
9	0.0947	0.09	0.10	0.000E+00	8.952E+02	8.952E+02
10	0.1335	0.10	0.20	2.322E+06	2.278E+03	2.324E+06
11	0.2139	0.20	0.30	0.000E+00	5.692E+01	5.692E+01
12	0.3000	0.30	0.40	0.000E+00	2.197E-02	2.197E-02
Total Photons/sec:				4.658E+06	1.052E+05	4.764E+06

>>> PR-144 (Z = 59) Weight(377) = 5.810E+02 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0145	0.01	0.02	0.000E+00	9.927E+05	9.927E+05
2	0.0246	0.02	0.03	0.000E+00	4.960E+05	4.960E+05
3	0.0346	0.03	0.04	0.000E+00	3.341E+05	3.341E+05
4	0.0448	0.04	0.05	0.000E+00	2.309E+05	2.309E+05
5	0.0548	0.05	0.06	0.000E+00	1.818E+05	1.818E+05
6	0.0648	0.06	0.07	0.000E+00	1.385E+05	1.385E+05
7	0.0749	0.07	0.08	0.000E+00	1.109E+05	1.109E+05
8	0.0850	0.08	0.09	0.000E+00	1.031E+05	1.031E+05
9	0.0949	0.09	0.10	0.000E+00	9.720E+04	9.720E+04
10	0.1424	0.10	0.20	0.000E+00	6.480E+05	6.480E+05
11	0.2418	0.20	0.30	0.000E+00	2.106E+05	2.106E+05
12	0.3447	0.30	0.40	0.000E+00	1.085E+05	1.085E+05
13	0.4668	0.40	0.55	0.000E+00	8.697E+04	8.697E+04
14	0.6876	0.55	0.75	3.182E+05	5.676E+04	3.749E+05
15	0.8186	0.75	0.90	0.000E+00	2.262E+04	2.262E+04
16	0.9894	0.90	1.10	0.000E+00	1.757E+04	1.757E+04
17	1.2095	1.10	1.35	0.000E+00	1.124E+04	1.124E+04
18	1.4867	1.35	1.60	6.449E+04	5.257E+03	6.975E+04
19	1.6891	1.60	1.80	0.000E+00	2.017E+03	2.017E+03
20	1.8874	1.80	2.00	0.000E+00	1.002E+03	1.002E+03
21	2.1857	2.00	2.20	1.655E+05	4.551E+02	1.660E+05
22	2.2828	2.20	2.40	0.000E+00	1.742E+02	1.742E+02
23	2.4759	2.40	2.60	0.000E+00	5.234E+01	5.234E+01
24	2.6672	2.60	2.80	0.000E+00	1.012E+01	1.012E+01
25	2.8000	2.80	3.20	0.000E+00	1.035E+00	1.035E+00
Total Photons/sec:				5.482E+05	3.856E+06	4.405E+06

>>> U -234 (Z = 92) Weight(520) = 2.690E+00 μ Ci

Group No.	Photon Mean	Energy, MeV Low	High	Photon Production Rate Gamma&Xray	Bremss.	Total photon/s
1	0.0130	0.01	0.02	1.045E+04	9.047E-01	1.045E+04
2	0.0231	0.02	0.03	0.000E+00	8.468E-02	8.468E-02
3	0.0334	0.03	0.04	0.000E+00	1.018E-02	1.018E-02
4	0.0439	0.04	0.05	0.000E+00	1.957E-03	1.957E-03
5	0.0532	0.05	0.06	1.184E+02	6.204E-04	1.184E+02
6	0.0639	0.06	0.07	0.000E+00	1.863E-04	1.863E-04
7	0.0736	0.07	0.08	0.000E+00	4.332E-05	4.332E-05
8	0.0830	0.08	0.09	0.000E+00	6.132E-06	6.132E-06
9	0.0916	0.09	0.10	0.000E+00	2.824E-07	2.824E-07
10	0.1210	0.10	0.20	3.981E+01	1.040E-11	3.981E+01
13	0.4900	0.40	0.55	3.981E+00	0.000E+00	3.981E+00
14	0.5800	0.55	0.75	1.194E-02	0.000E+00	1.194E-02
Total Photons/sec:				1.061E+04	1.002E+00	1.061E+04

>>> U -235 (Z = 92) Weight(476) = 9.800E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	1.121E+06	2.021E+02	1.121E+06
2	0.0241	0.02	0.03	0.000E+00	5.115E+01	5.115E+01
3	0.0342	0.03	0.04	0.000E+00	1.885E+01	1.885E+01
4	0.0443	0.04	0.05	0.000E+00	8.147E+00	8.147E+00
5	0.0544	0.05	0.06	0.000E+00	3.912E+00	3.912E+00
6	0.0645	0.06	0.07	0.000E+00	1.994E+00	1.994E+00
7	0.0727	0.07	0.08	3.989E+03	1.050E+00	3.990E+03
8	0.0845	0.08	0.09	0.000E+00	5.511E-01	5.511E-01
9	0.0921	0.09	0.10	2.607E+05	2.865E-01	2.607E+05
10	0.1729	0.10	0.20	2.688E+06	5.063E-01	2.688E+06
11	0.2071	0.20	0.30	2.197E+05	0.000E+00	2.197E+05
12	0.3685	0.30	0.40	4.714E+03	0.000E+00	4.714E+03
13	0.4457	0.40	0.55	4.351E+02	0.000E+00	4.351E+02
14	0.7425	0.55	0.75	1.450E+01	0.000E+00	1.450E+01
15	0.7947	0.75	0.90	2.176E+01	0.000E+00	2.176E+01
Total Photons/sec:				4.298E+06	2.885E+02	4.298E+06

>>> U -236 (Z = 92) Weight(398) = 2.170E+01 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0128	0.01	0.02	0.000E+00	4.695E+00	4.695E+00
2	0.0230	0.02	0.03	0.000E+00	3.894E-01	3.894E-01
3	0.0335	0.03	0.04	0.000E+00	4.566E-02	4.566E-02
4	0.0440	0.04	0.05	0.000E+00	1.116E-02	1.116E-02
5	0.0539	0.05	0.06	0.000E+00	3.330E-03	3.330E-03
6	0.0682	0.06	0.07	8.832E+02	7.981E-04	8.832E+02
7	0.0731	0.07	0.08	0.000E+00	1.222E-04	1.222E-04
8	0.0817	0.08	0.09	0.000E+00	6.494E-06	6.494E-06
9	0.0900	0.09	0.10	0.000E+00	3.386E-09	3.386E-09
Total Photons/sec:				8.832E+02	5.146E+00	8.883E+02

>>> U -238 (Z = 92) Weight(526) = 1.590E+04 μ Ci

Group No.	Photon Energy, MeV			Photon Production Rate		Total photon/s
	Mean	Low	High	Gamma&Xray	Bremss.	
1	0.0130	0.01	0.02	5.195E+07	3.094E+03	5.195E+07
2	0.0230	0.02	0.03	0.000E+00	2.563E+02	2.563E+02
3	0.0335	0.03	0.04	0.000E+00	2.914E+01	2.914E+01
4	0.0440	0.04	0.05	0.000E+00	6.644E+00	6.644E+00
5	0.0538	0.05	0.06	0.000E+00	1.823E+00	1.823E+00
6	0.0664	0.06	0.07	5.883E+05	3.766E-01	5.883E+05
7	0.0729	0.07	0.08	0.000E+00	4.775E-02	4.775E-02
8	0.0808	0.08	0.09	0.000E+00	2.309E-03	2.309E-03
Total Photons/sec:				5.254E+07	3.388E+03	5.254E+07

New UNH Tank (HO-64-5473) Line Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.004E+01	6.779E+02	2.838E-03
0.0245	3.229E+00	1.146E+02	6.409E-04
0.0354	1.236E+00	4.037E+01	3.627E-04
0.0429	8.096E-01	2.318E+01	2.979E-04
0.0548	5.145E-01	1.182E+01	2.497E-04
0.0659	4.008E-01	7.416E+00	2.302E-04
0.0748	3.516E-01	5.442E+00	2.186E-04
0.0819	3.254E-01	4.420E+00	2.117E-04
0.0933	2.947E-01	3.335E+00	2.030E-04
0.1522	2.284E-01	1.508E+00	1.749E-04
0.2310	1.920E-01	1.031E+00	1.518E-04
0.3458	1.636E-01	7.918E-01	1.304E-04
0.5068	1.399E-01	6.509E-01	1.114E-04
0.6423	1.259E-01	5.802E-01	1.006E-04
0.7680	1.160E-01	5.316E-01	9.281E-05
1.0434	1.001E-01	4.565E-01	8.021E-05
1.1417	9.565E-02	4.360E-01	7.665E-05
1.4187	8.565E-02	3.906E-01	6.855E-05
1.6904	7.831E-02	3.585E-01	6.267E-05
1.8897	7.401E-02	3.402E-01	5.906E-05
2.1850	6.883E-02	3.188E-01	5.431E-05
2.2879	6.728E-02	3.124E-01	5.280E-05
2.4864	6.458E-02	3.017E-01	5.019E-05
2.6844	6.221E-02	2.926E-01	4.795E-05
2.9209	5.971E-02	2.836E-01	4.577E-05
3.2000	5.717E-02	2.751E-01	4.383E-05

New UNH Tank (H0-64-5473) Annular Source - Middle

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00

Totals: 1.290E-03 1.665E+00 7.800E+00 1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.838E-03	2.004E+01	6.779E+02	2.838E-03
0.0245	6.409E-04	3.229E+00	1.146E+02	6.409E-04
0.0354	3.627E-04	1.236E+00	4.037E+01	3.627E-04
0.0429	2.979E-04	8.096E-01	2.318E+01	2.979E-04
0.0548	2.497E-04	5.145E-01	1.182E+01	2.497E-04
0.0659	2.302E-04	4.008E-01	7.416E+00	2.302E-04
0.0748	2.186E-04	3.516E-01	5.442E+00	2.186E-04
0.0819	2.117E-04	3.254E-01	4.420E+00	2.117E-04
0.0933	2.030E-04	2.947E-01	3.335E+00	2.030E-04
0.1522	1.749E-04	2.284E-01	1.508E+00	1.749E-04
0.2310	1.518E-04	1.920E-01	1.031E+00	1.518E-04
0.3458	1.304E-04	1.636E-01	7.918E-01	1.304E-04
0.5068	1.114E-04	1.399E-01	6.509E-01	1.114E-04
0.6423	1.006E-04	1.259E-01	5.802E-01	1.006E-04
0.7680	9.281E-05	1.160E-01	5.316E-01	9.281E-05
1.0434	8.021E-05	1.001E-01	4.565E-01	8.021E-05
1.1417	7.665E-05	9.565E-02	4.360E-01	7.665E-05
1.4187	6.855E-05	8.565E-02	3.906E-01	6.855E-05
1.6904	6.267E-05	7.831E-02	3.585E-01	6.267E-05
1.8897	5.906E-05	7.401E-02	3.402E-01	5.906E-05
2.1850	5.431E-05	6.883E-02	3.188E-01	5.431E-05
2.2879	5.280E-05	6.728E-02	3.124E-01	5.280E-05
2.4864	5.019E-05	6.458E-02	3.017E-01	5.019E-05
2.6844	4.795E-05	6.221E-02	2.926E-01	4.795E-05
2.9209	4.577E-05	5.971E-02	2.836E-01	4.577E-05
3.2000	4.383E-05	5.717E-02	2.751E-01	4.383E-05

New UNH Tank (HO-64-5473) Line Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3
AIR	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	7.800E+00	0.000E+00
Totals:	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.004E+01	6.779E+02	2.838E-03
0.0245	3.229E+00	1.146E+02	6.409E-04
0.0354	1.236E+00	4.037E+01	3.627E-04
0.0429	8.096E-01	2.318E+01	2.979E-04
0.0548	5.145E-01	1.182E+01	2.497E-04
0.0659	4.008E-01	7.416E+00	2.302E-04
0.0748	3.516E-01	5.442E+00	2.186E-04
0.0819	3.254E-01	4.420E+00	2.117E-04
0.0933	2.947E-01	3.335E+00	2.030E-04
0.1522	2.284E-01	1.508E+00	1.749E-04
0.2310	1.920E-01	1.031E+00	1.518E-04
0.3458	1.636E-01	7.918E-01	1.304E-04
0.5068	1.399E-01	6.509E-01	1.114E-04
0.6423	1.259E-01	5.802E-01	1.006E-04
0.7680	1.160E-01	5.316E-01	9.281E-05
1.0434	1.001E-01	4.565E-01	8.021E-05
1.1417	9.565E-02	4.360E-01	7.665E-05
1.4187	8.565E-02	3.906E-01	6.855E-05
1.6904	7.831E-02	3.585E-01	6.267E-05
1.8897	7.401E-02	3.402E-01	5.906E-05
2.1850	6.883E-02	3.188E-01	5.431E-05
2.2879	6.728E-02	3.124E-01	5.280E-05
2.4864	6.458E-02	3.017E-01	5.019E-05
2.6844	6.221E-02	2.926E-01	4.795E-05
2.9209	5.971E-02	2.836E-01	4.577E-05
3.2000	5.717E-02	2.751E-01	4.383E-05

New UNH Tank (HO-64-5473) Annular Source - End

Shield Composition, g/cc

	Shield 1	Shield 2	Shield 3	Shield 4
AIR	1.290E-03	0.000E+00	0.000E+00	1.290E-03
ALUMINUM	0.000E+00	1.665E+00	0.000E+00	0.000E+00
IRON	0.000E+00	0.000E+00	7.800E+00	0.000E+00
Totals:	1.290E-03	1.665E+00	7.800E+00	1.290E-03

E, MeV Linear Attenuation, per cm (last region is air)

0.0131	2.838E-03	2.004E+01	6.779E+02	2.838E-03
0.0245	6.409E-04	3.229E+00	1.146E+02	6.409E-04
0.0354	3.627E-04	1.236E+00	4.037E+01	3.627E-04
0.0429	2.979E-04	8.096E-01	2.318E+01	2.979E-04
0.0548	2.497E-04	5.145E-01	1.182E+01	2.497E-04
0.0659	2.302E-04	4.008E-01	7.416E+00	2.302E-04
0.0748	2.186E-04	3.516E-01	5.442E+00	2.186E-04
0.0819	2.117E-04	3.254E-01	4.420E+00	2.117E-04
0.0933	2.030E-04	2.947E-01	3.335E+00	2.030E-04
0.1522	1.749E-04	2.284E-01	1.508E+00	1.749E-04
0.2310	1.518E-04	1.920E-01	1.031E+00	1.518E-04
0.3458	1.304E-04	1.636E-01	7.918E-01	1.304E-04
0.5068	1.114E-04	1.399E-01	6.509E-01	1.114E-04
0.6423	1.006E-04	1.259E-01	5.802E-01	1.006E-04
0.7680	9.281E-05	1.160E-01	5.316E-01	9.281E-05
1.0434	8.021E-05	1.001E-01	4.565E-01	8.021E-05
1.1417	7.665E-05	9.565E-02	4.360E-01	7.665E-05
1.4187	6.855E-05	8.565E-02	3.906E-01	6.855E-05
1.6904	6.267E-05	7.831E-02	3.585E-01	6.267E-05
1.8897	5.906E-05	7.401E-02	3.402E-01	5.906E-05
2.1850	5.431E-05	6.883E-02	3.188E-01	5.431E-05
2.2879	5.280E-05	6.728E-02	3.124E-01	5.280E-05
2.4864	5.019E-05	6.458E-02	3.017E-01	5.019E-05
2.6844	4.795E-05	6.221E-02	2.926E-01	4.795E-05
2.9209	4.577E-05	5.971E-02	2.836E-01	4.577E-05
3.2000	4.383E-05	5.717E-02	2.751E-01	4.383E-05

Finish run at 11:55:31 12/20/96
Input File (D:\ISOSHLD\INPUT\TANKER.) is shown below:

```
0          2 PUREX Tank Trailers
Organic Tank (HO-64-4278) Line Source - Middle
&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
  NSHLD=2, JBUF=2, ICONC=0, OPTION=1,
  SLTH=1036., Y=518., X=2.5, T(1)=1., T(2)=1.27,
  SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
  WEIGHT(376)=7.12E-01, WEIGHT(377)=7.12E-01,
  WEIGHT(472)=1.45E-01, WEIGHT(319)=1.93E-02,
  WEIGHT(335)=8.45E-01, WEIGHT(336)=7.99E-01,
  WEIGHT(119)=1.84E-02, WEIGHT(155)=1.46E-02,
  WEIGHT(170)=6.82E+00, WEIGHT(172)=6.82E+00,
  WEIGHT(117)=2.08E-02, WEIGHT(496)=2.15E-02,
  WEIGHT(418)=8.44E-02, WEIGHT(269)=1.20E-01,
  WEIGHT(520)=1.72E-09, WEIGHT(398)=4.97E-08,
  WEIGHT(476)=1.39E-08, WEIGHT(526)=8.31E-06, &
SOURCE 7 0.8122
1 STEEL 9          7.8
Organic Tank (HO-64-4278) Annular Source - Middle
&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
  NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=1.27,
  SLTH=1036., Y=518., X=78., T(1)=76.2, T(2)=0.1,
  SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
  WEIGHT(376)=7.12E-01, WEIGHT(377)=7.12E-01,
  WEIGHT(472)=1.45E-01, WEIGHT(319)=1.93E-02,
  WEIGHT(335)=8.45E-01, WEIGHT(336)=7.99E-01,
  WEIGHT(119)=1.84E-02, WEIGHT(155)=1.46E-02,
  WEIGHT(170)=6.82E+00, WEIGHT(172)=6.82E+00,
  WEIGHT(117)=2.08E-02, WEIGHT(496)=2.15E-02,
  WEIGHT(418)=8.44E-02, WEIGHT(269)=1.20E-01,
  WEIGHT(520)=1.72E-09, WEIGHT(398)=4.97E-08,
  WEIGHT(476)=1.39E-08, WEIGHT(526)=8.31E-06, &
AIR 3 .00129
SOURCE 7          0.8122
1 STEEL 9          7.8
```

Organic Tank (HO-64-4278) Line Source - End
&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
NSHLD=2, JBUF=2, ICONC=0, OPTION=0,
SLTH=1036., Y=1035., X=2.5, T(1)=1., T(2)=1.27,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=7.12E-01, WEIGHT(377)=7.12E-01,
WEIGHT(472)=1.45E-01, WEIGHT(319)=1.93E-02,
WEIGHT(335)=8.45E-01, WEIGHT(336)=7.99E-01,
WEIGHT(119)=1.84E-02, WEIGHT(155)=1.46E-02,
WEIGHT(170)=6.82E+00, WEIGHT(172)=6.82E+00,
WEIGHT(117)=2.08E-02, WEIGHT(496)=2.15E-02,
WEIGHT(418)=8.44E-02, WEIGHT(269)=1.20E-01,
WEIGHT(520)=1.72E-09, WEIGHT(398)=4.97E-08,
WEIGHT(476)=1.39E-08, WEIGHT(526)=8.31E-06, &
SOURCE 7 0.8122

1 STEEL 9 7.8

Organic Tank (HO-64-4278) Annular Source - End
&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=1.27,
SLTH=1036., Y=1035., X=78., T(1)=76.2, T(2)=0.1,

SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=7.12E-01, WEIGHT(377)=7.12E-01,
WEIGHT(472)=1.45E-01, WEIGHT(319)=1.93E-02,
WEIGHT(335)=8.45E-01, WEIGHT(336)=7.99E-01,
WEIGHT(119)=1.84E-02, WEIGHT(155)=1.46E-02,
WEIGHT(170)=6.82E+00, WEIGHT(172)=6.82E+00,
WEIGHT(117)=2.08E-02, WEIGHT(496)=2.15E-02,
WEIGHT(418)=8.44E-02, WEIGHT(269)=1.20E-01,
WEIGHT(520)=1.72E-09, WEIGHT(398)=4.97E-08,
WEIGHT(476)=1.39E-08, WEIGHT(526)=8.31E-06, &

AIR 3 .00129

SOURCE 7 0.8122

1 STEEL 9 7.8

Old UNH Tank (HO-64-5920) Line Source - Middle
&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
NSHLD=2, JBUF=2, ICONC=0, OPTION=1,
SLTH=701., Y=350.5, X=2., T(1)=1., T(2)=0.635,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
SOURCE 7 1.665

1 STEEL 9 7.8

Old UNH Tank (HO-64-5920) Annular Source - Middle
&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=0.635,
SLTH=701., Y=350.5, X=73.5, T(1)=72.4, T(2)=0.1,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
AIR 3 .00129
SOURCE 7 1.665

1 STEEL 9 7.8

Old UNH Tank (HO-64-5920) Line Source - End
&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
NSHLD=2, JBUF=2, ICONC=0, OPTION=0,
SLTH=701., Y=700., X=2., T(1)=1., T(2)=0.635,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
SOURCE 7 1.665

1 STEEL 9 7.8

Old UNH Tank (HO-64-5920) Annular Source - End
&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=0.635,
SLTH=701., Y=700., X=73.5, T(1)=72.4, T(2)=0.1,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
AIR 3 .00129
SOURCE 7 1.665

1 STEEL 9 7.8
New UNH Tank (HO-64-5473) Line Source - Middle

&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
NSHLD=2, JBUF=2, ICONC=0, OPTION=1,
SLTH=750., Y=375., X=2., T(1)=1., T(2)=0.635,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
SOURCE 7 1.665

1 STEEL 9 7.8
New UNH Tank (HO-64-5473) Annular Source - Middle

&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=0.635,
SLTH=750., Y=375., X=73.5, T(1)=72.4, T(2)=0.1,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
AIR 3 .00129
SOURCE 7 1.665

1 STEEL 9 7.8

New UNH Tank (HO-64-5473) Line Source - End
&INPUT NEXT=1, IGEOM=7, NTHETA=11, NPSI=11,
NSHLD=2, JBUF=2, ICONC=0, OPTION=0,
SLTH=750., Y=749., X=2., T(1)=1., T(2)=0.635,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
SOURCE 7 1.665

1 STEEL 9 7.8

New UNH Tank (HO-64-5473) Annular Source - End
&INPUT NEXT=1, IGEOM=13, NTHETA=11, NPSI=11,
NSHLD=3, JBUF=3, ICONC=0, OPTION=0, T(3)=0.635,
SLTH=750., Y=749., X=73.5, T(1)=72.4, T(2)=0.1,
SRCUNIT=0, DOSEUNIT=0, SRCPRFX=-6, SFACT=1.0E+3,
WEIGHT(376)=5.81E-01, WEIGHT(377)=5.81E-01,
WEIGHT(319)=4.27E-02, WEIGHT(335)=3.60E-02,
WEIGHT(336)=3.41E-02, WEIGHT(119)=4.67E-01,
WEIGHT(155)=3.96E-02, WEIGHT(170)=5.33E-01,
WEIGHT(172)=5.33E-01, WEIGHT(117)=7.18E-02,
WEIGHT(526)=1.59E+01, WEIGHT(398)=2.17E-02,
WEIGHT(476)=9.80E-02, WEIGHT(520)=2.69E-03,
WEIGHT(472)=0.00E+00, WEIGHT(496)=0.00E+00,
WEIGHT(418)=0.00E+00, WEIGHT(269)=0.00E+00, &
AIR 3 .00129
SOURCE 7 1.665

1 STEEL 9 7.8

DAT'S ALL PHOLQUES!!!!!!!

&INPUT NEXT=6, &

CHECKLIST FOR INDEPENDENT TECHNICAL REVIEW

DOCUMENT REVIEWED
NUMBER: WHC-SD-WM-CN-087 Rev 0.
TITLE: Shielding Analysis for the WESF Ion Exchange Module
Reviewer(s): Steve Gedeon

I. Method(s) of Review

- Input data checked for accuracy
- Independent calculation performed
- Hand calculation
- Alternate computer code: Macintosh
- 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
- 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 assessment appropriate and reasonable
- Other (define) _____

III. Comments: _____

IV. REVIEWER: SG 29 Dec 96

DISTRIBUTION SHEET

To Distribution	From Criticality and Shielding	Page 1 of 1
		Date December 30, 1996
Project Title/Work Order Calculational Note in Support of Inventory Assessment of Three Tank Trailers Using Radiological Attenuation Calculations		EDT No. 620284
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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D. F. Baker	S6-01	X			
S. R. Gedeon	H0-35	X			
H. J. Goldberg	H0-35	X			
J. Greenborg	H0-35	X			
J. R. Hilliard	S6-01	X			
C. V. Villalobos	S6-19	X			
Central Files (2 + Original)	A3-88	X			
Docket Files (2)	B1-17	X			