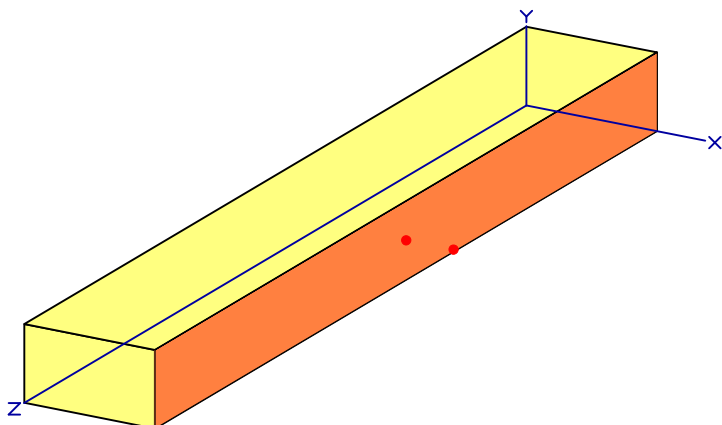


**MicroShield v5.05 (5.05-00473)**  
**American Ecology**

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File Ref: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 By: \_\_\_\_\_  
 Checked: \_\_\_\_\_

**Case Title: MKM Gondola**  
**Description: DU, U-238-124pCi/g, U-234-20 pCi/g, U-235-5 pCi/g**  
**Geometry: 13 - Rectangular Volume**



**Source Dimensions**

Length	274.32 cm	9 ft
Width	1.8e+3 cm	60 ft
Height	152.4 cm	5 ft 0.0 in

**Dose Points**

	<u>X</u>	<u>Y</u>	<u>Z</u>
# 1	275.844 cm	76.2 cm	914.4 cm
	9 ft 0.6 in	2 ft 6.0 in	30 ft
# 2	3.75e+02 cm	76.2 cm	914.4 cm
	12 ft 3.6 in	2 ft 6.0 in	30 ft

**Shields**

<u>Shield Name</u>	<u>Dimension</u>	<u>Material</u>	<u>Density</u>
Source	2700.0 ft <sup>3</sup>	Concrete	1.5
Shield 1	.018 ft	Iron	7.86
Air Gap		Air	0.00122

**Source Input**

**Grouping Method : Standard Indices**

**Number of Groups : 25**

**Lower Energy Cutoff : 0.015**

**Photons < 0.015 : Excluded**

**Library : Grove**

<u>Nuclide</u>	<u>curies</u>	<u>becquerels</u>	<u>uCi/cm<sup>3</sup></u>	<u>Bq/cm<sup>3</sup></u>
Ac-227	7.5320e-010	2.7868e+001	9.8515e-012	3.6450e-007
Bi-210	3.4682e-013	1.2832e-002	4.5363e-015	1.6784e-010
Bi-211	6.6883e-010	2.4747e+001	8.7480e-012	3.2368e-007
Bi-214	1.7610e-011	6.5159e-001	2.3034e-013	8.5225e-009
Fr-223	1.0394e-011	3.8456e-001	1.3594e-013	5.0299e-009
Pa-231	2.4214e-008	8.9590e+002	3.1670e-010	1.1718e-005
Pa-234	2.2753e-005	8.4187e+005	2.9760e-007	1.1011e-002
Pa-234m	1.4221e-002	5.2617e+008	1.8600e-004	6.8820e+000
Pb-210	3.5725e-013	1.3218e-002	4.6727e-015	1.7289e-010
Pb-211	6.6883e-010	2.4747e+001	8.7480e-012	3.2368e-007
Pb-214	1.7611e-011	6.5162e-001	2.3035e-013	8.5229e-009
Po-210	1.7525e-013	6.4841e-003	2.2921e-015	8.4809e-011
Po-211	1.8259e-012	6.7559e-002	2.3882e-014	8.8363e-010
Po-214	1.7607e-011	6.5145e-001	2.3029e-013	8.5207e-009
Po-215	6.6891e-010	2.4750e+001	8.7490e-012	3.2371e-007
Po-218	1.7616e-011	6.5180e-001	2.3041e-013	8.5253e-009
Ra-223	6.6891e-010	2.4750e+001	8.7490e-012	3.2371e-007
Ra-226	1.7884e-011	6.6172e-001	2.3392e-013	8.6550e-009
Rn-219	6.6891e-010	2.4750e+001	8.7490e-012	3.2371e-007
Rn-222	1.7616e-011	6.5181e-001	2.3041e-013	8.5253e-009
Th-227	6.9031e-010	2.5541e+001	9.0289e-012	3.3407e-007
Th-230	4.1295e-008	1.5279e+003	5.4012e-010	1.9984e-005

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<u>Nuclide</u>	<u>curies</u>	<u>becquerels</u>	<u>µCi/cm<sup>3</sup></u>	<u>Bq/cm<sup>3</sup></u>
Th-231	5.7342e-004	2.1216e+007	7.5000e-006	2.7750e-001
Th-234	1.4221e-002	5.2617e+008	1.8600e-004	6.8820e+000
Tl-207	6.6700e-010	2.4679e+001	8.7240e-012	3.2279e-007
U-234	2.2937e-003	8.4868e+007	3.0001e-005	1.1100e+000
U-235	5.7342e-004	2.1216e+007	7.5000e-006	2.7750e-001
U-238	1.4221e-002	5.2617e+008	1.8600e-004	6.8820e+000

**Buildup**  
**The material reference is : Source**

**Integration Parameters**

X Direction	20
Y Direction	20
Z Direction	20

**Results - Dose Point # 1 - (9.05,2.5,30) ft**

<u>Energy</u>	<u>Activity</u>	<u>Fluence Rate</u>	<u>Fluence Rate</u>	<u>Exposure Rate</u>	<u>Exposure Rate</u>
<u>MeV</u>	<u>photons/sec</u>	<u>MeV/cm<sup>2</sup>/sec</u>	<u>MeV/cm<sup>2</sup>/sec</u>	<u>mR/hr</u>	<u>mR/hr</u>
		<u>No Buildup</u>	<u>With Buildup</u>	<u>No Buildup</u>	<u>With Buildup</u>
0.015	3.991e+04	2.100e-231	7.715e-30	1.801e-232	6.617e-31
0.02	3.190e+00	1.037e-109	9.703e-34	3.592e-111	3.361e-35
0.03	3.109e+06	1.565e-35	2.091e-27	1.551e-37	2.072e-29
0.04	1.032e+03	1.301e-21	5.055e-21	5.754e-24	2.236e-23
0.05	1.001e+05	3.305e-13	2.161e-12	8.804e-16	5.757e-15
0.06	2.070e+07	6.448e-08	6.208e-07	1.281e-10	1.233e-09
0.08	3.237e+06	4.144e-06	5.568e-05	6.557e-09	8.811e-08
0.1	3.455e+07	5.369e-04	8.001e-03	8.215e-07	1.224e-05
0.15	3.570e+06	6.378e-04	8.765e-03	1.050e-06	1.443e-05
0.2	1.327e+07	6.675e-03	7.852e-02	1.178e-05	1.386e-04
0.3	6.122e+04	9.322e-05	8.265e-04	1.768e-07	1.568e-06
0.4	5.170e+04	1.564e-04	1.117e-03	3.048e-07	2.176e-06
0.5	7.677e+04	3.856e-04	2.314e-03	7.569e-07	4.543e-06
0.6	3.137e+05	2.357e-03	1.230e-02	4.600e-06	2.400e-05
0.8	1.747e+06	2.444e-02	1.034e-01	4.649e-05	1.967e-04
1.0	5.585e+06	1.253e-01	4.557e-01	2.310e-04	8.400e-04
1.5	1.178e+05	6.073e-03	1.733e-02	1.022e-05	2.915e-05
2.0	1.520e+04	1.368e-03	3.401e-03	2.116e-06	5.259e-06
TOTALS:	8.654e+07	1.680e-01	6.917e-01	3.093e-04	1.269e-03

**Results - Dose Point # 2 - (12.298,2.5,30) ft**

<u>Energy</u>	<u>Activity</u>	<u>Fluence Rate</u>	<u>Fluence Rate</u>	<u>Exposure Rate</u>	<u>Exposure Rate</u>
<u>MeV</u>	<u>photons/sec</u>	<u>MeV/cm<sup>2</sup>/sec</u>	<u>MeV/cm<sup>2</sup>/sec</u>	<u>mR/hr</u>	<u>mR/hr</u>
		<u>No Buildup</u>	<u>With Buildup</u>	<u>No Buildup</u>	<u>With Buildup</u>
0.015	3.991e+04	5.015e-119	3.162e-30	4.302e-120	2.712e-31
0.02	3.190e+00	3.821e-61	3.976e-34	1.324e-62	1.377e-35
0.03	3.109e+06	1.217e-20	2.435e-20	1.206e-22	2.413e-22
0.04	1.032e+03	5.397e-15	1.671e-14	2.387e-17	7.389e-17
0.05	1.001e+05	1.903e-09	8.489e-09	5.070e-12	2.262e-11
0.06	2.070e+07	2.020e-05	1.139e-04	4.013e-08	2.262e-07
0.08	3.237e+06	1.040e-04	6.735e-04	1.646e-07	1.066e-06

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<u>Energy</u> <u>MeV</u>	<u>Activity</u> <u>photons/sec</u>	<u>Fluence Rate</u> <u>MeV/cm<sup>2</sup>/sec</u> <u>No Buildup</u>	<u>Fluence Rate</u> <u>MeV/cm<sup>2</sup>/sec</u> <u>With Buildup</u>	<u>Exposure Rate</u> <u>mR/hr</u> <u>No Buildup</u>	<u>Exposure Rate</u> <u>mR/hr</u> <u>With Buildup</u>
0.1	3.455e+07	4.833e-03	3.078e-02	7.394e-06	4.709e-05
0.15	3.570e+06	2.174e-03	1.187e-02	3.581e-06	1.955e-05
0.2	1.327e+07	1.552e-02	7.512e-02	2.739e-05	1.326e-04
0.3	6.122e+04	1.504e-04	6.138e-04	2.853e-07	1.164e-06
0.4	5.170e+04	2.062e-04	7.440e-04	4.017e-07	1.450e-06
0.5	7.677e+04	4.426e-04	1.453e-03	8.688e-07	2.852e-06
0.6	3.137e+05	2.440e-03	7.401e-03	4.762e-06	1.445e-05
0.8	1.747e+06	2.181e-02	5.883e-02	4.148e-05	1.119e-04
1.0	5.585e+06	1.008e-01	2.498e-01	1.857e-04	4.604e-04
1.5	1.178e+05	4.154e-03	8.940e-03	6.989e-06	1.504e-05
2.0	1.520e+04	8.546e-04	1.696e-03	1.322e-06	2.622e-06
TOTALS:	8.654e+07	1.535e-01	4.480e-01	2.804e-04	8.104e-04