MicroShield® - Exposure Rate Tool 9.05

Exposure Rate Inputs	
Geometry & Material File	Hs PPS file.PPS
Source Assay File	Ra-224 decay.msd
Initial Date	23/04/2013
Final Date	29/04/2013
Days Duration	6.00000E+00 days
Number of Time Intervals	2.00000E+01
Exposure Rate Units	mR/hr

Dose Exposure Results

Date	Days Since Initial Date	Exposure - Without Buildup (mR/hr)	Exposure - With Buildup (mR/hr)
23/04/2013	0.0	2.955e-010	6.422e-010
23/04/2013	0.0	2.955e-010	6.422e-010
24/04/2013	1.0	2.653e+001	8.015e+001
24/04/2013	1.0	2.653e+001	8.015e+001
24/04/2013	1.0	2.653e+001	8.015e+001
24/04/2013	1.0	2.653e+001	8.015e+001
25/04/2013	2.0	2.822e+001	8.525e+001
25/04/2013	2.0	2.822e+001	8.525e+001
25/04/2013	2.0	2.822e+001	8.525e+001
26/04/2013	3.0	2.462e+001	7.439e+001
26/04/2013	3.0	2.462e+001	7.439e+001
26/04/2013	3.0	2.462e+001	7.439e+001
27/04/2013	4.0	2.061e+001	6.226e+001
27/04/2013	4.0	2.061e+001	6.226e+001
27/04/2013	4.0	2.061e+001	6.226e+001
27/04/2013	4.0	2.061e+001	6.226e+001
28/04/2013	5.0	1.708e+001	5.159e+001
28/04/2013	5.0	1.708e+001	5.159e+001
28/04/2013	5.0	1.708e+001	5.159e+001
29/04/2013	6.0	1.411e+001	4.263e+001
29/04/2013	6.0	1.411e+001	4.263e+001

MicroShield 9.05
Croft (9.05-0000)

Date	By	Checked

Filename	Run Date	Run Time	Duration
HS-3977A-Base with 3985 insert-Ra-224.msd	April 23, 2013	17:22:18	00:00:00

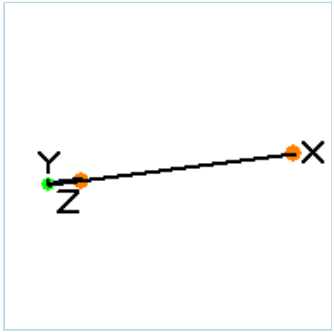
Project Info	
Case Title	HS 3977A
Description	Validation, Base Shielding, point source with 3985 insert
Geometry	1 - Point

Dose Points

A	X	Y	Z
#1	15.17 cm (6.0 in)	0.0 cm (0 in)	0.0 cm (0 in)
#2	115.17 cm (3 ft 9.3 in)	0.0 cm (0 in)	0.0 cm (0 in)

Shields

Shield N	Dimension	Material	Density
Shield 1	1.78 cm	Tungsten	17.23
Shield 2	.31 cm	Iron	7.86
Shield 3	.07 cm	Air	0.00122
Shield 4	4.6 cm	Uranium	17.93
Shield 5	.06 cm	Air	0.00122
Shield 6	.6 cm	Iron	7.86
Shield 7	.6 cm	Iron	7.86
Shield 8	6.75 cm	Air	0.00122
Shield 9	.4 cm	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: Included
Library: Grove

Nuclide	Ci	Bq
Bi-212	7.3097e-001	2.7046e+010
Pb-212	7.2708e-001	2.6902e+010
Po-212	4.6833e-001	1.7328e+010
Po-216	6.8197e-001	2.5233e+010
Ra-224	6.8184e-001	2.5228e+010
Rn-220	6.8197e-001	2.5233e+010
Tl-208	2.6271e-001	9.7202e+009

Buildup: The material reference is Shield 4
Integration Parameters

Results - Dose Point # 1 - (15.17,0,0) cm

Energy (MeV)	Activity (Photons/sec)	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup	Absorbed Dose Rate mrad/hr No Buildup	Absorbed Dose Rate mrad/hr With Buildup	Absorbed Dose Rate mGy/hr No Buildup	Absorbed Dose Rate mGy/hr With Buildup
0.015	6.639e+09	0.000e+00	3.015e-22	0.000e+00	2.586e-23	0.000e+00	2.258e-23	0.000e+00	2.258e-25
0.04	2.765e+08	0.000e+00	3.443e-23	0.000e+00	1.523e-25	0.000e+00	1.329e-25	0.000e+00	1.329e-27
0.08	1.071e+10	3.761e-209	3.040e-21	5.952e-212	4.810e-24	5.196e-212	4.199e-24	5.196e-214	4.199e-26
0.1	1.860e+08	9.521e-118	7.218e-23	1.457e-120	1.104e-25	1.272e-120	9.640e-26	1.272e-122	9.640e-28

0.2	1.307e+10	1.451e-49	1.489e-20	2.562e-52	2.628e-23	2.236e-52	2.294e-23	2.236e-54	2.294e-25
0.3	1.775e+09	1.229e-17	2.000e-17	2.331e-20	3.794e-20	2.035e-20	3.312e-20	2.035e-22	3.312e-22
0.4	2.558e+07	5.662e-10	1.070e-09	1.103e-12	2.085e-12	9.631e-13	1.820e-12	9.631e-15	1.820e-14
0.5	2.218e+09	4.730e-04	1.003e-03	9.285e-07	1.968e-06	8.106e-07	1.718e-06	8.106e-09	1.718e-08
0.6	8.187e+09	2.129e-01	4.766e-01	4.156e-04	9.304e-04	3.628e-04	8.122e-04	3.628e-06	8.122e-06
0.8	5.333e+09	1.753e+01	4.384e+01	3.335e-02	8.338e-02	2.911e-02	7.279e-02	2.911e-04	7.279e-04
1.0	4.172e+08	1.609e+01	4.283e+01	2.965e-02	7.895e-02	2.589e-02	6.892e-02	2.589e-04	6.892e-04
1.5	9.269e+08	5.817e+02	1.629e+03	9.787e-01	2.741e+00	8.544e-01	2.393e+00	8.544e-03	2.393e-02
2.0	5.361e+07	9.862e+01	2.818e+02	1.525e-01	4.358e-01	1.331e-01	3.805e-01	1.331e-03	3.805e-03
3.0	9.701e+09	4.478e+04	1.242e+05	6.076e+01	1.685e+02	5.304e+01	1.471e+02	5.304e-01	1.471e+00
Totals	**5.952e+10**	**4.550e+04**	**1.262e+05**	**6.195e+01**	**1.719e+02**	**5.409e+01**	**1.500e+02**	**5.409e-01**	**1.500e+00**

Results - Dose Point # 2 - (115.17,0,0) cm									
Energy (MeV)	**Activity (Photons/sec)**	**Fluence Rate MeV/cm²/sec No Buildup**	**Fluence Rate MeV/cm²/sec With Buildup**	**Exposure Rate mR/hr No Buildup**	**Exposure Rate mR/hr With Buildup**	**Absorbed Dose Rate mrad/hr No Buildup**	**Absorbed Dose Rate mrad/hr With Buildup**	**Absorbed Dose Rate mGy/hr No Buildup**	**Absorbed Dose Rate mGy/hr With Buildup**
0.015	6.639e+09	0.000e+00	5.232e-24	0.000e+00	4.487e-25	0.000e+00	3.917e-25	0.000e+00	3.917e-27
0.04	2.765e+08	0.000e+00	5.974e-25	0.000e+00	2.642e-27	0.000e+00	2.306e-27	0.000e+00	2.306e-29
0.08	1.071e+10	6.398e-211	5.274e-23	1.012e-213	8.345e-26	8.839e-214	7.285e-26	8.839e-216	7.285e-28
0.1	1.860e+08	1.622e-119	1.252e-24	2.481e-122	1.916e-27	2.166e-122	1.672e-27	2.166e-124	1.672e-29
0.2	1.307e+10	2.481e-51	2.583e-22	4.379e-54	4.559e-25	3.822e-54	3.980e-25	3.822e-56	3.980e-27
0.3	1.775e+09	2.104e-19	3.425e-19	3.992e-22	6.497e-22	3.485e-22	5.672e-22	3.485e-24	5.672e-24
0.4	2.558e+07	9.710e-12	1.835e-11	1.892e-14	3.576e-14	1.652e-14	3.121e-14	1.652e-16	3.121e-16
0.5	2.218e+09	8.121e-06	1.721e-05	1.594e-08	3.379e-08	1.392e-08	2.950e-08	1.392e-10	2.950e-10
0.6	8.187e+09	3.658e-03	8.190e-03	7.139e-06	1.599e-05	6.233e-06	1.396e-05	6.233e-08	1.396e-07
0.8	5.333e+09	3.016e-01	7.542e-01	5.736e-04	1.435e-03	5.008e-04	1.252e-03	5.008e-06	1.252e-05
1.0	4.172e+08	2.769e-01	7.377e-01	5.105e-04	1.360e-03	4.456e-04	1.187e-03	4.456e-06	1.187e-05
1.5	9.269e+08	1.003e+01	2.811e+01	1.687e-02	4.729e-02	1.473e-02	4.128e-02	1.473e-04	4.128e-04
2.0	5.361e+07	1.702e+00	4.866e+00	2.632e-03	7.525e-03	2.297e-03	6.569e-03	2.297e-05	6.569e-05
3.0	9.701e+09	7.736e+02	2.147e+03	1.050e+00	2.913e+00	9.163e-01	2.543e+00	9.163e-03	2.543e-02
Totals	**5.952e+10**	**7.859e+02**	**2.182e+03**	**1.070e+00**	**2.971e+00**	**9.343e-01**	**2.593e+00**	**9.343e-03**	**2.593e-02**