

MicroShield 8.03
GA (8.03-0000)

Date	By	Checked

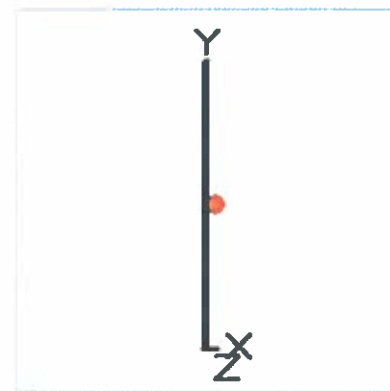
Filename	Run Date	Run Time	Duration
TRIGA Pipe Filled Cyl Surface External Dose.ms	May 18, 2021	8:08:08 AM	00:00:00

Project Info	
Case Title	Case 1
Description	Case 1
Geometry	10 - Cylinder Surface - External Dose Point

Source Dimensions	
Height	914.4 cm (30 ft)
Radius	3.493 cm (1.4 in)

Dose Points			
A	X	Y	Z
#1	33.973 cm (1 ft 1.4 in)	457.2 cm (15 ft)	0.0 cm (0 in)

Shields			
Shield N	Dimension	Material	Density
Cyl. Radius	3.493 cm	Concrete	2.35
Transition		Air	0.00122
Shield 2	.318 cm	Iron	7.86
Air Gap		Air	0.00122



Source Input: Grouping Method - Actual Photon Energies				
Nuclide	Ci	Bq	$\mu\text{Ci}/\text{cm}^2$	Bq/cm^2
Ba-137m	1.7983e-005	6.6539e+005	8.9623e-004	3.3161e+001
Cs-137	1.9010e-005	7.0337e+005	9.4739e-004	3.5053e+001

Buildup: The material reference is Cyl. Radius	
Integration Parameters	
Y Direction (axial)	20
Circumferential	20

Results					
Energy (MeV)	Activity (Photons/sec)	Fluence Rate MeV/cm ² /sec No Buildup	Fluence Rate MeV/cm ² /sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0045	6.907e+03	1.353e-67	2.305e-30	9.276e-68	1.580e-30
0.0318	1.378e+04	2.030e-11	3.951e-11	1.691e-13	3.291e-13
0.0322	2.542e+04	6.705e-11	1.322e-10	5.396e-13	1.064e-12
0.0364	9.249e+03	3.837e-09	8.716e-09	2.180e-11	4.952e-11
0.6616	5.987e+05	1.463e+00	2.287e+00	2.836e-03	4.433e-03
Totals	6.541e+05	1.463e+00	2.287e+00	2.836e-03	4.433e-03

Dose Equivalent Report

Program	MicroShield, Grove Software, Inc.
Version	8.03
Organization	GA
Serial #	8.03-0000
Date / Time	This case was run on Tuesday, September 22, 2020 at 9:38:05 AM
Filename	C:\Program Files (x86)\MicroShield 8\Examples\CaseFiles\TRIGA Pipe Filled Cyl Surface External Dose.msdl
Case Title	Case 1
Geometry	10 - Cylinder Surface - External Dose Point
Sensitivity	No

Results

Nominal Case			
Dose Point #1	(13.375, 180, 0) in		
Variable	Not Applicable		
Results (Summed over energies)	Units	Without Buildup	With Buildup
Photon Fluence Rate (flux)	Photons/cm ² /sec	2.211e+000	3.456e+000
Photon Energy Fluence Rate	MeV/cm ² /sec	1.463e+000	2.287e+000
Exposure and Dose Rates			
Exposure Rate in Air	mR/hr	2.836e-003	4.433e-003
Absorbed Dose Rate in Air	mGy/hr	2.476e-005	3.870e-005
Absorbed Dose Rate in Air	mrad/hr	2.476e-003	3.870e-003
Deep Dose Equivalent Rate (ICRP 51 - 1987)			
Parallel Geometry	mSv/hr	2.931e-005	4.582e-005
Opposed Geometry	mSv/hr	2.347e-005	3.669e-005
Rational Geometry	mSv/hr	2.347e-005	3.669e-005
Isotropic Geometry	mSv/hr	2.075e-005	3.244e-005
Shallow Dose Equivalent Rate (ICRP 51 - 1987)			

Parallel Geometry	mSv/hr	3.115e-005	4.870e-005
Opposed Geometry	mSv/hr	2.959e-005	4.626e-005
Rational Geometry	mSv/hr	2.959e-005	4.626e-005
Isotropic Geometry	mSv/hr	2.218e-005	3.468e-005
Effective Dose Equivalent Rate (ICRP 51 - 1987)			
Anterior/Posterior Geometry	mSv/hr	2.592e-005	4.052e-005
Posterior/Anterior Geometry	mSv/hr	2.288e-005	3.576e-005
Lateral Geometry	mSv/hr	1.696e-005	2.652e-005
Rotational Geometry	mSv/hr	2.044e-005	3.196e-005
Isotropic Geometry	mSv/hr	1.740e-005	2.721e-005
Nominal Case			
Dose Point #1	(13.375, 180, 0) in		
Variable	Not Applicable		
Results (Summed over energies)			
	Units	Without Buildup	With Buildup
Photon Fluence Rate (flux)	Photons/cm ² /sec	2.211e+000	3.456e+000
Photon Energy Fluence Rate	MeV/cm ² /sec	1.463e+000	2.287e+000
Exposure and Dose Rates			
Exposure Rate in Air	mR/hr	2.836e-003	4.433e-003
Absorbed Dose Rate in Air	mGy/hr	2.476e-005	3.870e-005
Absorbed Dose Rate in Air	mrad/hr	2.476e-003	3.870e-003
Bladder Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.772e-005	4.334e-005
Postero-anterior Geometry	mSv/hr	1.833e-005	2.866e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.410e-005	2.204e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.934e-005	3.024e-005
Isotropic Geometry	mSv/hr	1.584e-005	2.477e-005
Bone (Red Marrow) Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	1.893e-005	2.960e-005
Postero-anterior Geometry	mSv/hr	2.458e-005	3.843e-005

Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.617e-005	2.528e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.960e-005	3.064e-005
Isotropic Geometry	mSv/hr	1.680e-005	2.627e-005
Bone (Red Marrow) Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.139e-005	3.344e-005
Postero-anterior Geometry	mSv/hr	2.319e-005	3.626e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	3.238e-006	5.063e-006
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.030e-005	3.174e-005
Isotropic Geometry	mSv/hr	1.757e-005	2.746e-005
Breast - Female Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.858e-005	4.468e-005
Postero-anterior Geometry	mSv/hr	1.850e-005	2.892e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.949e-005	3.047e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.130e-005	3.329e-005
Isotropic Geometry	mSv/hr	1.999e-005	3.125e-005
Colon Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.549e-005	3.985e-005
Postero-anterior Geometry	mSv/hr	2.127e-005	3.325e-005
Left Lateral Geometry	mSv/hr	1.419e-005	2.219e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	1.419e-005	2.219e-005
Rotational Geometry	mSv/hr	1.938e-005	3.029e-005
Isotropic Geometry	mSv/hr	1.557e-005	2.435e-005
Gonads - Female Ovaries Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.298e-005	3.593e-005
Postero-anterior Geometry	mSv/hr	2.266e-005	3.542e-005

	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.308e-005	2.045e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.945e-005	3.040e-005
Isotropic Geometry	mSv/hr	1.571e-005	2.456e-005
Gonads - Male Testes Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	3.033e-005	4.741e-005
Postero-anterior Geometry	mSv/hr	1.859e-005	2.907e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.300e-005	2.032e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.936e-005	3.027e-005
Isotropic Geometry	mSv/hr	1.808e-005	2.826e-005
Gonads Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.672e-005	4.177e-005
Postero-anterior Geometry	mSv/hr	2.095e-005	3.275e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.315e-005	2.056e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.940e-005	3.034e-005
Isotropic Geometry	mSv/hr	8.633e-003	1.350e-002
Liver Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.517e-005	3.935e-005
Postero-anterior Geometry	mSv/hr	2.181e-005	3.410e-005
Left Lateral Geometry	mSv/hr	8.345e-006	1.305e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	2.113e-005	3.304e-005
Rotational Geometry	mSv/hr	1.988e-005	3.108e-005
Isotropic Geometry	mSv/hr	1.677e-005	2.622e-005
Lung Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.477e-005	3.872e-005
Postero-anterior Geometry	mSv/hr	2.647e-005	4.138e-005

	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.602e-005	2.504e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.137e-005	3.341e-005
Isotropic Geometry	mSv/hr	1.814e-005	2.837e-005
Oesophagus Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.033e-005	3.178e-005
Postero-anterior Geometry	mSv/hr	2.223e-005	3.476e-005
Left Lateral Geometry	mSv/hr	1.802e-005	2.818e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	1.640e-005	2.564e-005
Rotational Geometry	mSv/hr	1.943e-005	3.037e-005
Isotropic Geometry	mSv/hr	1.644e-005	2.570e-005
Remainder Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.258e-005	3.530e-005
Postero-anterior Geometry	mSv/hr	2.264e-005	3.539e-005
Left Lateral Geometry	mSv/hr	1.604e-005	2.508e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	1.438e-005	2.249e-005
Rotational Geometry	mSv/hr	1.982e-005	3.099e-005
Isotropic Geometry	mSv/hr	1.660e-005	2.595e-005
Skin Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.400e-005	3.753e-005
Postero-anterior Geometry	mSv/hr	2.391e-005	3.739e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	2.004e-005	3.133e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.240e-005	3.502e-005
Isotropic Geometry	mSv/hr	2.079e-005	3.251e-005
Stomach Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.756e-005	4.308e-005
Postero-anterior Geometry	mSv/hr	1.879e-005	3.626e-005

	mSv/hr	2.117e-005	3.310e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	8.562e-006	1.339e-005
Rotational Geometry	mSv/hr	1.994e-005	3.117e-005
Isotropic Geometry	mSv/hr	1.659e-005	2.593e-005
Thyroid Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	3.195e-005	4.995e-005
Postero-anterior Geometry	mSv/hr	1.616e-005	2.526e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.653e-005	4.148e-005
Isotropic Geometry	mSv/hr	2.524e-005	3.946e-005
Effective Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.522e-005	3.942e-005
Postero-anterior Geometry	mSv/hr	2.157e-005	3.372e-005
Left Lateral Geometry	mSv/hr	1.620e-005	2.532e-005
Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Right Lateral Geometry	mSv/hr	1.508e-005	2.357e-005
Rotational Geometry	mSv/hr	2.020e-005	3.157e-005
Isotropic Geometry	mSv/hr	1.708e-005	2.670e-005
Eye Lens Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.875e-005	4.494e-005
Postero-anterior Geometry	mSv/hr	1.036e-005	1.620e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	2.498e-005	3.905e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	2.498e-005	3.905e-005
Isotropic Geometry	mSv/hr	2.254e-005	3.523e-005
Thymus Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.969e-005	4.642e-005
Postero-anterior Geometry	mSv/hr	1.322e-005	2.067e-005

	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.623e-005	2.537e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.623e-005	2.537e-005
Isotropic Geometry	mSv/hr	2.062e-005	3.223e-005
Uterus Absorbed Dose (ICRP 74 - 1997)			
Antero-posterior Geometry	mSv/hr	2.345e-005	3.666e-005
Postero-anterior Geometry	mSv/hr	2.111e-005	3.301e-005
Left Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Lateral Geometry	mSv/hr	1.250e-005	1.954e-005
Right Lateral Geometry	mSv/hr	0.000e+000	0.000e+000
Rotational Geometry	mSv/hr	1.250e-005	1.954e-005
Isotropic Geometry	mSv/hr	1.858e-005	2.905e-005