Attachment 3 – TAN Warm Shop Drum Layout Exposure Calculations

MicroShield v5.05 (5.05-00340)
BBWI

Page : 1
DOS File : P1R23C.MS5
Run Date : August 7, 2001
Run Time : 12:31:46 PM
Duration : 00:01:57

File Ref: _____
Date: 8/7/01
By: [illegible]
Checked: _____

Case Title: Sludge Package
Description: 20-gallons of homogenized V-tank sludge
Geometry: 7 - Cylinder Volume - Side Shields

Source Dimensions

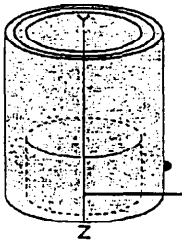
Height	29.464 cm	11.6 in
Radius	28.258 cm	11.1 in

Dose Points

	X	Y	Z
# 1	40.3695 cm	14.732 cm	0 cm
	1 ft 3.9 in	5.8 in	0.0 in
# 2	285.75 cm	14.732 cm	0 cm
	9 ft 4.5 in	5.8 in	0.0 in
# 3	285.75 cm	84.7598 cm	0 cm
	9 ft 4.5 in	2 ft 9.4 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	2.61 ft³	V123 SLUDGE	1.02
Shield 1	.004 ft	Iron	7.86
Shield 2	.194 ft	Air	0.00122
Shield 3	.016 ft	Iron	7.86
Shield 4	.135 ft	Lead	11.34
Shield 5	.016 ft	Iron	7.86
Transition		Air	0.00122
Air Gap		Air	0.00122
Immersion		Air	0.00122



Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	7.6717e-001	2.8385e+010	1.0380e+001	3.8405e+005
Co-60	2.2770e-002	8.4249e+008	3.0807e-001	1.1399e+004
Cs-137	8.1096e-001	3.0006e+010	1.0972e+001	4.0597e+005

Buildup
The material reference is : Shield 4

Integration Parameters

Radial	20
Circumferential	20
Y Direction (axial)	20

Results - Dose Point # 1 - (1.32e+00,4.83e-01,0) ft

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
0.0318	5.877e+08	0.000e+00	1.029e-23	0.000e+00	8.574e-26
0.0322	1.084e+09	0.000e+00	1.924e-23	0.000e+00	1.548e-25
0.0364	3.946e+08	0.000e+00	8.009e-24	0.000e+00	4.550e-26
0.6616	2.554e+10	6.318e+02	1.408e+03	1.225e+00	2.730e+00
0.6938	1.374e+05	4.931e-03	1.114e-02	9.520e-06	2.151e-05
1.1732	8.425e+08	5.597e+02	1.348e+03	1.000e+00	2.409e+00
1.3325	8.425e+08	9.067e+02	2.160e+03	1.573e+00	3.747e+00
TOTALS:	2.929e+10	2.098e+03	4.916e+03	3.798e+00	8.886e+00

Results - Dose Point # 2 - (9.375,4.83e-01,0) ft

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
0.0318	5.877e+08	0.000e+00	1.656e-25	0.000e+00	1.379e-27
0.0322	1.084e+09	0.000e+00	3.095e-25	0.000e+00	2.491e-27
0.0364	3.946e+08	0.000e+00	1.288e-25	0.000e+00	7.320e-28
0.6616	2.554e+10	1.130e+01	2.493e+01	2.190e-02	4.833e-02
0.6938	1.374e+05	8.713e-05	1.948e-04	1.682e-07	3.761e-07
1.1732	8.425e+08	9.126e+00	2.179e+01	1.631e-02	3.894e-02
1.3325	8.425e+08	1.466e+01	3.465e+01	2.543e-02	6.011e-02
TOTALS:	2.929e+10	3.508e+01	8.137e+01	6.364e-02	1.474e-01

Results - Dose Point # 3 - (9.375,2.78e+00,0) ft

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
0.0318	5.877e+08	0.000e+00	1.561e-25	0.000e+00	1.300e-27
0.0322	1.084e+09	0.000e+00	2.918e-25	0.000e+00	2.348e-27
0.0364	3.946e+08	0.000e+00	1.215e-25	0.000e+00	6.901e-28
0.6616	2.554e+10	1.021e+01	2.263e+01	1.979e-02	4.386e-02
0.6938	1.374e+05	7.920e-05	1.779e-04	1.529e-07	3.435e-07
1.1732	8.425e+08	8.606e+00	2.060e+01	1.538e-02	3.681e-02

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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
0.0318	5.877e+08	0.000e+00	3.460e-26	0.000e+00	2.882e-28
0.0322	1.084e+09	0.000e+00	6.466e-26	0.000e+00	5.203e-28
0.0364	3.946e+08	0.000e+00	2.692e-26	0.000e+00	1.529e-28
0.6616	2.554e+10	2.315e+00	5.118e+00	4.488e-03	9.921e-03
0.6938	1.374e+05	1.788e-05	4.005e-05	3.452e-08	7.733e-08
1.1732	8.425e+08	1.892e+00	4.526e+00	3.381e-03	8.088e-03
1.3325	8.425e+08	3.043e+00	7.204e+00	5.279e-03	1.250e-02
TOTALS:	2.929e+10	7.250e+00	1.685e+01	1.315e-02	3.051e-02
	Sensitivity	Variable	Z Dose Point 3	(9 of 13)	(20.64 ft)
0.0318	5.877e+08	0.000e+00	2.794e-26	0.000e+00	2.327e-28
0.0322	1.084e+09	0.000e+00	5.221e-26	0.000e+00	4.202e-28
0.0364	3.946e+08	0.000e+00	2.174e-26	0.000e+00	1.235e-28
0.6616	2.554e+10	1.855e+00	4.101e+00	3.596e-03	7.951e-03
0.6938	1.374e+05	1.432e-05	3.210e-05	2.765e-08	6.197e-08
1.1732	8.425e+08	1.516e+00	3.630e+00	2.710e-03	6.487e-03
1.3325	8.425e+08	2.440e+00	5.780e+00	4.233e-03	1.003e-02
TOTALS:	2.929e+10	5.811e+00	1.351e+01	1.054e-02	2.447e-02
	Sensitivity	Variable	Z Dose Point 3	(10 of 13)	(23.22 ft)
0.0318	5.877e+08	0.000e+00	2.294e-26	0.000e+00	1.910e-28
0.0322	1.084e+09	0.000e+00	4.286e-26	0.000e+00	3.450e-28
0.0364	3.946e+08	0.000e+00	1.785e-26	0.000e+00	1.014e-28
0.6616	2.554e+10	1.509e+00	3.339e+00	2.926e-03	6.473e-03
0.6938	1.374e+05	1.166e-05	2.613e-05	2.251e-08	5.046e-08
1.1732	8.425e+08	1.235e+00	2.959e+00	2.208e-03	5.289e-03
1.3325	8.425e+08	1.988e+00	4.714e+00	3.449e-03	8.179e-03
TOTALS:	2.929e+10	4.733e+00	1.101e+01	8.583e-03	1.994e-02
	Sensitivity	Variable	Z Dose Point 3	(11 of 13)	(25.8 ft)
0.0318	5.877e+08	0.000e+00	1.911e-26	0.000e+00	1.592e-28
0.0322	1.084e+09	0.000e+00	3.572e-26	0.000e+00	2.874e-28
0.0364	3.946e+08	0.000e+00	1.487e-26	0.000e+00	8.448e-29
0.6616	2.554e+10	1.247e+00	2.759e+00	2.417e-03	5.348e-03
0.6938	1.374e+05	9.627e-06	2.159e-05	1.859e-08	4.169e-08
1.1732	8.425e+08	1.021e+00	2.449e+00	1.825e-03	4.376e-03
1.3325	8.425e+08	1.644e+00	3.903e+00	2.853e-03	6.771e-03
TOTALS:	2.929e+10	3.912e+00	9.110e+00	7.095e-03	1.649e-02
	Sensitivity	Variable	Z Dose Point 3	(12 of 13)	(28.38 ft)
0.0318	5.877e+08	0.000e+00	1.614e-26	0.000e+00	1.344e-28
0.0322	1.084e+09	0.000e+00	3.016e-26	0.000e+00	2.427e-28
0.0364	3.946e+08	0.000e+00	1.256e-26	0.000e+00	7.134e-29
0.6616	2.554e+10	1.043e+00	2.309e+00	2.022e-03	4.476e-03
0.6938	1.374e+05	8.056e-06	1.808e-05	1.555e-08	3.490e-08
1.1732	8.425e+08	8.559e-01	2.054e+00	1.529e-03	3.670e-03
1.3325	8.425e+08	1.379e+00	3.274e+00	2.392e-03	5.681e-03
TOTALS:	2.929e+10	3.277e+00	7.637e+00	5.943e-03	1.383e-02
	Sensitivity	Variable	Z Dose Point 3	(13 of 13)	(30.96 ft)
0.0318	5.877e+08	0.000e+00	1.379e-26	0.000e+00	1.148e-28
0.0322	1.084e+09	0.000e+00	2.577e-26	0.000e+00	2.074e-28
0.0364	3.946e+08	0.000e+00	1.073e-26	0.000e+00	6.095e-29
0.6616	2.554e+10	8.829e-01	1.956e+00	1.712e-03	3.791e-03
0.6938	1.374e+05	6.820e-06	1.531e-05	1.317e-08	2.956e-08
1.1732	8.425e+08	7.257e-01	1.743e+00	1.297e-03	3.114e-03
1.3325	8.425e+08	1.169e+00	2.780e+00	2.029e-03	4.823e-03
TOTALS:	2.929e+10	2.778e+00	6.478e+00	5.037e-03	1.173e-02

MicroShield v5.05 (5.05-00340)
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Checked:

Case Title: Sludge Package
Description: 20-gallons of homogenized V-tank sludge
Geometry: 7 - Cylinder Volume - Side Shields

Source Dimensions

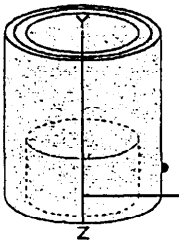
Height	29.464 cm	11.6 in
Radius	28.258 cm	11.1 in

Dose Points

	X	Y	Z
# 1	40.3695 cm	14.732 cm	0 cm
	1 ft 3.9 in	5.8 in	0.0 in
# 2	285.75 cm	14.732 cm	0 cm
	9 ft 4.5 in	5.8 in	0.0 in
# 3	285.75 cm	84.7598 cm	0 cm
	9 ft 4.5 in	2 ft 9.4 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Source	2.61 ft³	V123 SLUDGE	1.02
Shield 1	.004 ft	Iron	7.86
Shield 2	.194 ft	Air	0.00122
Shield 3	.016 ft	Iron	7.86
Shield 4	.135 ft	Lead	11.34
Shield 5	.016 ft	Iron	7.86
Transition		Air	0.00122
Air Gap		Air	0.00122
Immersion		Air	0.00122



Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	7.6717e-001	2.8385e+010	1.0380e+001	3.8405e+005
Co-60	2.2770e-002	8.4249e+008	3.0807e-001	1.1399e+004
Cs-137	8.1096e-001	3.0006e+010	1.0972e+001	4.0597e+005

Buildup
The material reference is : Shield 4

Integration Parameters

Radial	20
Circumferential	20
Y Direction (axial)	20

Results - Dose Point # 1 - (1.32e+00,4.83e-01,0) ft

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
0.0318	5.877e+08	0.000e+00	1.029e-23	0.000e+00	8.574e-26
0.0322	1.084e+09	0.000e+00	1.924e-23	0.000e+00	1.548e-25
0.0364	3.946e+08	0.000e+00	8.009e-24	0.000e+00	4.550e-26
0.6616	2.554e+10	6.318e+02	1.408e+03	1.225e+00	2.730e+00
0.6938	1.374e+05	4.931e-03	1.114e-02	9.520e-06	2.151e-05
1.1732	8.425e+08	5.597e+02	1.348e+03	1.000e+00	2.409e+00
1.3325	8.425e+08	9.067e+02	2.160e+03	1.573e+00	3.747e+00
TOTALS:	2.929e+10	2.098e+03	4.916e+03	3.798e+00	8.886e+00

Results - Dose Point # 2 - (9.375,4.83e-01,0) ft

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
0.0318	5.877e+08	0.000e+00	1.656e-25	0.000e+00	1.379e-27
0.0322	1.084e+09	0.000e+00	3.095e-25	0.000e+00	2.491e-27
0.0364	3.946e+08	0.000e+00	1.288e-25	0.000e+00	7.320e-28
0.6616	2.554e+10	1.130e+01	2.493e+01	2.190e-02	4.833e-02
0.6938	1.374e+05	8.713e-05	1.948e-04	1.682e-07	3.761e-07
1.1732	8.425e+08	9.126e+00	2.179e+01	1.631e-02	3.894e-02
1.3325	8.425e+08	1.466e+01	3.465e+01	2.543e-02	6.011e-02
TOTALS:	2.929e+10	3.508e+01	8.137e+01	6.364e-02	1.474e-01
	Sensitivity	Variable	Z Dose Point 2	(1 of 13)	(0 ft)
0.0318	5.877e+08	0.000e+00	1.656e-25	0.000e+00	1.379e-27
0.0322	1.084e+09	0.000e+00	3.095e-25	0.000e+00	2.491e-27
0.0364	3.946e+08	0.000e+00	1.288e-25	0.000e+00	7.320e-28
0.6616	2.554e+10	1.130e+01	2.493e+01	2.190e-02	4.833e-02
0.6938	1.374e+05	8.713e-05	1.948e-04	1.682e-07	3.761e-07
1.1732	8.425e+08	9.126e+00	2.179e+01	1.631e-02	3.894e-02
1.3325	8.425e+08	1.466e+01	3.465e+01	2.543e-02	6.011e-02
TOTALS:	2.929e+10	3.508e+01	8.137e+01	6.364e-02	1.474e-01

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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
0.6616	2.554e+10	1.804e+00	3.993e+00	3.497e-03	7.741e-03
0.6938	1.374e+05	1.393e-05	3.124e-05	2.689e-08	6.032e-08
1.1732	8.425e+08	1.477e+00	3.547e+00	2.640e-03	6.338e-03
1.3325	8.425e+08	2.380e+00	5.657e+00	4.129e-03	9.814e-03
TOTALS:	2.929e+10	5.662e+00	1.320e+01	1.027e-02	2.389e-02
	Sensitivity	Variable	Z Dose Point 2	(10 of 13)	(23.25 ft)
0.0318	5.877e+08	0.000e+00	2.308e-26	0.000e+00	1.922e-28
0.0322	1.084e+09	0.000e+00	4.313e-26	0.000e+00	3.471e-28
0.0364	3.946e+08	0.000e+00	1.796e-26	0.000e+00	1.020e-28
0.6616	2.554e+10	1.466e+00	3.245e+00	2.841e-03	6.291e-03
0.6938	1.374e+05	1.132e-05	2.540e-05	2.185e-08	4.904e-08
1.1732	8.425e+08	1.203e+00	2.889e+00	2.149e-03	5.163e-03
1.3325	8.425e+08	1.938e+00	4.610e+00	3.362e-03	7.998e-03
TOTALS:	2.929e+10	4.606e+00	1.074e+01	8.353e-03	1.945e-02
	Sensitivity	Variable	Z Dose Point 2	(11 of 13)	(2.58e+01 ft)
0.0318	5.877e+08	0.000e+00	1.920e-26	0.000e+00	1.599e-28
0.0322	1.084e+09	0.000e+00	3.589e-26	0.000e+00	2.888e-28
0.0364	3.946e+08	0.000e+00	1.494e-26	0.000e+00	8.488e-29
0.6616	2.554e+10	1.209e+00	2.679e+00	2.344e-03	5.193e-03
0.6938	1.374e+05	9.339e-06	2.097e-05	1.803e-08	4.048e-08
1.1732	8.425e+08	9.941e-01	2.390e+00	1.776e-03	4.271e-03
1.3325	8.425e+08	1.603e+00	3.815e+00	2.781e-03	6.619e-03
TOTALS:	2.929e+10	3.806e+00	8.884e+00	6.901e-03	1.608e-02
	Sensitivity	Variable	Z Dose Point 2	(12 of 13)	(2.84e+01 ft)
0.0318	5.877e+08	0.000e+00	1.619e-26	0.000e+00	1.349e-28
0.0322	1.084e+09	0.000e+00	3.027e-26	0.000e+00	2.436e-28
0.0364	3.946e+08	0.000e+00	1.260e-26	0.000e+00	7.159e-29
0.6616	2.554e+10	1.011e+00	2.242e+00	1.961e-03	4.346e-03
0.6938	1.374e+05	7.813e-06	1.755e-05	1.508e-08	3.389e-08
1.1732	8.425e+08	8.331e-01	2.004e+00	1.489e-03	3.582e-03
1.3325	8.425e+08	1.344e+00	3.201e+00	2.331e-03	5.554e-03
TOTALS:	2.929e+10	3.188e+00	7.447e+00	5.781e-03	1.348e-02
	Sensitivity	Variable	Z Dose Point 2	(13 of 13)	(31 ft)
0.0318	5.877e+08	0.000e+00	1.382e-26	0.000e+00	1.152e-28
0.0322	1.084e+09	0.000e+00	2.584e-26	0.000e+00	2.079e-28
0.0364	3.946e+08	0.000e+00	1.076e-26	0.000e+00	6.111e-29
0.6616	2.554e+10	8.564e-01	1.899e+00	1.660e-03	3.681e-03
0.6938	1.374e+05	6.616e-06	1.487e-05	1.277e-08	2.871e-08
1.1732	8.425e+08	7.067e-01	1.701e+00	1.263e-03	3.041e-03
1.3325	8.425e+08	1.140e+00	2.718e+00	1.978e-03	4.716e-03
TOTALS:	2.929e+10	2.703e+00	6.319e+00	4.901e-03	1.144e-02

Results - Dose Point # 3 - (9.375,2.78e+00,0) ft

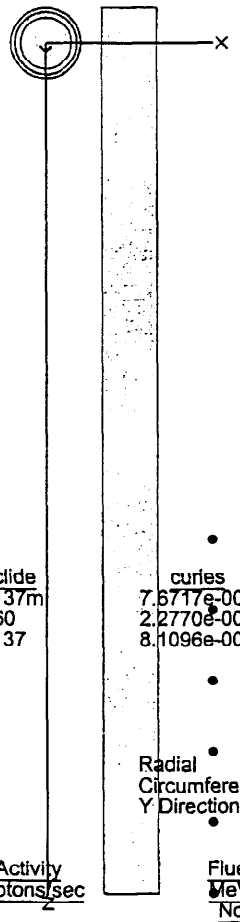
Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	5.877e+08	0.000e+00	1.561e-25	0.000e+00	1.300e-27
0.0322	1.084e+09	0.000e+00	2.918e-25	0.000e+00	2.348e-27
0.0364	3.946e+08	0.000e+00	1.215e-25	0.000e+00	6.901e-28
0.6616	2.554e+10	1.021e+01	2.263e+01	1.979e-02	4.386e-02
0.6938	1.374e+05	7.920e-05	1.779e-04	1.529e-07	3.435e-07
1.1732	8.425e+08	8.606e+00	2.060e+01	1.538e-02	3.681e-02
1.3325	8.425e+08	1.387e+01	3.283e+01	2.406e-02	5.696e-02
TOTALS:	2.929e+10	3.268e+01	7.606e+01	5.922e-02	1.376e-01

MicroShield v5.05 (5.05-00340)
BBWI

Page : 1
DOS File : P2R1D813.MS5
Run Date: August 7, 2001
Run Time: 2:18:01 PM
Duration : 00:00:49

File Ref:
Date: 8/7/01
By: JE
Checked:

Case Title: Sludge Package
Description: 20-gallons of homogenized V-tank sludge
Geometry: 7 - Cylinder Volume - Side Shields



Source Dimensions

Height	29.464 cm	11.6 in
Radius	28.258 cm	11.1 in

Dose Points

	X	Y	Z
# 1	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	550.4688 cm 18 ft 0.7 in
# 2	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	629.1072 cm 20 ft 7.7 in
# 3	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	707.7456 cm 23 ft 2.6 in
# 4	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	786.384 cm 25 ft 9.6 in
# 5	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	865.0224 cm 28 ft 4.6 in
# 6	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	943.6608 cm 30 ft 11.5 in

Shields

Shield Name	Dimension	Material	Density
Source	2.61 ft³	V123 SLUDGE	1.02
Shield 1	.004 ft	Iron	7.86
Shield 2	.194 ft	Air	0.00122
Shield 3	.016 ft	Iron	7.86
Shield 4	.135 ft	Lead	11.34
Shield 5	.016 ft	Iron	7.86
Transition	.75 ft	Air	0.00122
Shield 7	2.0 ft	Concrete	2.35
Air Gap		Air	0.00122
Immersion		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	7.6717e-001	2.8385e+010	1.0380e+001	3.8405e+005
Co-60	2.2770e-002	8.4249e+008	3.0807e-001	1.1399e+004
Cs-137	8.1096e-001	3.0006e+010	1.0972e+001	4.0597e+005

Buildup
The material reference is : Shield 7

Integration Parameters

Radial	20
Circumferential	20
Y Direction (axial)	20

Results - Dose Point # 1 - (6.04,2.78,18.06) ft

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
0.0318	5.877e+08	0.000e+00	8.322e-26	0.000e+00	6.932e-28
0.0322	1.084e+09	0.000e+00	1.596e-25	0.000e+00	1.284e-27
0.0364	3.946e+08	0.000e+00	8.892e-26	0.000e+00	5.052e-28
0.6616	2.554e+10	6.449e-15	2.122e-12	1.250e-17	4.113e-15
0.6938	1.374e+05	1.017e-19	2.956e-17	1.964e-22	5.707e-20
1.1732	8.425e+08	1.534e-11	1.247e-09	2.741e-14	2.229e-12
1.3325	8.425e+08	1.195e-10	7.425e-09	2.073e-13	1.288e-11
TOTALS:	2.929e+10	1.348e-10	8.674e-09	2.347e-13	1.511e-11

Results - Dose Point # 2 - (6.04,2.78,20.64) ft

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
0.0318	5.877e+08	0.000e+00	6.544e-26	0.000e+00	5.451e-28
0.0322	1.084e+09	0.000e+00	1.255e-25	0.000e+00	1.010e-27
0.0364	3.946e+08	0.000e+00	6.992e-26	0.000e+00	3.973e-28
0.6616	2.554e+10	8.339e-17	3.259e-14	1.617e-19	6.317e-17
0.6938	1.374e+05	1.435e-21	4.952e-19	2.771e-24	9.560e-22
1.1732	8.425e+08	5.230e-13	4.896e-11	9.347e-16	8.749e-14
1.3325	8.425e+08	4.933e-12	3.507e-10	8.558e-15	6.085e-13
TOTALS:	2.929e+10	5.456e-12	3.997e-10	9.492e-15	6.960e-13

Results - Dose Point # 3 - (6.04,2.78,23.22) ft

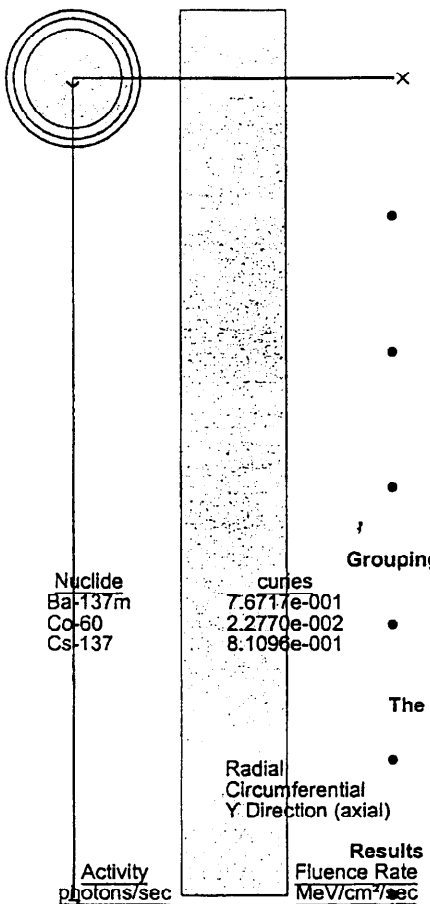
Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	5.877e+08	0.000e+00	5.269e-26	0.000e+00	4.389e-28

MicroShield v5.05 (5.05-00340)
BBWI

Page : 1
DOS File : P2R1D27.MS5
Run Date : August 7, 2001
Run Time : 2:21:26 PM
Duration : 00:00:44

File Ref:
Date: 8/7/01
By: JR.
Checked:

Case Title: Sludge Package
Description: 20-gallons of homogenized V-tank sludge
Geometry: 7 - Cylinder Volume - Side Shields



Source Dimensions

Height	29.464 cm	11.6 in
Radius	28.258 cm	11.1 in

Dose Points

	X	Y	Z
# 1	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	78.6384 cm 2 ft 7.0 in
# 2	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	157.2768 cm 5 ft 1.9 in
# 3	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	235.9152 cm 7 ft 8.9 in
# 4	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	314.5536 cm 10 ft 3.8 in
# 5	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	393.192 cm 12 ft 10.8 in
# 6	184.0992 cm 6 ft 0.5 in	84.7344 cm 2 ft 9.4 in	471.8304 cm 15 ft 5.8 in

Shields

Shield Name	Dimension	Material	Density
Source	2.61 ft³	V123 SLUDGE	1.02
Shield 1	.004 ft	Iron	7.86
Shield 2	.194 ft	Air	0.00122
Shield 3	.016 ft	Iron	7.86
Shield 4	.135 ft	Lead	11.34
Shield 5	.016 ft	Iron	7.86
Transition	.75 ft	Air	0.00122
Shield 7	2.0 ft	Concrete	2.35
Air Gap		Air	0.00122
Immersion		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	µCi/cm³	Bq/cm³
Ba-137m	7.6717e-001	2.8385e+010	1.0380e+001	3.8405e+005
Co-60	2.2770e-002	8.4249e+008	3.0807e-001	1.1399e+004
Cs-137	8.1096e-001	3.0006e+010	1.0972e+001	4.0597e+005

Buildup
The material reference is : Shield 7

Integration Parameters

Radial	20
Circumferential	20
Y Direction (axial)	20

Results - Dose Point # 1 - (6.04,2.78,2.58) ft

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
0.0318	5.877e+08	0.000e+00	6.357e-25	0.000e+00	5.295e-27
0.0322	1.084e+09	0.000e+00	1.219e-24	0.000e+00	9.809e-27
0.0364	3.946e+08	0.000e+00	6.792e-25	0.000e+00	3.859e-27
0.6616	2.554e+10	5.237e-05	4.832e-03	1.015e-07	9.368e-06
0.6938	1.374e+05	5.347e-10	4.432e-08	1.032e-12	8.556e-11
1.1732	8.425e+08	9.608e-04	2.754e-02	1.717e-06	4.921e-05
1.3325	8.425e+08	2.853e-03	6.556e-02	4.950e-06	1.137e-04
TOTALS:	2.929e+10	3.866e-03	9.793e-02	6.768e-06	1.723e-04

Results - Dose Point # 2 - (6.04,2.78,5.16) ft

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
0.0318	5.877e+08	0.000e+00	4.494e-25	0.000e+00	3.743e-27
0.0322	1.084e+09	0.000e+00	8.615e-25	0.000e+00	6.934e-27
0.0364	3.946e+08	0.000e+00	4.801e-25	0.000e+00	2.728e-27
0.6616	2.554e+10	4.010e-06	4.457e-04	7.774e-09	8.640e-07
0.6938	1.374e+05	4.282e-11	4.267e-09	8.268e-14	8.238e-12
1.1732	8.425e+08	1.227e-04	4.100e-03	2.192e-07	7.327e-06
1.3325	8.425e+08	4.039e-04	1.075e-02	7.007e-07	1.865e-05
TOTALS:	2.929e+10	5.305e-04	1.529e-02	9.276e-07	2.684e-05

Results - Dose Point # 3 - (6.04,2.78,7.74) ft

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
0.0318	5.877e+08	0.000e+00	3.018e-25	0.000e+00	2.514e-27