

Subject: ORIGEN, COMPLY and MicroShield results used for MHA and FHA calculations in UFTR FSAR Chapter 13 dated March 6, 2017

Date: Monday, March 6, 2017 at 1:42:29 PM Eastern Standard Time

From: Cronin,Dan

To: Duane Hardesty, Helvenston, Edward

CC: Shea,Brian C, Baciak,James Edward

Attached are the ORIGEN, COMPLY and MicroShield results used for the MHA and FHA calculations in the FSAR Chapter 13 dated March 6, 2017.

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time (days)	i130 (Ci)	i131 (Ci)	i132 (Ci)	i133 (Ci)	i135 (Ci)	kr85 (Ci)	kr85m (Ci)	kr88 (Ci)	mo95 (Ci)	nd143 (Ci)	nd145 (Ci)	o16 (Ci)
0.00E+00	9.76E-23	1.58E-22	3.12E-20	3.13E-20	2.27E-06	2.10E-24	1.02E-20	4.75E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.00E+00	9.86E-03	4.70E+01	1.37E+02	3.13E+02	2.96E+02	1.47E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.00E+01	9.88E-03	7.90E+01	1.84E+02	3.19E+02	2.96E+02	3.00E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.50E+01	9.88E-03	9.98E+01	2.00E+02	3.19E+02	2.96E+02	4.53E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.00E+01	9.88E-03	1.13E+02	2.05E+02	3.19E+02	2.96E+02	6.06E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.50E+01	9.88E-03	1.22E+02	2.07E+02	3.19E+02	2.96E+02	7.58E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.00E+01	9.88E-03	1.28E+02	2.08E+02	3.19E+02	2.96E+02	9.11E-02	6.32E+01	1.66E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.09E+01	2.92E-03	1.19E+02	1.71E+02	1.58E+02	2.96E+01	9.17E-02	2.19E+00	8.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.18E+01	8.58E-04	1.11E+02	1.41E+02	7.65E+01	2.96E+00	9.17E-02	7.48E-02	3.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.27E+01	2.52E-04	1.03E+02	1.16E+02	3.70E+01	2.96E-01	9.17E-02	2.56E-03	2.22E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.36E+01	7.42E-05	9.50E+01	9.50E+01	1.79E+01	2.97E-02	9.17E-02	8.86E-05	3.13E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.46E+01	2.18E-05	8.79E+01	7.80E+01	8.64E+00	2.97E-03	9.16E-02	4.16E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.55E+01	6.42E-06	8.13E+01	6.41E+01	4.17E+00	3.03E-04	9.16E-02	1.27E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.64E+01	1.89E-06	7.52E+01	5.26E+01	2.02E+00	3.52E-05	9.16E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.73E+01	5.56E-07	6.95E+01	4.32E+01	9.75E-01	8.40E-06	9.16E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.82E+01	1.64E-07	6.43E+01	3.55E+01	4.71E-01	5.73E-06	9.16E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.91E+01	4.83E-08	5.94E+01	2.92E+01	2.28E-01	5.46E-06	9.16E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.00E+01	1.43E-08	5.49E+01	2.40E+01	1.10E-01	5.43E-06	9.16E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.09E+01	4.35E-09	5.08E+01	1.97E+01	5.32E-02	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.18E+01	1.41E-09	4.70E+01	1.62E+01	2.57E-02	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.27E+01	5.43E-10	4.34E+01	1.33E+01	1.24E-02	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.36E+01	2.89E-10	4.01E+01	1.09E+01	6.01E-03	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.46E+01	2.14E-10	3.71E+01	8.97E+00	2.91E-03	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.55E+01	1.92E-10	3.43E+01	7.37E+00	1.41E-03	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.64E+01	1.85E-10	3.17E+01	6.05E+00	6.84E-04	5.43E-06	9.15E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.73E+01	1.84E-10	2.93E+01	4.97E+00	3.34E-04	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.82E+01	1.83E-10	2.71E+01	4.08E+00	1.64E-04	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.91E+01	1.83E-10	2.50E+01	3.35E+00	8.25E-05	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.00E+01	1.83E-10	2.32E+01	2.76E+00	4.30E-05	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.09E+01	1.83E-10	2.14E+01	2.26E+00	2.38E-05	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5.18E+01	1.83E-10	1.98E+01	1.86E+00	1.46E-05	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.27E+01	1.83E-10	1.83E+01	1.53E+00	1.01E-05	5.43E-06	9.14E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.36E+01	1.83E-10	1.69E+01	1.25E+00	7.97E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.46E+01	1.83E-10	1.56E+01	1.03E+00	6.93E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.55E+01	1.83E-10	1.45E+01	8.47E-01	6.43E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.64E+01	1.83E-10	1.34E+01	6.95E-01	6.18E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.73E+01	1.83E-10	1.24E+01	5.71E-01	6.07E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.82E+01	1.83E-10	1.14E+01	4.69E-01	6.01E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.91E+01	1.83E-10	1.06E+01	3.85E-01	5.98E-06	5.43E-06	9.13E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.00E+01	1.827E-10	9.755E+00	3.166E-01	5.967E-06	5.427E-06	9.123E-02	1.168E-06	3.036E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.09E+01	1.83E-10	9.02E+00	2.60E-01	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.18E+01	1.83E-10	8.34E+00	2.14E-01	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.27E+01	1.83E-10	7.71E+00	1.76E-01	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.36E+01	1.83E-10	7.13E+00	1.44E-01	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.46E+01	1.83E-10	6.59E+00	1.18E-01	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.55E+01	1.83E-10	6.09E+00	9.73E-02	5.96E-06	5.43E-06	9.12E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.64E+01	1.83E-10	5.63E+00	7.99E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.73E+01	1.83E-10	5.20E+00	6.57E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.82E+01	1.83E-10	4.81E+00	5.39E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.91E+01	1.83E-10	4.45E+00	4.43E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.00E+01	1.83E-10	4.11E+00	3.64E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.09E+01	1.83E-10	3.80E+00	2.99E-02	5.96E-06	5.43E-06	9.11E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.18E+01	1.83E-10	3.51E+00	2.46E-02	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.27E+01	1.83E-10	3.25E+00	2.02E-02	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.36E+01	1.83E-10	3.00E+00	1.66E-02	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.46E+01	1.83E-10	2.78E+00	1.36E-02	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.55E+01	1.83E-10	2.57E+00	1.12E-02	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.64E+01	1.83E-10	2.37E+00	9.19E-03	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.73E+01	1.83E-10	2.19E+00	7.55E-03	5.96E-06	5.43E-06	9.10E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.82E+01	1.83E-10	2.03E+00	6.20E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.91E+01	1.83E-10	1.87E+00	5.10E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.00E+01	1.83E-10	1.73E+00	4.19E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.09E+01	1.83E-10	1.60E+00	3.44E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.18E+01	1.83E-10	1.48E+00	2.83E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.27E+01	1.83E-10	1.37E+00	2.32E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.36E+01	1.83E-10	1.27E+00	1.91E-03	5.96E-06	5.43E-06	9.09E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

1.17E+02	1.83E-10	6.91E-02	5.08E-06	5.96E-06	5.43E-06	9.03E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.18E+02	1.83E-10	6.39E-02	4.84E-06	5.96E-06	5.43E-06	9.03E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.19E+02	1.83E-10	5.91E-02	4.65E-06	5.96E-06	5.43E-06	9.03E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.20E+02	1.83E-10	5.46E-02	4.49E-06	5.96E-06	5.43E-06	9.03E-02	1.17E-06	3.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

time (days)	pm147 (Ci)	pu238 (Ci)	pu239 (Ci)	pu240 (Ci)	pu241 (Ci)	pu242 (Ci)	pu243 (Ci)	rh103 (Ci)	ru101 (Ci)	sm147 (Ci)	sm149 (Ci)	sm150 (Ci)
0.00E+00	6.49E-10	1.94E-11	7.06E-14	2.59E-13	1.19E-10	4.54E-15	0.00E+00	0.00E+00	0.00E+00	1.61E-20	0.00E+00	0.00E+00
5.00E+00	5.48E-02	2.05E-11	4.09E-05	9.49E-12	1.19E-10	5.32E-15	7.57E-15	0.00E+00	0.00E+00	1.68E-15	0.00E+00	0.00E+00
1.00E+01	1.99E-01	2.57E-11	1.17E-04	4.66E-11	1.19E-10	5.32E-15	7.59E-15	0.00E+00	0.00E+00	1.25E-14	0.00E+00	0.00E+00
1.50E+01	4.08E-01	3.97E-11	2.01E-04	1.17E-10	1.19E-10	5.32E-15	7.64E-15	0.00E+00	0.00E+00	3.92E-14	0.00E+00	0.00E+00
2.00E+01	6.64E-01	6.62E-11	2.87E-04	2.22E-10	1.19E-10	5.32E-15	7.64E-15	0.00E+00	0.00E+00	8.69E-14	0.00E+00	0.00E+00
2.50E+01	9.54E-01	1.07E-10	3.73E-04	3.61E-10	1.19E-10	5.32E-15	7.67E-15	0.00E+00	0.00E+00	1.59E-13	0.00E+00	0.00E+00
3.00E+01	1.27E+00	1.64E-10	4.59E-04	5.35E-10	1.19E-10	5.32E-15	7.66E-15	0.00E+00	0.00E+00	2.58E-13	0.00E+00	0.00E+00
3.09E+01	1.33E+00	1.75E-10	4.73E-04	5.35E-10	1.19E-10	5.32E-15	3.62E-16	0.00E+00	0.00E+00	2.79E-13	0.00E+00	0.00E+00
3.18E+01	1.38E+00	1.82E-10	4.83E-04	5.35E-10	1.19E-10	5.32E-15	1.71E-17	0.00E+00	0.00E+00	3.01E-13	0.00E+00	0.00E+00
3.27E+01	1.43E+00	1.88E-10	4.91E-04	5.35E-10	1.19E-10	5.32E-15	8.10E-19	0.00E+00	0.00E+00	3.24E-13	0.00E+00	0.00E+00
3.36E+01	1.48E+00	1.92E-10	4.98E-04	5.35E-10	1.19E-10	5.32E-15	3.84E-20	0.00E+00	0.00E+00	3.48E-13	0.00E+00	0.00E+00
3.46E+01	1.52E+00	1.95E-10	5.02E-04	5.35E-10	1.19E-10	5.32E-15	1.95E-21	0.00E+00	0.00E+00	3.72E-13	0.00E+00	0.00E+00
3.55E+01	1.57E+00	1.98E-10	5.06E-04	5.35E-10	1.19E-10	5.32E-15	2.24E-22	0.00E+00	0.00E+00	3.98E-13	0.00E+00	0.00E+00
3.64E+01	1.61E+00	2.00E-10	5.09E-04	5.35E-10	1.19E-10	5.32E-15	1.44E-22	0.00E+00	0.00E+00	4.23E-13	0.00E+00	0.00E+00
3.73E+01	1.64E+00	2.01E-10	5.11E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	4.50E-13	0.00E+00	0.00E+00
3.82E+01	1.68E+00	2.02E-10	5.13E-04	5.35E-10	1.19E-10	5.32E-15	1.40E-22	0.00E+00	0.00E+00	4.77E-13	0.00E+00	0.00E+00
3.91E+01	1.71E+00	2.03E-10	5.14E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	5.04E-13	0.00E+00	0.00E+00
4.00E+01	1.74E+00	2.04E-10	5.15E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	5.33E-13	0.00E+00	0.00E+00
4.09E+01	1.77E+00	2.04E-10	5.16E-04	5.35E-10	1.19E-10	5.32E-15	1.38E-22	0.00E+00	0.00E+00	5.61E-13	0.00E+00	0.00E+00
4.18E+01	1.80E+00	2.04E-10	5.16E-04	5.35E-10	1.19E-10	5.32E-15	1.40E-22	0.00E+00	0.00E+00	5.90E-13	0.00E+00	0.00E+00
4.27E+01	1.83E+00	2.05E-10	5.17E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	6.20E-13	0.00E+00	0.00E+00
4.36E+01	1.85E+00	2.05E-10	5.17E-04	5.35E-10	1.19E-10	5.32E-15	1.40E-22	0.00E+00	0.00E+00	6.50E-13	0.00E+00	0.00E+00
4.46E+01	1.88E+00	2.05E-10	5.17E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	6.80E-13	0.00E+00	0.00E+00
4.55E+01	1.90E+00	2.05E-10	5.17E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	7.11E-13	0.00E+00	0.00E+00
4.64E+01	1.92E+00	2.06E-10	5.17E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	7.42E-13	0.00E+00	0.00E+00
4.73E+01	1.94E+00	2.06E-10	5.18E-04	5.35E-10	1.19E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	7.73E-13	0.00E+00	0.00E+00

1.14E+02	2.18E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.40E-22	0.00E+00	0.00E+00	3.33E-12	0.00E+00	0.00E+00
1.15E+02	2.18E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	3.37E-12	0.00E+00	0.00E+00
1.16E+02	2.18E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	3.40E-12	0.00E+00	0.00E+00
1.16E+02	2.18E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.38E-22	0.00E+00	0.00E+00	3.44E-12	0.00E+00	0.00E+00
1.17E+02	2.17E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	3.47E-12	0.00E+00	0.00E+00
1.18E+02	2.17E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.38E-22	0.00E+00	0.00E+00	3.51E-12	0.00E+00	0.00E+00
1.19E+02	2.17E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.38E-22	0.00E+00	0.00E+00	3.55E-12	0.00E+00	0.00E+00
1.20E+02	2.17E+00	2.13E-10	5.18E-04	5.35E-10	1.17E-10	5.32E-15	1.39E-22	0.00E+00	0.00E+00	3.58E-12	0.00E+00	0.00E+00

time (days)	sm151 (Ci)	sm152 (Ci)	tc99 (Ci)	u234 (Ci)	u235 (Ci)	u236 (Ci)	u238 (Ci)	xe131 (Ci)	xe133 (Ci)	xe133m (Ci)	xe135 (Ci)	xe135m (Ci)
0.00E+00	5.69E+00	0.00E+00	8.06E-15	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.19E-07	2.83E-22	1.63E-06	5.46E-18
5.00E+00	5.69E+00	0.00E+00	5.01E-06	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.23E+02	2.31E+00	3.08E+02	3.75E+01
1.00E+01	5.69E+00	0.00E+00	1.57E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.18E+02	3.20E+00	3.08E+02	3.75E+01
1.50E+01	5.69E+00	0.00E+00	2.79E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.69E+02	3.39E+00	3.08E+02	3.75E+01
2.00E+01	5.69E+00	0.00E+00	4.06E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.94E+02	3.43E+00	3.08E+02	3.75E+01
2.50E+01	5.70E+00	0.00E+00	5.35E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.08E+02	3.43E+00	3.08E+02	3.75E+01
3.00E+01	5.70E+00	0.00E+00	6.64E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.15E+02	3.44E+00	3.08E+02	3.75E+01
3.09E+01	5.70E+00	0.00E+00	6.86E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.05E+02	3.17E+00	1.28E+02	3.04E+00
3.18E+01	5.70E+00	0.00E+00	7.04E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.84E+02	2.67E+00	3.14E+01	3.04E-01
3.27E+01	5.70E+00	0.00E+00	7.18E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.58E+02	2.14E+00	6.69E+00	3.04E-02
3.36E+01	5.70E+00	0.00E+00	7.30E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.32E+02	1.67E+00	1.35E+00	3.04E-03
3.46E+01	5.70E+00	0.00E+00	7.39E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.07E+02	1.29E+00	2.65E-01	3.05E-04
3.55E+01	5.70E+00	0.00E+00	7.46E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.84E+02	9.79E-01	5.13E-02	3.12E-05
3.64E+01	5.70E+00	0.00E+00	7.52E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.64E+02	7.42E-01	9.88E-03	3.75E-06
3.73E+01	5.70E+00	0.00E+00	7.57E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.46E+02	5.60E-01	1.90E-03	1.01E-06
3.82E+01	5.70E+00	0.00E+00	7.60E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.29E+02	4.22E-01	3.68E-04	7.31E-07
3.91E+01	5.70E+00	0.00E+00	7.63E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.15E+02	3.17E-01	7.51E-05	7.03E-07
4.00E+01	5.70E+00	0.00E+00	7.65E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.02E+02	2.38E-01	1.89E-05	7.01E-07
4.09E+01	5.70E+00	0.00E+00	7.67E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	9.03E+01	1.79E-01	8.20E-06	7.00E-07
4.18E+01	5.70E+00	0.00E+00	7.69E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	8.01E+01	1.34E-01	6.15E-06	7.00E-07
4.27E+01	5.70E+00	0.00E+00	7.70E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	7.10E+01	1.01E-01	5.75E-06	7.00E-07
4.36E+01	5.70E+00	0.00E+00	7.71E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	6.30E+01	7.56E-02	5.68E-06	7.00E-07

4.46E+01	5.70E+00	0.00E+00	7.71E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	5.59E+01	5.67E-02	5.66E-06	7.00E-07
4.55E+01	5.70E+00	0.00E+00	7.72E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	4.95E+01	4.25E-02	5.66E-06	7.00E-07
4.64E+01	5.70E+00	0.00E+00	7.72E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	4.39E+01	3.19E-02	5.66E-06	7.00E-07
4.73E+01	5.70E+00	0.00E+00	7.73E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.90E+01	2.39E-02	5.66E-06	7.00E-07
4.82E+01	5.70E+00	0.00E+00	7.73E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.46E+01	1.79E-02	5.66E-06	7.00E-07
4.91E+01	5.70E+00	0.00E+00	7.73E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.06E+01	1.35E-02	5.66E-06	7.00E-07
5.00E+01	5.70E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.72E+01	1.01E-02	5.66E-06	7.00E-07
5.09E+01	5.70E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.41E+01	7.57E-03	5.66E-06	7.00E-07
5.18E+01	5.70E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.14E+01	5.68E-03	5.66E-06	7.00E-07
5.27E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.90E+01	4.26E-03	5.66E-06	7.00E-07
5.36E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.68E+01	3.19E-03	5.66E-06	7.00E-07
5.46E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.49E+01	2.39E-03	5.66E-06	7.00E-07
5.55E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.32E+01	1.80E-03	5.66E-06	7.00E-07
5.64E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.17E+01	1.35E-03	5.66E-06	7.00E-07
5.73E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.04E+01	1.01E-03	5.66E-06	7.00E-07
5.82E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	9.21E+00	7.58E-04	5.66E-06	7.00E-07
5.91E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	8.17E+00	5.68E-04	5.66E-06	7.00E-07
6.00E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	7.245E+00	4.261E-04	5.661E-06	7.003E-07
6.09E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	6.43E+00	3.20E-04	5.66E-06	7.00E-07
6.18E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	5.70E+00	2.40E-04	5.66E-06	7.00E-07
6.27E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	5.05E+00	1.80E-04	5.66E-06	7.00E-07
6.36E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	4.48E+00	1.35E-04	5.66E-06	7.00E-07
6.46E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.97E+00	1.01E-04	5.66E-06	7.00E-07
6.55E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.52E+00	7.59E-05	5.66E-06	7.00E-07
6.64E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.12E+00	5.69E-05	5.66E-06	7.00E-07
6.73E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.77E+00	4.27E-05	5.66E-06	7.00E-07
6.82E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.46E+00	3.20E-05	5.66E-06	7.00E-07
6.91E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.18E+00	2.40E-05	5.66E-06	7.00E-07
7.00E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.93E+00	1.81E-05	5.66E-06	7.00E-07
7.09E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.71E+00	1.36E-05	5.66E-06	7.00E-07
7.18E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.52E+00	1.02E-05	5.66E-06	7.00E-07
7.27E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.35E+00	7.65E-06	5.66E-06	7.00E-07
7.36E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.19E+00	5.75E-06	5.66E-06	7.00E-07
7.46E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	1.06E+00	4.33E-06	5.66E-06	7.00E-07
7.55E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	9.39E-01	3.26E-06	5.66E-06	7.00E-07
7.64E+01	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	8.33E-01	2.46E-06	5.66E-06	7.00E-07

1.10E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	9.76E-03	6.38E-08	5.66E-06	7.00E-07
1.11E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	8.66E-03	6.38E-08	5.66E-06	7.00E-07
1.12E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	7.68E-03	6.38E-08	5.66E-06	7.00E-07
1.13E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	6.81E-03	6.38E-08	5.66E-06	7.00E-07
1.14E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	6.04E-03	6.38E-08	5.66E-06	7.00E-07
1.15E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	5.36E-03	6.38E-08	5.66E-06	7.00E-07
1.16E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	4.75E-03	6.38E-08	5.66E-06	7.00E-07
1.16E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	4.21E-03	6.38E-08	5.66E-06	7.00E-07
1.17E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.74E-03	6.38E-08	5.66E-06	7.00E-07
1.18E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	3.31E-03	6.38E-08	5.66E-06	7.00E-07
1.19E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.94E-03	6.38E-08	5.66E-06	7.00E-07
1.20E+02	5.69E+00	0.00E+00	7.74E-05	1.01E+01	4.26E-01	6.70E-02	2.69E-01	0.00E+00	2.61E-03	6.38E-08	5.66E-06	7.00E-07

COMPLY: V1.6.
12:14

2/23/2017

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

REPORT ON COMPLIANCE WITH
THE CLEAN AIR ACT LIMITS FOR RADIONUCLIDE EMISSIONS
FROM THE COMPLY CODE - V1.6.

Prepared by:

UFTR
UFTR

Prepared for:

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Washington, DC 20460

COMPLY: V1.6.
12:14

2/23/2017

FHA Feb 2017

SCREENING LEVEL 3

DATA ENTERED:

Nuclide		Release Rate (curies/YEAR)
KR-85		1.750E-04
KR-85M		2.241E-09
KR-88		5.825E-09
I-129	D	4.748E-11
I-130	D	8.764E-14
I-131	D	4.679E-03
I-132	D	1.519E-04
I-133	D	2.862E-09
I-135	D	2.603E-09
XE-133		1.390E-02
XE-133M		8.176E-07
XE-135		1.086E-08
XE-135M		1.344E-09

Release height 9 meters.

Building height 8 meters.

The source and receptor are not on the same building.

Distance from the source to the receptor is 10 meters.

Building width 19 meters.

Default mean wind speed used (2.0 m/sec).

Distance from the SOURCE to the FARM producing
VEGETABLES is 1350 meters.

Distance from the SOURCE to the FARM producing
MILK and MEAT is 2700 meters.

NOTES:

Input parameters outside the "normal" range:

None.

COMPLY: V1.6.
12:14

2/23/2017

RESULTS:

Effective dose equivalent: 0.5 mrem/yr.

Effective dose equivalent: 0.5 mrem/yr due to Iodine.

*** Comply at level 3.

This facility is in COMPLIANCE.

It may or may not be EXEMPT from reporting to the EPA.

You may contact your regional EPA office for more
information.

***** END OF COMPLIANCE REPORT *****

COMPLY: V1.6.
2:48

2/23/2017

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

REPORT ON COMPLIANCE WITH
THE CLEAN AIR ACT LIMITS FOR RADIONUCLIDE EMISSIONS
FROM THE COMPLY CODE - V1.6.

Prepared by:

UFTR

Prepared for:

U.S. Environmental Protection Agency
Office of Radiation and Indoor Air
Washington, DC 20460

COMPLY: V1.6.
2:48

2/23/2017

MHA Feb 2017

SCREENING LEVEL 3

DATA ENTERED:

Nuclide		Release Rate (curies/YEAR)
KR-85		2.451E-03
KR-85M		3.138E-08
KR-88		8.156E-08
I-129	D	6.647E-10
I-130	D	1.227E-12
I-131	D	6.551E-02
I-132	D	2.126E-03
I-133	D	4.007E-08
I-135	D	3.645E-08
XE-133		1.946E-01
XE-133M		1.145E-05
XE-135		1.521E-07
XE-135M		1.881E-08

Release height 9 meters.

Building height 8 meters.

The source and receptor are not on the same building.

Distance from the source to the receptor is 10 meters.

Building width 19 meters.

Default mean wind speed used (2.0 m/sec).

Distance from the SOURCE to the FARM producing
VEGETABLES is 1350 meters.

Distance from the SOURCE to the FARM producing
MILK and MEAT is 2700 meters.

NOTES:

Input parameters outside the "normal" range:

None.

COMPLY: V1.6.
2:48

2/23/2017

RESULTS:

Effective dose equivalent: 7.3 mrem/yr.

Effective dose equivalent: 7.3 mrem/yr due to Iodine.

*** Failed at level 3.

This facility is NOT in COMPLIANCE (1).

Please send this report to your regional EPA office.

You may contact your regional EPA office to determine further
action.

(1) You may comply at a higher level.

***** END OF COMPLIANCE REPORT *****

**MicroShield 9.07
Microsoft (9.07-0000)**

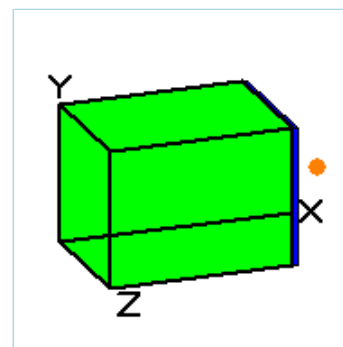
Date	By	Checked

Filename	Run Date	Run Time	Duration
Rectangular_sourceFHA.msdc	February 24, 2017	9:28:03 AM	00:00:00

Project Info	
Case Title	gaseous_source1
Description	Case 1
Geometry	13 - Rectangular Volume

Source Dimensions	
Length	1.2e+3 cm (40 ft 0.0 in)
Width	914.4 cm (30 ft)
Height	914.4 cm (30 ft)

Dose Points			
A	X	Y	Z
#1	1.2e+3 cm (41 ft 0.0 in)	457.2 cm (15 ft)	457.2 cm (15 ft)
#2	1.6e+3 cm (51 ft)	457.2 cm (15 ft)	457.2 cm (15 ft)



Shields			
Shield N	Dimension	Material	Density
Source	3.60e+04 ft ³	Air	.00122
Shield 1	1.0 ft	Concrete	2.35
Air Gap		Air	.00122

Source Input: Grouping Method - Standard Indices
Number of Groups: 25
Lower Energy Cutoff: .015
Photons < .015: Included
Library: Grove

Nuclide	Ci	Bq	μCi/cm ³	Bq/cm ³
I-129	1.8990e-010	7.0263e+000	1.8628e-013	6.8925e-009
I-130	3.5060e-013	1.2972e-002	3.4393e-016	1.2725e-011
I-131	1.8720e-002	6.9264e+008	1.8364e-005	6.7945e-001
I-132	6.0750e-004	2.2478e+007	5.9594e-007	2.2050e-002
I-133	1.1450e-008	4.2365e+002	1.1232e-011	4.1558e-007
I-135	1.0410e-008	3.8517e+002	1.0212e-011	3.7784e-007
Kr-85	1.7500e-004	6.4750e+006	1.7167e-007	6.3517e-003
Kr-85m	2.2410e-009	8.2917e+001	2.1983e-012	8.1339e-008
Kr-88	5.8250e-009	2.1553e+002	5.7141e-012	2.1142e-007
Xe-133	1.3900e-002	5.1430e+008	1.3635e-005	5.0451e-001
Xe-133m	8.1760e-007	3.0251e+004	8.0204e-010	2.9675e-005
Xe-135	1.0860e-008	4.0182e+002	1.0653e-011	3.9417e-007
Xe-135m	1.3440e-009	4.9728e+001	1.3184e-012	4.8781e-008

Buildup: The material reference is Shield 1	
Integration Parameters	
X Direction	10
Y Direction	20
Z Direction	20

Results - Dose Point # 1 - (41.001,15,15) ft									
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	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	3.541e+07	1.373e-255	1.484e-27	1.177e-256	1.273e-28	1.028e-256	1.111e-28	1.028e-258	1.111e-30
0.03	2.796e+08	1.452e-37	4.076e-26	1.439e-39	4.040e-28	1.256e-39	3.527e-28	1.256e-41	3.527e-30
0.04	5.284e-01	5.412e-28	2.195e-27	2.393e-30	9.709e-30	2.090e-30	8.476e-30	2.090e-32	8.476e-32
0.08	2.069e+08	3.191e-07	7.908e-06	5.049e-10	1.251e-08	4.408e-10	1.092e-08	4.408e-12	1.092e-10
0.1	4.251e-01	8.001e-15	2.963e-13	1.224e-17	4.532e-16	1.069e-17	3.957e-16	1.069e-19	3.957e-18
0.15	5.332e+04	1.577e-08	7.773e-07	2.596e-11	1.280e-09	2.266e-11	1.117e-09	2.266e-13	1.117e-11
0.2	2.235e+06	2.787e-06	1.332e-04	4.920e-09	2.351e-07	4.295e-09	2.052e-07	4.295e-11	2.052e-09
0.3	4.581e+07	3.437e-04	1.229e-02	6.520e-07	2.332e-05	5.692e-07	2.036e-05	5.692e-09	2.036e-07
0.4	5.627e+08	1.396e-02	3.678e-01	2.721e-05	7.166e-04	2.375e-05	6.256e-04	2.375e-07	6.256e-06
0.5	7.863e+06	4.778e-04	9.656e-03	9.379e-07	1.895e-05	8.188e-07	1.655e-05	8.188e-09	1.655e-07
0.6	8.053e+07	9.949e-03	1.605e-01	1.942e-05	3.134e-04	1.695e-05	2.736e-04	1.695e-07	2.736e-06
0.8	3.380e+07	1.233e-02	1.406e-01	2.345e-05	2.674e-04	2.047e-05	2.334e-04	2.047e-07	2.334e-06
1.0	6.586e+06	5.384e-03	4.729e-02	9.925e-06	8.716e-05	8.665e-06	7.609e-05	8.665e-08	7.609e-07
1.5	3.467e+06	1.126e-02	6.394e-02	1.894e-05	1.076e-04	1.653e-05	9.391e-05	1.653e-07	9.391e-07
2.0	7.389e+05	5.819e-03	2.550e-02	8.999e-06	3.943e-05	7.856e-06	3.442e-05	7.856e-08	3.442e-07
3.0	1.663e+00	3.968e-08	1.268e-07	5.383e-11	1.720e-10	4.700e-11	1.501e-10	4.700e-13	1.501e-12
Totals	1.266e+09	5.952e-02	8.277e-01	1.095e-04	1.574e-03	9.562e-05	1.374e-03	9.562e-07	1.374e-05

Results - Dose Point # 2 - (51,15,15) ft									
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	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	3.541e+07	7.773e-256	5.670e-28	6.667e-257	4.864e-29	5.820e-257	4.246e-29	5.820e-259	4.246e-31
0.03	2.796e+08	1.264e-37	1.558e-26	1.253e-39	1.544e-28	1.094e-39	1.348e-28	1.094e-41	1.348e-30
0.04	5.284e-01	4.805e-28	1.950e-27	2.125e-30	8.623e-30	1.855e-30	7.528e-30	1.855e-32	7.528e-32
0.08	2.069e+08	2.715e-07	6.704e-06	4.296e-10	1.061e-08	3.751e-10	9.261e-09	3.751e-12	9.261e-11
0.1	4.251e-01	6.712e-15	2.467e-13	1.027e-17	3.774e-16	8.964e-18	3.295e-16	8.964e-20	3.295e-18
0.15	5.332e+04	1.298e-08	6.305e-07	2.138e-11	1.038e-09	1.866e-11	9.063e-10	1.866e-13	9.063e-12
0.2	2.235e+06	2.270e-06	1.063e-04	4.006e-09	1.876e-07	3.497e-09	1.638e-07	3.497e-11	1.638e-09
0.3	4.581e+07	2.754e-04	9.594e-03	5.223e-07	1.820e-05	4.560e-07	1.589e-05	4.560e-09	1.589e-07
0.4	5.627e+08	1.104e-02	2.823e-01	2.151e-05	5.500e-04	1.878e-05	4.802e-04	1.878e-07	4.802e-06
0.5	7.863e+06	3.734e-04	7.309e-03	7.330e-07	1.435e-05	6.399e-07	1.253e-05	6.399e-09	1.253e-07
0.6	8.053e+07	7.696e-03	1.200e-01	1.502e-05	2.343e-04	1.311e-05	2.045e-04	1.311e-07	2.045e-06
0.8	3.380e+07	9.365e-03	1.030e-01	1.781e-05	1.959e-04	1.555e-05	1.710e-04	1.555e-07	1.710e-06
1.0	6.586e+06	4.026e-03	3.405e-02	7.422e-06	6.276e-05	6.479e-06	5.479e-05	6.479e-08	5.479e-07
1.5	3.467e+06	8.148e-03	4.442e-02	1.371e-05	7.474e-05	1.197e-05	6.525e-05	1.197e-07	6.525e-07
2.0	7.389e+05	4.109e-03	1.725e-02	6.354e-06	2.668e-05	5.547e-06	2.329e-05	5.547e-08	2.329e-07
3.0	1.663e+00	2.702e-08	8.259e-08	3.665e-11	1.120e-10	3.200e-11	9.782e-11	3.200e-13	9.782e-13
Totals	1.266e+09	4.503e-02	6.180e-01	8.309e-05	1.177e-03	7.254e-05	1.028e-03	7.254e-07	1.028e-05

MicroShield 9.07
Microsoft (9.07-0000)

Date	By	Checked

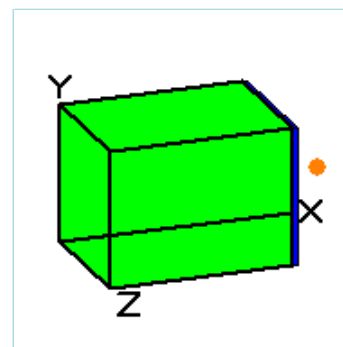
Filename	Run Date	Run Time	Duration
Rectangular_sourceMHA.msdx	February 24, 2017	9:00:13 AM	00:00:00

Project Info	
Case Title	gaseous_source1
Description	Case 1
Geometry	13 - Rectangular Volume

Source Dimensions	
Length	1.2e+3 cm (40 ft 0.0 in)
Width	914.4 cm (30 ft)
Height	914.4 cm (30 ft)

Dose Points			
A	X	Y	Z
#1	1.2e+3 cm (41 ft 0.0 in)	457.2 cm (15 ft)	457.2 cm (15 ft)
#2	1.6e+3 cm (51 ft)	457.2 cm (15 ft)	457.2 cm (15 ft)

Shields			
Shield N	Dimension	Material	Density
Source	3.60e+04 ft ³	Air	.00122
Shield 1	1.0 ft	Concrete	2.35
Air Gap		Air	.00122



Source Input: Grouping Method - Standard Indices
Number of Groups: 25
Lower Energy Cutoff: .015
Photons < .015: Included
Library: Grove

Nuclide	Ci	Bq	μCi/cm ³	Bq/cm ³
I-129	2.6590e-009	9.8383e+001	2.6084e-012	9.6510e-008
I-130	4.9080e-012	1.8160e-001	4.8146e-015	1.7814e-010
I-131	2.6200e-001	9.6940e+009	2.5701e-004	9.5095e+000
I-132	8.5050e-003	3.1469e+008	8.3431e-006	3.0869e-001
I-133	1.6030e-007	5.9311e+003	1.5725e-010	5.8182e-006
I-135	1.4580e-007	5.3946e+003	1.4302e-010	5.2919e-006
Kr-85	2.4510e-003	9.0687e+007	2.4043e-006	8.8961e-002
Kr-85m	3.1380e-008	1.1611e+003	3.0783e-011	1.1390e-006
Kr-88	8.1560e-008	3.0177e+003	8.0007e-011	2.9603e-006
Xe-133	1.9460e-001	7.2002e+009	1.9090e-004	7.0631e+000
Xe-133m	1.1450e-005	4.2365e+005	1.1232e-008	4.1558e-004
Xe-135	1.5210e-007	5.6277e+003	1.4920e-010	5.5206e-006
Xe-135m	1.8810e-008	6.9597e+002	1.8452e-011	6.8272e-007

Buildup: The material reference is Shield 1	
Integration Parameters	
X Direction	10
Y Direction	20
Z Direction	20

Results - Dose Point # 1 - (41.001,15,15) ft									
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	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	4.958e+08	1.922e-254	2.077e-26	1.648e-255	1.781e-27	1.439e-255	1.555e-27	1.439e-257	1.555e-29
0.03	3.915e+09	2.033e-36	5.707e-25	2.015e-38	5.656e-27	1.759e-38	4.937e-27	1.759e-40	4.937e-29
0.04	7.398e+00	7.578e-27	3.074e-26	3.351e-29	1.359e-28	2.926e-29	1.187e-28	2.926e-31	1.187e-30
0.08	2.896e+09	4.467e-06	1.107e-04	7.068e-09	1.752e-07	6.171e-09	1.529e-07	6.171e-11	1.529e-09
0.1	5.952e+00	1.120e-13	4.148e-12	1.714e-16	6.346e-15	1.496e-16	5.540e-15	1.496e-18	5.540e-17
0.15	7.464e+05	2.207e-07	1.088e-05	3.635e-10	1.792e-08	3.173e-10	1.564e-08	3.173e-12	1.564e-10
0.2	3.128e+07	3.901e-05	1.864e-03	6.886e-08	3.290e-06	6.011e-08	2.872e-06	6.011e-10	2.872e-08
0.3	6.412e+08	4.811e-03	1.720e-01	9.125e-06	3.264e-04	7.966e-06	2.849e-04	7.966e-08	2.849e-06
0.4	7.875e+09	1.954e-01	5.147e+00	3.808e-04	1.003e-02	3.324e-04	8.755e-03	3.324e-06	8.755e-05
0.5	1.101e+08	6.689e-03	1.352e-01	1.313e-05	2.653e-04	1.146e-05	2.316e-04	1.146e-07	2.316e-06
0.6	1.127e+09	1.393e-01	2.247e+00	2.718e-04	4.386e-03	2.373e-04	3.829e-03	2.373e-06	3.829e-05
0.8	4.731e+08	1.726e-01	1.968e+00	3.283e-04	3.743e-03	2.866e-04	3.268e-03	2.866e-06	3.268e-05
1.0	9.221e+07	7.538e-02	6.620e-01	1.390e-04	1.220e-03	1.213e-04	1.065e-03	1.213e-06	1.065e-05
1.5	4.854e+07	1.576e-01	8.951e-01	2.651e-04	1.506e-03	2.314e-04	1.315e-03	2.314e-06	1.315e-05
2.0	1.035e+07	8.147e-02	3.570e-01	1.260e-04	5.520e-04	1.100e-04	4.819e-04	1.100e-06	4.819e-06
3.0	2.328e+01	5.556e-07	1.775e-06	7.538e-10	2.408e-09	6.580e-10	2.102e-09	6.580e-12	2.102e-11
Totals	1.772e+10	8.332e-01	1.159e+01	1.533e-03	2.203e-02	1.339e-03	1.923e-02	1.339e-05	1.923e-04

Results - Dose Point # 2 - (51,15,15) ft									
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	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	4.958e+08	1.088e-254	7.938e-27	9.334e-256	6.809e-28	8.148e-256	5.944e-28	8.148e-258	5.944e-30
0.03	3.915e+09	1.770e-36	2.181e-25	1.754e-38	2.162e-27	1.531e-38	1.887e-27	1.531e-40	1.887e-29
0.04	7.398e+00	6.729e-27	2.730e-26	2.976e-29	1.207e-28	2.598e-29	1.054e-28	2.598e-31	1.054e-30
0.08	2.896e+09	3.801e-06	9.385e-05	6.015e-09	1.485e-07	5.251e-09	1.297e-07	5.251e-11	1.297e-09
0.1	5.952e+00	9.398e-14	3.454e-12	1.438e-16	5.284e-15	1.255e-16	4.613e-15	1.255e-18	4.613e-17
0.15	7.464e+05	1.817e-07	8.826e-06	2.993e-10	1.453e-08	2.612e-10	1.269e-08	2.612e-12	1.269e-10
0.2	3.128e+07	3.177e-05	1.488e-03	5.607e-08	2.626e-06	4.895e-08	2.292e-06	4.895e-10	2.292e-08
0.3	6.412e+08	3.854e-03	1.343e-01	7.310e-06	2.547e-04	6.382e-06	2.224e-04	6.382e-08	2.224e-06
0.4	7.875e+09	1.545e-01	3.951e+00	3.011e-04	7.698e-03	2.628e-04	6.720e-03	2.628e-06	6.720e-05
0.5	1.101e+08	5.228e-03	1.023e-01	1.026e-05	2.008e-04	8.958e-06	1.753e-04	8.958e-08	1.753e-06
0.6	1.127e+09	1.077e-01	1.680e+00	2.103e-04	3.279e-03	1.836e-04	2.863e-03	1.836e-06	2.863e-05
0.8	4.731e+08	1.311e-01	1.442e+00	2.494e-04	2.742e-03	2.177e-04	2.394e-03	2.177e-06	2.394e-05
1.0	9.221e+07	5.637e-02	4.767e-01	1.039e-04	8.786e-04	9.071e-05	7.671e-04	9.071e-07	7.671e-06
1.5	4.854e+07	1.141e-01	6.219e-01	1.919e-04	1.046e-03	1.675e-04	9.135e-04	1.675e-06	9.135e-06
2.0	1.035e+07	5.752e-02	2.415e-01	8.895e-05	3.735e-04	7.765e-05	3.260e-04	7.765e-07	3.260e-06
3.0	2.328e+01	3.783e-07	1.156e-06	5.132e-10	1.569e-09	4.480e-10	1.370e-09	4.480e-12	1.370e-11
Totals	1.772e+10	6.304e-01	8.651e+00	1.163e-03	1.648e-02	1.015e-03	1.438e-02	1.015e-05	1.438e-04