

**CSMRI Radionuclide Dose/Risk Assessment**

	Option	Risk Scenario	Dose, in millirems per year				
			Radon	External	Ingestion	Inhalation	Total
<b>Dose</b>	Alternative 1 - Farm	Farm - Current Conditions - No Backfill	3.5	49	21	0.35	74
	Alternative 1 - IC	Institutional Controls - Current Conditions - No Backfill	6.4	1.3	1.3E-02	1.6E-02	7.7
	Alternative 2 thru 5 1A	Residence - Current Conditions - No Backfill	2.6	50	0.39	0.35	53
	Alternative 2 thru 5 1B	Residence - Current Conditions - 3.0 m Backfill	0.85	4.1E-18	0	0	0.85
	Alternative 2 thru 5 2A	Residence - Remove to 50 pCi/g - No Backfill	1.4	27	0.25	0.27	29
	Alternative 2 thru 5 2B	Residence - Remove to 50 pCi/g - 3.0 m Backfill	0.46	3.8E-18	0	0	0.46
	Alternative 2 thru 5 3A	Residence - Remove to 25 pCi/g - No Backfill	1.0	19	0.17	0.17	20
	Alternative 2 thru 5 3B	Residence - Remove to 25 pCi/g - 3.0 m Backfill	52	1.2E-28	0	0	52
	Alternative 2 thru 5 4A	Residence - Remove to 15 pCi/g - No Backfill	0.70	13	0.11	0.11	14
	Alternative 2 thru 5 4B	Residence - Remove to 15 pCi/g - 3.0 m Backfill	35.3	7.8E-29	0	0	35
	Alternative 2 thru 5 5A	Residence - Remove to 5 pCi/g - No Backfill	0.28	5.3	0.056	0.067	5.7
	Alternative 2 thru 5 5B	Residence - Remove to 5 pCi/g - 3.0 m Backfill	14	3.2E-29	0	0	14
	Alternative 2 thru 5 6A	Residence - Remove to background - No Backfill	8.4E-06	1.4E-02	2.3E-03	5.1E-03	2.1E-02
	Alternative 2 thru 5 6B	Residence - Remove to background - 3.0 m Backfill	4.3E-04	0	0	0	4.3E-04
	Landfill A Alternative 5	Landfill - Material to 15 pCi/g - 7.0 m Cover	9.0	0	0	0	9.0
	Landfill B Alternative 5	Landfill - Material to 15 pCi/g - 25.0 m Cover	0	0	0	0	0
	Landfill A Alternative 4	Landfill - All Material - 7.0 m Cover	62	0	0	0	62
	Landfill B Alternative 4	Landfill - All Material - 25.0 m Cover	0	0	0	0	0

	Option	Risk Scenario	Risk				
			Radon	External	Ingestion	Inhalation	Total
<b>Risk</b>	Alternative 1 - Farm	Farm - Current Conditions - No Backfill	8.8E-05	1.0E-03	3.5E-04	2.2E-06	1.4E-03
	Alternative 1 - IC	Institutional Controls - Current Conditions - No Backfill	1.5E-04	1.7E-05	2.1E-07	8.5E-08	1.7E-04
	Alternative 2 thru 5 1A	Residence - Current Conditions - No Backfill	6.6E-05	1.0E-03	9.2E-06	2.2E-06	1.1E-03
	Alternative 2 thru 5 1B	Residence - Current Conditions - 3.0 m Backfill	2.2E-05	1.1E-22	0	0	2.2E-05
	Alternative 2 thru 5 2A	Residence - Remove to 50 pCi/g - No Backfill	3.6E-05	5.9E-04	5.3E-06	1.5E-06	6.3E-04
	Alternative 2 thru 5 2B	Residence - Remove to 50 pCi/g - 3.0 m Backfill	1.2E-05	1.0E-22	0	0	1.2E-05
	Alternative 2 thru 5 3A	Residence - Remove to 25 pCi/g - No Backfill	2.6E-05	4.0E-04	3.7E-06	9.7E-07	4.3E-04
	Alternative 2 thru 5 3B	Residence - Remove to 25 pCi/g - 3.0 m Backfill	1.3E-03	0	0	0	1.3E-03
	Alternative 2 thru 5 4A	Residence - Remove to 15 pCi/g - No Backfill	1.7E-05	2.7E-04	2.5E-06	6.5E-07	2.9E-04
	Alternative 2 thru 5 4B	Residence - Remove to 15 pCi/g - 3.0 m Backfill	8.6E-04	0	0	0	8.6E-04
	Alternative 2 thru 5 5A	Residence - Remove to 5 pCi/g - No Backfill	7.1E-06	1.1E-04	1.1E-06	3.5E-07	1.2E-04
	Alternative 2 thru 5 5B	Residence - Remove to 5 pCi/g - 3.0 m Backfill	3.5E-04	0	0	0	3.5E-04
	Alternative 2 thru 5 6A	Residence - Remove to background - No Backfill	6.4E-09	3.1E-07	2.1E-08	2.0E-08	3.6E-07
	Alternative 2 thru 5 6B	Residence - Remove to background - 3.0 m Backfill	3.2E-07	0	0	0	3.2E-07
	Alternative 5 Landfill A	Landfill - Material to 15 pCi/g - 7.0 m Cover	2.3E-04	0	0	0	2.3E-04
	Alternative 5 Landfill B	Landfill - Material to 15 pCi/g - 15.0 m Cover	0	0	0	0	0
	Alternative 4 Landfill A	Landfill - All Material - 7.0 m Cover	1.6E-03	0	0	0	1.6E-03
	Alternative 4 Landfill B	Landfill - All Material - 25.0 m Cover	0	0	0	0	0

**Purpose of Dose / Risk Assessment:** The U.S. Department of Energy and U.S. Nuclear Regulatory Commission model for site-specific dose assessment of residual radioactivity, RESRAD 6.21, was used to evaluate dose and risk for the various options. This table summarizes the process used to determine the appropriate site cleanup activities required to achieve the current 25 millirem per year dose standard. The table also shows the risk associated with placing the material in a landfill assuming a worst case scenario of a residence built directly on top of the site (land restrictions prohibit this type of construction). The radionuclide risk is added to the trace metals risk (primarily arsenic) to determine the total risk for the alternative.