Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

Supplier Document

ERA Modelling for Bedrock Geo-Pathway Sensitivity Analysis

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Accepted by:

Jeff Miller
Manager, Regulatory Approval

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Date

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TO:	FROM:
Jeffrey Miller, Canadian Nuclear Laboratories	Authors: Rina Parker and Langping Wu Reviewer: Don Hart
REF:	**DATE:**
16-2292 – ERA Modelling for Bedrock Geo-Pathway Sensitivity Analysis	20 November 2024

Introduction

Canadian Nuclear Laboratories (CNL) received a number of information requests with a common theme that the reviewers were concerned that the geo-pathway between the Whiteshell Reactor Disposal Facility (WRDF) and the Winnipeg River was more permeable than that presented in the Environmental Impact Statement. More permeability would lead to shorter travel times to the Winnipeg River and higher impacts in groundwater downgradient of the WRDF.

WSP updated the groundwater solute transport model for the Project to expand the sensitivity analysis in consideration of the geo-pathway as a fractured bedrock pathway for the purposes of solute transport (i.e., advection and dispersion along the fractures, with diffusion into the rock matrix) (WSP, 2024). The intent of the sensitivity analysis in the groundwater solute transport model was to explore model sensitivity to various input parameters, and the analysis does not necessarily reflect a plausible scenario.

The purpose of this memorandum is to assess the groundwater solute transport model outputs from the sensitivity analysis further in terms of impact on risk to human health and the environment; however, these results do not replace those of the normal evolution scenario.

This memorandum also addresses a modification to the Well in Plume scenario assumptions in the Decommissioning Safety Assessment Report (DSAR). The scenario assumption in the DSAR was placement of a drinking water well halfway between the WRDF and the Winnipeg River (approximately 250 m downgradient of the WRDF). The evaluation in this memorandum considers downstream distances closer, at 100 m and 10 m.

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The assessment in this memo is consistent with the specific details and assumptions in the WR-1 environmental risk assessment (ERA) which are not reproduced here. However, some high level information is provided to help with understanding the context of the memo.

Additional Sensitivity Scenarios – Fractured Geo-Pathway

Selection of Radionuclides and Non-Radionuclides

Based on the groundwater solute transport model, mass loadings (g/year) of radionuclides and non-radionuclides to the Winnipeg River were provided over a modelling timeframe of 500,000 years.

2.1.1 Radionuclides

Maximum mass loadings for the sensitivity analysis for each radionuclide expected to be potentially released from the WRDF over the 500,000 year modelling timeframe are presented in Table 2-1. Consistent with the WR-1 environmental risk assessment (ERA; EcoMetrix 2021), radon-222 (Rn-222) and samarium-148 (Sm-148) were excluded from the aquatic dispersion modelling. Rn-222 is expected to volatilize rapidly to air. Sm-148 has a very long half-life and is of no toxicological concern based on its low groundwater concentration.

Table 2-1: Mass and Activity Loadings to the Winnipeg River for Radionuclides in Groundwater

Radionuclide	Peak Mass Loading (g/year)	Time to Peak (yr)	Atomic Mass (g/mol)	Half Life (s)	Bq/s
Ac-225	1.72E-17	89,300	225.02	8.64E+05	1.17E-09
Ac-227	4.43E-14	7,364	227.03	6.87E+08	3.76E-09
Ag-108m	4.69E-08	276	107.91	1.38E+10	4.16E-04
Am-241	1.14E-11	1,537	241.06	1.36E+10	4.58E-08
Am-243	7.98E-12	5,684	243.06	2.32E+11	1.87E-09
Bi-210	2.29E-14	210,200	209.98	4.33E+05	3.33E-06
C-14	6.01E-04	495	14.00	1.81E+11	3.14E+00
Ca-41	5.47E-05	669	40.96	3.22E+12	5.50E-03
Cl-36	2.84E-08	132	35.97	9.46E+12	1.10E-06
Cm-244	0.00E+00	N/A	244.06	5.71E+08	0.00E+00
Co-60	9.22E-12	26	59.93	1.67E+08	1.22E-05
Cs-137	2.05E-07	52	137.91	9.51E+08	2.06E-02
Eu-152	2.18E-25	112	151.92	4.26E+08	4.47E-20
Eu-154	2.21E-27	83	153.92	2.71E+08	7.00E-22

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Radionuclide	Peak Mass Loading (g/year)	Time to Peak (yr)	Atomic Mass (g/mol)	Half Life (s)	Bq/s
Eu-155	0.00E+00	N/A	154.92	1.50E+08	0.00E+00
Fe-55	4.46E-19	22	54.94	8.51E+07	1.26E-12
Gd-152	7.22E-07	132	151.92	3.41E+21	1.85E-14
H-3	1.70E-02	66	3.02	3.89E+08	1.92E+05
I-129	3.54E-04	132	128.90	4.95E+14	7.35E-05
Nb-94	2.95E-03	5,059	93.91	6.40E+11	6.50E-01
Nd-144	0.00E+00	N/A	143.91	7.22E+22	0.00E+00
Ni-59	7.74E-02	28,100	58.93	2.40E+12	7.25E+00
Ni-63	1.09E-06	269	62.93	3.15E+09	7.24E-02
Np-237	1.61E-04	1,463	237.05	6.75E+13	1.34E-04
Np-239	2.52E-14	5,726	239.05	2.04E+05	6.85E-06
Pa-231	6.78E-11	7,332	231.04	1.03E+12	3.76E-09
Pa-233	1.01E-14	394	233.04	2.33E+06	2.46E-07
Pb-210	9.29E-13	210,200	209.98	7.03E+08	8.33E-08
Po-210	1.64E-10	209,500	209.98	1.19E+07	8.69E-04
Pu-238	5.49E-08	101	238.05	2.77E+09	1.10E-03
Pu-239	7.01E-04	231	239.05	7.60E+11	5.11E-02
Pu-240	2.57E-04	226	240.05	2.07E+11	6.84E-02
Pu-241	3.09E-09	46	241.06	4.42E+08	3.84E-04
Ra-223	1.06E-15	7,364	223.02	9.88E+05	6.36E-08
Ra-224	6.66E-22	497,800	224.02	3.14E+05	1.25E-13
Ra-225	2.20E-16	89,300	225.02	1.29E+06	1.00E-08
Ra-226	1.65E-11	210,200	226.03	5.05E+10	1.91E-08
Ra-228	3.89E-19	497,500	228.03	1.80E+08	1.26E-13
Rn-222	4.82E-12	210,200	222.02	3.30E+05	8.70E-04
Sm-148	4.03E-22	2,692	147.91	2.21E+23	1.63E-31
Sr-90	1.39E-06	44	89.91	9.08E+08	2.26E-01
Tc-99	3.70E-04	391	98.91	6.65E+12	7.45E-03
Th-227	1.92E-16	7,364	227.03	1.61E+06	6.95E-09
Th-228	2.83E-20	490,100	228.03	6.03E+07	2.72E-14
Th-229	8.80E-12	89,300	229.03	2.30E+11	2.21E-09
Th-230	1.73E-10	207,900	230.03	2.38E+12	4.19E-09
Th-231	5.84E-16	203	231.04	9.19E+04	3.64E-07
Th-232	2.12E-10	495,000	232.04	4.45E+17	2.72E-14
Th-234	5.06E-14	202	234.04	2.08E+06	1.37E-06
U-233	9.13E-08	2,786	233.04	5.02E+12	1.03E-06

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Radionuclide	Peak Mass Loading (g/year)	Time to Peak (yr)	Atomic Mass (g/mol)	Half Life (s)	Bq/s
U-234	3.78E-06	1,129	234.04	7.74E+12	2.76E-05
U-235	1.60E-02	1,107	235.04	2.22E+16	4.06E-05
U-236	1.10E-04	1,876	236.05	7.40E+14	8.30E-06
U-237	1.48E-13	46	237.05	5.83E+05	1.42E-05
U-238	7.95E-01	1,105	238.05	1.41E+17	3.14E-04
Y-90	5.46E-12	44	89.91	2.31E+05	3.48E-03

2.1.2 Non-Radionuclides

Maximum mass loadings for the sensitivity analysis for each non-radionuclide expected to be potentially released from the WRDF over the 500,000 year modelling timeframe are presented in Table 2-2. Consistent with the WR-1 ERA maximum mass loadings for each non-radionuclide were converted to groundwater concentrations using the anticipated flowrate through the WRDF (see Table 5-1 in the WR-1 ERA; EcoMetrix 2021) for the time period of maximum mass loadings.

The maximum predicted concentrations in groundwater at the river were compared to water quality guidelines to determine potential constituents of potential concern (COPC) relevant to human and ecological health. The selection of water quality guidelines differed between human health and ecological health assessments (see Figure 2-1 for hierarchy). Note that the Health Canada drinking water guidelines reflect the most recent guidelines, which have been updated since the ERA.

Table 2-2: Mass and Activity Loadings to the Winnipeg River for Non-Radionuclides in Groundwater

Non-Radionuclides	Peak Mass Loading (g/year)	Time to Peak (yr)	Flow (m^3/d)	Groundwater concentration (µg/L)
Argon	1.20E-11	161	0.17	1.93E-10
Boron	2.45E-03	190	0.17	3.95E-02
Barium	9.12E-07	216,600	0.19	1.31E-05
Beryllium	0.00E+00	N/A	0.19	N/A
Bismuth	1.13E-08	21,200	0.19	1.62E-07

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Non-Radionuclides	Peak Mass Loading (g/year)	Time to Peak (yr)	Flow (m^3/d)	Groundwater concentration (µg/L)
Cadmium	1.83E+01	4,463	0.18	2.78E+02
Cerium	0.00E+00	N/A	0.19	N/A
Cobalt	2.69E-02	67,300	0.19	3.88E-01
Chromium	3.53E+00	35,300	0.19	5.09E+01
Copper	1.30E-02	29,500	0.19	1.87E-01
Gadolinium	2.64E-05	132	0.17	4.25E-04
HB40	1.29E+02	10,700	0.19	1.86E+03
Helium	2.56E-02	132	0.17	4.13E-01
Mercury	2.08E-03	131,900	0.19	3.00E-02
Potassium	3.70E-07	13,400	0.19	5.33E-06
Potassium Hydroxide (as K)	2.21E-01	123	0.17	2.50E+00
Manganese	1.14E-03	20,600	0.19	1.64E-02
Molybdenum	1.18E-02	17,900	0.19	1.70E-01
Nitrogen	6.96E-04	16,800	0.19	1.00E-02
Nickel	1.12E-03	28,700	0.19	1.61E-02
Lead	1.61E+01	500,000	0.19	2.32E+02
Palladium	5.29E+00	206	0.17	8.53E+01
Ruthenium	3.26E-08	9,439	0.19	4.71E-07
Sulphur (as SO4)	5.43E-12	154	0.17	2.62E-10
Samarium	4.04E-10	2,425	0.18	6.16E-09
Thallium	0.00E+00	N/A	0.19	N/A
Xenon	3.58E-09	152	0.17	5.77E-08
Xylene	1.52E+01	132	0.17	2.45E+02
Zirconium	1.27E-07	3,263	0.18	1.93E-06

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Figure 2-1: Hierarchy of Surface Water Screening Values for Human and Ecological Health

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Table 2-3: Screening of Groundwater Concentrations for Non-Radionuclides from the WRDF

Non-Radionuclides	Groundwater concentration (µg/L)	Background Winnipeg River	WQSOG Manitoba	CCME WQG	CDWS MAC	PWQO Ontario	WQG BC	Toxicity Benchmark	Selected Benchmark Human health	Selected Benchmark Eco health	COPC Human Health?	COPC Eco Health?
Argon	1.93E-10	-	-	-	-	-	-		N/A		N	N
Boron	3.95E-02	1.00E+01		1500	5000	200	1200		5000	1500	N	N
Barium	1.31E-05	1.10E+01			2000			0.4[(a)]	2000	0.4	N	N
Beryllium	N/A	-				11					N/A	N/A
Bismuth	1.62E-07	<2.00E-01						0.25[(b)]	0.25	0.25	N	N
Cadmium	**2.78E+02**	1.00E-02	0.137	0.08	7	0.1	0.114		7	0.08	**Y**	**Y**
Cerium	N/A	-	-	-	-	-	-					
Cobalt	3.88E-01	2.00E-01				0.9	4		0.9	0.9	N	N
Chromium	**5.09E+01**	1.70E+00	37.1	1.0 (VI)	50	1 (VI)			50	1	**Y**	**Y**
Copper	1.87E-01	1.40E+01	4.3	2	2000	5	2		2000	2	N	N
Gadolinium	4.25E-04	-						1.5[(b)]	1.5	1.5	N	N
HB40	**1.86E+03**	0.00E+00			8800[(d)]			2[(c)]	8800	2	N	**Y**
Helium	4.13E-01	-	-	-	-	-	-				N/A	N/A
Mercury	**3.00E-02**	1.00E-02	1	0.026	1	0.2			1	0.026	N	**Y**
Potassium	5.33E-06	9.07E+02						5300[(a)]	5300	5300	N	N
Potassium Hydroxide (as K)	2.50E+00	-						5300[(a)]	5300	5300	N	N
Manganese	1.64E-02	1.10E+01			120		794.2	110[(a)]	120	794.2	N	N
Molybdenum	1.70E-01	2.00E-01		73		40	1000		73	73	N	N
Nitrogen	1.00E-02	-			1000		3000		1000	3000	N	N

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Non-Radionuclides	Groundwater concentration (µg/L)	Background Winnipeg River	WQSOG Manitoba	CCME WQG	CDWS MAC	PWQO Ontario	WQG BC	Toxicity Benchmark	Selected Benchmark Human health	Selected Benchmark Eco health	COPC Human Health?	COPC Eco Health?
Nickel	1.61E-02	1.78E+00	25.5	25		25			25	25	N	N
Lead	**2.32E+02**	2.60E+00	0.99	1	5	3	4.4		5	0.99	**Y**	**Y**
Palladium	**8.53E+01**	-						5.7[(b)]	5.7	5.7	**Y**	**Y**
Ruthenium	4.71E-07	-						10[(b)]	10	10	N	N
Sulphur (as SO_4)	2.62E-10	-					218000		218000	218000	N	N
Samarium	6.16E-09	-						0.74[(b)]			N/A	N/A
Thallium	N/A	-		0.8		0.3					N/A	N/A
Xenon	5.77E-08	-	-	-	-	-	-				N/A	N/A
Xylene	**2.45E+02**	-			90	2/40/30 (m/o/p)	30		90	2	**Y**	**Y**
Zirconium	1.93E-06	-				4			4	4	N	N

Notes:
(a): Suter and Tsao 1996, divided by 10
(b): Borgmann et al. 2005, divided by 100
(c): Ecometrix 2017, IC25 divided by 10
(d): Derived drinking water limit based on a minimal effect level in mice of 250 mg/kg-day (Weeks 1974), divided by 1000, times 70 kg body weight, over 2 L/day of drinking water
Assumed hardness of 43 mg/L consistent with WR-1 ERA.

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In summary, the following non-radionuclides will be assessed further:

- Cadmium
- Chromium
- HB40 (eco only)
- Mercury (eco only)
- Lead
- Palladium
- Xylene

Human and Ecological Receptors

During post-closure the human receptors evaluated include (see Figure 5-1 in the WR-1 ERA):

- Farm A (year-round occupants, with livestock) (located near the east bank of the Winnipeg River);
- New On-site Farm (located on the WRDF site after institutional control) and
- Harvesters.

During post-closure the ecological receptors evaluated include:

- Bottom feeding fish: lake sturgeon, carmine shiner
- Pelagic fish: walleye
- Generic aquatic plants and aquatic invertebrates
- Riparian birds: horned grebe, trumpeter swan, wild waterfowl
- Riparian mammals: mink
- Terrestrial birds: barn swallow
- Terrestrial mammals: little brown myotis, moose

Aquatic ecological receptors were assumed to be located where the groundwater seep enters the Winnipeg River. Mammals and birds were assumed to be located on the river bank (see Figure 7-3 in the WR-1 ERA).

Radiological Dose and Risk

Consistent with the WR-1 ERA, human and ecological dose was estimated using the IMPACT-DRL software which follows the equations in CSA N288.1:20 and N288.6:22. The maximum mass loadings for the sensitivity analysis for each radionuclide expected to be potentially released from the WRDF over the 500,000 year modelling timeframe as presented in Table 2-1 were used as inputs into IMPACT-DRL.

The dose is conservative as it is based on the maximum mass loadings for each COPC provided in the groundwater solute transport model. The maximum dose for each radionuclide was assessed at a single point in time, corresponding to the peak loading rate from groundwater to the Winnipeg River.

2.3.1 Human Radiological Dose and Risk

The estimated total radiological doses to human receptors during post-closure are presented in Table 2-4 including background Cs-137 in sediment in the Winnipeg River, and in Table 2-5 for project only. The doses shown represent the maximum annual dose over the assessment period. Detailed tables by radionuclide and pathway are shown in Appendix A.

During the Project post-closure, the maximum estimated total dose including background for the sensitivity analysis is estimated to be 5.49E-03 mSv/yr for the new on-site farm (nursing infant) (Table 2-4). The main contribution to total dose is from Cs-137 from the external sediment pathway. The maximum estimated total dose from project only is 2.44E-03 mSv/yr for the new on-site farm (nursing 3-month-old) (Table 2-5). The main contribution to total dose is from tritium (HTO) from drinking breast milk (represented as the terrestrial animals pathway).

Potential dose from radiation was compared to a public dose limit of 1 mSv/yr as well as to a dose constraint of 0.25 mSv/yr. The public dose limit for radiation protection is 1 mSv/yr, as described in the *Radiation Protection Regulations* under the *Nuclear Safety and Control Act*, and as recommended in CSA N288.6. A higher incremental dose than the effective dose limit is considered unacceptable. A dose constraint is a conservative value for the annual incremental dose applied to a single operation that is considered protective without further demonstration in situations where multiple sources may contribute to incremental dose (Health Canada, 2011). Application of a dose constraint is meant to ensure that the combined doses from multiple sources do not exceed the public dose limit of 1 mSv/yr. Exceedance of the dose constraint does not indicate that adverse effects would occur, but instead indicates that the assumptions used in the calculation of exposure estimates for the operation should be examined in more detail.

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The total radiation dose including background Cs-137 (Table 2-4) and project contribution only (Table 2-5) to all human receptors during post-closure for the sensitivity scenario is predicted to be well below the regulatory public dose limit of 1 mSv/yr and the dose constraint of 0.25 mSv/yr. Including background Cs-137, the maximum percent of public dose limit is 0.55% and the maximum percent of dose constraint is 2.2%.

Overall, since the radiation dose estimates would be below the public dose limit and the dose constraint, no discernable health effects are anticipated due to exposure of these receptors to radioactive releases from the Project for the sensitivity analysis scenario.

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Table 2-4: The Total Radiological Exposure Dose (including Background Cs-137) to Human Receptors during Post-Closure

Age Group	Dose (mSv/a)								
	New On-site Farm			Farm A			Harvester		
	Dose (including background Cs-137)	Percent of Dose Constraint	Percent of Public Dose Limit	Dose (including background Cs-137)	Percent of Dose Constraint	Percent of Public Dose Limit	Dose (including background Cs-137)	Percent of Dose Constraint	Percent of Public Dose Limit
Adult	4.71E-03	1.88%	0.47%	3.63E-04	0.15%	0.04%	9.65E-04	0.39%	<0.01%
Child	4.51E-03	1.80%	0.45%	3.59E-04	0.14%	0.04%	7.37E-04	0.29%	<0.01%
Infant (nursing)	5.49E-03	2.20%	0.55%	4.60E-04	0.18%	0.05%	4.19E-04	0.17%	<0.01%
Infant (formula)	4.95E-03	1.98%	0.49%	4.50E-04	0.18%	0.05%	N/A	N/A	N/A
3-month-old (nursing)	2.44E-03	0.98%	0.24%	4.59E-05	<0.01%	<0.01%	N/A	N/A	N/A
3-month-old (formula)	7.15E-04	<0.01%	<0.01%	1.34E-05	<0.01%	<0.01%	N/A	N/A	N/A

Note: Dose limit is 1 mSv/a and dose constraint is 0.25 mSv/a.

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Table 2-5: The Total Radiological Exposure Dose (Project Only) to Human Receptors during Post-Closure

Age Group	Dose (mSv/a)								
	New On-site Farm			Farm A			Harvester		
	Dose (project only*)	Percent of Dose Constraint	Percent of Public Dose Limit	Dose (project only*)	Percent of Dose Constraint	Percent of Public Dose Limit	Dose (project only*)	Percent of Dose Constraint	Percent of Public Dose Limit
Adult	1.52E-03	0.61%	0.15%	2.86E-05	<0.01%	<0.01%	9.65E-04	0.39%	<0.01%
Child	1.31E-03	0.52%	0.13%	2.46E-05	<0.01%	<0.01%	7.37E-04	0.29%	<0.01%
Infant (nursing)	1.34E-03	0.54%	0.13%	2.51E-05	<0.01%	<0.01%	4.19E-04	0.17%	<0.01%
Infant (formula)	7.92E-04	0.32%	<0.01%	1.49E-05	<0.01%	<0.01%	N/A	N/A	N/A
3-month-old (nursing)	2.44E-03	0.98%	0.24%	4.59E-05	<0.01%	<0.01%	N/A	N/A	N/A
3-month-old (formula)	7.15E-04	<0.01%	<0.01%	1.34E-05	<0.01%	<0.01%	N/A	N/A	N/A

Note:
*Project dose results exclude the existing background contribution from Cs-137 present in sediment. No sediment pathways for Harvester and 3-month-old.

2.3.2 Ecological Radiological Dose and Risk

The estimated total radiological doses to ecological receptors during post-closure for the sensitivity analysis are presented in Table 2-6. During post-closure, the maximum predicted total dose including background Cs-137 for terrestrial and riparian biota is to horned grebe near the riverbank (1.62E-04 mGy/d), and the main contribution to total dose is from Cs-137 in sediment. The maximum predicted total dose from project only for terrestrial and riparian biota is to moose near the riverbank (1.78E-05 mGy/d), and the main contribution to total dose is from tritium (HTO) from eating freshwater plants. The maximum predicted total dose for aquatic biota is to carmine shiner and lake sturgeon in the Winnipeg River, which is 7.63E-04 mGy/d including background Cs-137 and 6.53E-04 mGy/d from project only, and the main contribution to total dose is from Pu-240 in water.

Radiation dose benchmarks of 9.6 mGy/d and 2.4 mGy/d (UNSCEAR, 2008) were selected for the assessment of effects on aquatic biota and terrestrial biota, respectively, as recommended in CSA N288.6. There are no predicted exceedances of the 9.6 mGy/d radiation dose benchmark for aquatic biota or of the 2.4 mGy/d radiation dose benchmark for terrestrial and riparian biota during Project post-closure. Therefore, it is unlikely that there would be potential adverse effects on terrestrial or aquatic populations or communities as a result of radionuclide releases from the Project for the sensitivity analysis.

Table 2-6: Total Radiological Exposure Dose to Ecological Receptors during Post-Closure

Category	Ecological Receptor	Total (including background Cs-137) (mGy/day)	Project only* (mGy/day)
Aquatic Biota	Carmine Shiner	7.63E-04	6.53E-04
	Lake Sturgeon	7.63E-04	6.53E-04
	Walleye	6.53E-04	6.53E-04
	Freshwater plant	1.36E-04	1.36E-04
	Benthic Invertebrate	6.10E-04	3.68E-05
Terrestrial Biota	Barn Swallow	1.49E-05	1.49E-05
	Little Brown Bat	1.35E-05	1.35E-05
	Horned Grebe	1.62E-04	1.54E-05
	Trumpeter Swan	1.60E-04	1.53E-05
	Wild Waterfowl	1.59E-04	1.53E-05
	Mink	1.62E-04	1.40E-05
	Moose	2.09E-05	1.78E-05

Note:
*Project dose results exclude the existing background contribution from Cs-137 present in sediment.

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Non-Radiological Dose and Risk

2.4.1 Exposure Concentrations

Consistent with the WR-1 ERA, the concentration of non-radionuclides in surface water was determined at 50 m and 3,150 m downstream from the upstream edge of the groundwater seep. These locations correspond to on-site and Farm A. Exposure point concentrations are shown in Table 2-7. As shown in Table 2-7, the background concentrations of non-radionuclides in the Winnipeg River typically dominate over the Project contribution via groundwater to river water concentrations.

As identified in Section 2.2, the non-radionuclides considered further include: cadmium, chromium, HB40 (eco only), mercury (eco only), lead, palladium, and xylene.

Limited toxicity data are available for palladium; therefore, a more qualitative discussion is presented here. Palladium belongs to the platinum group metals which include: platinum, palladium, rhodium, ruthenium, iridium, and osmium. Certain adverse effects noted in humans from exposure to palladium include sensitization. Existing concentrations of palladium in surface water generally range from 0.4 to 22 ng/litre (WHO, 2002).

The Nuclear Waste Management Organization (NWMO, 2019) compiled recent information surrounding the toxicity of palladium in the report "Supplementary Non-Radiological Interim Acceptance Criteria for the Protection of Persons and the Environment NWMO-TR-2017-05". No chronic toxicity data were available; however, acute studies were used to derive a suggested long term water quality guideline. The lowest effects based acute value was 6.8 µg/L which was a 48-hr EC20 for *Daphnia magna* immobilization. The NWMO applied a safety factor of 100 to derive a palladium long-term guideline of 0.068 µg/L.

For the WR-1, during post-closure, the exposure point location is in the Winnipeg River. As shown in Table 2-7, the palladium concentration once groundwater enters the Winnipeg River is 5.13E-04 µg/L, well below the derived long-term guideline of 0.068 µg/L. As such, no further quantitative assessment of palladium has been conducted.

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Table 2-7: Exposure Point Concentrations for Non-Radiological COPCs for the Sensitivity Analysis during Post-Closure

Parameter	Groundwater Concentration (µg/L)	Background Concentration (µg/L)	Project Contribution to River Concentrations at Groundwater Seep at River Bottom (µg/L)	River Concentration at Groundwater Seep at River Bottom (µg/L)	Project Contribution to River Concentrations at Groundwater Seep - 50 m Downstream (µg/L)	River Concentration at Groundwater Seep - 50 m Downstream (µg/L)	Project Contribution to River Concentration at Farm A Intake (µg/L)	River Concentration at Farm A Intake (µg/L)
Cadmium	2.78E+02	1.00E-02	1.77E-03	1.18E-02	2.04E-04	1.02E-02	3.84E-06	1.00E-02
Chromium	5.09E+01	1.70E+00	3.42E-04	1.70E+00	3.94E-05	1.70E+00	7.42E-07	1.70E+00
HB40	1.86E+03	0.00E+00	1.25E-02	1.25E-02	1.44E-03	1.44E-03	2.71E-05	2.71E-05
Mercury	3.00E-02	1.00E-02	2.02E-07	1.00E-02	2.33E-08	1.00E-02	4.38E-10	1.00E-02
Lead	2.32E+02	2.60E+00	1.56E-03	2.60E+00	1.80E-04	2.60E+00	3.38E-06	2.60E+00
Palladium	8.53E+01	NV	5.13E-04	5.13E-04	5.92E-05	5.92E-05	1.11E-06	1.11E-06
Xylene	2.45E+02	NV	1.48E-03	1.48E-03	1.70E-04	1.70E-04	3.20E-06	3.20E-06

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2.4.2 Human Dose and Risk (Non-Radionuclides)

As identified above, the relevant COPCs assessed quantitatively for human health for post-closure in the sensitivity analysis are cadmium, chromium, lead, and xylene.

Non-radiological doses to human receptors were calculated for the sensitivity analysis following the methodology outlined in the WR-1 ERA and the methodology is not repeated in this memo. Toxicity reference values were obtained from Health Canada (2021).

Exposure doses to human receptors exposed to COPCs in surface water are calculated based on total concentrations (background plus Project contribution) and based on Project contributions only (see Table 2-8, Table 2-9, and Table 2-10). For the harvester, the only relevant pathways during post-closure are the aquatic and terrestrial animal ingestion pathways, as well as the medicinal plant (weekay) ingestion pathway.

Table 2-8: Non-Radiological Exposure Dose to Harvester during Post-Closure

Human Type	Parameter	Unit	Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total
Total River Contribution (Dose by Pathway)							
Adult	Cadmium	mg/kg bw/day	1.41E-07	6.15E-07	1.46E-05	2.97E-06	1.84E-05
	Chromium	mg/kg bw/day	9.32E-06	7.96E-07	1.28E-07	2.63E-07	1.05E-05
	Lead	mg/kg bw/day	6.48E-06	1.13E-05	2.63E-05	7.65E-05	1.21E-04
	Xylene	mg/kg bw/day	5.49E-09	2.43E-15	2.79E-13	3.57E-10	5.85E-09
Toddler	Cadmium	mg/kg bw/day	1.48E-07	3.97E-07	9.45E-06	4.18E-06	1.42E-05
	Chromium	mg/kg bw/day	9.77E-06	5.14E-07	8.27E-08	3.70E-07	1.07E-05
	Lead	mg/kg bw/day	6.79E-06	7.28E-06	1.70E-05	1.08E-04	1.39E-04
	Xylene	mg/kg bw/day	5.76E-09	1.57E-15	1.80E-13	5.03E-10	6.26E-09
WRDF Contribution (Dose by Pathway)							
Adult	Cadmium	mg/kg bw/day	1.45E-09	6.34E-09	1.51E-07	3.06E-08	1.89E-07
	Chromium	mg/kg bw/day	1.10E-10	9.41E-12	1.52E-12	3.11E-12	1.24E-10
	Lead	mg/kg bw/day	2.28E-10	3.97E-10	9.26E-10	2.69E-09	4.24E-09
	Xylene	mg/kg bw/day	5.49E-09	2.43E-15	2.79E-13	3.57E-10	5.85E-09
Toddler	Cadmium	mg/kg bw/day	1.52E-09	4.09E-09	9.74E-08	4.31E-08	1.46E-07
	Chromium	mg/kg bw/day	1.15E-10	6.07E-12	9.78E-13	4.38E-12	1.27E-10
	Lead	mg/kg bw/day	2.39E-10	2.56E-10	5.97E-10	3.79E-09	4.88E-09
	Xylene	mg/kg bw/day	5.76E-09	1.57E-15	1.80E-13	5.03E-10	6.26E-09

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Table 2-9: Non-Radiological Exposure Dose to On-Site Farm during Post-Closure

Human Type	Parameter	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	7.88E-05	1.25E-09	7.13E-11	7.89E-10	2.41E-09	1.14E-07	2.57E-09	7.53E-09	6.73E-09	4.47E-09	9.24E-10	4.50E-11	7.89E-05
	Chromium	mg/kg bw/day	1.31E-02	2.35E-08	1.34E-08	1.48E-08	1.37E-09	7.46E-06	7.17E-07	5.91E-07	1.41E-07	2.92E-07	3.18E-07	1.42E-09	1.31E-02
	Lead	mg/kg bw/day	2.01E-02	1.50E-07	5.15E-09	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	2.01E-02
	Xylene	mg/kg bw/day	1.32E-06	2.44E-10	4.18E-11	1.54E-10	1.06E-09	8.64E-09	8.74E-13	7.95E-15	8.11E-14	3.94E-15	7.89E-12	6.12E-16	1.33E-06
Toddler	Cadmium	mg/kg bw/day	1.35E-04	2.14E-08	1.39E-10	1.69E-09	2.54E-09	1.19E-07	1.06E-09	6.86E-09	5.12E-09	2.12E-09	7.66E-09	0.00E+00	1.35E-04
	Chromium	mg/kg bw/day	2.25E-02	4.02E-07	2.61E-08	3.17E-08	1.45E-09	7.82E-06	2.96E-07	5.38E-07	1.07E-07	1.38E-07	2.63E-06	0.00E+00	2.25E-02
	Lead	mg/kg bw/day	3.44E-02	2.58E-06	1.00E-08	2.03E-07	9.05E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.44E-02
	Xylene	mg/kg bw/day	2.25E-06	4.19E-09	8.15E-11	3.30E-10	1.12E-09	9.05E-09	3.61E-13	7.25E-15	6.17E-14	1.86E-15	6.53E-11	0.00E+00	2.27E-06
WRDF Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	1.58E-06	2.51E-11	1.43E-12	1.58E-11	4.83E-11	2.28E-09	5.15E-11	1.51E-10	1.35E-10	8.96E-11	1.85E-11	9.01E-13	1.58E-06
	Chromium	mg/kg bw/day	3.05E-07	5.44E-13	3.10E-13	3.43E-13	3.19E-14	1.73E-10	1.66E-11	1.37E-11	3.28E-12	6.79E-12	7.37E-12	3.30E-14	3.05E-07
	Lead	mg/kg bw/day	1.39E-06	1.04E-11	3.55E-13	6.56E-12	5.93E-12	3.58E-10	4.95E-12	8.35E-11	2.78E-12	4.14E-11	1.51E-11	8.30E-14	1.39E-06
	Xylene	mg/kg bw/day	1.32E-06	2.44E-10	4.18E-11	1.54E-10	1.06E-09	8.64E-09	8.74E-13	7.95E-15	8.11E-14	3.94E-15	7.89E-12	6.12E-16	1.33E-06
Toddler	Cadmium	mg/kg bw/day	2.71E-06	4.29E-10	2.79E-12	3.39E-11	5.08E-11	2.39E-09	2.12E-11	1.37E-10	1.02E-10	4.24E-11	1.53E-10	0.00E+00	2.71E-06
	Chromium	mg/kg bw/day	5.22E-07	9.33E-12	6.05E-13	7.36E-13	3.35E-14	1.81E-10	6.86E-12	1.25E-11	2.49E-12	3.21E-12	6.11E-11	0.00E+00	5.22E-07
	Lead	mg/kg bw/day	2.38E-06	1.78E-10	6.93E-13	1.40E-11	6.25E-12	3.76E-10	2.04E-12	7.61E-11	2.12E-12	1.96E-11	1.25E-10	0.00E+00	2.38E-06
	Xylene	mg/kg bw/day	2.25E-06	4.19E-09	8.15E-11	3.30E-10	1.12E-09	9.05E-09	3.61E-13	7.25E-15	6.17E-14	1.86E-15	6.53E-11	0.00E+00	2.27E-06

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Table 2-10: Non-Radiological Exposure Dose to Farm A during Post-Closure

Human Type	Parameter	Unit	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	7.73E-05	1.23E-09	7.02E-11	7.73E-10	2.36E-09	1.12E-07	2.52E-09	7.38E-09	6.60E-09	4.38E-09	9.06E-10	4.41E-11	7.74E-05
	Chromium	mg/kg bw/day	1.31E-02	2.35E-08	1.34E-08	1.48E-08	1.37E-09	7.46E-06	7.17E-07	5.91E-07	1.41E-07	2.92E-07	3.18E-07	1.42E-09	1.31E-02
	Lead	mg/kg bw/day	2.01E-02	1.50E-07	5.15E-09	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	2.01E-02
	Xylene	mg/kg bw/day	2.47E-08	4.60E-12	9.78E-12	2.90E-12	2.00E-11	1.62E-10	1.64E-14	1.50E-16	1.53E-15	7.40E-17	1.48E-13	1.15E-17	2.49E-08
Toddler	Cadmium	mg/kg bw/day	1.32E-04	2.10E-08	1.36E-10	1.66E-09	2.49E-09	1.17E-07	1.04E-09	6.73E-09	5.01E-09	2.08E-09	7.51E-09	0.00E+00	1.33E-04
	Chromium	mg/kg bw/day	2.25E-02	4.02E-07	2.61E-08	3.17E-08	1.45E-09	7.82E-06	2.96E-07	5.38E-07	1.07E-07	1.38E-07	2.63E-06	0.00E+00	2.25E-02
	Lead	mg/kg bw/day	3.44E-02	2.58E-06	1.00E-08	2.03E-07	9.04E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	3.44E-02
	Xylene	mg/kg bw/day	4.24E-08	7.88E-11	1.53E-12	6.21E-12	2.10E-11	1.70E-10	6.78E-15	1.36E-16	1.16E-15	3.50E-17	1.23E-12	0.00E+00	4.27E-08
WRDF Contribution (Dose by Pathway)															
Adult	Cadmium	mg/kg bw/day	2.97E-08	4.71E-13	3.34E-13	2.97E-13	9.08E-13	4.29E-11	9.68E-13	2.84E-12	2.54E-12	1.69E-12	3.48E-13	1.69E-14	2.97E-08
	Chromium	mg/kg bw/day	5.73E-09	1.02E-14	7.26E-14	6.46E-15	5.99E-16	3.25E-12	3.13E-13	2.58E-13	6.16E-14	1.28E-13	1.39E-13	6.20E-16	5.73E-09
	Lead	mg/kg bw/day	2.61E-08	1.95E-13	8.32E-14	1.23E-13	1.12E-13	6.74E-12	9.31E-14	1.57E-12	5.23E-14	7.78E-13	2.85E-13	1.56E-15	2.61E-08
	Xylene	mg/kg bw/day	2.47E-08	4.60E-12	9.78E-12	2.90E-12	2.00E-11	1.62E-10	1.64E-14	1.50E-16	1.53E-15	7.40E-17	1.48E-13	1.15E-17	2.49E-08
Toddler	Cadmium	mg/kg bw/day	5.09E-08	8.07E-12	5.24E-14	6.37E-13	9.56E-13	4.50E-11	3.99E-13	2.59E-12	1.93E-12	7.98E-13	2.89E-12	0.00E+00	5.10E-08
	Chromium	mg/kg bw/day	9.82E-09	1.75E-13	1.14E-14	1.38E-14	6.31E-16	3.41E-12	1.29E-13	2.35E-13	4.68E-14	6.04E-14	1.15E-12	0.00E+00	9.82E-09
	Lead	mg/kg bw/day	4.47E-08	3.35E-12	1.30E-14	2.64E-13	1.18E-13	7.06E-12	3.84E-14	1.43E-12	3.98E-14	3.68E-13	2.36E-12	0.00E+00	4.47E-08
	Xylene	mg/kg bw/day	4.24E-08	7.88E-11	1.53E-12	6.21E-12	2.10E-11	1.70E-10	6.78E-15	1.36E-16	1.16E-15	3.50E-17	1.23E-12	0.00E+00	4.27E-08

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Potential human health risks were characterized in terms of a hazard quotient (HQ) where the estimated exposure dose for the non-carcinogenic substances was divided by a toxicity reference value. The HQs were compared to an acceptable risk level of 0.2 per medium, consistent with the WR-1 ERA.

The HQs for the harvester, on-site farm, and Farm A are below the acceptable risk level of 0.2 for cadmium, chromium, and xylene for all pathways for the toddler and adult. The HQs for the harvester, on-site farm and Farm A are above the acceptable risk level of 0.2 for lead for ingestion of weekay for the harvester (toddler), and from drinking water from the Winnipeg River for the on-site farm (toddler and adult) and Farm A (toddler and adult). The HQs for all receptors are based on background plus Project exposure. If only the Project contribution is considered, all HQs for all receptors are well below the acceptable risk level of 0.2.

The Project contribution to the lead HQ for weekay ingestion for the harvester is 0.002%. The Project contribution to the lead HQ for drinking water is 0.007% for the on-site farm. This indicates that the Project contribution to the total HQ is small and the HQ exceedance is from existing background concentrations of lead in the Winnipeg River.

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Table 2-11: Hazard Quotients for Harvester during Post-Closure

Human Type	Parameter	Total River Contribution					WR-1 Project Contribution				
		Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total	Ingestion of Fish	Ingestion of Wild Waterfowl	Ingestion of Moose	Ingestion of Weekay	Total
Adult	Cadmium	1.76E-04	7.69E-04	1.83E-02	3.71E-03	2.30E-02	1.82E-06	7.92E-06	1.89E-04	3.83E-05	2.37E-04
	Chromium	6.21E-06	5.31E-07	8.55E-08	1.75E-07	7.00E-06	7.34E-11	6.27E-12	1.01E-12	3.89E-09	3.97E-09
	Lead	1.30E-02	2.26E-02	5.26E-02	1.53E-01	2.41E-01	4.56E-07	7.94E-07	1.85E-06	3.36E-06	6.46E-06
	Xylene	4.23E-07	1.87E-13	2.14E-11	2.75E-08	4.50E-07	4.23E-07	1.87E-13	2.14E-11	4.47E-07	8.69E-07
Toddler	Cadmium	1.85E-04	4.96E-04	1.18E-02	5.23E-03	1.77E-02	1.90E-06	5.11E-06	1.22E-04	5.39E-05	1.83E-04
	Chromium	6.51E-06	3.42E-07	5.51E-08	2.47E-07	7.16E-06	7.70E-11	4.05E-12	6.52E-13	5.47E-09	5.55E-09
	Lead	1.36E-02	1.46E-02	3.39E-02	**2.15E-01**	2.77E-01	4.78E-07	5.12E-07	1.19E-06	4.73E-06	6.92E-06
	Xylene	4.43E-07	1.21E-13	1.38E-11	3.87E-08	4.82E-07	4.43E-07	1.21E-13	1.38E-11	6.29E-07	1.07E-06

Notes: **Bold** and shaded values indicate HQ greater than 0.2.

Table 2-12: Hazard Quotients for On-Site Farm during Post-Closure

Human Type	Parameter	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (HQ by Pathway)														
Adult	Cadmium	9.85E-02	1.56E-06	8.91E-08	9.86E-07	3.01E-06	1.42E-04	3.21E-06	9.41E-06	8.41E-06	5.59E-06	1.16E-06	5.62E-08	9.87E-02
	Chromium	8.75E-03	1.56E-08	8.91E-09	9.86E-09	9.15E-10	4.97E-06	4.78E-07	3.94E-07	9.41E-08	1.95E-07	2.12E-07	9.48E-10	8.76E-03
	Lead	**4.02E+01**	3.01E-04	1.03E-05	1.90E-04	1.72E-04	1.04E-02	1.43E-04	2.42E-03	8.06E-05	1.20E-03	4.38E-04	2.40E-06	4.02E+01
	Xylene	1.01E-04	1.88E-08	3.21E-09	1.19E-08	8.17E-08	6.64E-07	6.73E-11	6.12E-13	6.24E-12	3.03E-13	6.07E-10	4.71E-14	1.02E-04
Toddler	Cadmium	1.69E-01	2.68E-05	1.74E-07	2.11E-06	3.17E-06	1.49E-04	1.33E-06	8.58E-06	6.39E-06	2.65E-06	9.57E-06	0.00E+00	1.69E-01
	Chromium	1.50E-02	2.68E-07	1.74E-08	2.11E-08	9.64E-10	5.21E-06	1.97E-07	3.59E-07	7.15E-08	9.23E-08	1.76E-06	0.00E+00	1.50E-02
	Lead	**6.88E+01**	5.16E-03	2.01E-05	4.07E-04	1.81E-04	1.09E-02	5.92E-05	2.20E-03	6.12E-05	5.67E-04	3.63E-03	0.00E+00	6.89E+01
	Xylene	1.73E-04	3.22E-07	6.27E-09	2.54E-08	8.60E-08	6.97E-07	2.77E-11	5.57E-13	4.74E-12	1.43E-13	5.03E-09	0.00E+00	1.75E-04
WRDF Project Contribution (HQ by Pathway)														
Adult	Cadmium	1.97E-03	3.13E-08	1.78E-09	1.98E-08	6.03E-08	2.85E-06	6.43E-08	1.89E-07	1.69E-07	1.12E-07	2.31E-08	1.13E-09	1.98E-03
	Chromium	2.03E-07	3.63E-13	2.07E-13	2.29E-13	2.12E-14	1.15E-10	1.11E-11	9.14E-12	2.18E-12	4.52E-12	4.92E-12	2.20E-14	2.03E-07
	Lead	2.77E-03	2.08E-08	7.11E-10	1.31E-08	1.19E-08	7.16E-07	9.90E-09	1.67E-07	5.57E-09	8.27E-08	3.03E-08	1.66E-10	2.78E-03
	Xylene	1.01E-04	1.88E-08	3.21E-09	1.19E-08	8.17E-08	6.64E-07	6.73E-11	6.12E-13	6.24E-12	3.03E-13	6.07E-10	4.71E-14	1.02E-04
Toddler	Cadmium	3.38E-03	5.37E-07	3.48E-09	4.23E-08	6.35E-08	2.99E-06	2.65E-08	1.72E-07	1.28E-07	5.30E-08	1.92E-07	0.00E+00	3.39E-03
	Chromium	3.48E-07	6.22E-12	4.03E-13	4.90E-13	2.24E-14	1.21E-10	4.57E-12	8.33E-12	1.66E-12	2.14E-12	4.07E-11	0.00E+00	3.48E-07
	Lead	4.75E-03	3.56E-07	1.39E-09	2.81E-08	1.25E-08	7.51E-07	4.09E-09	1.52E-07	4.23E-09	3.92E-08	2.51E-07	0.00E+00	4.76E-03
	Xylene	1.73E-04	3.22E-07	6.27E-09	2.54E-08	8.60E-08	6.97E-07	2.77E-11	5.57E-13	4.74E-12	1.43E-13	5.03E-09	0.00E+00	1.75E-04

Notes: **Bold** and shaded values indicate HQ greater than 0.2.

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Table 2-13: Hazard Quotients for Farm A during Post-Closure

Human Type	Parameter	River Water Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Total River Contribution (HQ by Pathway)														
Adult	Cadmium	9.66E-02	1.53E-06	8.77E-08	9.67E-07	2.95E-06	1.40E-04	3.15E-06	9.23E-06	8.25E-06	5.48E-06	1.13E-06	5.51E-08	9.67E-02
	Chromium	8.75E-03	1.56E-08	8.91E-09	9.86E-09	9.15E-10	4.97E-06	4.78E-07	3.94E-07	9.41E-08	1.95E-07	2.12E-07	9.48E-10	8.76E-03
	Lead	**4.02E+01**	3.01E-04	1.03E-05	1.90E-04	1.72E-04	1.04E-02	1.43E-04	2.42E-03	8.06E-05	1.20E-03	4.38E-04	2.40E-06	4.02E+01
	Xylene	1.90E-06	3.54E-10	7.52E-10	2.23E-10	1.54E-09	1.25E-08	1.26E-12	1.15E-14	1.17E-13	5.69E-15	1.14E-11	8.85E-16	1.92E-06
Toddler	Cadmium	1.66E-01	2.63E-05	1.70E-07	2.07E-06	3.11E-06	1.46E-04	1.30E-06	8.41E-06	6.27E-06	2.59E-06	9.39E-06	0.00E+00	1.66E-01
	Chromium	1.50E-02	2.68E-07	1.74E-08	2.11E-08	9.64E-10	5.21E-06	1.97E-07	3.59E-07	7.15E-08	9.23E-08	1.76E-06	0.00E+00	1.50E-02
	Lead	**6.88E+01**	5.16E-03	2.01E-05	4.07E-04	1.81E-04	1.09E-02	5.91E-05	2.20E-03	6.12E-05	5.67E-04	3.63E-03	0.00E+00	6.89E+01
	Xylene	3.26E-06	6.06E-09	1.18E-10	4.78E-10	1.62E-09	1.31E-08	5.22E-13	1.05E-14	8.92E-14	2.70E-15	9.45E-11	0.00E+00	3.28E-06
WRDF Project Contribution (HQ by Pathway)														
Adult	Cadmium	3.71E-05	5.89E-10	4.18E-10	3.71E-10	1.13E-09	5.37E-08	1.21E-09	3.55E-09	3.17E-09	2.11E-09	4.35E-10	2.12E-11	3.72E-05
	Chromium	3.82E-09	6.82E-15	4.84E-14	4.30E-15	3.99E-16	2.17E-12	2.09E-13	1.72E-13	4.11E-14	8.51E-14	9.24E-14	4.14E-16	3.82E-09
	Lead	5.22E-05	3.91E-10	1.66E-10	2.47E-10	2.23E-10	1.35E-08	1.86E-10	3.14E-09	1.05E-10	1.56E-09	5.69E-10	3.12E-12	5.22E-05
	Xylene	1.90E-06	3.54E-10	7.52E-10	2.23E-10	1.54E-09	1.25E-08	1.26E-12	1.15E-14	1.17E-13	5.69E-15	1.14E-11	8.85E-16	1.92E-06
Toddler	Cadmium	6.36E-05	1.01E-08	6.55E-11	7.96E-10	1.19E-09	5.63E-08	4.99E-10	3.23E-09	2.41E-09	9.97E-10	3.61E-09	0.00E+00	6.37E-05
	Chromium	6.55E-09	1.17E-13	7.59E-15	9.22E-15	4.20E-16	2.27E-12	8.60E-14	1.57E-13	3.12E-14	4.03E-14	7.66E-13	0.00E+00	6.55E-09
	Lead	8.94E-05	6.70E-09	2.61E-11	5.28E-10	2.35E-10	1.41E-08	7.68E-11	2.86E-09	7.96E-11	7.36E-10	4.72E-09	0.00E+00	8.95E-05
	Xylene	3.26E-06	6.06E-09	1.18E-10	4.78E-10	1.62E-09	1.31E-08	5.22E-13	1.05E-14	8.92E-14	2.70E-15	9.45E-11	0.00E+00	3.28E-06

Notes: **Bold** and shaded values indicate HQ greater than 0.2.

2.4.3 Ecological Dose and Risk (Non-Radionuclides)

As identified above, the relevant COPCs assessed quantitatively for ecological health for post-closure in the sensitivity analysis are cadmium, chromium, HB40, mercury, lead, and xylene.

Non-radiological doses to birds and mammals were calculated for the sensitivity analysis following the methodology outlined in the WR-1 ERA (not repeated in this memo), and are provided in Table 2-14. For chromium and mercury which were previously not assessed in the WR-1 ERA, bioaccumulation factors were obtained from CSA N288.1:20. For xylene bioaccumulation factors were obtained from US EPA 1999.

Table 2-14: Non-Radiological Exposure Doses for Birds and Mammals during Post-Closure

Non-Radionuclide	Unit	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose
Cadmium	mg/kg bw/day	1.26E-03	4.35E-04	2.32E-02	2.86E-02	5.83E-04	2.25E-04	2.13E-02
Chromium	mg/kg bw/day	6.91E-01	1.36E-01	1.88E-03	5.87E-02	3.27E-01	2.52E-02	1.76E-03
HB40	mg/kg bw/day	3.41E+00	1.41E+00	8.63E-02	3.85E-01	1.62E+00	8.30E-01	7.94E-02
Mercury	mg/kg bw/day	4.99E-02	1.66E-02	3.83E-02	5.12E-02	2.37E-02	8.27E-03	3.52E-02
Lead	mg/kg bw/day	7.77E-02	2.43E-02	5.13E-01	6.38E-01	2.87E-02	1.14E-02	4.72E-01
Xylene	mg/kg bw/day	6.83E-04	2.40E-04	4.07E-05	1.06E-04	3.24E-04	1.25E-04	3.75E-05

Toxicity benchmarks for fish, aquatic plants and benthic invertebrates for chromium and mercury which were previously not assessed in the WR-1 ERA, were obtained from Suter and Tsao (1996). For birds and mammals, toxicity benchmarks were obtained from Sample et al. (1996).

Ecological risk was characterized in terms of a hazard quotient (HQ) by dividing the exposure value by the toxicity benchmark. The HQs for aquatic receptors are summarized in Table 2-15 and HQs for riparian and terrestrial birds and mammals are summarized in

Table 2-16. All HQs are below 1 indicating no adverse ecological effect is anticipated.

Table 2-15: Non-Radiological Hazard Quotients for Aquatic Receptors

Non-Radionuclide	Benthic Invertebrates	Fish	Aquatic Plants
Cadmium	7.85E-02	6.92E-03	5.89E-03
Chromium	3.86E-02	2.48E-02	4.28E-03
HB40	6.23E-04	1.45E-05	2.65E-05
Mercury	1.04E-02	4.35E-02	2.00E-03
Lead	2.12E-01	1.38E-01	5.20E-03
Xylene	1.48E-05	5.50E-07	3.78E-07

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Table 2-16: Non-Radiological Hazard Quotients for Birds and Mammals

Non-Radionuclide	Barn Swallow	Horned Grebe	Trumpeter Swan	Wild Waterfowl	Little Brown Myotis	Mink	Moose
Cadmium	6.29E-05	2.18E-05	1.16E-03	1.43E-03	5.83E-05	2.25E-05	2.13E-03
Chromium	1.38E-01	2.72E-02	3.76E-04	1.17E-02	1.20E-04	9.21E-06	6.44E-07
HB40	NV	NV	NV	NV	6.47E-03	3.32E-03	3.18E-04
Mercury	5.55E-02	1.84E-02	4.26E-02	5.69E-02	2.37E-02	8.27E-03	3.52E-02
Lead	6.87E-03	2.15E-03	4.54E-02	5.65E-02	3.58E-04	1.42E-04	5.90E-03
Xylene	1.22E-05	4.28E-06	7.28E-07	1.89E-06	9.08E-07	3.51E-07	1.05E-07

NV = no value

Well in Plume – Disruptive Event

This memorandum also addresses a modification to the Well in Plume scenario assumptions in the Decommissioning Safety Assessment Report (DSAR). The Well in Plume scenario assumption in the DSAR was consideration of placement of a drinking water well halfway between the WRDF and the Winnipeg River (approximately 250 m downgradient of the WRDF). The evaluation below considers downstream distances closer, at 100 m and 10 m. To bound the assessment, the worst case loadings between the 100 m and 10 m distance were considered.

Selection of Radionuclides and Non-Radionuclides

It was determined that the Well in Plume disruptive events scenario was not feasible until after the 100-year institutional control period ended. During institutional control long-term performance monitoring and maintenance activities will occur to demonstrate compliance with the safety case assumptions; therefore, the scenario is based on mass loadings after 100 years of institutional control.

The maximum mass loadings from a well location at 100 m (Scenario 19) and 10 m (Scenario 20) were converted to groundwater concentrations using the anticipated flowrate through the bedrock pathway for the time period of maximum mass loadings.

3.1.1 Radionuclides

The maximum predicted concentrations of radionuclides in groundwater are shown in Table 3-1. All radionuclides identified in Table 3-1 were assessed quantitatively for radiological dose to the on-site Farm, based on the assumptions presented in Section 5.2 of the main ERA report using IMPACT™.

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Table 3-1: Concentrations of Radionuclides in Groundwater Well

Radionuclide	Peak Mass Loading (g/year)	Time to Peak (yr)	Release Rate (Bq/d)	Groundwater Concentration (Bq/L)
Ac-225	1.50E-17	28,000	8.80E-05	4.63E-07
Ac-227	4.43E-14	7,207	3.25E-04	1.71E-06
Ag-108m	4.68E-08	274	3.59E+01	2.11E-01
Am-241	6.19E-28	675	2.16E-19	1.27E-21
Am-243	0.00E+00	N/A	0.00E+00	0.00E+00
Bi-210	1.65E-14	60,000	2.08E-01	1.09E-03
C-14	5.64E-04	879	2.55E+05	1.50E+03
Ca-41	5.47E-05	665	4.75E+02	2.79E+00
Cl-36	1.34E-08	100	4.50E-02	2.65E-04
Cm-244	0.00E+00	N/A	0.00E+00	0.00E+00
Co-60	1.51E-23	163	1.72E-12	1.01E-14
Cs-137	1.58E-11	427	1.38E-01	8.10E-04
Eu-152	0.00E+00	NA	0.00E+00	0.00E+00
Eu-154	0.00E+00	NA	0.00E+00	0.00E+00
Eu-155	0.00E+00	N/A	0.00E+00	0.00E+00
Fe-55	0.00E+00	NA	0.00E+00	0.00E+00
Gd-152	1.97E-07	100	4.35E-10	2.56E-12
H-3	4.23E-05	100	4.13E+07	2.43E+05
I-129	1.67E-04	100	3.00E+00	1.76E-02
Nb-94	1.98E-04	74,000	3.76E+03	1.98E+01
Nd-144	0.00E+00	N/A	0.00E+00	0.00E+00
Ni-59	8.11E-02	30,000	6.57E+05	3.46E+03
Ni-63	5.18E-19	2,957	2.99E-09	1.66E-11
Np-237	1.61E-04	1,445	1.15E+01	6.79E-02
Np-239	0.00E+00	NA	0.00E+00	0.00E+00
Pa-231	6.78E-11	7,221	3.25E-04	1.71E-06
Pa-233	7.30E-15	1,460	1.54E-02	9.04E-05
Pb-210	6.71E-13	60,000	5.20E-03	2.74E-05
Po-210	1.18E-10	58,000	5.38E+01	2.83E-01
Pu-238	1.63E-13	1,254	2.84E-04	1.67E-06
Pu-239	5.17E-04	4,096	3.25E+03	1.81E+01
Pu-240	1.48E-04	3,884	3.40E+03	1.89E+01
Pu-241	8.07E-26	536	8.68E-16	5.10E-18
Ra-223	1.06E-15	7,273	5.49E-03	2.89E-05

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Radionuclide	Peak Mass Loading (g/year)	Time to Peak (yr)	Release Rate (Bq/d)	Groundwater Concentration (Bq/L)
Ra-224	6.53E-22	120,000	1.06E-08	5.59E-11
Ra-225	1.91E-16	28,000	7.54E-04	3.97E-06
Ra-226	1.19E-11	60,000	1.19E-03	6.28E-06
Ra-228	3.82E-19	112,000	1.06E-08	5.60E-11
Rn-222	3.48E-12	60,000	5.43E+01	2.86E-01
Sm-148	2.94E-22	610,000	1.03E-26	5.43E-29
Sr-90	7.86E-09	251	1.10E+02	6.48E-01
Tc-99	3.70E-04	389	6.43E+02	3.78E+00
Th-227	1.92E-16	7,134	6.01E-04	3.16E-06
Th-228	2.78E-20	110,000	2.31E-09	1.21E-11
Th-229	7.65E-12	28,000	1.66E-04	8.73E-07
Th-230	1.25E-10	58,000	2.62E-04	1.38E-06
Th-231	1.95E-16	2,831	1.05E-02	5.83E-05
Th-232	2.08E-10	114,000	2.30E-09	1.21E-11
Th-234	3.43E-14	2,832	8.06E-02	4.48E-04
U-233	3.38E-08	2,587	3.30E-02	1.84E-04
U-234	1.63E-06	2,871	1.03E+00	5.73E-03
U-235	6.72E-03	2,836	1.47E+00	8.18E-03
U-236	1.04E-04	3,706	6.80E-01	3.78E-03
U-237	0.00E+00	N/A	0.00E+00	0.00E+00
U-238	3.32E-01	2,825	1.13E+01	6.28E-02
Y-90	1.18E-14	249	6.50E-01	3.83E-03

3.1.2 Non-Radionuclides

The maximum predicted concentrations of non-radionuclides in groundwater are shown in Table 3-2. The maximum predicted concentrations in groundwater at the river were compared to water quality guidelines to determine constituents of potential concern (COPC) relevant to human health. Consistent with the Well in Plume scenario in the DSAR, the focus is on human health because it is assumed that the on-site Farmer would obtain drinking water from this well. Ecological receptors would not be exposed to groundwater since they do not live in groundwater, and therefore are not considered as part of this assessment. The selection of water quality guidelines for human health followed the hierarchy identified above in Figure 2-1. Note that the Health Canada drinking water guidelines reflect the most recent guidelines, which have been updated since the ERA.

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The screening indicates that cadmium, lead, and palladium are considered COPCs for human health.

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Table 3-2: Screening of Groundwater Concentrations for Non-Radionuclides from the WRDF

Non-Radionuclides	Maximum Loading (g/year)	Time of Maximum (Year)	Groundwater concentration (µg/L)	Background Winnipeg River	WQSOG Manitoba	CCME WQG	CDWS MAC	PWQO Ontario	WQG BC	Toxicity Benchmark	Selected Benchmark	COPC Human Health?
Argon	4.94E-12	141	7.96E-11	-	-	-	-	-	-		N/A	N
Boron	2.45E-03	189	3.95E-02	1.00E+01		1500	5000	200	1200		5000	N
Barium	9.12E-07	218,000	1.31E-05	1.10E+01			2000			0.4[a]	2000	N
Beryllium	0.00E+00	N/A	N/A	-				11				N/A
Bismuth	1.82E-09	26,000	2.62E-08	<2.00E-01						0.25[b]	0.25	N
Cadmium	1.83E+01	4,420	**2.78E+02**	1.00E-02	0.137	0.08	7	0.1	0.114		7	**Y**
Cerium	0.00E+00	N/A		-	-	-	-	-	-			
Cobalt	2.78E-02	70,000	4.01E-01	2.00E-01				0.9	4		0.9	N
Chromium	2.00E-01	608,000	2.89E+00	1.70E+00	37.1	1.0 (VI)	50	1 (VI)			50	N
Copper	1.37E-02	32,000	1.97E-01	1.40E+01	4.3	2	2000	5	2		2000	N
Gadolinium	7.39E-06	100	1.19E-04	-						1.5[b]	1.5	N
HB40	4.05E+01	9,988	5.84E+02	0.00E+00			8800[d]			2[c]	8800	N
Helium	1.08E-02	100	1.75E-01	-	-	-	-	-	-			N/A
Mercury	2.08E-03	132,000	3.00E-02	1.00E-02	1	0.026	1	0.2			1	N
Potassium	3.53E-07	2,869	5.37E-06	9.07E+02						5300[a]	5300	N
Potassium Hydroxide (as K)	4.67E-02	100	5.26E-01	-						5300[a]	5300	N
Manganese	1.14E-03	22,000	1.64E-02	1.10E+01			120		794.2	110[a]	120	N
Molybdenum	1.13E-02	20,000	1.63E-01	2.00E-01		73		40	1000		73	N
Nitrogen	5.15E-04	18,000	7.43E-03	-			1000		3000		1000	N

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Non-Radionuclides	Maximum Loading (g/year)	Time of Maximum (Year)	Groundwater concentration (µg/L)	Background Winnipeg River	WQSOG Manitoba	CCME WQG	CDWS MAC	PWQO Ontario	WQG BC	Toxicity Benchmark	Selected Benchmark	COPC Human Health?
Nickel	1.17E-03	32,000	1.69E-02	1.78E+00	25.5	25		25			25	N
Lead	5.05E+00	116,000	**7.27E+01**	2.60E+00	0.99	1	5	3	4.4		5	**Y**
Palladium	4.93E+00	2,953	**7.50E+01**	-						5.7[(b)]	5.7	**Y**
Ruthenium	1.31E-08	22,000	1.89E-07	-						10[(b)]	10	N
Sulphur (as SO_4)	6.23E-13	100	3.01E-11	-					218000		218000	N
Samarium	3.02E-10	610,000	4.35E-09	-						0.74[(b)]		N/A
Thallium	0.00E+00	N/A		-		0.8		0.3				N/A
Xenon	8.25E-10	169	1.33E-08	-	-	-	-	-	-			N/A
Xylene	5.03E+00	100	8.11E+01	-			90	2/40/30 (m/o/p)	30		90	N
Zirconium	8.56E-08	976,000	1.23E-06	-				4			4	N

Notes:
(a): Suter and Tsao 1996, divided by 10
(b): Borgmann et al. 2005, divided by 100
(c): Ecometrix 2017, IC25 divided by 10
(d): Derived drinking water limit based on a minimal effect level in mice of 250 mg/kg-day (Weeks 1974), divided by 1000, times 70 kg body weight, over 2 L/day of drinking water
Assumed hardness of 43 mg/L consistent with WR-1 ERA.

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Radiological Dose and Risk

Radiological dose was calculated for the modified Well in Plume disruptive event scenario where the on-site farmer receives drinking water from a groundwater well in the groundwater plume from the WRDF. The estimated total radiological doses to the on-site farm residents who drink groundwater during post-closure are presented in Table 3-3. The doses shown represent the maximum annual dose over the assessment period. Detailed tables by radionuclide and pathway are shown in Appendix A.

The maximum estimated total dose for on-site farm residents who drink groundwater from a well in the WRDF is estimated to be 2.44E+01 mSv/a for the new on-site farm (3-month-old who drinks formula) (Table 3-3). The main contribution to total dose is from Pu-240 and Pu-239 from drinking groundwater (the internal water pathway).

Consistent with the DSAR, for disruptive events, a reference level ranging from 1 mSv/a to 20 mSv/a has been defined (IAEA 2011). The total radiological dose to the on-site farmer receptors that drink groundwater from a well in the plume from WRDF exceeds the lower IAEA reference level of 1 mSv/a for all receptors, except the nursing infant who drinks cow's milk. All doses are below the upper IAEA reference level of 20 mSv/a for all receptors, except for the 3-month-old (formula) where the dose is 24.4 mSv/a.

The dominant radionuclides and pathways are HTO, Pu-240 and Pu-239 through water ingestion with the breakdown as follows:

- Adult: 31% HTO, 30% Pu-240 and 29% Pu-239 of the total, through water ingestion;
- Child: 33% HTO, 28% Pu-240 and 26% Pu-239 of the total, through water ingestion;
- Infant (formula): 37% HTO, 23% Pu-240 and 22% Pu-239 of the total, through water ingestion;
- Infant (nursing): Cs-137 through external sediment which contributes 98% of its total dose.
- 3 month old (nursing): HTO from breast feeding which contributes 92% of its total dose.
- 3 month old (formula): 43% Pu-240 and 41% Pu-239 of the total, through water ingestion.

Table 3-3 presents the results based on the conservative assumption that the on-site residents are exposed to the maximum groundwater concentrations for all COPCs in the plume at the same time. Realistically, predicted dose rates from individual radionuclides peak at different times over the post-closure phase. For the 3 month old (formula drinking) infant, tritium

contributes approximately 9% of the total dose of 24 mSv/a and peaks at the end of the 100-year institutional control period. Pu-240 contributes approximately 43% of the dose and peaks after 3,884 years. Pu-239 contributes approximately 41% of the dose and peaks at 4,096 years. Po-210 contributes approximately 4% of the dose and peaks after 58,000 years. Therefore, considering only the contributions of radionuclides that peak at similar timeframes, the maximum dose to the 3-month old would be approximately 20 mSv/a (considering only Pu-239 and Pu-240).

Table 3-3: Summary of Total Dose for Post-Closure Human Receptors at an On-Site Farm with Groundwater Well and Comparison to Limits

Age Group	Total Dose (mSv/a)	Percent of the lower IAEA reference level of 1 mSv/a	Percent of the upper IAEA reference level of 20 mSv/a
Adult	**5.92E+00**	592%	30%
Child	**2.80E+00**	280%	14%
Infant (nursing)	4.23E-03	0.42%	0.02%
Infant (formula)	**3.44E+00**	344%	17%
3-month-old (nursing)	**2.98E+00**	298%	15%
3-month-old (formula)	**2.44E+01**	2438%	122%

Notes:
Bold cells indicate exceedance of the lower IAEA reference level of 1 mSv/a.
Shaded cells indicate exceedance of the upper IAEA reference level of 20 mSv/a.

Non-Radiological Dose and Risk

As identified above, the relevant COPCs assessed quantitatively for human health for the Well in Plume disruptive event are cadmium, lead, and palladium.

Non-radiological doses to the on-site farm residents who drink groundwater from the well in plume are shown in Table 3-4. The dose was calculated following the methodology outlined in the WR-1 ERA and the methodology is not repeated in this memo. The dose from all other pathways other than groundwater ingestion is the same as in Table 2-9.

Toxicity reference values were obtained from Health Canada (2021). Potential human health risks were characterized in terms of a hazard quotient (HQ) where the estimated exposure dose for the non-carcinogenic substances was divided by a toxicity reference value. The HQs were compared to an acceptable risk level of 0.2 per medium, consistent with the WR-1 ERA.

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Hazard quotients for non-radionuclides for the on-site farm residents who drink groundwater from the well in plume are shown in Table 3-5.

The hazard quotients for cadmium and lead exceed the target value for the adult and toddler, based on the drinking water pathway. Risk could not be ruled out for the on-site farm residents drinking groundwater in the plume of WRDF. The hazard quotients for cadmium and lead for all other pathways are below the target value for both adult and toddler.

There is limited toxicity data available on palladium in drinking water. Palladium is a metal commonly used in dental appliances, chemical catalysts, electrical appliances and jewelry. Exposure to palladium can cause sensitization, which can result in allergic reactions in sensitive individuals. For drinking-water, a maximum daily intake of 0.03 µg palladium/person per day has been calculated (assuming a consumption of 2 litres/day) based on background conditions (WHO, 2002). This would result in a background concentration of 0.015 µg/L in drinking water. The predicted concentration of palladium in groundwater in Table 3-2 is 75 µg/L. A study in mice exposed to $PdCl_2$ in drinking water (5,000 µg palladium/L) from weaning until natural death showed suppression of body weight gain, and also a questionable carcinogenic effect (WHO, 2002). The WHO considers the existing toxicological data insufficient to support human health risk assessment.

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Table 3-4: Non-Radiological Exposure Dose to On-Site Farm from Well in Plume

Human Type	Parameter	Unit	Groundwater Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Adult	Cadmium	mg/kg bw/day	2.15E+00	1.25E-09	7.13E-11	7.89E-10	2.41E-09	1.14E-07	2.57E-09	7.53E-09	6.73E-09	4.47E-09	9.24E-10	4.50E-11	2.15E+00
	Lead	mg/kg bw/day	5.61E-01	1.50E-07	5.15E-09	9.49E-08	8.59E-08	5.19E-06	7.17E-08	1.21E-06	4.03E-08	5.99E-07	2.19E-07	1.20E-09	5.61E-01
Toddler	Cadmium	mg/kg bw/day	3.68E+00	2.14E-08	1.39E-10	1.69E-09	2.54E-09	1.19E-07	1.06E-09	6.86E-09	5.12E-09	2.12E-09	7.66E-09	0.00E+00	3.68E+00
	Lead	mg/kg bw/day	9.62E-01	2.58E-06	1.00E-08	2.03E-07	9.05E-08	5.44E-06	2.96E-08	1.10E-06	3.06E-08	2.83E-07	1.82E-06	0.00E+00	9.62E-01

Table 3-5: Hazard Quotients for On-Site Farm from Well in Plume

Human Type	Parameter	Groundwater Ingestion	Soil Ingestion	Soil Dermal Contact	Dust Inhalation	Ingestion of Plants	Ingestion of Fish	Ingestion of Beef	Ingestion of Poultry	Ingestion of Pork	Ingestion of Eggs	Ingestion of Milk	Ingestion of Deer	Total
Adult	Cadmium	**2.69E+03**	1.56E-06	8.91E-08	9.86E-07	3.01E-06	1.42E-04	3.21E-06	9.41E-06	8.41E-06	5.59E-06	1.16E-06	5.62E-08	**2.69E+03**
	Lead	**1.12E+03**	3.01E-04	1.03E-05	1.90E-04	1.72E-04	1.04E-02	1.43E-04	2.42E-03	8.06E-05	1.20E-03	4.38E-04	2.40E-06	**1.12E+03**
Toddler	Cadmium	**4.60E+03**	2.68E-05	1.74E-07	2.11E-06	3.17E-06	1.49E-04	1.33E-06	8.58E-06	6.39E-06	2.65E-06	9.57E-06	0.00E+00	**4.60E+03**
	Lead	**1.92E+03**	5.16E-03	2.01E-05	4.07E-04	1.81E-04	1.09E-02	5.92E-05	2.20E-03	6.12E-05	5.67E-04	3.63E-03	0.00E+00	**1.92E+03**

Notes: Bold and shaded values indicate HQ greater than 0.2.

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Summary and Conclusions

Human and ecological dose and risk were evaluated based on updates to the mass loadings from the groundwater solute transport model assuming a geo-pathway as a fractured bedrock pathway. The intent of the sensitivity analysis in the groundwater solute transport model was to explore model sensitivity to various input parameters, and the analysis does not necessarily reflect a plausible scenario. The on-site farm receptors were also evaluated based on a modification to the Well in Plume scenario from the DSAR to consider placement of a drinking water well at a distance closer than previously assumed, at 100 m and 10 m downgradient of the WRDF.

The assessment was consistent with the specific details and assumptions in the WR-1 ERA.

Geo-pathway

Estimated doses to human receptors from radionuclides in the sensitivity scenario are below the public dose limit of 1 mSv/year and the dose constraint of 0.25 mSv/year.

For the non-radiological assessment, the COPCs evaluated quantitatively for human health risk were cadmium, chromium, lead, and xylene. The HQs for all human receptors for cadmium, chromium, lead and xylene are below the acceptable risk level of 0.2 per medium when considering impacts from the Project only. When including background concentrations, the HQs for lead exceed the acceptable risk level of 0.2 based on ingestion of weekay for the harvester, and drinking water from the Winnipeg River for other receptors.

All radionuclide doses to ecological receptors are well below the radiation dose benchmarks of 2.4 mGy/day for terrestrial and riparian biota and 9.6 mGy/day for aquatic biota.

The COPCs evaluated quantitatively for ecological health risk were cadmium, chromium, HB40, mercury, lead, and xylene. The HQs for the ecological receptors are below the acceptable risk level of 1.0 for all COPCs.

Modified Well in Plume

Estimated doses to on-site farm receptors from radionuclides in the modified Well in Plume disruptive event scenario are below the upper IAEA reference level of 20 mSv/a for all receptors, except for the 3-month-old (formula) where the estimated dose is 24.4 mSv/a.

The hazard quotients for cadmium and lead exceed the target value for the adult and toddler, based on the drinking water pathway. Risk could not be ruled out for the on-site farm residents drinking groundwater in the plume of WRDF.

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Appendix A Human Dose Tables – By Radionuclide and Pathway

Table A-1: Estimated Radiation Dose for New On-site Farm during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	3.76E-15	1.49E-17	2.62E-22	1.14E-17	3.03E-18	5.31E-16	0.00E+00	3.06E-16	5.08E-17	6.32E-17	4.74E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	5.54E-13	9.72E-19	1.98E-17	2.86E-14	4.47E-16	3.13E-15	0.00E+00	4.51E-14	2.74E-14	1.96E-14	6.78E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.28E-10	4.07E-11	6.83E-15	1.98E-08	5.77E-12	8.40E-08	0.00E+00	7.65E-11	5.13E-11	1.03E-10	1.04E-07
	Am-241	mSv/a	0.00E+00	0.00E+00	1.23E-12	4.04E-17	7.47E-17	3.59E-14	1.22E-13	1.27E-13	0.00E+00	1.60E-12	6.17E-15	1.43E-14	3.13E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	5.01E-14	8.65E-18	3.14E-18	1.30E-14	4.99E-15	8.81E-14	0.00E+00	6.52E-14	2.53E-16	5.84E-16	2.22E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.80E-13	5.70E-16	2.03E-20	1.26E-15	1.38E-15	2.89E-14	0.00E+00	1.16E-13	4.54E-16	1.26E-14	7.42E-13
	C-14	mSv/a	8.10E-12	9.31E-15	2.44E-07	5.19E-12	2.93E-14	1.47E-12	5.79E-12	3.08E-12	0.00E+00	7.55E-06	3.11E-06	3.94E-05	5.03E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.40E-10	0.00E+00	6.21E-15	0.00E+00	1.26E-14	0.00E+00	0.00E+00	1.52E-12	2.03E-10	8.78E-11	4.32E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.38E-13	1.23E-16	1.40E-18	3.87E-14	1.30E-18	7.64E-17	0.00E+00	3.51E-14	3.46E-12	1.53E-11	1.90E-11
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	5.54E-12	1.79E-12	7.07E-17	1.97E-10	1.13E-13	1.60E-09	0.00E+00	1.62E-12	3.09E-13	1.83E-12	1.80E-09
	Cs-137	mSv/a	0.00E+00	0.00E+00	3.59E-08	6.56E-10	1.42E-12	2.50E-07	7.55E-07	3.19E-03	0.00E+00	6.82E-07	1.63E-08	8.81E-08	3.19E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	8.38E-27	2.92E-27	2.27E-31	7.22E-25	1.99E-30	3.07E-26	0.00E+00	5.91E-27	4.44E-28	4.18E-28	7.71E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	1.88E-28	5.02E-29	3.63E-33	8.76E-27	4.45E-32	5.24E-28	0.00E+00	1.32E-28	9.20E-30	9.11E-30	9.67E-27
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	5.57E-20	0.00E+00	3.79E-25	0.00E+00	1.32E-22	0.00E+00	0.00E+00	7.25E-20	2.23E-21	4.31E-20	1.74E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.01E-19	0.00E+00	6.09E-24	0.00E+00	4.76E-23	0.00E+00	0.00E+00	1.65E-20	8.69E-21	1.17E-20	1.38E-19
	HTO	mSv/a	2.61E-05	0.00E+00	5.15E-04	1.74E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-06	1.25E-04	2.34E-04	9.20E-04
	I-129	mSv/a	2.50E-13	2.33E-18	1.08E-09	2.76E-14	1.38E-14	1.01E-11	2.26E-12	1.18E-12	0.00E+00	3.52E-11	6.59E-11	1.70E-09	2.90E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.48E-07	5.80E-08	9.24E-12	3.34E-05	1.19E-10	2.14E-06	0.00E+00	2.41E-07	1.32E-08	1.04E-10	3.60E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	6.12E-08	0.00E+00	3.76E-12	0.00E+00	4.06E-11	0.00E+00	0.00E+00	6.97E-09	7.26E-08	4.63E-08	1.87E-07
	Ni-63	mSv/a	0.00E+00	0.00E+00	1.45E-09	0.00E+00	7.86E-14	0.00E+00	9.65E-13	0.00E+00	0.00E+00	1.66E-10	1.59E-09	1.03E-09	4.24E-09
	Np-237	mSv/a	0.00E+00	0.00E+00	1.97E-09	1.88E-13	8.05E-14	6.39E-10	9.33E-15	3.39E-13	0.00E+00	3.20E-10	9.66E-11	2.06E-11	3.04E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	7.34E-13	6.01E-14	1.21E-20	9.58E-15	3.48E-18	1.26E-14	0.00E+00	1.19E-13	2.94E-15	1.61E-15	9.41E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-07	2.07E-05	2.82E-05	4.97E-05
	Pa-231	mSv/a	0.00E+00	0.00E+00	3.58E-13	8.14E-18	2.24E-17	4.13E-14	9.16E-16	7.24E-15	0.00E+00	1.94E-14	3.74E-14	8.04E-16	4.65E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.86E-14	2.63E-15	5.38E-21	4.79E-15	7.34E-17	3.11E-13	0.00E+00	1.55E-15	6.93E-16	3.98E-17	3.50E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	7.70E-12	6.78E-18	2.75E-16	6.14E-14	4.74E-15	2.70E-16	0.00E+00	1.25E-10	6.13E-12	9.20E-12	1.48E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.40E-07	4.49E-16	1.34E-13	3.82E-15	8.61E-14	1.24E-17	0.00E+00	1.14E-07	4.99E-08	1.15E-07	4.18E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	3.40E-08	5.17E-15	1.81E-12	2.04E-11	3.87E-09	1.10E-11	0.00E+00	3.87E-06	1.42E-10	7.69E-11	3.91E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.71E-06	2.29E-13	1.05E-10	4.93E-10	1.95E-07	8.82E-10	0.00E+00	1.95E-04	7.20E-09	3.95E-09	1.97E-04
	Pu-240	mSv/a	0.00E+00	0.00E+00	2.29E-06	3.13E-13	1.41E-10	1.40E-09	2.61E-07	6.62E-10	0.00E+00	2.61E-04	9.64E-09	5.28E-09	2.63E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	2.47E-10	3.87E-17	7.00E-15	2.59E-11	2.81E-11	2.25E-10	0.00E+00	2.81E-08	1.00E-12	5.22E-13	2.86E-08
	Ra-223	mSv/a	0.00E+00	0.00E+00	8.51E-13	1.09E-15	6.78E-20	7.92E-16	2.99E-15	1.70E-13	0.00E+00	1.85E-14	1.26E-13	6.40E-14	1.23E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.09E-18	8.17E-21	2.78E-26	2.55E-21	3.83E-21	1.70E-18	0.00E+00	2.37E-20	6.50E-20	4.52E-20	2.94E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	1.33E-13	1.14E-17	1.38E-20	1.52E-16	4.67E-16	2.00E-14	0.00E+00	2.89E-15	2.35E-14	1.12E-14	1.91E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.16E-13	3.20E-16	4.48E-17	1.11E-12	2.51E-15	3.01E-13	0.00E+00	1.55E-14	4.19E-13	1.33E-13	2.70E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.16E-17	6.52E-21	1.61E-22	2.29E-18	4.07E-20	2.81E-18	0.00E+00	2.52E-19	5.07E-18	1.68E-18	2.38E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	8.46E-07	1.41E-11	2.60E-11	3.50E-09	7.62E-11	4.14E-11	0.00E+00	9.17E-09	9.54E-07	4.38E-07	2.25E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	6.38E-10	1.34E-13	2.52E-16	5.83E-14	1.51E-15	6.54E-15	0.00E+00	6.92E-11	2.79E-10	2.85E-10	1.27E-09
	Th-227	mSv/a	0.00E+00	0.00E+00	8.19E-15	4.96E-17	1.07E-21	1.93E-16	7.38E-16	6.48E-13	0.00E+00	2.66E-16	1.65E-17	1.08E-16	6.58E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.63E-19	2.07E-22	1.26E-24	1.04E-19	2.37E-20	9.57E-18	0.00E+00	8.54E-21	1.13E-21	5.14E-21	9.97E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	1.45E-13	9.46E-18	9.07E-18	2.64E-14	1.31E-14	1.50E-13	0.00E+00	4.71E-15	1.39E-15	3.17E-15	3.44E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	1.18E-13	7.98E-20	7.39E-18	4.36E-15	1.06E-14	2.95E-14	0.00E+00	3.83E-15	1.13E-15	2.58E-15	1.70E-13

Table A-1: Estimated Radiation Dose for New On-site Farm during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-231	mSv/a	0.00E+00	0.00E+00	1.66E-14	1.33E-16	1.23E-22	5.01E-16	1.49E-15	2.83E-11	0.00E+00	5.39E-16	3.13E-18	5.56E-17	2.83E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	8.36E-19	5.87E-25	5.25E-23	2.24E-18	7.54E-20	1.56E-17	0.00E+00	2.72E-20	8.05E-21	1.83E-20	1.88E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	6.25E-13	2.07E-15	1.05E-19	1.47E-14	5.63E-14	7.95E-12	0.00E+00	2.03E-14	1.44E-15	8.95E-15	8.68E-12
	U-233	mSv/a	0.00E+00	0.00E+00	7.05E-12	1.86E-17	4.06E-16	6.28E-14	1.67E-16	8.81E-17	0.00E+00	3.67E-14	3.91E-13	5.34E-12	1.29E-11
	U-234	mSv/a	0.00E+00	0.00E+00	1.81E-10	2.20E-16	1.04E-14	5.15E-13	4.29E-15	1.52E-16	0.00E+00	9.43E-13	1.00E-11	1.37E-10	3.30E-10
	U-235	mSv/a	0.00E+00	0.00E+00	2.56E-10	3.32E-13	1.47E-14	2.01E-10	6.06E-15	3.75E-13	0.00E+00	1.33E-12	1.42E-11	1.94E-10	6.66E-10
	U-236	mSv/a	0.00E+00	0.00E+00	5.22E-11	4.23E-17	3.01E-15	1.33E-13	1.24E-15	2.47E-17	0.00E+00	2.72E-13	2.90E-12	3.96E-11	9.51E-11
	U-237	mSv/a	0.00E+00	0.00E+00	1.45E-12	9.54E-17	6.80E-20	7.79E-14	3.43E-17	1.80E-13	0.00E+00	7.53E-15	1.44E-14	4.10E-13	2.14E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.89E-09	1.44E-14	1.09E-13	1.16E-09	4.48E-14	4.78E-13	0.00E+00	9.84E-12	1.05E-10	1.43E-09	4.60E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	1.26E-09	1.97E-12	2.33E-17	2.18E-12	1.02E-12	3.67E-10	0.00E+00	1.37E-10	5.63E-12	9.59E-12	1.78E-09
	Total	**mSv/a**	**2.61E-05**	**9.32E-15**	**5.21E-04**	**1.74E-05**	**2.89E-10**	**3.36E-05**	**1.21E-06**	**3.19E-03**	**0.00E+00**	**4.71E-04**	**1.49E-04**	**3.02E-04**	**4.71E-03**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	3.37E-15	1.49E-17	8.11E-21	1.14E-17	9.39E-17	5.31E-16	0.00E+00	4.84E-16	7.45E-17	1.08E-16	4.69E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.01E-13	9.72E-19	3.71E-16	2.86E-14	8.37E-15	3.13E-15	0.00E+00	4.32E-14	2.43E-14	2.01E-14	4.29E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	9.54E-11	4.07E-11	1.75E-13	1.98E-08	1.48E-10	8.40E-08	0.00E+00	1.00E-10	6.24E-11	2.85E-10	1.05E-07
	Am-241	mSv/a	0.00E+00	0.00E+00	5.38E-13	4.04E-17	1.13E-15	3.59E-14	1.85E-12	1.27E-13	0.00E+00	1.23E-12	4.42E-15	4.87E-15	3.79E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	2.19E-14	8.65E-18	4.74E-17	1.30E-14	7.54E-14	8.81E-14	0.00E+00	5.03E-14	1.81E-16	2.00E-16	2.49E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.15E-13	5.70E-16	6.21E-19	1.26E-15	4.22E-14	2.89E-14	0.00E+00	1.82E-13	6.59E-16	1.62E-14	7.87E-13
	C-14	mSv/a	1.16E-11	9.31E-15	1.34E-07	5.19E-12	5.56E-13	1.47E-12	1.10E-10	3.08E-12	0.00E+00	7.31E-06	2.79E-06	4.67E-05	5.70E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.41E-10	0.00E+00	2.16E-13	0.00E+00	4.38E-13	0.00E+00	0.00E+00	2.69E-12	3.33E-10	3.19E-10	7.96E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.12E-13	1.23E-16	3.94E-17	3.87E-14	3.66E-17	7.64E-17	0.00E+00	5.03E-14	4.59E-12	4.47E-11	4.95E-11
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	7.14E-12	1.79E-12	3.14E-15	1.97E-10	5.03E-12	1.60E-09	0.00E+00	3.69E-12	6.51E-13	3.64E-12	1.81E-09
	Cs-137	mSv/a	0.00E+00	0.00E+00	1.10E-08	6.56E-10	1.50E-11	2.50E-07	7.98E-06	3.19E-03	0.00E+00	3.69E-07	8.18E-09	6.33E-08	3.20E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	6.19E-27	2.92E-27	5.80E-30	7.22E-25	5.07E-29	3.07E-26	0.00E+00	7.71E-27	5.36E-28	3.46E-28	7.71E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	1.53E-28	5.02E-29	1.02E-31	8.76E-27	1.25E-30	5.24E-28	0.00E+00	1.90E-28	1.23E-29	8.30E-30	9.70E-27
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	7.40E-20	0.00E+00	1.74E-23	0.00E+00	6.06E-21	0.00E+00	0.00E+00	1.70E-19	4.85E-21	6.38E-20	3.19E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	5.22E-20	0.00E+00	1.08E-22	0.00E+00	8.46E-22	0.00E+00	0.00E+00	1.50E-20	7.30E-21	8.38E-21	8.38E-20
	HTO	mSv/a	3.10E-05	0.00E+00	2.56E-04	1.45E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-06	1.01E-04	3.98E-04	8.03E-04
	I-129	mSv/a	4.22E-13	2.33E-18	7.44E-10	2.76E-14	3.27E-13	1.01E-11	5.36E-11	1.18E-12	0.00E+00	4.27E-11	7.41E-11	3.86E-09	4.78E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.18E-07	5.80E-08	2.54E-10	3.34E-05	3.28E-09	2.14E-06	0.00E+00	3.38E-07	1.71E-08	1.35E-10	3.60E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.25E-08	0.00E+00	9.03E-11	0.00E+00	9.75E-10	0.00E+00	0.00E+00	8.55E-09	8.23E-08	7.91E-08	2.13E-07
	Ni-63	mSv/a	0.00E+00	0.00E+00	1.08E-09	0.00E+00	2.02E-12	0.00E+00	2.48E-11	0.00E+00	0.00E+00	2.17E-10	1.92E-09	1.88E-09	5.13E-09
	Np-237	mSv/a	0.00E+00	0.00E+00	7.83E-10	1.88E-13	1.11E-12	6.39E-10	1.28E-13	3.39E-13	0.00E+00	2.25E-10	6.29E-11	8.76E-12	1.72E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	6.21E-13	6.01E-14	3.53E-19	9.58E-15	1.02E-16	1.26E-14	0.00E+00	1.78E-13	4.07E-15	1.51E-15	8.87E-13
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.66E-07	1.84E-05	3.38E-05	5.30E-05
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.84E-13	8.14E-18	3.98E-16	4.13E-14	1.63E-14	7.24E-15	0.00E+00	1.77E-14	3.15E-14	1.11E-15	3.00E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.49E-14	2.63E-15	1.61E-19	4.79E-15	2.20E-15	3.11E-13	0.00E+00	2.38E-15	9.86E-16	9.10E-17	3.49E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	8.44E-12	6.78E-18	1.04E-14	6.14E-14	1.80E-13	2.70E-16	0.00E+00	2.42E-10	1.10E-11	1.88E-11	2.81E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	1.20E-07	4.49E-16	3.99E-12	3.82E-15	2.57E-12	1.24E-17	0.00E+00	1.73E-07	7.05E-08	1.26E-07	4.90E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	1.41E-08	5.17E-15	2.60E-11	2.04E-11	5.55E-08	1.10E-11	0.00E+00	2.84E-06	9.66E-11	1.25E-10	2.91E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	7.35E-07	2.29E-13	1.56E-09	4.93E-10	2.89E-06	8.82E-10	0.00E+00	1.48E-04	5.07E-09	6.64E-09	1.51E-04
	Pu-240	mSv/a	0.00E+00	0.00E+00	9.84E-07	3.13E-13	2.09E-09	1.40E-09	3.87E-06	6.62E-10	0.00E+00	1.98E-04	6.78E-09	8.89E-09	2.03E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	1.04E-10	3.87E-17	1.02E-13	2.59E-11	4.10E-10	2.25E-10	0.00E+00	2.10E-08	6.96E-13	8.59E-13	2.17E-08
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.53E-12	1.09E-15	4.19E-18	7.92E-16	1.85E-13	1.70E-13	0.00E+00	5.84E-14	3.70E-13	2.97E-13	2.61E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.74E-18	8.17E-21	1.53E-24	2.55E-21	2.11E-19	1.70E-18	0.00E+00	6.66E-20	1.69E-19	1.93E-19	4.09E-18

Table A-1: Estimated Radiation Dose for New On-site Farm during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.67E-13	1.14E-17	9.58E-19	1.52E-16	3.24E-14	2.00E-14	0.00E+00	1.02E-14	7.72E-14	5.80E-14	4.65E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	8.15E-13	3.20E-16	1.76E-15	1.11E-12	9.87E-14	3.01E-13	0.00E+00	3.12E-14	7.79E-13	3.88E-13	3.53E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.61E-17	6.52E-21	1.25E-20	2.29E-18	3.17E-18	2.81E-18	0.00E+00	1.00E-18	1.86E-17	9.64E-18	6.37E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	7.21E-07	1.41E-11	7.67E-10	3.50E-09	2.24E-09	4.14E-11	0.00E+00	1.38E-08	1.33E-06	1.35E-06	3.42E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.16E-10	1.34E-13	7.04E-15	5.83E-14	4.23E-14	6.54E-15	0.00E+00	9.87E-11	3.69E-10	4.60E-10	1.44E-09
	Th-227	mSv/a	0.00E+00	0.00E+00	8.52E-15	4.96E-17	3.83E-20	1.93E-16	2.65E-14	6.48E-13	0.00E+00	4.89E-16	2.81E-17	2.02E-16	6.84E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	2.18E-19	2.07E-22	3.60E-23	1.04E-19	6.78E-19	9.57E-18	0.00E+00	1.25E-20	1.54E-21	7.59E-21	1.06E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.30E-14	9.46E-18	1.58E-16	2.64E-14	2.27E-13	1.50E-13	0.00E+00	4.19E-15	1.15E-15	2.90E-15	4.85E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.36E-14	7.98E-20	1.16E-16	4.36E-15	1.67E-13	2.95E-14	0.00E+00	3.08E-15	8.42E-16	2.13E-15	2.60E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	1.44E-14	1.33E-16	3.67E-21	5.01E-16	4.47E-14	2.83E-11	0.00E+00	8.24E-16	4.43E-18	9.36E-17	2.83E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	4.20E-19	5.87E-25	9.10E-22	2.24E-18	1.31E-18	1.56E-17	0.00E+00	2.41E-20	6.60E-21	1.67E-20	1.96E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	5.42E-13	2.07E-15	3.14E-18	1.47E-14	1.69E-12	7.95E-12	0.00E+00	3.11E-14	2.04E-15	1.39E-14	1.02E-11
	U-233	mSv/a	0.00E+00	0.00E+00	4.29E-12	1.86E-17	8.54E-15	6.28E-14	3.52E-15	8.81E-17	0.00E+00	3.94E-14	3.89E-13	8.84E-12	1.36E-11
	U-234	mSv/a	0.00E+00	0.00E+00	1.09E-10	2.20E-16	2.17E-13	5.15E-13	8.92E-14	1.52E-16	0.00E+00	1.00E-12	9.88E-12	2.24E-10	3.45E-10
	U-235	mSv/a	0.00E+00	0.00E+00	1.54E-10	3.32E-13	3.06E-13	2.01E-10	1.26E-13	3.75E-13	0.00E+00	1.41E-12	1.39E-11	3.17E-10	6.88E-10
	U-236	mSv/a	0.00E+00	0.00E+00	3.10E-11	4.23E-17	6.16E-14	1.33E-13	2.54E-14	2.47E-17	0.00E+00	2.85E-13	2.81E-12	6.38E-11	9.81E-11
	U-237	mSv/a	0.00E+00	0.00E+00	1.21E-12	9.54E-17	1.97E-18	7.79E-14	9.92E-16	1.80E-13	0.00E+00	1.11E-14	1.98E-14	9.38E-13	2.44E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.14E-09	1.44E-14	2.26E-12	1.16E-09	9.32E-13	4.78E-13	0.00E+00	1.04E-11	1.03E-10	2.34E-09	4.76E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	1.10E-09	1.97E-12	7.02E-16	2.18E-12	3.05E-11	3.67E-10	0.00E+00	2.10E-10	8.02E-12	1.21E-11	1.73E-09
	Total	**mSv/a**	**3.10E-05**	**9.32E-15**	**2.59E-04**	**1.45E-05**	**4.82E-09**	**3.36E-05**	**1.48E-05**	**3.19E-03**	**0.00E+00**	**3.59E-04**	**1.24E-04**	**4.81E-04**	**4.51E-03**
	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.68E-18	3.00E-20	1.48E-17	3.47E-16	6.90E-16	0.00E+00	5.62E-16	1.02E-16	2.38E-16	1.96E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.41E-19	8.50E-16	3.72E-14	1.92E-14	4.07E-15	0.00E+00	3.11E-14	2.00E-14	2.73E-14	1.40E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.01E-11	4.98E-13	2.58E-08	4.21E-10	1.09E-07	0.00E+00	8.95E-11	6.59E-11	7.33E-10	1.36E-07
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.00E-17	2.11E-15	4.67E-14	3.45E-12	1.65E-13	0.00E+00	7.23E-13	2.96E-15	2.98E-15	4.39E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.14E-18	8.85E-17	1.69E-14	1.41E-13	1.15E-13	0.00E+00	2.95E-14	1.21E-16	1.22E-16	3.02E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	3.17E-14	4.41E-13
	C-14	mSv/a	7.89E-12	9.31E-15	0.00E+00	9.88E-13	1.23E-12	1.47E-12	2.43E-10	3.08E-12	0.00E+00	5.09E-06	2.31E-06	7.34E-05	8.08E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-13	0.00E+00	5.26E-13	0.00E+00	0.00E+00	1.02E-12	1.31E-10	3.49E-10	4.81E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.35E-17	1.45E-16	3.86E-14	1.35E-16	7.64E-17	0.00E+00	5.81E-14	5.23E-12	1.48E-10	1.54E-10
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.44E-13	8.56E-15	2.56E-10	1.37E-11	2.07E-09	0.00E+00	3.15E-12	6.27E-13	4.27E-12	2.35E-09
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-10	2.00E-11	3.26E-07	1.06E-05	4.14E-03	0.00E+00	1.54E-07	3.96E-09	6.31E-08	4.15E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.23E-28	1.83E-29	9.39E-25	1.60E-28	4.00E-26	0.00E+00	7.64E-27	6.03E-28	6.19E-28	9.89E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.24E-29	3.32E-31	1.14E-26	4.07E-30	6.81E-28	0.00E+00	1.94E-28	1.44E-29	1.53E-29	1.23E-26
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-23	0.00E+00	1.47E-20	0.00E+00	0.00E+00	1.29E-19	4.35E-21	5.02E-20	1.98E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-22	0.00E+00	2.12E-21	0.00E+00	0.00E+00	1.18E-20	6.20E-21	1.10E-20	3.14E-20
	HTO	mSv/a	2.14E-05	0.00E+00	0.00E+00	3.81E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-06	8.25E-05	8.31E-04	9.40E-04
	I-129	mSv/a	1.60E-13	3.03E-18	0.00E+00	6.83E-15	4.20E-13	1.31E-11	6.89E-11	1.53E-12	0.00E+00	1.72E-11	3.37E-11	4.38E-09	4.51E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-08	8.04E-10	4.34E-05	1.04E-08	2.78E-06	0.00E+00	3.36E-07	1.83E-08	2.17E-10	4.65E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-10	0.00E+00	3.34E-09	0.00E+00	0.00E+00	9.20E-09	9.32E-08	2.15E-07	3.21E-07
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-12	0.00E+00	8.24E-11	0.00E+00	0.00E+00	2.27E-10	2.13E-09	4.96E-09	7.40E-09
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.66E-14	2.34E-12	8.30E-10	2.72E-13	4.41E-13	0.00E+00	1.49E-10	4.80E-11	9.07E-12	1.04E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-14	1.31E-18	1.25E-14	3.78E-16	1.63E-14	0.00E+00	2.08E-13	5.63E-15	2.88E-15	2.61E-13

Table A-1: Estimated Radiation Dose for New On-site Farm during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Infant_1y	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-07	1.30E-05	5.50E-05	6.86E-05
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.02E-18	6.24E-16	5.37E-14	2.56E-14	9.41E-15	0.00E+00	8.69E-15	1.64E-14	1.38E-15	1.16E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.52E-16	5.84E-19	6.23E-15	7.97E-15	4.05E-13	0.00E+00	2.71E-15	1.33E-15	2.60E-16	4.24E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	2.19E-14	7.98E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	2.61E-11	1.94E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	1.50E-11	4.96E-15	9.63E-12	1.61E-17	0.00E+00	2.04E-07	9.84E-08	1.98E-07	5.00E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.28E-15	4.80E-11	2.65E-11	1.03E-07	1.42E-11	0.00E+00	1.65E-06	6.59E-11	2.12E-10	1.75E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.67E-14	2.70E-09	6.41E-10	4.98E-06	1.15E-09	0.00E+00	8.00E-05	3.22E-09	1.05E-08	8.50E-05
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.74E-14	3.61E-09	1.82E-09	6.67E-06	8.61E-10	0.00E+00	1.07E-04	4.31E-09	1.41E-08	1.14E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.58E-18	1.27E-13	3.37E-11	5.09E-10	2.93E-10	0.00E+00	8.17E-09	3.19E-13	9.76E-13	9.00E-09
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.70E-16	1.14E-17	1.03E-15	5.01E-13	2.21E-13	0.00E+00	4.97E-14	3.74E-13	6.61E-13	1.81E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	4.31E-24	3.31E-21	5.93E-19	2.21E-18	0.00E+00	5.89E-20	1.77E-19	4.53E-19	3.50E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-18	2.55E-18	1.97E-16	8.63E-14	2.61E-14	0.00E+00	8.56E-15	7.64E-14	1.26E-13	3.24E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	2.34E-15	1.45E-12	1.31E-13	3.93E-13	0.00E+00	1.30E-14	3.65E-13	4.22E-13	2.78E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.61E-21	2.03E-20	2.98E-18	5.13E-18	3.65E-18	0.00E+00	5.09E-19	1.11E-17	1.27E-17	3.61E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.68E-12	1.03E-09	3.50E-09	3.03E-09	4.14E-11	0.00E+00	5.85E-09	5.94E-07	1.66E-06	2.27E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.54E-14	2.88E-14	5.83E-14	1.73E-13	6.54E-15	0.00E+00	1.27E-10	5.54E-10	1.25E-09	1.94E-09
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.23E-17	1.29E-19	2.52E-16	8.95E-14	8.42E-13	0.00E+00	5.19E-16	3.53E-17	4.20E-16	9.33E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.12E-23	9.84E-23	1.35E-19	1.85E-18	1.24E-17	0.00E+00	1.07E-20	1.54E-21	1.27E-20	1.44E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.34E-18	2.82E-16	3.44E-14	4.06E-13	1.95E-13	0.00E+00	2.35E-15	6.87E-16	3.26E-15	6.42E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	2.54E-15	3.65E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.29E-17	1.38E-20	6.52E-16	1.67E-13	3.68E-11	0.00E+00	9.70E-16	6.18E-18	2.33E-16	3.69E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	1.81E-20	2.55E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.13E-16	1.18E-17	1.92E-14	6.32E-12	1.03E-11	0.00E+00	3.66E-14	2.83E-15	3.19E-14	1.67E-11
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.61E-18	1.70E-14	8.17E-14	7.00E-15	1.15E-16	0.00E+00	2.47E-14	2.75E-13	1.39E-11	1.43E-11
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.45E-17	4.22E-13	6.69E-13	1.74E-13	1.98E-16	0.00E+00	6.12E-13	6.82E-12	3.45E-10	3.54E-10
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.23E-14	6.21E-13	2.61E-10	2.56E-13	4.88E-13	0.00E+00	9.01E-13	1.00E-11	5.08E-10	7.81E-10
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.05E-17	1.27E-13	1.73E-13	5.22E-14	3.21E-17	0.00E+00	1.84E-13	2.05E-12	1.04E-10	1.06E-10
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.36E-17	7.37E-18	1.01E-13	3.71E-15	2.35E-13	0.00E+00	1.31E-14	2.76E-14	2.78E-12	3.16E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.55E-15	4.43E-12	1.51E-09	1.82E-12	6.22E-13	0.00E+00	6.42E-12	7.15E-11	3.62E-09	5.22E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.74E-13	2.64E-15	2.18E-12	1.15E-10	3.67E-10	0.00E+00	2.48E-10	1.12E-11	3.02E-11	7.73E-10
	Total	**mSv/a**	**2.14E-05**	**9.32E-15**	**0.00E+00**	**3.82E-06**	**8.56E-09**	**4.37E-05**	**2.24E-05**	**4.15E-03**	**0.00E+00**	**1.97E-04**	**9.86E-05**	**9.61E-04**	**5.49E-03**
	Ac-225	mSv/a	0.00E+00	0.00E+00	7.36E-15	3.68E-18	3.00E-20	1.48E-17	3.47E-16	6.90E-16	0.00E+00	5.62E-16	1.02E-16	7.66E-17	9.15E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	4.07E-13	2.41E-19	8.50E-16	3.72E-14	1.92E-14	4.07E-15	0.00E+00	3.11E-14	2.00E-14	8.95E-15	5.28E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.60E-10	1.01E-11	4.98E-13	2.58E-08	4.21E-10	1.09E-07	0.00E+00	8.95E-11	6.59E-11	2.14E-11	1.36E-07
	Am-241	mSv/a	0.00E+00	0.00E+00	5.92E-13	1.00E-17	2.11E-15	4.67E-14	3.45E-12	1.65E-13	0.00E+00	7.23E-13	2.96E-15	2.64E-15	4.98E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	2.41E-14	2.14E-18	8.85E-17	1.69E-14	1.41E-13	1.15E-13	0.00E+00	2.95E-14	1.21E-16	1.08E-16	3.26E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.13E-12	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	1.23E-14	1.55E-12
	C-14	mSv/a	7.89E-12	9.31E-15	1.75E-07	9.88E-13	1.23E-12	1.47E-12	2.43E-10	3.08E-12	0.00E+00	5.09E-06	2.31E-06	1.28E-05	2.03E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	9.97E-11	0.00E+00	2.59E-13	0.00E+00	5.26E-13	0.00E+00	0.00E+00	1.02E-12	1.31E-10	7.37E-12	2.40E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	2.43E-13	2.35E-17	1.45E-16	3.86E-14	1.35E-16	7.64E-17	0.00E+00	5.81E-14	5.23E-12	4.48E-12	1.01E-11
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	1.15E-11	4.44E-13	8.56E-15	2.56E-10	1.37E-11	2.07E-09	0.00E+00	3.15E-12	6.27E-13	2.74E-12	2.36E-09
	Cs-137	mSv/a	0.00E+00	0.00E+00	8.65E-09	1.62E-10	2.00E-11	3.26E-07	1.06E-05	4.14E-03	0.00E+00	1.54E-07	3.96E-09	8.84E-09	4.15E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	1.15E-26	7.23E-28	1.83E-29	9.39E-25	1.60E-28	4.00E-26	0.00E+00	7.64E-27	6.03E-28	1.98E-28	1.00E-24
	Eu-154	mSv/a	0.00E+00	0.00E+00	2.93E-28	1.24E-29	3.32E-31	1.14E-26	4.07E-30	6.81E-28	0.00E+00	1.94E-28	1.44E-29	4.88E-30	1.26E-26

Table A-1: Estimated Radiation Dose for New On-site Farm during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Infant_1y-Formula	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	1.06E-19	0.00E+00	4.21E-23	0.00E+00	1.47E-20	0.00E+00	0.00E+00	1.29E-19	4.35E-21	4.59E-20	3.00E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	7.73E-20	0.00E+00	2.72E-22	0.00E+00	2.12E-21	0.00E+00	0.00E+00	1.18E-20	6.20E-21	4.32E-21	1.02E-19
	HTO	mSv/a	2.14E-05	0.00E+00	3.56E-04	3.81E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-06	8.25E-05	3.23E-05	4.97E-04
	I-129	mSv/a	1.60E-13	3.03E-18	5.64E-10	6.83E-15	4.20E-13	1.31E-11	6.89E-11	1.53E-12	0.00E+00	1.72E-11	3.37E-11	1.42E-10	8.41E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.20E-07	1.44E-08	8.04E-10	4.34E-05	1.04E-08	2.78E-06	0.00E+00	3.36E-07	1.83E-08	8.69E-11	4.68E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	8.61E-08	0.00E+00	3.09E-10	0.00E+00	3.34E-09	0.00E+00	0.00E+00	9.20E-09	9.32E-08	2.13E-08	2.13E-07
	Ni-63	mSv/a	0.00E+00	0.00E+00	2.12E-09	0.00E+00	6.72E-12	0.00E+00	8.24E-11	0.00E+00	0.00E+00	2.27E-10	2.13E-09	4.93E-10	5.06E-09
	Np-237	mSv/a	0.00E+00	0.00E+00	9.79E-10	4.66E-14	2.34E-12	8.30E-10	2.72E-13	4.41E-13	0.00E+00	1.49E-10	4.80E-11	3.94E-12	2.01E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	1.36E-12	1.49E-14	1.31E-18	1.25E-14	3.78E-16	1.63E-14	0.00E+00	2.08E-13	5.63E-15	1.13E-15	1.62E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-07	1.30E-05	9.23E-06	2.28E-05
	Pa-231	mSv/a	0.00E+00	0.00E+00	1.71E-13	2.02E-18	6.24E-16	5.37E-14	2.56E-14	9.41E-15	0.00E+00	8.69E-15	1.64E-14	1.33E-16	2.85E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	5.32E-14	6.52E-16	5.84E-19	6.23E-15	7.97E-15	4.05E-13	0.00E+00	2.71E-15	1.33E-15	2.65E-17	4.77E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.05E-11	1.68E-18	2.19E-14	7.98E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	5.65E-12	1.84E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	2.67E-07	1.11E-16	1.50E-11	4.96E-15	9.63E-12	1.61E-17	0.00E+00	2.04E-07	9.84E-08	9.86E-08	6.68E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	1.54E-08	1.28E-15	4.80E-11	2.65E-11	1.03E-07	1.42E-11	0.00E+00	1.65E-06	6.59E-11	4.42E-12	1.77E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	7.48E-07	5.67E-14	2.70E-09	6.41E-10	4.98E-06	1.15E-09	0.00E+00	8.00E-05	3.22E-09	2.17E-10	8.58E-05
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.00E-06	7.74E-14	3.61E-09	1.82E-09	6.67E-06	8.61E-10	0.00E+00	1.07E-04	4.31E-09	2.91E-10	1.15E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	7.64E-11	9.58E-18	1.27E-13	3.37E-11	5.09E-10	2.93E-10	0.00E+00	8.17E-09	3.19E-13	2.11E-14	9.08E-09
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.44E-12	2.70E-16	1.14E-17	1.03E-15	5.01E-13	2.21E-13	0.00E+00	4.97E-14	3.74E-13	4.50E-14	3.63E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.89E-18	2.03E-21	4.31E-24	3.31E-21	5.93E-19	2.21E-18	0.00E+00	5.89E-20	1.77E-19	2.79E-20	5.97E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.20E-13	2.82E-18	2.55E-18	1.97E-16	8.63E-14	2.61E-14	0.00E+00	8.56E-15	7.64E-14	8.71E-15	6.26E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	6.40E-13	7.92E-17	2.34E-15	1.45E-12	1.31E-13	3.93E-13	0.00E+00	1.30E-14	3.65E-13	2.92E-14	3.02E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.50E-17	1.61E-21	2.03E-20	2.98E-18	5.13E-18	3.65E-18	0.00E+00	5.09E-19	1.11E-17	9.06E-19	4.93E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	5.75E-07	2.68E-12	1.03E-09	3.50E-09	3.03E-09	4.14E-11	0.00E+00	5.85E-09	5.94E-07	3.50E-08	1.22E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.25E-09	2.54E-14	2.88E-14	5.83E-14	1.73E-13	6.54E-15	0.00E+00	1.27E-10	5.54E-10	2.23E-10	2.15E-09
	Th-227	mSv/a	0.00E+00	0.00E+00	1.70E-14	1.23E-17	1.29E-19	2.52E-16	8.95E-14	8.42E-13	0.00E+00	5.19E-16	3.53E-17	1.10E-16	9.50E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	3.52E-19	5.12E-23	9.84E-23	1.35E-19	1.85E-18	1.24E-17	0.00E+00	1.07E-20	1.54E-21	3.37E-21	1.48E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	7.70E-14	2.34E-18	2.82E-16	3.44E-14	4.06E-13	1.95E-13	0.00E+00	2.35E-15	6.87E-16	8.01E-16	7.17E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	5.99E-14	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	6.23E-16	4.23E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	3.18E-14	3.29E-17	1.38E-20	6.52E-16	1.67E-13	3.68E-11	0.00E+00	9.70E-16	6.18E-18	4.84E-17	3.70E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	4.26E-19	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	4.43E-21	2.59E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	1.20E-12	5.13E-16	1.18E-17	1.92E-14	6.32E-12	1.03E-11	0.00E+00	3.66E-14	2.83E-15	8.38E-15	1.79E-11
	U-233	mSv/a	0.00E+00	0.00E+00	5.04E-12	4.61E-18	1.70E-14	8.17E-14	7.00E-15	1.15E-16	0.00E+00	2.47E-14	2.75E-13	1.37E-12	6.82E-12
	U-234	mSv/a	0.00E+00	0.00E+00	1.25E-10	5.45E-17	4.22E-13	6.69E-13	1.74E-13	1.98E-16	0.00E+00	6.12E-13	6.82E-12	3.40E-11	1.68E-10
	U-235	mSv/a	0.00E+00	0.00E+00	1.84E-10	8.23E-14	6.21E-13	2.61E-10	2.56E-13	4.88E-13	0.00E+00	9.01E-13	1.00E-11	5.00E-11	5.08E-10
	U-236	mSv/a	0.00E+00	0.00E+00	3.77E-11	1.05E-17	1.27E-13	1.73E-13	5.22E-14	3.21E-17	0.00E+00	1.84E-13	2.05E-12	1.02E-11	5.05E-11
	U-237	mSv/a	0.00E+00	0.00E+00	2.68E-12	2.36E-17	7.37E-18	1.01E-13	3.71E-15	2.35E-13	0.00E+00	1.31E-14	2.76E-14	2.69E-13	3.33E-12
	U-238	mSv/a	0.00E+00	0.00E+00	1.31E-09	3.55E-15	4.43E-12	1.51E-09	1.82E-12	6.22E-13	0.00E+00	6.42E-12	7.15E-11	3.56E-10	3.26E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	2.43E-09	3.74E-13	2.64E-15	2.18E-12	1.15E-10	3.67E-10	0.00E+00	2.48E-10	1.12E-11	6.46E-12	3.18E-09
	Total	**mSv/a**	**2.14E-05**	**9.32E-15**	**3.59E-04**	**3.82E-06**	**8.56E-09**	**4.37E-05**	**2.24E-05**	**4.15E-03**	**0.00E+00**	**1.97E-04**	**9.86E-05**	**5.45E-05**	**4.95E-03**

Table A-2: Estimated Radiation Dose for New On-site Farm 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.68E-18	4.77E-20	1.48E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-17	8.89E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.41E-19	5.64E-15	3.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-14	6.06E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.01E-11	3.10E-13	2.58E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.21E-11	2.58E-08
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.00E-17	1.31E-14	4.67E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-15	6.22E-14
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.14E-18	5.36E-16	1.69E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.46E-17	1.76E-14
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-14	1.60E-14
	C-14	mSv/a	3.32E-12	9.31E-15	0.00E+00	9.88E-13	6.72E-13	1.47E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-04	5.83E-04
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-10	3.54E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.35E-17	1.40E-16	3.86E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.08E-11	9.08E-11
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.44E-13	1.07E-14	2.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-12	2.65E-10
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-10	2.18E-11	3.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-06	2.03E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.23E-28	2.46E-29	9.39E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-28	9.40E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.24E-29	4.31E-31	1.14E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-30	1.14E-26
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-20	1.23E-20
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.36E-21	8.05E-21
	HTO	mSv/a	1.18E-05	0.00E+00	0.00E+00	3.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-03	1.74E-03
	I-129	mSv/a	5.74E-14	3.03E-18	0.00E+00	6.83E-15	2.14E-13	1.31E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-09	2.15E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.44E-08	7.74E-10	4.34E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-09	4.34E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-08	1.64E-08
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.97E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E-10	3.87E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.66E-14	1.39E-11	8.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-12	8.47E-10
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-14	1.28E-18	1.25E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.12E-16	2.80E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.65E-05	6.65E-05
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.02E-18	4.19E-15	5.37E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.52E-16	5.70E-19	6.23E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	3.18E-14	7.98E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-11	5.00E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	2.76E-11	4.96E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-08	9.76E-08
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.28E-15	2.99E-10	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-09	2.79E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.67E-14	1.68E-08	6.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	1.37E-07
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.74E-14	2.25E-08	1.82E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-07	1.85E-07
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.58E-18	7.76E-13	3.37E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-11	4.65E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.70E-16	3.41E-17	1.03E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13	1.08E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	1.10E-23	3.31E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-20	9.30E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.82E-18	9.40E-18	1.97E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-14	2.39E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	7.14E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-14	1.51E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.61E-21	6.72E-20	2.98E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.87E-18	4.91E-18
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.68E-12	2.03E-09	3.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-06	2.34E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.54E-14	3.74E-14	5.83E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.43E-10	4.44E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.23E-17	3.45E-19	2.52E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-16	4.27E-16
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.12E-23	6.13E-22	1.35E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.92E-21	1.44E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.34E-18	1.94E-15	3.44E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-15	3.82E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-15	8.39E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.29E-17	1.34E-20	6.52E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-16	7.95E-16
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	9.97E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.90E-21	2.94E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.13E-16	1.17E-17	1.92E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-15	2.40E-14
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.61E-18	2.87E-14	8.17E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-13	2.55E-13
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.45E-17	7.48E-13	6.69E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-12	5.18E-12

Table A-2: Estimated Radiation Dose for New On-site Farm 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.23E-14	1.04E-12	2.61E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.23E-12	2.67E-10
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.05E-17	2.13E-13	1.73E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-12	1.46E-12
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.36E-17	7.05E-18	1.01E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-14	1.30E-13
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.55E-15	7.82E-12	1.51E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-11	1.55E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.74E-13	2.55E-15	2.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-11	1.42E-11
	Total	**mSv/a**	**1.18E-05**	**9.32E-15**	**0.00E+00**	**3.09E-06**	**4.28E-08**	**4.37E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.38E-03**	**2.44E-03**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	2.51E-14	3.68E-18	4.77E-20	1.48E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	5.78E-12	2.41E-19	5.64E-15	3.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-12
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.13E-10	1.01E-11	3.10E-13	2.58E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-08
	Am-241	mSv/a	0.00E+00	0.00E+00	7.90E-12	1.00E-17	1.31E-14	4.67E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.96E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	3.14E-13	2.14E-18	5.36E-16	1.69E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.33E-12	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-12
	C-14	mSv/a	3.32E-12	9.31E-15	2.05E-07	9.88E-13	6.72E-13	1.47E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	3.07E-10	0.00E+00	3.72E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	5.04E-13	2.35E-17	1.40E-16	3.86E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.43E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	3.06E-11	4.44E-13	1.07E-14	2.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-10
	Cs-137	mSv/a	0.00E+00	0.00E+00	2.02E-08	1.62E-10	2.18E-11	3.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-07
	Eu-152	mSv/a	0.00E+00	0.00E+00	3.33E-26	7.23E-28	2.46E-29	9.39E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	8.16E-28	1.24E-29	4.31E-31	1.14E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-26
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	4.47E-19	0.00E+00	8.30E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.03E-18	0.00E+00	1.69E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-18
	HTO	mSv/a	1.18E-05	0.00E+00	6.28E-04	3.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-04
	I-129	mSv/a	5.74E-14	3.03E-18	6.16E-10	6.83E-15	2.14E-13	1.31E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.54E-07	1.44E-08	7.74E-10	4.34E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.16E-07	0.00E+00	3.63E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-07
	Ni-63	mSv/a	0.00E+00	0.00E+00	5.40E-09	0.00E+00	7.97E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E-09
	Np-237	mSv/a	0.00E+00	0.00E+00	1.24E-08	4.66E-14	1.39E-11	8.30E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-08
	Np-239	mSv/a	0.00E+00	0.00E+00	2.84E-12	1.49E-14	1.28E-18	1.25E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.45E-12	2.02E-18	4.19E-15	5.37E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-12
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.11E-13	6.52E-16	5.70E-19	6.23E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	3.26E-11	1.68E-18	3.18E-14	7.98E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-11
	Po-210	mSv/a	0.00E+00	0.00E+00	1.05E-06	1.11E-16	2.76E-11	4.96E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-06
	Pu-238	mSv/a	0.00E+00	0.00E+00	2.06E-07	1.28E-15	2.99E-10	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.00E-05	5.67E-14	1.68E-08	6.41E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-05
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.34E-05	7.74E-14	2.25E-08	1.82E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-05
	Pu-241	mSv/a	0.00E+00	0.00E+00	1.00E-09	9.58E-18	7.76E-13	3.37E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-09
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.57E-11	2.70E-16	3.41E-17	1.03E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-11
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.58E-17	2.03E-21	1.10E-23	3.31E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-17
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.32E-12	2.82E-18	9.40E-18	1.97E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	4.18E-12	7.92E-17	7.14E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.77E-16	1.61E-21	6.72E-20	2.98E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-16
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	2.42E-06	2.68E-12	2.03E-09	3.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-06
	Tc-99	mSv/a	0.00E+00	0.00E+00	3.47E-09	2.54E-14	3.74E-14	5.83E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-09
	Th-227	mSv/a	0.00E+00	0.00E+00	9.72E-14	1.23E-17	3.45E-19	2.52E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.74E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	4.70E-18	5.12E-23	6.13E-22	1.35E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	1.13E-12	2.34E-18	1.94E-15	3.44E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-12

Table A-2: Estimated Radiation Dose for New On-site Farm 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-230	mSv/a	0.00E+00	0.00E+00	8.00E-13	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	6.61E-14	3.29E-17	1.34E-20	6.52E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.68E-14
	Th-232	mSv/a	0.00E+00	0.00E+00	5.82E-18	1.46E-25	9.97E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-18
	Th-234	mSv/a	0.00E+00	0.00E+00	2.56E-12	5.13E-16	1.17E-17	1.92E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-12
	U-233	mSv/a	0.00E+00	0.00E+00	1.83E-11	4.61E-18	2.87E-14	8.17E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-11
	U-234	mSv/a	0.00E+00	0.00E+00	4.76E-10	5.45E-17	7.48E-13	6.69E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.77E-10
	U-235	mSv/a	0.00E+00	0.00E+00	6.62E-10	8.23E-14	1.04E-12	2.61E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.25E-10
	U-236	mSv/a	0.00E+00	0.00E+00	1.35E-10	1.05E-17	2.13E-13	1.73E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-10
	U-237	mSv/a	0.00E+00	0.00E+00	5.50E-12	2.36E-17	7.05E-18	1.01E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-12
	U-238	mSv/a	0.00E+00	0.00E+00	4.97E-09	3.55E-15	7.82E-12	1.51E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.49E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	5.03E-09	3.74E-13	2.55E-15	2.18E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-09
	Total	**mSv/a**	**1.18E-05**	**9.32E-15**	**6.56E-04**	**3.09E-06**	**4.28E-08**	**4.37E-05**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**7.15E-04**

Table A-3: Estimated Radiation Dose for Farm A during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	7.01E-17	2.77E-19	4.88E-24	2.13E-19	5.65E-20	9.90E-18	0.00E+00	5.71E-18	9.47E-19	1.18E-18	8.84E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.04E-14	1.83E-20	3.72E-19	5.38E-16	8.40E-18	5.88E-17	0.00E+00	8.48E-16	5.15E-16	3.68E-16	1.28E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.41E-12	7.66E-13	1.28E-16	3.73E-10	1.09E-13	1.58E-09	0.00E+00	1.44E-12	9.64E-13	1.93E-12	1.96E-09
	Am-241	mSv/a	0.00E+00	0.00E+00	2.31E-14	7.61E-19	1.41E-18	6.75E-16	2.30E-15	2.39E-15	0.00E+00	3.01E-14	1.16E-16	2.68E-16	5.89E-14
	Am-243	mSv/a	0.00E+00	0.00E+00	9.41E-16	1.63E-19	5.90E-20	2.45E-16	9.38E-17	1.66E-15	0.00E+00	1.23E-15	4.76E-18	1.10E-17	4.18E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.07E-14	1.05E-17	3.74E-22	2.32E-17	2.54E-17	5.34E-16	0.00E+00	2.15E-15	8.38E-18	2.34E-16	1.37E-14
	C-14	mSv/a	1.39E-13	1.59E-16	4.59E-09	9.75E-14	5.51E-16	2.77E-14	1.09E-13	5.80E-14	0.00E+00	1.42E-07	5.84E-08	7.41E-07	9.46E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.63E-12	0.00E+00	1.17E-16	0.00E+00	2.37E-16	0.00E+00	0.00E+00	2.85E-14	3.82E-12	1.65E-12	8.13E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	2.59E-15	2.32E-18	2.64E-20	7.27E-16	2.45E-20	1.44E-18	0.00E+00	6.59E-16	6.51E-14	2.88E-13	3.57E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	1.04E-13	3.37E-14	1.33E-18	3.71E-12	2.13E-15	3.00E-11	0.00E+00	3.05E-14	5.82E-15	3.45E-14	3.39E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	6.76E-10	1.23E-11	2.67E-14	4.70E-09	7.91E-08	3.34E-04	0.00E+00	1.28E-08	3.07E-10	1.66E-09	3.34E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	1.58E-28	5.49E-29	4.27E-33	1.36E-26	3.74E-32	5.78E-28	0.00E+00	1.11E-28	8.34E-30	7.87E-30	1.45E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	3.53E-30	9.44E-31	6.83E-35	1.65E-28	8.36E-34	9.85E-30	0.00E+00	2.49E-30	1.73E-31	1.71E-31	1.82E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	1.05E-21	0.00E+00	7.14E-27	0.00E+00	2.49E-24	0.00E+00	0.00E+00	1.36E-21	4.20E-23	8.10E-22	3.27E-21
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.91E-21	0.00E+00	1.15E-25	0.00E+00	8.95E-25	0.00E+00	0.00E+00	3.10E-22	1.63E-22	2.20E-22	2.60E-21
	HTO	mSv/a	4.65E-07	0.00E+00	9.69E-06	3.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E-08	2.33E-06	4.39E-06	1.72E-05
	I-129	mSv/a	4.28E-15	3.99E-20	2.03E-11	5.19E-16	2.59E-16	1.89E-13	4.25E-14	2.21E-14	0.00E+00	6.62E-13	1.23E-12	3.16E-11	5.41E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.78E-09	1.09E-09	1.74E-13	6.27E-07	2.24E-12	4.02E-08	0.00E+00	4.53E-09	2.48E-10	1.95E-12	6.76E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.15E-09	0.00E+00	7.07E-14	0.00E+00	7.64E-13	0.00E+00	0.00E+00	1.31E-10	1.36E-09	8.71E-10	3.52E-09
	Ni-63	mSv/a	0.00E+00	0.00E+00	2.73E-11	0.00E+00	1.48E-15	0.00E+00	1.81E-14	0.00E+00	0.00E+00	3.11E-12	2.98E-11	1.94E-11	7.97E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	3.70E-11	3.54E-15	1.51E-15	1.20E-11	1.75E-16	6.38E-15	0.00E+00	6.02E-12	1.82E-12	3.87E-13	5.72E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	1.33E-14	1.09E-15	2.19E-22	1.74E-16	6.31E-20	2.28E-16	0.00E+00	2.16E-15	5.32E-17	2.91E-17	1.70E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-08	3.86E-07	5.29E-07	9.32E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	6.73E-15	1.53E-19	4.20E-19	7.77E-16	1.72E-17	1.36E-16	0.00E+00	3.65E-16	7.03E-16	1.51E-17	8.74E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	5.37E-16	4.94E-17	1.01E-22	8.98E-17	1.37E-18	5.84E-15	0.00E+00	2.91E-17	1.30E-17	7.46E-19	6.56E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.45E-13	1.28E-19	5.18E-18	1.15E-15	8.92E-17	5.07E-18	0.00E+00	2.35E-12	1.15E-13	1.73E-13	2.79E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.63E-09	8.44E-18	2.52E-15	7.17E-17	1.62E-15	2.33E-19	0.00E+00	2.14E-09	9.38E-10	2.16E-09	7.86E-09
	Pu-238	mSv/a	0.00E+00	0.00E+00	6.40E-10	9.73E-17	3.41E-14	3.83E-13	7.28E-11	2.06E-13	0.00E+00	7.29E-08	2.67E-12	1.45E-12	7.36E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	3.22E-08	4.31E-15	1.98E-12	9.28E-12	3.66E-09	1.66E-11	0.00E+00	3.66E-06	1.35E-10	7.42E-11	3.70E-06
	Pu-240	mSv/a	0.00E+00	0.00E+00	4.31E-08	5.88E-15	2.65E-12	2.63E-11	4.90E-09	1.25E-11	0.00E+00	4.90E-06	1.81E-10	9.93E-11	4.95E-06
	Pu-241	mSv/a	0.00E+00	0.00E+00	4.64E-12	7.27E-19	1.32E-16	4.87E-13	5.28E-13	4.23E-12	0.00E+00	5.29E-10	1.89E-14	9.81E-15	5.38E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.59E-14	2.04E-17	1.26E-21	1.48E-17	5.57E-17	3.17E-15	0.00E+00	3.45E-16	2.36E-15	1.19E-15	2.30E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.00E-20	1.50E-22	5.11E-28	4.67E-23	7.03E-23	3.13E-20	0.00E+00	4.35E-22	1.19E-21	8.30E-22	5.40E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	2.49E-15	2.13E-19	2.58E-22	2.84E-18	8.73E-18	3.75E-16	0.00E+00	5.39E-17	4.38E-16	2.09E-16	3.57E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.35E-14	6.01E-18	8.43E-19	2.10E-14	4.73E-17	5.66E-15	0.00E+00	2.92E-16	7.88E-15	2.49E-15	5.08E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.18E-19	1.23E-22	3.03E-24	4.31E-20	7.66E-22	5.28E-20	0.00E+00	4.74E-21	9.53E-20	3.16E-20	4.47E-19
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	1.59E-08	2.65E-13	4.90E-13	6.57E-11	1.43E-12	7.79E-13	0.00E+00	1.73E-10	1.79E-08	8.24E-09	4.23E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.20E-11	2.51E-15	4.74E-18	1.10E-15	2.85E-17	1.23E-16	0.00E+00	1.30E-12	5.25E-12	5.36E-12	2.39E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	1.53E-16	9.28E-19	1.99E-23	3.61E-18	1.38E-17	1.21E-14	0.00E+00	4.99E-18	3.09E-19	2.03E-18	1.23E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	4.94E-21	3.89E-24	2.36E-26	1.95E-21	4.45E-22	1.80E-19	0.00E+00	1.61E-22	2.13E-23	9.66E-23	1.87E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	2.72E-15	1.78E-19	1.71E-19	4.96E-16	2.45E-16	2.83E-15	0.00E+00	8.86E-17	2.62E-17	5.96E-17	6.47E-15
	Th-230	mSv/a	0.00E+00	0.00E+00	2.21E-15	1.50E-21	1.39E-19	8.19E-17	2.00E-16	5.54E-16	0.00E+00	7.21E-17	2.13E-17	4.84E-17	3.19E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	2.87E-16	2.30E-18	2.12E-24	8.67E-18	2.58E-17	4.89E-13	0.00E+00	9.32E-18	5.41E-20	9.61E-19	4.89E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	1.57E-20	1.10E-26	9.87E-25	4.22E-20	1.42E-21	2.93E-19	0.00E+00	5.12E-22	1.51E-22	3.44E-22	3.53E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.17E-14	3.89E-17	1.96E-21	2.76E-16	1.06E-15	1.49E-13	0.00E+00	3.81E-16	2.69E-17	1.68E-16	1.63E-13
	U-233	mSv/a	0.00E+00	0.00E+00	1.33E-13	3.50E-19	7.64E-18	1.18E-15	3.14E-18	1.66E-18	0.00E+00	6.90E-16	7.36E-15	1.01E-13	2.42E-13
	U-234	mSv/a	0.00E+00	0.00E+00	3.41E-12	4.14E-18	1.96E-16	9.68E-15	8.08E-17	2.87E-18	0.00E+00	1.77E-14	1.89E-13	2.58E-12	6.21E-12

Table A-3: Estimated Radiation Dose for Farm A during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	4.81E-12	6.25E-15	2.77E-16	3.78E-12	1.14E-16	7.06E-15	0.00E+00	2.50E-14	2.67E-13	3.64E-12	1.25E-11
	U-236	mSv/a	0.00E+00	0.00E+00	9.82E-13	7.96E-19	5.66E-17	2.50E-15	2.33E-17	4.65E-19	0.00E+00	5.11E-15	5.45E-14	7.45E-13	1.79E-12
	U-237	mSv/a	0.00E+00	0.00E+00	2.68E-14	1.77E-18	1.26E-21	1.45E-15	6.36E-19	3.35E-15	0.00E+00	1.40E-16	2.68E-16	7.60E-15	3.96E-14
	U-238	mSv/a	0.00E+00	0.00E+00	3.56E-11	2.70E-16	2.05E-15	2.18E-11	8.43E-16	8.99E-15	0.00E+00	1.85E-13	1.97E-12	2.70E-11	8.65E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	2.29E-11	3.58E-14	4.25E-19	3.96E-14	1.85E-14	6.68E-12	0.00E+00	2.48E-12	1.02E-13	1.74E-13	3.24E-11
	Total	**mSv/a**	**4.65E-07**	**1.59E-16**	**9.80E-06**	**3.28E-07**	**5.43E-12**	**6.33E-07**	**8.77E-08**	**3.34E-04**	**0.00E+00**	**8.86E-06**	**2.79E-06**	**5.67E-06**	**3.63E-04**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	6.28E-17	2.77E-19	1.51E-22	2.13E-19	1.75E-18	9.90E-18	0.00E+00	9.02E-18	1.39E-18	2.01E-18	8.74E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	5.66E-15	1.83E-20	6.97E-18	5.38E-16	1.58E-16	5.88E-17	0.00E+00	8.12E-16	4.57E-16	3.78E-16	8.06E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.79E-12	7.66E-13	3.30E-15	3.73E-10	2.79E-12	1.58E-09	0.00E+00	1.89E-12	1.17E-12	5.36E-12	1.97E-09
	Am-241	mSv/a	0.00E+00	0.00E+00	1.01E-14	7.61E-19	2.13E-17	6.75E-16	3.48E-14	2.39E-15	0.00E+00	2.32E-14	8.30E-17	9.17E-17	7.14E-14
	Am-243	mSv/a	0.00E+00	0.00E+00	4.12E-16	1.63E-19	8.92E-19	2.45E-16	1.42E-15	1.66E-15	0.00E+00	9.47E-16	3.41E-18	3.76E-18	4.69E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	9.52E-15	1.05E-17	1.15E-20	2.32E-17	7.80E-16	5.34E-16	0.00E+00	3.37E-15	1.22E-17	2.99E-16	1.45E-14
	C-14	mSv/a	1.98E-13	1.59E-16	2.52E-09	9.75E-14	1.05E-14	2.77E-14	2.06E-12	5.80E-14	0.00E+00	1.37E-07	5.25E-08	8.79E-07	1.07E-06
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.64E-12	0.00E+00	4.05E-15	0.00E+00	8.23E-15	0.00E+00	0.00E+00	5.06E-14	6.26E-12	6.00E-12	1.50E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	2.10E-15	2.32E-18	7.41E-19	7.27E-16	6.89E-19	1.44E-18	0.00E+00	9.46E-16	8.63E-14	8.41E-13	9.31E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	1.34E-13	3.37E-14	5.91E-17	3.71E-12	9.46E-14	3.00E-11	0.00E+00	6.94E-14	1.22E-14	6.84E-14	3.41E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	2.07E-10	1.23E-11	2.83E-13	4.70E-09	8.37E-07	3.34E-04	0.00E+00	6.93E-09	1.54E-10	1.19E-09	3.35E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	1.16E-28	5.49E-29	1.09E-31	1.36E-26	9.54E-31	5.78E-28	0.00E+00	1.45E-28	1.01E-29	6.50E-30	1.45E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	2.88E-30	9.44E-31	1.93E-33	1.65E-28	2.36E-32	9.85E-30	0.00E+00	3.58E-30	2.31E-31	1.56E-31	1.82E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	1.39E-21	0.00E+00	3.27E-25	0.00E+00	1.14E-22	0.00E+00	0.00E+00	3.19E-21	9.12E-23	1.20E-21	5.99E-21
	Gd-152	mSv/a	0.00E+00	0.00E+00	9.81E-22	0.00E+00	2.04E-24	0.00E+00	1.59E-23	0.00E+00	0.00E+00	2.82E-22	1.37E-22	1.58E-22	1.58E-21
	HTO	mSv/a	5.53E-07	0.00E+00	4.82E-06	2.72E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-08	1.89E-06	7.47E-06	1.50E-05
	I-129	mSv/a	7.22E-15	3.99E-20	1.40E-11	5.19E-16	6.16E-15	1.89E-13	1.01E-12	2.21E-14	0.00E+00	8.03E-13	1.38E-12	7.17E-11	8.91E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	2.22E-09	1.09E-09	4.78E-12	6.27E-07	6.17E-11	4.02E-08	0.00E+00	6.36E-09	3.23E-10	2.55E-12	6.78E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	8.00E-10	0.00E+00	1.70E-12	0.00E+00	1.83E-11	0.00E+00	0.00E+00	1.61E-10	1.55E-09	1.49E-09	4.02E-09
	Ni-63	mSv/a	0.00E+00	0.00E+00	2.03E-11	0.00E+00	3.80E-14	0.00E+00	4.66E-13	0.00E+00	0.00E+00	4.08E-12	3.62E-11	3.54E-11	9.65E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	1.47E-11	3.54E-15	2.08E-14	1.20E-11	2.41E-15	6.38E-15	0.00E+00	4.23E-12	1.18E-12	1.65E-13	3.23E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	1.12E-14	1.09E-15	6.39E-21	1.74E-16	1.84E-18	2.28E-16	0.00E+00	3.23E-15	7.37E-17	2.73E-17	1.61E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-08	3.43E-07	6.34E-07	9.94E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	3.47E-15	1.53E-19	7.49E-18	7.77E-16	3.07E-16	1.36E-16	0.00E+00	3.32E-16	5.92E-16	2.08E-17	5.64E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	4.67E-16	4.94E-17	3.03E-21	8.98E-17	4.13E-17	5.84E-15	0.00E+00	4.47E-17	1.85E-17	1.71E-18	6.55E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.59E-13	1.28E-19	1.96E-16	1.15E-15	3.38E-15	5.07E-18	0.00E+00	4.55E-12	2.06E-13	3.54E-13	5.28E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	2.26E-09	8.44E-18	7.51E-14	7.17E-17	4.82E-14	2.33E-19	0.00E+00	3.25E-09	1.32E-09	2.37E-09	9.21E-09
	Pu-238	mSv/a	0.00E+00	0.00E+00	2.66E-10	9.73E-17	4.89E-13	3.83E-13	1.04E-09	2.06E-13	0.00E+00	5.34E-08	1.82E-12	2.35E-12	5.47E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.38E-08	4.31E-15	2.94E-11	9.28E-12	5.43E-08	1.66E-11	0.00E+00	2.78E-06	9.53E-11	1.25E-10	2.85E-06
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.85E-08	5.88E-15	3.93E-11	2.63E-11	7.28E-08	1.25E-11	0.00E+00	3.72E-06	1.28E-10	1.67E-10	3.81E-06
	Pu-241	mSv/a	0.00E+00	0.00E+00	1.96E-12	7.27E-19	1.92E-15	4.87E-13	7.72E-12	4.23E-12	0.00E+00	3.94E-10	1.31E-14	1.62E-14	4.09E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.85E-14	2.04E-17	7.83E-20	1.48E-17	3.45E-15	3.17E-15	0.00E+00	1.09E-15	6.91E-15	5.55E-15	4.87E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	3.19E-20	1.50E-22	2.81E-26	4.67E-23	3.87E-21	3.13E-20	0.00E+00	1.22E-21	3.11E-21	3.55E-21	7.51E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	5.00E-15	2.13E-19	1.79E-20	2.84E-18	6.06E-16	3.75E-16	0.00E+00	1.91E-16	1.44E-15	1.08E-15	8.70E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.53E-14	6.01E-18	3.31E-17	2.10E-14	1.86E-15	5.66E-15	0.00E+00	5.86E-16	1.47E-14	7.29E-15	6.64E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.91E-19	1.23E-22	2.35E-22	4.31E-20	5.96E-20	5.28E-20	0.00E+00	1.88E-20	3.51E-19	1.81E-19	1.20E-18
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	1.36E-08	2.65E-13	1.44E-11	6.57E-11	4.22E-11	7.79E-13	0.00E+00	2.60E-10	2.50E-08	2.54E-08	6.44E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	9.70E-12	2.51E-15	1.32E-16	1.10E-15	7.95E-16	1.23E-16	0.00E+00	1.86E-12	6.94E-12	8.64E-12	2.72E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	1.59E-16	9.28E-19	7.17E-22	3.61E-18	4.96E-16	1.21E-14	0.00E+00	9.16E-18	5.27E-19	3.78E-18	1.28E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	4.09E-21	3.89E-24	6.77E-25	1.95E-21	1.27E-20	1.80E-19	0.00E+00	2.35E-22	2.89E-23	1.43E-22	1.99E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.37E-15	1.78E-19	2.97E-18	4.96E-16	4.27E-15	2.83E-15	0.00E+00	7.88E-17	2.15E-17	5.45E-17	9.12E-15

Table A-3: Estimated Radiation Dose for Farm A during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-230	mSv/a	0.00E+00	0.00E+00	1.01E-15	1.50E-21	2.18E-18	8.19E-17	3.14E-15	5.54E-16	0.00E+00	5.78E-17	1.58E-17	4.00E-17	4.90E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	2.48E-16	2.30E-18	6.35E-23	8.67E-18	7.73E-16	4.89E-13	0.00E+00	1.43E-17	7.67E-20	1.62E-18	4.90E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	7.89E-21	1.10E-26	1.71E-23	4.22E-20	2.46E-20	2.93E-19	0.00E+00	4.53E-22	1.24E-22	3.14E-22	3.69E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	1.01E-14	3.89E-17	5.88E-20	2.76E-16	3.16E-14	1.49E-13	0.00E+00	5.83E-16	3.81E-17	2.60E-16	1.92E-13
	U-233	mSv/a	0.00E+00	0.00E+00	8.07E-14	3.50E-19	1.61E-16	1.18E-15	6.61E-17	1.66E-18	0.00E+00	7.42E-16	7.32E-15	1.66E-13	2.56E-13
	U-234	mSv/a	0.00E+00	0.00E+00	2.05E-12	4.14E-18	4.07E-15	9.68E-15	1.68E-15	2.87E-18	0.00E+00	1.88E-14	1.86E-13	4.22E-12	6.49E-12
	U-235	mSv/a	0.00E+00	0.00E+00	2.89E-12	6.25E-15	5.75E-15	3.78E-12	2.37E-15	7.06E-15	0.00E+00	2.66E-14	2.62E-13	5.95E-12	1.29E-11
	U-236	mSv/a	0.00E+00	0.00E+00	5.82E-13	7.96E-19	1.16E-15	2.50E-15	4.77E-16	4.65E-19	0.00E+00	5.35E-15	5.28E-14	1.20E-12	1.84E-12
	U-237	mSv/a	0.00E+00	0.00E+00	2.25E-14	1.77E-18	3.65E-20	1.45E-15	1.84E-17	3.35E-15	0.00E+00	2.07E-16	3.68E-16	1.74E-14	4.53E-14
	U-238	mSv/a	0.00E+00	0.00E+00	2.14E-11	2.70E-16	4.26E-14	2.18E-11	1.75E-14	8.99E-15	0.00E+00	1.97E-13	1.94E-12	4.41E-11	8.95E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	1.99E-11	3.58E-14	1.28E-17	3.96E-14	5.55E-13	6.68E-12	0.00E+00	3.81E-12	1.46E-13	2.21E-13	3.14E-11
	Total	**mSv/a**	**5.53E-07**	**1.59E-16**	**4.88E-06**	**2.73E-07**	**9.06E-11**	**6.33E-07**	**9.65E-07**	**3.34E-04**	**0.00E+00**	**6.76E-06**	**2.32E-06**	**9.01E-06**	**3.59E-04**
Infant_1y	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.86E-20	5.59E-22	2.76E-19	6.47E-18	1.29E-17	0.00E+00	1.05E-17	1.91E-18	4.44E-18	3.65E-17
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.53E-21	1.60E-17	7.00E-16	3.61E-16	7.65E-17	0.00E+00	5.85E-16	3.77E-16	5.14E-16	2.63E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.90E-13	9.36E-15	4.84E-10	7.92E-12	2.05E-09	0.00E+00	1.68E-12	1.24E-12	1.38E-11	2.56E-09
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.88E-19	3.96E-17	8.78E-16	6.49E-14	3.10E-15	0.00E+00	1.36E-14	5.56E-17	5.60E-17	8.26E-14
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.02E-20	1.66E-18	3.19E-16	2.64E-15	2.16E-15	0.00E+00	5.55E-16	2.28E-18	2.30E-18	5.68E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.26E-20	3.02E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	5.85E-16	8.15E-15
	C-14	mSv/a	1.35E-13	1.59E-16	0.00E+00	1.86E-14	2.32E-14	2.77E-14	4.58E-12	5.80E-14	0.00E+00	9.58E-08	4.34E-08	1.38E-06	1.52E-06
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-15	0.00E+00	9.89E-15	0.00E+00	0.00E+00	1.91E-14	2.46E-12	6.56E-12	9.05E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.42E-19	2.72E-18	7.27E-16	2.53E-18	1.44E-18	0.00E+00	1.09E-15	9.84E-14	2.79E-12	2.89E-12
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.34E-15	1.61E-16	4.82E-12	2.57E-13	3.90E-11	0.00E+00	5.93E-14	1.18E-14	8.03E-14	4.43E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.05E-12	3.76E-13	6.12E-09	1.11E-06	4.34E-04	0.00E+00	2.90E-09	7.46E-11	1.19E-09	4.35E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.36E-29	3.44E-31	1.77E-26	3.01E-30	7.52E-28	0.00E+00	1.44E-28	1.13E-29	1.16E-29	1.86E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.34E-31	6.25E-33	2.14E-28	7.65E-32	1.28E-29	0.00E+00	3.65E-30	2.70E-31	2.88E-31	2.31E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-25	0.00E+00	2.76E-22	0.00E+00	0.00E+00	2.43E-21	8.18E-23	9.44E-22	3.73E-21
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E-24	0.00E+00	4.00E-23	0.00E+00	0.00E+00	2.22E-22	1.17E-22	2.06E-22	5.90E-22
	HTO	mSv/a	3.81E-07	0.00E+00	0.00E+00	7.16E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-08	1.54E-06	1.56E-05	1.76E-05
	I-129	mSv/a	2.75E-15	5.19E-20	0.00E+00	1.29E-16	7.91E-15	2.46E-13	1.29E-12	2.88E-14	0.00E+00	3.24E-13	6.30E-13	8.14E-11	8.39E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.70E-10	1.51E-11	8.16E-07	1.95E-10	5.22E-08	0.00E+00	6.32E-09	3.44E-10	4.08E-12	8.75E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-12	0.00E+00	6.29E-11	0.00E+00	0.00E+00	1.73E-10	1.75E-09	4.03E-09	6.03E-09
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-13	0.00E+00	1.55E-12	0.00E+00	0.00E+00	4.27E-12	4.00E-11	9.33E-11	1.39E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.77E-16	4.41E-14	1.56E-11	5.11E-15	8.29E-15	0.00E+00	2.81E-12	9.02E-13	1.71E-13	1.96E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.69E-16	2.38E-20	2.26E-16	6.85E-18	2.96E-16	0.00E+00	3.77E-15	1.02E-16	5.22E-17	4.72E-15
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-08	2.43E-07	1.03E-06	1.29E-06
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.79E-20	1.17E-17	1.01E-15	4.81E-16	1.77E-16	0.00E+00	1.63E-16	3.09E-16	2.60E-17	2.18E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.22E-17	1.10E-20	1.17E-16	1.49E-16	7.59E-15	0.00E+00	5.08E-17	2.49E-17	4.88E-18	7.95E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	4.92E-13	3.65E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	2.82E-13	9.33E-17	1.81E-13	3.03E-19	0.00E+00	3.83E-09	1.85E-09	3.71E-09	9.40E-09
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.41E-17	9.03E-13	4.98E-13	1.93E-09	2.67E-13	0.00E+00	3.10E-08	1.24E-12	3.99E-12	3.29E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.07E-15	5.08E-11	1.21E-11	9.37E-08	2.16E-11	0.00E+00	1.51E-06	6.06E-11	1.98E-10	1.60E-06
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-15	6.79E-11	3.42E-11	1.26E-07	1.62E-11	0.00E+00	2.02E-06	8.11E-11	2.65E-10	2.14E-06
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.80E-19	2.38E-15	6.34E-13	9.56E-12	5.50E-12	0.00E+00	1.54E-10	6.01E-15	1.84E-14	1.69E-10
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.04E-18	2.12E-19	1.92E-17	9.35E-15	4.12E-15	0.00E+00	9.28E-16	6.97E-15	1.23E-14	3.37E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	7.91E-26	6.08E-23	1.09E-20	4.06E-20	0.00E+00	1.08E-21	3.25E-21	8.32E-21	6.43E-20
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.26E-20	4.77E-20	3.69E-18	1.61E-15	4.87E-16	0.00E+00	1.60E-16	1.43E-15	2.36E-15	6.05E-15
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	4.41E-17	2.72E-14	2.47E-15	7.39E-15	0.00E+00	2.45E-16	6.87E-15	7.94E-15	5.22E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	3.82E-22	5.61E-20	9.65E-20	6.87E-20	0.00E+00	9.57E-21	2.08E-19	2.40E-19	6.79E-19
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-3: Estimated Radiation Dose for Farm A during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.04E-14	1.95E-11	6.57E-11	5.70E-11	7.79E-13	0.00E+00	1.10E-10	1.12E-08	3.12E-08	4.26E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.78E-16	5.42E-16	1.10E-15	3.25E-15	1.23E-16	0.00E+00	2.39E-12	1.04E-11	2.36E-11	3.64E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.30E-19	2.42E-21	4.71E-18	1.68E-15	1.58E-14	0.00E+00	9.71E-18	6.61E-19	7.86E-18	1.75E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.63E-25	1.85E-24	2.54E-21	3.49E-20	2.33E-19	0.00E+00	2.02E-22	2.90E-23	2.39E-22	2.71E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.41E-20	5.31E-18	6.46E-16	7.64E-15	3.67E-15	0.00E+00	4.43E-17	1.29E-17	6.13E-17	1.21E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	4.77E-17	6.86E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.69E-19	2.38E-22	1.13E-17	2.89E-15	6.36E-13	0.00E+00	1.68E-17	1.07E-19	4.02E-18	6.39E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	2.95E-23	5.48E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.16E-23	3.40E-22	4.79E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.61E-18	2.20E-19	3.59E-16	1.18E-13	1.94E-13	0.00E+00	6.86E-16	5.31E-17	5.98E-16	3.14E-13
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.67E-20	3.20E-16	1.54E-15	1.32E-16	2.15E-18	0.00E+00	4.64E-16	5.16E-15	2.62E-13	2.69E-13
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.02E-18	7.94E-15	1.26E-14	3.27E-15	3.73E-18	0.00E+00	1.15E-14	1.28E-13	6.49E-12	6.66E-12
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.55E-15	1.17E-14	4.91E-12	4.81E-15	9.18E-15	0.00E+00	1.69E-14	1.89E-13	9.55E-12	1.47E-11
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.97E-19	2.39E-15	3.25E-15	9.82E-16	6.04E-19	0.00E+00	3.46E-15	3.86E-14	1.95E-12	2.00E-12
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.38E-19	1.37E-19	1.88E-15	6.89E-17	4.35E-15	0.00E+00	2.43E-16	5.12E-16	5.16E-14	5.87E-14
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.67E-17	8.33E-14	2.84E-11	3.43E-14	1.17E-14	0.00E+00	1.21E-13	1.35E-12	6.81E-11	9.81E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.81E-15	4.80E-17	3.96E-14	2.09E-12	6.68E-12	0.00E+00	4.50E-12	2.04E-13	5.49E-13	1.41E-11
	Total	**mSv/a**	**3.81E-07**	**1.59E-16**	**0.00E+00**	**7.19E-08**	**1.61E-10**	**8.23E-07**	**1.33E-06**	**4.34E-04**	**0.00E+00**	**3.70E-06**	**1.84E-06**	**1.80E-05**	**4.60E-04**
Infant_1y-Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	1.37E-16	6.86E-20	5.59E-22	2.76E-19	6.47E-18	1.29E-17	0.00E+00	1.05E-17	1.91E-18	1.43E-18	1.71E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	7.65E-15	4.53E-21	1.60E-17	7.00E-16	3.61E-16	7.65E-17	0.00E+00	5.85E-16	3.77E-16	1.68E-16	9.94E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.00E-12	1.90E-13	9.36E-15	4.84E-10	7.92E-12	2.05E-09	0.00E+00	1.68E-12	1.24E-12	4.03E-13	2.55E-09
	Am-241	mSv/a	0.00E+00	0.00E+00	1.11E-14	1.88E-19	3.96E-17	8.78E-16	6.49E-14	3.10E-15	0.00E+00	1.36E-14	5.56E-17	4.97E-17	9.37E-14
	Am-243	mSv/a	0.00E+00	0.00E+00	4.54E-16	4.02E-20	1.66E-18	3.19E-16	2.64E-15	2.16E-15	0.00E+00	5.55E-16	2.28E-18	2.04E-18	6.13E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.08E-14	2.61E-18	4.26E-20	3.02E-17	2.89E-15	6.94E-16	0.00E+00	3.93E-15	1.68E-17	2.28E-16	2.86E-14
	C-14	mSv/a	1.35E-13	1.59E-16	3.30E-09	1.86E-14	2.32E-14	2.77E-14	4.58E-12	5.80E-14	0.00E+00	9.58E-08	4.34E-08	2.40E-07	3.83E-07
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.88E-12	0.00E+00	4.87E-15	0.00E+00	9.89E-15	0.00E+00	0.00E+00	1.91E-14	2.46E-12	1.39E-13	4.51E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	4.57E-15	4.42E-19	2.72E-18	7.27E-16	2.53E-18	1.44E-18	0.00E+00	1.09E-15	9.84E-14	8.42E-14	1.89E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	2.16E-13	8.34E-15	1.61E-16	4.82E-12	2.57E-13	3.90E-11	0.00E+00	5.93E-14	1.18E-14	5.15E-14	4.44E-11
	Cs-137	mSv/a	0.00E+00	0.00E+00	1.63E-10	3.05E-12	3.76E-13	6.12E-09	1.11E-06	4.34E-04	0.00E+00	2.90E-09	7.46E-11	1.66E-10	4.35E-04
	Eu-152	mSv/a	0.00E+00	0.00E+00	2.17E-28	1.36E-29	3.44E-31	1.77E-26	3.01E-30	7.52E-28	0.00E+00	1.44E-28	1.13E-29	3.72E-30	1.88E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	5.52E-30	2.34E-31	6.25E-33	2.14E-28	7.65E-32	1.28E-29	0.00E+00	3.65E-30	2.70E-31	9.18E-32	2.37E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	1.99E-21	0.00E+00	7.91E-25	0.00E+00	2.76E-22	0.00E+00	0.00E+00	2.43E-21	8.18E-23	8.62E-22	5.64E-21
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.45E-21	0.00E+00	5.11E-24	0.00E+00	4.00E-23	0.00E+00	0.00E+00	2.22E-22	1.17E-22	8.12E-23	1.92E-21
	HTO	mSv/a	3.81E-07	0.00E+00	6.69E-06	7.16E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-08	1.54E-06	6.07E-07	9.32E-06
	I-129	mSv/a	2.75E-15	5.19E-20	1.06E-11	1.29E-16	7.91E-15	2.46E-13	1.29E-12	2.88E-14	0.00E+00	3.24E-13	6.30E-13	2.64E-12	1.58E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	4.14E-09	2.70E-10	1.51E-11	8.16E-07	1.95E-10	5.22E-08	0.00E+00	6.32E-09	3.44E-10	1.63E-12	8.79E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.62E-09	0.00E+00	5.82E-12	0.00E+00	6.29E-11	0.00E+00	0.00E+00	1.73E-10	1.75E-09	4.01E-10	4.01E-09
	Ni-63	mSv/a	0.00E+00	0.00E+00	3.99E-11	0.00E+00	1.26E-13	0.00E+00	1.55E-12	0.00E+00	0.00E+00	4.27E-12	4.00E-11	9.27E-12	9.51E-11
	Np-237	mSv/a	0.00E+00	0.00E+00	1.84E-11	8.77E-16	4.41E-14	1.56E-11	5.11E-15	8.29E-15	0.00E+00	2.81E-12	9.02E-13	7.41E-14	3.79E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	2.47E-14	2.69E-16	2.38E-20	2.26E-16	6.85E-18	2.96E-16	0.00E+00	3.77E-15	1.02E-16	2.05E-17	2.94E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-08	2.43E-07	1.73E-07	4.28E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	3.21E-15	3.79E-20	1.17E-17	1.01E-15	4.81E-16	1.77E-16	0.00E+00	1.63E-16	3.09E-16	2.51E-18	5.36E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	9.97E-16	1.22E-17	1.10E-20	1.17E-16	1.49E-16	7.59E-15	0.00E+00	5.08E-17	2.49E-17	4.96E-19	8.94E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	1.97E-13	3.16E-20	4.12E-16	1.50E-15	7.10E-15	6.59E-18	0.00E+00	3.01E-12	1.48E-13	1.06E-13	3.47E-12
	Po-210	mSv/a	0.00E+00	0.00E+00	5.02E-09	2.09E-18	2.82E-13	9.33E-17	1.81E-13	3.03E-19	0.00E+00	3.83E-09	1.85E-09	1.85E-09	1.25E-08
	Pu-238	mSv/a	0.00E+00	0.00E+00	2.90E-10	2.41E-17	9.03E-13	4.98E-13	1.93E-09	2.67E-13	0.00E+00	3.10E-08	1.24E-12	8.31E-14	3.32E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.41E-08	1.07E-15	5.08E-11	1.21E-11	9.37E-08	2.16E-11	0.00E+00	1.51E-06	6.06E-11	4.08E-12	1.61E-06
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.88E-08	1.46E-15	6.79E-11	3.42E-11	1.26E-07	1.62E-11	0.00E+00	2.02E-06	8.11E-11	5.46E-12	2.16E-06
	Pu-241	mSv/a	0.00E+00	0.00E+00	1.44E-12	1.80E-19	2.38E-15	6.34E-13	9.56E-12	5.50E-12	0.00E+00	1.54E-10	6.01E-15	3.96E-16	1.71E-10

Table A-3: Estimated Radiation Dose for Farm A during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ra-223	mSv/a	0.00E+00	0.00E+00	4.55E-14	5.04E-18	2.12E-19	1.92E-17	9.35E-15	4.12E-15	0.00E+00	9.28E-16	6.97E-15	8.40E-16	6.78E-14
	Ra-224	mSv/a	0.00E+00	0.00E+00	5.30E-20	3.72E-23	7.91E-26	6.08E-23	1.09E-20	4.06E-20	0.00E+00	1.08E-21	3.25E-21	5.11E-22	1.09E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	7.85E-15	5.26E-20	4.77E-20	3.69E-18	1.61E-15	4.87E-16	0.00E+00	1.60E-16	1.43E-15	1.63E-16	1.17E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	1.20E-14	1.49E-18	4.41E-17	2.72E-14	2.47E-15	7.39E-15	0.00E+00	2.45E-16	6.87E-15	5.50E-16	5.69E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	4.70E-19	3.04E-23	3.82E-22	5.61E-20	9.65E-20	6.87E-20	0.00E+00	9.57E-21	2.08E-19	1.70E-20	9.27E-19
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	1.08E-08	5.04E-14	1.95E-11	6.57E-11	5.70E-11	7.79E-13	0.00E+00	1.10E-10	1.12E-08	6.59E-10	2.29E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	2.35E-11	4.78E-16	5.42E-16	1.10E-15	3.25E-15	1.23E-16	0.00E+00	2.39E-12	1.04E-11	4.19E-12	4.05E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	3.18E-16	2.30E-19	2.42E-21	4.71E-18	1.68E-15	1.58E-14	0.00E+00	9.71E-18	6.61E-19	2.05E-18	1.78E-14
	Th-228	mSv/a	0.00E+00	0.00E+00	6.61E-21	9.63E-25	1.85E-24	2.54E-21	3.49E-20	2.33E-19	0.00E+00	2.02E-22	2.90E-23	6.34E-23	2.78E-19
	Th-229	mSv/a	0.00E+00	0.00E+00	1.45E-15	4.41E-20	5.31E-18	6.46E-16	7.64E-15	3.67E-15	0.00E+00	4.43E-17	1.29E-17	1.51E-17	1.35E-14
	Th-230	mSv/a	0.00E+00	0.00E+00	1.13E-15	3.72E-22	4.14E-18	1.06E-16	5.94E-15	7.21E-16	0.00E+00	3.44E-17	1.01E-17	1.17E-17	7.95E-15
	Th-231	mSv/a	0.00E+00	0.00E+00	5.49E-16	5.69E-19	2.38E-22	1.13E-17	2.89E-15	6.36E-13	0.00E+00	1.68E-17	1.07E-19	8.37E-19	6.39E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	8.02E-21	2.74E-27	2.95E-23	5.48E-20	4.23E-20	3.81E-19	0.00E+00	2.45E-22	7.16E-23	8.34E-23	4.87E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	2.24E-14	9.61E-18	2.20E-19	3.59E-16	1.18E-13	1.94E-13	0.00E+00	6.86E-16	5.31E-17	1.57E-16	3.36E-13
	U-233	mSv/a	0.00E+00	0.00E+00	9.49E-14	8.67E-20	3.20E-16	1.54E-15	1.32E-16	2.15E-18	0.00E+00	4.64E-16	5.16E-15	2.57E-14	1.28E-13
	U-234	mSv/a	0.00E+00	0.00E+00	2.36E-12	1.02E-18	7.94E-15	1.26E-14	3.27E-15	3.73E-18	0.00E+00	1.15E-14	1.28E-13	6.39E-13	3.16E-12
	U-235	mSv/a	0.00E+00	0.00E+00	3.46E-12	1.55E-15	1.17E-14	4.91E-12	4.81E-15	9.18E-15	0.00E+00	1.69E-14	1.89E-13	9.40E-13	9.55E-12
	U-236	mSv/a	0.00E+00	0.00E+00	7.08E-13	1.97E-19	2.39E-15	3.25E-15	9.82E-16	6.04E-19	0.00E+00	3.46E-15	3.86E-14	1.92E-13	9.49E-13
	U-237	mSv/a	0.00E+00	0.00E+00	4.97E-14	4.38E-19	1.37E-19	1.88E-15	6.89E-17	4.35E-15	0.00E+00	2.43E-16	5.12E-16	5.00E-15	6.17E-14
	U-238	mSv/a	0.00E+00	0.00E+00	2.47E-11	6.67E-17	8.33E-14	2.84E-11	3.43E-14	1.17E-14	0.00E+00	1.21E-13	1.35E-12	6.70E-12	6.14E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	4.42E-11	6.81E-15	4.80E-17	3.96E-14	2.09E-12	6.68E-12	0.00E+00	4.50E-12	2.04E-13	1.17E-13	5.78E-11
	Total	**mSv/a**	**3.81E-07**	**1.59E-16**	**6.75E-06**	**7.19E-08**	**1.61E-10**	**8.23E-07**	**1.33E-06**	**4.34E-04**	**0.00E+00**	**3.70E-06**	**1.84E-06**	**1.02E-06**	**4.50E-04**

Table A-4: Estimated Radiation Dose for Farm A 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.86E-20	8.89E-22	2.76E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-18	1.66E-18
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.53E-21	1.06E-16	7.00E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.34E-16	1.14E-15
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.90E-13	5.83E-15	4.84E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.03E-13	4.85E-10
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.88E-19	2.47E-16	8.78E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-17	1.17E-15
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.02E-20	1.01E-17	3.19E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-18	3.30E-16
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-18	4.10E-20	3.02E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-16	2.95E-16
	C-14	mSv/a	5.68E-14	1.59E-16	0.00E+00	1.86E-14	1.26E-14	2.77E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-05	1.10E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.64E-12	6.65E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.42E-19	2.64E-18	7.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-12	1.71E-12
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.34E-15	2.01E-16	4.82E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-13	4.99E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.05E-12	4.10E-13	6.12E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-07	1.64E-07
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.36E-29	4.63E-31	1.77E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-30	1.77E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.34E-31	8.11E-33	2.14E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-32	2.14E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-22	2.32E-22
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-22	1.51E-22
	HTO	mSv/a	2.11E-07	0.00E+00	0.00E+00	5.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-05	3.27E-05
	I-129	mSv/a	9.82E-16	5.19E-20	0.00E+00	1.29E-16	4.03E-15	2.46E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-11	4.01E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.70E-10	1.46E-11	8.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-11	8.16E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-10	3.08E-10
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.12E-12	7.27E-12
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.77E-16	2.62E-13	1.56E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.57E-14	1.59E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.69E-16	2.31E-20	2.26E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-17	5.06E-16
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-06	1.25E-06
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.79E-20	7.87E-17	1.01E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-15
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.22E-17	1.07E-20	1.17E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.16E-20	5.99E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-13	9.40E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.09E-18	5.19E-13	9.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-09	1.83E-09
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.41E-17	5.63E-12	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-11	5.25E-11
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.07E-15	3.16E-10	1.21E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-09	2.58E-09
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-15	4.23E-10	3.42E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-09	3.47E-09
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.80E-19	1.46E-14	6.34E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-13	8.75E-13
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.04E-18	6.37E-19	1.92E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-15	2.01E-15
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-23	2.02E-25	6.08E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-21	1.71E-21
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.26E-20	1.76E-19	3.69E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-16	4.48E-16
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-18	1.34E-16	2.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E-16	2.83E-14
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.04E-23	1.26E-21	5.61E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-20	9.24E-20
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.04E-14	3.82E-11	6.57E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-08	4.40E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.78E-16	7.04E-16	1.10E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-12	8.34E-12
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.30E-19	6.46E-21	4.71E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-18	7.99E-18
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.63E-25	1.15E-23	2.54E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-22	2.70E-21
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.41E-20	3.64E-17	6.46E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-17	7.19E-16
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-17	1.58E-16
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.69E-19	2.31E-22	1.13E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-18	1.37E-17
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.74E-27	1.88E-22	5.48E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-22	5.52E-20
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.61E-18	2.19E-19	3.59E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-17	4.50E-16
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.67E-20	5.41E-16	1.54E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-15	4.79E-15
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.02E-18	1.41E-14	1.26E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.07E-14	9.74E-14

Table A-4: Estimated Radiation Dose for Farm A 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.55E-15	1.96E-14	4.91E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.84E-14	5.03E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.97E-19	4.00E-15	3.25E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-14	2.74E-14
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.38E-19	1.31E-19	1.88E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-16	2.42E-15
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.67E-17	1.47E-13	2.84E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-13	2.92E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.81E-15	4.63E-17	3.96E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-13	2.58E-13
	Total	**mSv/a**	**2.11E-07**	**1.59E-16**	**0.00E+00**	**5.81E-08**	**8.06E-10**	**8.23E-07**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**4.48E-05**	**4.59E-05**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	4.68E-16	6.86E-20	8.89E-22	2.76E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-16
	Ac-227	mSv/a	0.00E+00	0.00E+00	1.09E-13	4.53E-21	1.06E-16	7.00E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-13
	Ag-108m	mSv/a	0.00E+00	0.00E+00	4.01E-12	1.90E-13	5.83E-15	4.84E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-10
	Am-241	mSv/a	0.00E+00	0.00E+00	1.49E-13	1.88E-19	2.47E-16	8.78E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-13
	Am-243	mSv/a	0.00E+00	0.00E+00	5.90E-15	4.02E-20	1.01E-17	3.19E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-15
	Bi-210	mSv/a	0.00E+00	0.00E+00	4.30E-14	2.61E-18	4.10E-20	3.02E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-14
	C-14	mSv/a	5.68E-14	1.59E-16	3.86E-09	1.86E-14	1.26E-14	2.77E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.86E-09
	Ca-41	mSv/a	0.00E+00	0.00E+00	5.78E-12	0.00E+00	7.00E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-12
	Cl-36	mSv/a	0.00E+00	0.00E+00	9.49E-15	4.42E-19	2.64E-18	7.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-14
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	5.76E-13	8.34E-15	2.01E-16	4.82E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.41E-12
	Cs-137	mSv/a	0.00E+00	0.00E+00	3.80E-10	3.05E-12	4.10E-13	6.12E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E-09
	Eu-152	mSv/a	0.00E+00	0.00E+00	6.27E-28	1.36E-29	4.63E-31	1.77E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-26
	Eu-154	mSv/a	0.00E+00	0.00E+00	1.53E-29	2.34E-31	8.11E-33	2.14E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-28
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	8.40E-21	0.00E+00	1.56E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-21
	Gd-152	mSv/a	0.00E+00	0.00E+00	1.94E-20	0.00E+00	3.19E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-20
	HTO	mSv/a	2.11E-07	0.00E+00	1.18E-05	5.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-05
	I-129	mSv/a	9.82E-16	5.19E-20	1.16E-11	1.29E-16	4.03E-15	2.46E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-11
	Nb-94	mSv/a	0.00E+00	0.00E+00	8.54E-09	2.70E-10	1.46E-11	8.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.25E-07
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	4.07E-09	0.00E+00	6.82E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-09
	Ni-63	mSv/a	0.00E+00	0.00E+00	1.01E-10	0.00E+00	1.50E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	2.34E-10	8.77E-16	2.62E-13	1.56E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-10
	Np-239	mSv/a	0.00E+00	0.00E+00	5.15E-14	2.69E-16	2.31E-20	2.26E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-14
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	4.62E-14	3.79E-20	7.87E-17	1.01E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.08E-15	1.22E-17	1.07E-20	1.17E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	6.13E-13	3.16E-20	5.99E-16	1.50E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-13
	Po-210	mSv/a	0.00E+00	0.00E+00	1.98E-08	2.09E-18	5.19E-13	9.33E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08
	Pu-238	mSv/a	0.00E+00	0.00E+00	3.87E-09	2.41E-17	5.63E-12	4.98E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-09
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.88E-07	1.07E-15	3.16E-10	1.21E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-07
	Pu-240	mSv/a	0.00E+00	0.00E+00	2.52E-07	1.46E-15	4.23E-10	3.42E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-07
	Pu-241	mSv/a	0.00E+00	0.00E+00	1.88E-11	1.80E-19	1.46E-14	6.34E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-11
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.93E-13	5.04E-18	6.37E-19	1.92E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.90E-19	3.72E-23	2.02E-25	6.08E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-19
	Ra-225	mSv/a	0.00E+00	0.00E+00	6.21E-14	5.26E-20	1.76E-19	3.69E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-14
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.87E-14	1.49E-18	1.34E-16	2.72E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-13
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.34E-18	3.04E-23	1.26E-21	5.61E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-18
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	4.55E-08	5.04E-14	3.82E-11	6.57E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-08
	Tc-99	mSv/a	0.00E+00	0.00E+00	6.52E-11	4.78E-16	7.04E-16	1.10E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.53E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	1.82E-15	2.30E-19	6.46E-21	4.71E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-15
	Th-228	mSv/a	0.00E+00	0.00E+00	8.83E-20	9.63E-25	1.15E-23	2.54E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.09E-20
	Th-229	mSv/a	0.00E+00	0.00E+00	2.13E-14	4.41E-20	3.64E-17	6.46E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-14

Table A-4: Estimated Radiation Dose for Farm A 3-month-old during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-230	mSv/a	0.00E+00	0.00E+00	1.50E-14	3.72E-22	2.58E-17	1.06E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-14
	Th-231	mSv/a	0.00E+00	0.00E+00	1.14E-15	5.69E-19	2.31E-22	1.13E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-15
	Th-232	mSv/a	0.00E+00	0.00E+00	1.09E-19	2.74E-27	1.88E-22	5.48E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-19
	Th-234	mSv/a	0.00E+00	0.00E+00	4.80E-14	9.61E-18	2.19E-19	3.59E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-14
	U-233	mSv/a	0.00E+00	0.00E+00	3.44E-13	8.67E-20	5.41E-16	1.54E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-13
	U-234	mSv/a	0.00E+00	0.00E+00	8.95E-12	1.02E-18	1.41E-14	1.26E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.98E-12
	U-235	mSv/a	0.00E+00	0.00E+00	1.25E-11	1.55E-15	1.96E-14	4.91E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-11
	U-236	mSv/a	0.00E+00	0.00E+00	2.55E-12	1.97E-19	4.00E-15	3.25E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-12
	U-237	mSv/a	0.00E+00	0.00E+00	1.02E-13	4.38E-19	1.31E-19	1.88E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-13
	U-238	mSv/a	0.00E+00	0.00E+00	9.35E-11	6.67E-17	1.47E-13	2.84E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-10
	Y-90	mSv/a	0.00E+00	0.00E+00	9.15E-11	6.81E-15	4.63E-17	3.96E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-11
	Total	**mSv/a**	**2.11E-07**	**1.59E-16**	**1.23E-05**	**5.81E-08**	**8.06E-10**	**8.23E-07**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.34E-05**

Table A-5: Estimated Radiation Dose for Harvester during Post-Closure - Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-18	3.22E-16	1.99E-14	5.82E-16	0.00E+00	3.60E-16	2.12E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-16	1.90E-15	2.94E-12	8.58E-14	0.00E+00	5.31E-14	3.08E-12
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-12	5.09E-08	7.00E-12	1.45E-10	0.00E+00	2.09E-11	5.11E-08
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-13	7.69E-14	6.11E-12	3.04E-12	0.00E+00	1.30E-13	9.50E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-15	5.34E-14	2.49E-13	1.24E-13	0.00E+00	5.28E-15	4.38E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-15	1.75E-14	2.98E-14	2.21E-13	0.00E+00	3.67E-15	2.74E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-12	1.87E-12	2.31E-06	1.44E-05	0.00E+00	1.54E-05	3.20E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-14	0.00E+00	8.31E-11	2.89E-12	0.00E+00	3.98E-12	9.00E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-18	4.63E-17	1.10E-14	6.67E-14	0.00E+00	7.36E-14	1.51E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-13	9.67E-10	7.03E-12	3.09E-12	0.00E+00	1.40E-12	9.79E-10
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-10	4.14E-07	1.27E-08	1.30E-06	0.00E+00	1.74E-05	1.91E-05
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-30	1.86E-26	6.73E-26	1.12E-26	0.00E+00	4.60E-27	1.02E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-32	3.18E-28	1.51E-27	2.52E-28	0.00E+00	1.03E-28	2.18E-27
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-22	0.00E+00	2.78E-19	1.38E-19	0.00E+00	1.97E-19	6.13E-19
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-23	0.00E+00	8.14E-19	3.14E-20	0.00E+00	6.37E-20	9.09E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-07	3.99E-06	0.00E+00	2.93E-06	7.54E-06
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-12	7.13E-13	1.23E-10	6.70E-11	0.00E+00	4.14E-11	2.35E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-10	1.29E-06	2.85E-07	4.58E-07	0.00E+00	1.34E-11	2.04E-06
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-11	0.00E+00	5.11E-09	1.33E-08	0.00E+00	1.89E-09	2.03E-08
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-12	0.00E+00	1.21E-10	3.15E-10	0.00E+00	4.43E-11	4.82E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-14	2.06E-13	6.00E-09	6.09E-10	0.00E+00	7.37E-11	6.69E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-18	7.62E-15	2.24E-12	2.27E-13	0.00E+00	2.73E-14	2.50E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-07	1.71E-06	0.00E+00	4.56E-07	2.38E-06
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-15	4.39E-15	1.72E-13	3.69E-14	0.00E+00	1.25E-16	2.15E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.64E-17	1.89E-13	1.38E-14	2.96E-15	0.00E+00	9.90E-18	2.06E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.59E-15	1.63E-16	1.24E-12	2.38E-10	0.00E+00	1.46E-12	2.41E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-13	7.51E-18	1.01E-07	2.16E-07	0.00E+00	4.84E-08	3.65E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-09	6.64E-12	2.19E-07	7.37E-06	0.00E+00	4.92E-11	7.59E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-07	5.35E-10	1.10E-05	3.70E-04	0.00E+00	2.47E-09	3.82E-04
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-07	4.01E-10	1.47E-05	4.96E-04	0.00E+00	3.31E-09	5.11E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-11	1.36E-10	1.59E-09	5.35E-08	0.00E+00	3.57E-13	5.52E-08
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-15	1.03E-13	1.64E-12	3.51E-14	0.00E+00	9.85E-14	1.88E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-21	1.03E-18	2.10E-18	4.50E-20	0.00E+00	1.26E-19	3.31E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-16	1.22E-14	2.56E-13	5.49E-15	0.00E+00	1.54E-14	2.90E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-15	1.83E-13	1.38E-12	2.96E-14	0.00E+00	8.36E-14	1.68E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-20	1.70E-18	2.24E-17	4.79E-19	0.00E+00	1.35E-18	2.60E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.97E-11	1.64E-09	5.03E-07	1.75E-08	0.00E+00	2.37E-08	5.45E-07
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-15	3.96E-15	7.79E-12	1.32E-10	0.00E+00	1.53E-12	1.41E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E-16	3.93E-13	2.89E-14	5.07E-16	0.00E+00	3.60E-16	4.24E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-20	5.80E-18	9.28E-19	1.63E-20	0.00E+00	1.16E-20	6.78E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-14	9.11E-14	5.12E-13	8.97E-15	0.00E+00	6.38E-15	6.34E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-14	1.79E-14	4.16E-13	7.29E-15	0.00E+00	5.18E-15	4.59E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-15	1.71E-11	5.85E-14	1.02E-15	0.00E+00	7.26E-16	1.72E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-20	9.45E-18	2.96E-18	5.18E-20	0.00E+00	3.68E-20	1.26E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.63E-14	4.82E-12	2.21E-12	3.87E-14	0.00E+00	2.75E-14	7.16E-12
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-16	5.34E-17	1.25E-11	6.98E-14	0.00E+00	1.36E-12	1.39E-11
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-15	9.24E-17	3.20E-10	1.79E-12	0.00E+00	3.49E-11	3.57E-10

Table A-5: Estimated Radiation Dose for Harvester during Post-Closure - Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-15	2.28E-13	4.52E-10	2.53E-12	0.00E+00	4.93E-11	5.04E-10
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-15	1.50E-17	9.23E-11	5.17E-13	0.00E+00	1.01E-11	1.03E-10
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-17	1.09E-13	2.55E-12	1.43E-14	0.00E+00	2.78E-13	2.96E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.28E-14	2.90E-13	3.34E-09	1.87E-11	0.00E+00	3.65E-10	3.72E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-08	2.60E-10	0.00E+00	5.55E-10	1.52E-08
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**5.41E-07**	**1.76E-06**	**3.00E-05**	**8.96E-04**	**0.00E+00**	**3.63E-05**	**9.65E-04**
Child-10y-Harvester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-16	3.22E-16	3.38E-14	9.21E-16	0.00E+00	3.63E-16	3.55E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.86E-15	1.90E-15	3.01E-12	8.22E-14	0.00E+00	3.24E-14	3.14E-12
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-10	5.09E-08	9.85E-12	1.91E-10	0.00E+00	1.75E-11	5.13E-08
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-12	7.69E-14	5.06E-12	2.35E-12	0.00E+00	6.38E-14	9.73E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.88E-14	5.34E-14	2.06E-13	9.58E-14	0.00E+00	2.60E-15	4.47E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-14	1.75E-14	5.00E-14	3.47E-13	0.00E+00	3.66E-15	4.68E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-10	1.87E-12	2.40E-06	1.39E-05	0.00E+00	9.48E-06	2.58E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-13	0.00E+00	1.58E-10	5.12E-12	0.00E+00	4.49E-12	1.68E-10
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-17	4.63E-17	1.70E-14	9.58E-14	0.00E+00	6.72E-14	1.80E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.92E-12	9.67E-10	1.71E-11	7.02E-12	0.00E+00	2.03E-12	9.99E-10
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-09	4.14E-07	7.35E-09	7.02E-07	0.00E+00	5.99E-06	7.12E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-29	1.86E-26	9.40E-26	1.47E-26	0.00E+00	3.82E-27	1.31E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-30	3.18E-28	2.32E-27	3.62E-28	0.00E+00	9.45E-29	3.10E-27
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-21	0.00E+00	6.96E-19	3.23E-19	0.00E+00	2.94E-19	1.32E-18
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-22	0.00E+00	7.92E-19	2.85E-20	0.00E+00	3.69E-20	8.58E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.84E-07	3.50E-06	0.00E+00	1.64E-06	5.73E-06
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-11	7.13E-13	1.60E-10	8.13E-11	0.00E+00	3.20E-11	3.38E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.86E-09	1.29E-06	4.29E-07	6.44E-07	0.00E+00	1.20E-11	2.37E-06
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-09	0.00E+00	6.71E-09	1.63E-08	0.00E+00	1.48E-09	2.56E-08
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-11	0.00E+00	1.71E-10	4.13E-10	0.00E+00	3.70E-11	6.50E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-13	2.06E-13	4.52E-09	4.28E-10	0.00E+00	3.30E-11	4.98E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-16	7.62E-15	3.58E-12	3.39E-13	0.00E+00	2.60E-14	3.95E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-07	1.65E-06	0.00E+00	2.80E-07	2.14E-06
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-14	4.39E-15	1.68E-13	3.36E-14	0.00E+00	7.23E-17	2.25E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-15	1.89E-13	2.27E-14	4.54E-15	0.00E+00	9.68E-18	2.19E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-13	1.63E-16	2.56E-12	4.61E-10	0.00E+00	1.80E-12	4.66E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-12	7.51E-18	1.65E-07	3.29E-07	0.00E+00	4.69E-08	5.41E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.54E-08	6.64E-12	1.72E-07	5.40E-06	0.00E+00	2.30E-11	5.64E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-06	5.35E-10	8.93E-06	2.81E-04	0.00E+00	1.19E-09	2.93E-04
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-06	4.01E-10	1.20E-05	3.76E-04	0.00E+00	1.60E-09	3.93E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-10	1.36E-10	1.27E-09	3.99E-08	0.00E+00	1.70E-13	4.18E-08
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-13	1.03E-13	5.56E-12	1.11E-13	0.00E+00	1.98E-13	6.19E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-19	1.03E-18	6.33E-18	1.27E-19	0.00E+00	2.25E-19	7.96E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-14	1.22E-14	9.74E-13	1.95E-14	0.00E+00	3.48E-14	1.08E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-13	1.83E-13	2.97E-12	5.93E-14	0.00E+00	1.07E-13	3.43E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-18	1.70E-18	9.52E-17	1.90E-18	0.00E+00	3.42E-18	1.06E-16
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-09	1.64E-09	8.10E-07	2.63E-08	0.00E+00	2.27E-08	8.64E-07
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-14	3.96E-15	1.19E-11	1.88E-10	0.00E+00	1.39E-12	2.01E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-14	3.93E-13	5.69E-14	9.31E-16	0.00E+00	4.21E-16	4.83E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-19	5.80E-18	1.45E-18	2.38E-20	0.00E+00	1.08E-20	8.09E-18
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-13	9.11E-14	4.87E-13	7.97E-15	0.00E+00	3.61E-15	8.57E-13

Table A-5: Estimated Radiation Dose for Harvester during Post-Closure - Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-13	1.79E-14	3.58E-13	5.85E-15	0.00E+00	2.65E-15	5.80E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-14	1.71E-11	9.58E-14	1.57E-15	0.00E+00	7.07E-16	1.73E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-18	9.45E-18	2.80E-18	4.59E-20	0.00E+00	2.08E-20	1.39E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-12	4.82E-12	3.62E-12	5.92E-14	0.00E+00	2.68E-14	1.05E-11
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-15	5.34E-17	1.43E-11	7.51E-14	0.00E+00	9.30E-13	1.53E-11
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-13	9.24E-17	3.64E-10	1.90E-12	0.00E+00	2.36E-11	3.89E-10
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-13	2.28E-13	5.13E-10	2.69E-12	0.00E+00	3.33E-11	5.50E-10
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-14	1.50E-17	1.03E-10	5.42E-13	0.00E+00	6.71E-12	1.11E-10
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-15	1.09E-13	4.05E-12	2.12E-14	0.00E+00	2.62E-13	4.44E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-12	2.90E-13	3.80E-09	1.99E-11	0.00E+00	2.47E-10	4.07E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-08	3.99E-10	0.00E+00	5.43E-10	2.45E-08
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**8.03E-06**	**1.76E-06**	**2.57E-05**	**6.84E-04**	**0.00E+00**	**1.75E-05**	**7.37E-04**
Infant_1y-Havester	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-16	4.18E-16	4.91E-14	1.07E-15	0.00E+00	4.07E-16	5.14E-14
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-14	2.47E-15	2.72E-12	5.91E-14	0.00E+00	2.25E-14	2.83E-12
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E-10	6.62E-08	1.10E-11	1.70E-10	0.00E+00	1.50E-11	6.69E-08
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.06E-12	1.00E-13	3.72E-12	1.38E-12	0.00E+00	3.61E-14	9.29E-12
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-13	6.95E-14	1.51E-13	5.61E-14	0.00E+00	1.47E-15	4.44E-13
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-13	2.28E-14	7.31E-14	4.04E-13	0.00E+00	4.12E-15	6.89E-13
	C-14	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-10	1.87E-12	2.10E-06	9.69E-06	0.00E+00	6.38E-06	1.82E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-13	0.00E+00	7.47E-11	1.93E-12	0.00E+00	1.64E-12	7.89E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-16	4.63E-17	2.46E-14	1.11E-13	0.00E+00	7.50E-14	2.10E-13
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-11	1.26E-09	1.84E-11	6.00E-12	0.00E+00	1.67E-12	1.30E-09
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-09	5.39E-07	3.85E-09	2.93E-07	0.00E+00	2.42E-06	3.26E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-28	2.42E-26	1.17E-25	1.45E-26	0.00E+00	3.66E-27	1.59E-25
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-30	4.13E-28	2.97E-27	3.69E-28	0.00E+00	9.31E-29	3.85E-27
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-20	0.00E+00	6.63E-19	2.46E-19	0.00E+00	2.16E-19	1.14E-18
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-21	0.00E+00	7.83E-19	2.25E-20	0.00E+00	2.81E-20	8.36E-19
	HTO	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.41E-07	2.59E-06	0.00E+00	1.17E-06	4.30E-06
	I-129	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.11E-11	9.27E-13	8.11E-11	3.28E-11	0.00E+00	1.25E-11	2.08E-10
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-08	1.68E-06	5.35E-07	6.40E-07	0.00E+00	1.15E-11	2.87E-06
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E-09	0.00E+00	9.06E-09	1.75E-08	0.00E+00	1.54E-09	3.20E-08
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E-11	0.00E+00	2.23E-10	4.32E-10	0.00E+00	3.74E-11	7.89E-10
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-13	2.67E-13	3.76E-09	2.84E-10	0.00E+00	2.12E-11	4.07E-09
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-16	9.90E-15	5.24E-12	3.96E-13	0.00E+00	2.93E-14	5.68E-12
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-07	1.18E-06	0.00E+00	1.94E-07	1.57E-06
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-14	5.70E-15	1.04E-13	1.65E-14	0.00E+00	3.44E-17	1.56E-13
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-15	2.45E-13	3.23E-14	5.15E-15	0.00E+00	1.06E-17	2.92E-13
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-13	2.12E-16	2.12E-12	3.04E-10	0.00E+00	1.15E-12	3.08E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-11	9.76E-18	2.43E-07	3.88E-07	0.00E+00	5.34E-08	6.85E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-07	8.61E-12	1.25E-07	3.14E-06	0.00E+00	1.29E-11	3.38E-06
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-06	6.95E-10	6.06E-06	1.52E-04	0.00E+00	6.25E-10	1.64E-04
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.86E-06	5.22E-10	8.12E-06	2.04E-04	0.00E+00	8.37E-10	2.20E-04
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-10	1.77E-10	6.19E-10	1.55E-08	0.00E+00	6.38E-14	1.69E-08
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-13	1.34E-13	5.93E-12	9.46E-14	0.00E+00	1.63E-13	6.91E-12
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-19	1.34E-18	7.02E-18	1.12E-19	0.00E+00	1.92E-19	9.36E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-13	1.58E-14	1.02E-12	1.63E-14	0.00E+00	2.81E-14	1.18E-12
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-13	2.38E-13	1.55E-12	2.48E-14	0.00E+00	4.31E-14	2.02E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.04E-18	2.21E-18	6.07E-17	9.69E-19	0.00E+00	1.68E-18	7.17E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-5: Estimated Radiation Dose for Harvester during Post-Closure - Maximum

Human Type	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-09	1.64E-09	4.30E-07	1.11E-08	0.00E+00	9.29E-09	4.56E-07
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-13	3.96E-15	1.92E-11	2.42E-10	0.00E+00	1.73E-12	2.63E-10
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-13	5.11E-13	7.56E-14	9.87E-16	0.00E+00	4.31E-16	6.93E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-18	7.52E-18	1.57E-18	2.04E-20	0.00E+00	8.94E-21	1.13E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-13	1.18E-13	3.43E-13	4.48E-15	0.00E+00	1.96E-15	9.46E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-13	2.32E-14	2.67E-13	3.48E-15	0.00E+00	1.52E-15	6.67E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-13	2.23E-11	1.41E-13	1.84E-15	0.00E+00	8.03E-16	2.26E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-18	1.23E-17	1.90E-18	2.48E-20	0.00E+00	1.08E-20	1.69E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-12	6.27E-12	5.34E-12	6.96E-14	0.00E+00	3.04E-14	1.91E-11
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-15	6.95E-17	1.12E-11	4.69E-14	0.00E+00	5.62E-13	1.19E-11
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-13	1.20E-16	2.79E-10	1.16E-12	0.00E+00	1.40E-11	2.94E-10
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-13	2.96E-13	4.10E-10	1.71E-12	0.00E+00	2.05E-11	4.33E-10
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-14	1.95E-17	8.39E-11	3.50E-13	0.00E+00	4.19E-12	8.85E-11
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-15	1.42E-13	5.96E-12	2.49E-14	0.00E+00	2.98E-13	6.43E-12
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.15E-12	3.77E-13	2.93E-09	1.22E-11	0.00E+00	1.46E-10	3.09E-09
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-08	4.71E-10	0.00E+00	6.19E-10	3.60E-08
	Total	**mSv/a**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.39E-05**	**2.29E-06**	**1.84E-05**	**3.74E-04**	**0.00E+00**	**1.02E-05**	**4.19E-04**

Table A-6: Estimated Radiation Dose for New On-site Farm Resident with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Adult	Ac-225	mSv/a	0.00E+00	0.00E+00	4.22E-09	1.47E-17	2.59E-22	1.13E-17	3.00E-18	5.25E-16	0.00E+00	3.03E-16	5.02E-17	6.25E-17	4.22E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	7.14E-07	3.09E-19	6.29E-18	9.11E-15	1.42E-16	9.96E-16	0.00E+00	1.43E-14	8.71E-15	6.23E-15	7.14E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.84E-04	6.92E-16	1.16E-19	3.37E-13	9.81E-17	1.43E-12	0.00E+00	1.30E-15	8.71E-16	1.75E-15	1.84E-04
	Am-241	mSv/a	0.00E+00	0.00E+00	9.63E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.63E-23
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	5.40E-07	5.70E-16	2.03E-20	1.26E-15	1.38E-15	2.89E-14	0.00E+00	1.16E-13	4.54E-16	1.26E-14	5.40E-07
	C-14	mSv/a	7.49E-12	8.61E-15	3.30E-01	4.79E-12	2.71E-14	1.36E-12	5.35E-12	2.85E-12	0.00E+00	6.97E-06	2.87E-06	3.64E-05	3.30E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.01E-04	0.00E+00	1.76E-16	0.00E+00	3.57E-16	0.00E+00	0.00E+00	4.30E-14	5.75E-12	2.49E-12	2.01E-04
	Cl-36	mSv/a	0.00E+00	0.00E+00	9.34E-08	4.99E-17	5.68E-19	1.57E-14	5.28E-19	3.10E-17	0.00E+00	1.42E-14	1.40E-12	6.20E-12	9.35E-08
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	1.31E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-17
	Cs-137	mSv/a	0.00E+00	0.00E+00	3.99E-06	0.00E+00	0.00E+00	0.00E+00	7.55E-07	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.98E-14	0.00E+00	1.44E-24	0.00E+00	1.13E-23	0.00E+00	0.00E+00	3.91E-21	2.06E-21	2.77E-21	3.98E-14
	HTO	mSv/a	9.76E-08	0.00E+00	1.84E+00	6.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-09	4.65E-07	8.75E-07	1.84E+00
	I-129	mSv/a	1.02E-13	9.50E-19	7.37E-04	1.12E-14	5.61E-15	4.10E-12	9.19E-13	4.79E-13	0.00E+00	1.43E-11	2.68E-11	6.92E-10	7.37E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.28E-02	1.26E-25	2.01E-29	7.27E-23	2.60E-28	4.65E-24	0.00E+00	5.24E-25	2.87E-26	2.25E-28	1.28E-02
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	8.26E-02	0.00E+00	2.00E-15	0.00E+00	2.16E-14	0.00E+00	0.00E+00	3.71E-12	3.87E-11	2.47E-11	8.26E-02
	Ni-63	mSv/a	0.00E+00	0.00E+00	9.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E-16
	Np-237	mSv/a	0.00E+00	0.00E+00	2.83E-03	6.00E-15	2.57E-15	2.04E-11	2.98E-16	1.08E-14	0.00E+00	1.02E-11	3.08E-12	6.56E-13	2.83E-03
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-09	7.73E-08	1.05E-07	1.86E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	4.61E-07	2.59E-18	7.12E-18	1.32E-14	2.92E-16	2.30E-15	0.00E+00	6.18E-15	1.19E-14	2.56E-16	4.61E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.99E-08	6.08E-17	1.24E-22	1.11E-16	1.69E-18	7.19E-15	0.00E+00	3.59E-17	1.60E-17	9.19E-19	2.99E-08
	Pb-210	mSv/a	0.00E+00	0.00E+00	7.17E-06	6.78E-18	2.75E-16	6.13E-14	4.74E-15	2.69E-16	0.00E+00	1.25E-10	6.13E-12	9.20E-12	7.17E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	1.29E-01	4.48E-16	1.34E-13	3.81E-15	8.59E-14	1.24E-17	0.00E+00	1.13E-07	4.98E-08	1.15E-07	1.29E-01
	Pu-238	mSv/a	0.00E+00	0.00E+00	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.72E+00	7.80E-17	3.59E-14	1.68E-13	6.63E-11	3.01E-13	0.00E+00	6.64E-08	2.45E-12	1.34E-12	1.72E+00
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.79E+00	1.93E-19	8.67E-17	8.61E-16	1.60E-13	4.08E-16	0.00E+00	1.61E-10	5.93E-15	3.25E-15	1.79E+00
	Pu-241	mSv/a	0.00E+00	0.00E+00	9.30E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.30E-21
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.10E-06	3.47E-16	2.15E-20	2.51E-16	9.49E-16	5.40E-14	0.00E+00	5.87E-15	4.01E-14	2.03E-14	1.10E-06
	Ra-224	mSv/a	0.00E+00	0.00E+00	1.38E-12	8.18E-21	2.79E-26	2.55E-21	3.84E-21	1.70E-18	0.00E+00	2.37E-20	6.50E-20	4.53E-20	1.38E-12
	Ra-225	mSv/a	0.00E+00	0.00E+00	1.49E-07	1.12E-17	1.36E-20	1.50E-16	4.61E-16	1.98E-14	0.00E+00	2.85E-15	2.32E-14	1.10E-14	1.49E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	6.67E-07	3.20E-16	4.49E-17	1.12E-12	2.52E-15	3.02E-13	0.00E+00	1.56E-14	4.20E-13	1.33E-13	6.67E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	1.47E-11	6.53E-21	1.61E-22	2.30E-18	4.08E-20	2.81E-18	0.00E+00	2.52E-19	5.08E-18	1.68E-18	1.47E-11
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	6.89E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.89E-03
	Tc-99	mSv/a	0.00E+00	0.00E+00	9.19E-04	5.77E-15	1.09E-17	2.52E-15	6.54E-17	2.83E-16	0.00E+00	2.99E-12	1.21E-11	1.23E-11	9.19E-04
	Th-227	mSv/a	0.00E+00	0.00E+00	1.06E-08	1.58E-17	3.39E-22	6.14E-17	2.35E-16	2.06E-13	0.00E+00	8.48E-17	5.26E-18	3.45E-17	1.06E-08
	Th-228	mSv/a	0.00E+00	0.00E+00	3.32E-13	2.07E-22	1.26E-24	1.04E-19	2.37E-20	9.60E-18	0.00E+00	8.57E-21	1.14E-21	5.16E-21	3.32E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	1.62E-07	9.35E-18	8.96E-18	2.60E-14	1.29E-14	1.48E-13	0.00E+00	4.66E-15	1.38E-15	3.13E-15	1.62E-07
	Th-230	mSv/a	0.00E+00	0.00E+00	1.10E-07	7.98E-20	7.39E-18	4.36E-15	1.06E-14	2.95E-14	0.00E+00	3.83E-15	1.13E-15	2.58E-15	1.10E-07

Table A-6: Estimated Radiation Dose for New On-site Farm Resident with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-231	mSv/a	0.00E+00	0.00E+00	7.53E-09	1.05E-18	9.74E-25	3.98E-18	1.18E-17	2.24E-13	0.00E+00	4.28E-18	2.48E-20	4.41E-19	7.53E-09
	Th-232	mSv/a	0.00E+00	0.00E+00	1.06E-12	5.87E-25	5.26E-23	2.25E-18	7.55E-20	1.56E-17	0.00E+00	2.73E-20	8.06E-21	1.83E-20	1.06E-12
	Th-234	mSv/a	0.00E+00	0.00E+00	5.78E-07	3.01E-17	1.52E-21	2.14E-16	8.19E-16	1.16E-13	0.00E+00	2.96E-16	2.09E-17	1.30E-16	5.78E-07
	U-233	mSv/a	0.00E+00	0.00E+00	3.55E-06	5.69E-18	1.24E-16	1.92E-14	5.11E-17	2.69E-17	0.00E+00	1.12E-14	1.20E-13	1.63E-12	3.55E-06
	U-234	mSv/a	0.00E+00	0.00E+00	1.07E-04	7.92E-18	3.75E-16	1.85E-14	1.55E-16	5.49E-18	0.00E+00	3.39E-14	3.62E-13	4.94E-12	1.07E-04
	U-235	mSv/a	0.00E+00	0.00E+00	1.46E-04	3.32E-15	1.47E-16	2.00E-12	6.04E-17	3.74E-15	0.00E+00	1.33E-14	1.41E-13	1.93E-12	1.46E-04
	U-236	mSv/a	0.00E+00	0.00E+00	6.74E-05	2.78E-18	1.98E-16	8.75E-15	8.15E-17	1.63E-18	0.00E+00	1.79E-14	1.91E-13	2.60E-12	6.74E-05
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	1.07E-03	1.28E-16	9.72E-16	1.04E-11	4.00E-16	4.27E-15	0.00E+00	8.79E-14	9.36E-13	1.28E-11	1.07E-03
	Y-90	mSv/a	0.00E+00	0.00E+00	3.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-06
	Total	**mSv/a**	**9.76E-08**	**8.61E-15**	**5.92E+00**	**6.50E-08**	**2.09E-13**	**4.00E-11**	**7.55E-07**	**3.19E-03**	**0.00E+00**	**7.16E-06**	**3.46E-06**	**3.75E-05**	**5.92E+00**
Child-10y	Ac-225	mSv/a	0.00E+00	0.00E+00	3.78E-09	1.47E-17	8.01E-21	1.13E-17	9.28E-17	5.25E-16	0.00E+00	4.78E-16	7.36E-17	1.07E-16	3.78E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	3.88E-07	3.09E-19	1.18E-16	9.11E-15	2.67E-15	9.96E-16	0.00E+00	1.37E-14	7.74E-15	6.39E-15	3.88E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	1.37E-04	6.92E-16	2.98E-18	3.37E-13	2.52E-15	1.43E-12	0.00E+00	1.71E-15	1.06E-15	4.84E-15	1.37E-04
	Am-241	mSv/a	0.00E+00	0.00E+00	4.22E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.22E-23
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	4.80E-07	5.70E-16	6.21E-19	1.26E-15	4.22E-14	2.89E-14	0.00E+00	1.82E-13	6.59E-16	1.62E-14	4.80E-07
	C-14	mSv/a	1.07E-11	8.61E-15	1.81E-01	4.79E-12	5.14E-13	1.36E-12	1.01E-10	2.85E-12	0.00E+00	6.76E-06	2.58E-06	4.32E-05	1.81E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	2.03E-04	0.00E+00	6.11E-15	0.00E+00	1.24E-14	0.00E+00	0.00E+00	7.62E-14	9.43E-12	9.04E-12	2.03E-04
	Cl-36	mSv/a	0.00E+00	0.00E+00	7.60E-08	4.99E-17	1.60E-17	1.57E-14	1.48E-17	3.10E-17	0.00E+00	2.04E-14	1.86E-12	1.81E-11	7.60E-08
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	1.68E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-17
	Cs-137	mSv/a	0.00E+00	0.00E+00	1.22E-06	0.00E+00	0.00E+00	0.00E+00	7.98E-06	3.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	2.05E-14	0.00E+00	2.56E-23	0.00E+00	2.00E-22	0.00E+00	0.00E+00	3.55E-21	1.73E-21	1.98E-21	2.05E-14
	HTO	mSv/a	1.16E-07	0.00E+00	9.18E-01	5.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-09	3.78E-07	1.49E-06	9.18E-01
	I-129	mSv/a	1.72E-13	9.50E-19	5.07E-04	1.12E-14	1.33E-13	4.10E-12	2.18E-11	4.79E-13	0.00E+00	1.74E-11	3.01E-11	1.57E-09	5.07E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.02E-02	1.26E-25	5.53E-28	7.27E-23	7.14E-27	4.65E-24	0.00E+00	7.37E-25	3.74E-26	2.95E-28	1.02E-02
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	5.74E-02	0.00E+00	4.81E-14	0.00E+00	5.20E-13	0.00E+00	0.00E+00	4.55E-12	4.38E-11	4.21E-11	5.74E-02
	Ni-63	mSv/a	0.00E+00	0.00E+00	7.02E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.02E-16
	Np-237	mSv/a	0.00E+00	0.00E+00	1.13E-03	6.00E-15	3.53E-14	2.04E-11	4.09E-15	1.08E-14	0.00E+00	7.17E-12	2.01E-12	2.80E-13	1.13E-03
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-09	6.86E-08	1.26E-07	1.98E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.38E-07	2.59E-18	1.27E-16	1.32E-14	5.20E-15	2.30E-15	0.00E+00	5.62E-15	1.00E-14	3.52E-16	2.38E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	2.60E-08	6.08E-17	3.73E-21	1.11E-16	5.09E-17	7.19E-15	0.00E+00	5.50E-17	2.28E-17	2.10E-18	2.60E-08
	Pb-210	mSv/a	0.00E+00	0.00E+00	7.85E-06	6.78E-18	1.04E-14	6.13E-14	1.80E-13	2.69E-16	0.00E+00	2.42E-10	1.10E-11	1.88E-11	7.85E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	1.11E-01	4.48E-16	3.99E-12	3.81E-15	2.56E-12	1.24E-17	0.00E+00	1.73E-07	7.04E-08	1.26E-07	1.11E-01
	Pu-238	mSv/a	0.00E+00	0.00E+00	6.05E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.05E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	7.37E-01	7.80E-17	5.33E-13	1.68E-13	9.85E-10	3.01E-13	0.00E+00	5.03E-08	1.73E-12	2.26E-12	7.37E-01
	Pu-240	mSv/a	0.00E+00	0.00E+00	7.70E-01	1.93E-19	1.29E-15	8.61E-16	2.38E-12	4.08E-16	0.00E+00	1.22E-10	4.18E-15	5.48E-15	7.70E-01
	Pu-241	mSv/a	0.00E+00	0.00E+00	3.93E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-21
	Ra-223	mSv/a	0.00E+00	0.00E+00	1.97E-06	3.47E-16	1.33E-18	2.51E-16	5.87E-14	5.40E-14	0.00E+00	1.85E-14	1.18E-13	9.44E-14	1.97E-06
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.20E-12	8.18E-21	1.53E-24	2.55E-21	2.11E-19	1.70E-18	0.00E+00	6.66E-20	1.69E-19	1.94E-19	2.20E-12

Table A-6: Estimated Radiation Dose for New On-site Farm Resident with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.00E-07	1.12E-17	9.47E-19	1.50E-16	3.20E-14	1.98E-14	0.00E+00	1.01E-14	7.63E-14	5.73E-14	3.00E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	7.59E-07	3.20E-16	1.76E-15	1.12E-12	9.89E-14	3.02E-13	0.00E+00	3.12E-14	7.80E-13	3.88E-13	7.59E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.30E-11	6.53E-21	1.25E-20	2.30E-18	3.17E-18	2.81E-18	0.00E+00	1.00E-18	1.87E-17	9.66E-18	3.30E-11
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	5.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-03
	Tc-99	mSv/a	0.00E+00	0.00E+00	7.43E-04	5.77E-15	3.04E-16	2.52E-15	1.83E-15	2.83E-16	0.00E+00	4.27E-12	1.60E-11	1.99E-11	7.43E-04
	Th-227	mSv/a	0.00E+00	0.00E+00	1.10E-08	1.58E-17	1.22E-20	6.14E-17	8.43E-15	2.06E-13	0.00E+00	1.56E-16	8.95E-18	6.43E-17	1.10E-08
	Th-228	mSv/a	0.00E+00	0.00E+00	2.75E-13	2.07E-22	3.61E-23	1.04E-19	6.80E-19	9.60E-18	0.00E+00	1.25E-20	1.54E-21	7.61E-21	2.75E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	8.18E-08	9.35E-18	1.56E-16	2.60E-14	2.24E-13	1.48E-13	0.00E+00	4.14E-15	1.13E-15	2.86E-15	8.18E-08
	Th-230	mSv/a	0.00E+00	0.00E+00	5.00E-08	7.98E-20	1.16E-16	4.36E-15	1.67E-13	2.95E-14	0.00E+00	3.08E-15	8.42E-16	2.13E-15	5.00E-08
	Th-231	mSv/a	0.00E+00	0.00E+00	6.52E-09	1.05E-18	2.91E-23	3.98E-18	3.54E-16	2.24E-13	0.00E+00	6.54E-18	3.52E-20	7.42E-19	6.52E-09
	Th-232	mSv/a	0.00E+00	0.00E+00	5.31E-13	5.87E-25	9.11E-22	2.25E-18	1.31E-18	1.56E-17	0.00E+00	2.41E-20	6.61E-21	1.67E-20	5.31E-13
	Th-234	mSv/a	0.00E+00	0.00E+00	5.00E-07	3.01E-17	4.56E-20	2.14E-16	2.45E-14	1.16E-13	0.00E+00	4.52E-16	2.96E-17	2.02E-16	5.00E-07
	U-233	mSv/a	0.00E+00	0.00E+00	2.16E-06	5.69E-18	2.61E-15	1.92E-14	1.07E-15	2.69E-17	0.00E+00	1.21E-14	1.19E-13	2.70E-12	2.16E-06
	U-234	mSv/a	0.00E+00	0.00E+00	6.41E-05	7.92E-18	7.80E-15	1.85E-14	3.21E-15	5.49E-18	0.00E+00	3.60E-14	3.55E-13	8.07E-12	6.41E-05
	U-235	mSv/a	0.00E+00	0.00E+00	8.78E-05	3.32E-15	3.05E-15	2.00E-12	1.26E-15	3.74E-15	0.00E+00	1.41E-14	1.39E-13	3.16E-12	8.78E-05
	U-236	mSv/a	0.00E+00	0.00E+00	4.00E-05	2.78E-18	4.05E-15	8.75E-15	1.67E-15	1.63E-18	0.00E+00	1.87E-14	1.85E-13	4.20E-12	4.00E-05
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	6.45E-04	1.28E-16	2.02E-14	1.04E-11	8.32E-15	4.27E-15	0.00E+00	9.33E-14	9.21E-13	2.09E-11	6.45E-04
	Y-90	mSv/a	0.00E+00	0.00E+00	3.41E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-06
	Total	**mSv/a**	**1.16E-07**	**8.61E-15**	**2.79E+00**	**5.41E-08**	**5.31E-12**	**4.00E-11**	**7.99E-06**	**3.19E-03**	**0.00E+00**	**6.99E-06**	**3.10E-06**	**4.49E-05**	**2.80E+00**
	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	2.35E-16	1.94E-15
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	8.71E-15	4.45E-14
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	1.24E-14	2.32E-12
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	3.17E-14	4.41E-13
	C-14	mSv/a	7.29E-12	8.61E-15	0.00E+00	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	6.78E-05	7.47E-05
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	9.87E-12	1.36E-11
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	6.00E-11	6.22E-11
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	2.59E-21	7.43E-21
	HTO	mSv/a	8.00E-08	0.00E+00	0.00E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	3.11E-06	3.51E-06
	I-129	mSv/a	6.53E-14	1.24E-18	0.00E+00	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	1.78E-09	1.84E-09
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	4.73E-28	1.01E-22
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-10	1.71E-10
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	2.89E-13	3.32E-11
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-6: Estimated Radiation Dose for New On-site Farm Resident with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Infant_1y	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	2.06E-07	2.57E-07
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.40E-16	3.69E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.01E-18	9.79E-15
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	2.61E-11	1.94E-10
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	1.97E-07	4.99E-07
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	3.59E-12	2.90E-08
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	8.68E-15	7.01E-11
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	2.10E-13	5.74E-13
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	4.54E-19	3.51E-18
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	1.25E-13	3.20E-13
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	4.23E-13	2.78E-12
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	1.28E-17	3.62E-17
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	5.42E-11	8.37E-11
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	1.34E-16	2.97E-13
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	1.27E-20	1.45E-17
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	3.22E-15	6.34E-13
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	2.54E-15	3.65E-13
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	1.84E-18	2.93E-13
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	1.81E-20	2.55E-17
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	4.64E-16	2.43E-13
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.25E-12	4.38E-12
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.24E-11	1.27E-11
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	5.07E-12	7.79E-12
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.83E-12	7.00E-12
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.23E-11	4.66E-11
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**0.00E+00**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**7.13E-05**	**4.23E-03**
	Ac-225	mSv/a	0.00E+00	0.00E+00	8.25E-09	3.64E-18	2.96E-20	1.47E-17	3.43E-16	6.82E-16	0.00E+00	5.55E-16	1.01E-16	7.57E-17	8.25E-09
	Ac-227	mSv/a	0.00E+00	0.00E+00	5.25E-07	7.66E-20	2.70E-16	1.18E-14	6.11E-15	1.29E-15	0.00E+00	9.89E-15	6.38E-15	2.85E-15	5.25E-07
	Ag-108m	mSv/a	0.00E+00	0.00E+00	2.30E-04	1.71E-16	8.46E-18	4.37E-13	7.15E-15	1.86E-12	0.00E+00	1.52E-15	1.12E-15	3.64E-16	2.30E-04
	Am-241	mSv/a	0.00E+00	0.00E+00	4.64E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-23
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	1.05E-06	1.41E-16	2.31E-18	1.63E-15	1.57E-13	3.76E-14	0.00E+00	2.13E-13	9.10E-16	1.23E-14	1.05E-06
	C-14	mSv/a	7.29E-12	8.61E-15	2.37E-01	9.13E-13	1.14E-12	1.36E-12	2.25E-10	2.85E-12	0.00E+00	4.71E-06	2.13E-06	1.18E-05	2.37E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	1.44E-04	0.00E+00	7.34E-15	0.00E+00	1.49E-14	0.00E+00	0.00E+00	2.88E-14	3.70E-12	2.09E-13	1.44E-04
	Cl-36	mSv/a	0.00E+00	0.00E+00	1.65E-07	9.51E-18	5.87E-17	1.56E-14	5.46E-17	3.09E-17	0.00E+00	2.35E-14	2.12E-12	1.81E-12	1.65E-07
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	2.70E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-17
	Cs-137	mSv/a	0.00E+00	0.00E+00	9.61E-07	0.00E+00	0.00E+00	0.00E+00	1.06E-05	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-03
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table A-6: Estimated Radiation Dose for New On-site Farm Resident with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
Infant_1y-Formula	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	3.04E-14	0.00E+00	6.44E-23	0.00E+00	5.03E-22	0.00E+00	0.00E+00	2.80E-21	1.47E-21	1.02E-21	3.04E-14
	HTO	mSv/a	8.00E-08	0.00E+00	1.27E+00	1.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-09	3.08E-07	1.21E-07	1.27E+00
	I-129	mSv/a	6.53E-14	1.24E-18	3.84E-04	2.78E-15	1.71E-13	5.33E-12	2.80E-11	6.23E-13	0.00E+00	7.01E-12	1.37E-11	5.79E-11	3.84E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	1.90E-02	3.13E-26	1.75E-27	9.45E-23	2.26E-26	6.05E-24	0.00E+00	7.32E-25	3.99E-26	1.89E-28	1.90E-02
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	1.16E-01	0.00E+00	1.65E-13	0.00E+00	1.78E-12	0.00E+00	0.00E+00	4.90E-12	4.97E-11	1.14E-11	1.16E-01
	Ni-63	mSv/a	0.00E+00	0.00E+00	1.38E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-15
	Np-237	mSv/a	0.00E+00	0.00E+00	1.41E-03	1.49E-15	7.48E-14	2.65E-11	8.66E-15	1.41E-14	0.00E+00	4.77E-12	1.53E-12	1.26E-13	1.41E-03
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	4.86E-08	3.45E-08	8.54E-08
	Pa-231	mSv/a	0.00E+00	0.00E+00	2.20E-07	6.42E-19	1.99E-16	1.71E-14	8.14E-15	3.00E-15	0.00E+00	2.77E-15	5.24E-15	4.25E-17	2.20E-07
	Pa-233	mSv/a	0.00E+00	0.00E+00	5.55E-08	1.51E-17	1.35E-20	1.44E-16	1.84E-16	9.35E-15	0.00E+00	6.26E-17	3.06E-17	6.11E-19	5.55E-08
	Pb-210	mSv/a	0.00E+00	0.00E+00	9.74E-06	1.68E-18	2.19E-14	7.97E-14	3.77E-13	3.50E-16	0.00E+00	1.60E-10	7.86E-12	5.65E-12	9.74E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	2.46E-01	1.11E-16	1.50E-11	4.95E-15	9.61E-12	1.61E-17	0.00E+00	2.04E-07	9.82E-08	9.84E-08	2.46E-01
	Pu-238	mSv/a	0.00E+00	0.00E+00	6.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E-08
	Pu-239	mSv/a	0.00E+00	0.00E+00	7.51E-01	1.93E-17	9.20E-13	2.19E-13	1.70E-09	3.91E-13	0.00E+00	2.73E-08	1.10E-12	7.40E-14	7.51E-01
	Pu-240	mSv/a	0.00E+00	0.00E+00	7.84E-01	4.77E-20	2.22E-15	1.12E-15	4.11E-12	5.30E-16	0.00E+00	6.60E-11	2.66E-15	1.79E-16	7.84E-01
	Pu-241	mSv/a	0.00E+00	0.00E+00	2.88E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-21
	Ra-223	mSv/a	0.00E+00	0.00E+00	3.15E-06	8.58E-17	3.61E-18	3.27E-16	1.59E-13	7.01E-14	0.00E+00	1.58E-14	1.19E-13	1.43E-14	3.15E-06
	Ra-224	mSv/a	0.00E+00	0.00E+00	3.65E-12	2.03E-21	4.32E-24	3.32E-21	5.94E-19	2.22E-18	0.00E+00	5.89E-20	1.78E-19	2.79E-20	3.65E-12
	Ra-225	mSv/a	0.00E+00	0.00E+00	4.71E-07	2.78E-18	2.52E-18	1.95E-16	8.53E-14	2.58E-14	0.00E+00	8.46E-15	7.55E-14	8.61E-15	4.71E-07
	Ra-226	mSv/a	0.00E+00	0.00E+00	5.96E-07	7.92E-17	2.35E-15	1.45E-12	1.32E-13	3.93E-13	0.00E+00	1.30E-14	3.66E-13	2.93E-14	5.96E-07
	Ra-228	mSv/a	0.00E+00	0.00E+00	3.16E-11	1.62E-21	2.03E-20	2.99E-18	5.14E-18	3.66E-18	0.00E+00	5.10E-19	1.11E-17	9.08E-19	3.16E-11
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	4.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-03
	Tc-99	mSv/a	0.00E+00	0.00E+00	1.80E-03	1.10E-15	1.25E-15	2.52E-15	7.48E-15	2.83E-16	0.00E+00	5.49E-12	2.39E-11	9.64E-12	1.80E-03
	Th-227	mSv/a	0.00E+00	0.00E+00	2.19E-08	3.91E-18	4.11E-20	8.00E-17	2.85E-14	2.68E-13	0.00E+00	1.65E-16	1.12E-17	3.49E-17	2.19E-08
	Th-228	mSv/a	0.00E+00	0.00E+00	4.45E-13	5.14E-23	9.88E-23	1.36E-19	1.86E-18	1.25E-17	0.00E+00	1.08E-20	1.55E-21	3.39E-21	4.45E-13
	Th-229	mSv/a	0.00E+00	0.00E+00	8.64E-08	2.31E-18	2.79E-16	3.39E-14	4.01E-13	1.93E-13	0.00E+00	2.32E-15	6.79E-16	7.91E-16	8.64E-08
	Th-230	mSv/a	0.00E+00	0.00E+00	5.59E-08	1.98E-20	2.20E-16	5.66E-15	3.16E-13	3.83E-14	0.00E+00	1.83E-15	5.35E-16	6.23E-16	5.59E-08
	Th-231	mSv/a	0.00E+00	0.00E+00	1.44E-08	2.61E-19	1.09E-22	5.17E-18	1.33E-15	2.92E-13	0.00E+00	7.69E-18	4.90E-20	3.84E-19	1.44E-08
	Th-232	mSv/a	0.00E+00	0.00E+00	5.39E-13	1.46E-25	1.57E-21	2.92E-18	2.25E-18	2.03E-17	0.00E+00	1.30E-20	3.81E-21	4.44E-21	5.39E-13
	Th-234	mSv/a	0.00E+00	0.00E+00	1.11E-06	7.45E-18	1.71E-19	2.79E-16	9.18E-14	1.50E-13	0.00E+00	5.32E-16	4.12E-17	1.22E-16	1.11E-06
	U-233	mSv/a	0.00E+00	0.00E+00	2.54E-06	1.41E-18	5.20E-15	2.50E-14	2.14E-15	3.50E-17	0.00E+00	7.54E-15	8.40E-14	4.18E-13	2.54E-06
	U-234	mSv/a	0.00E+00	0.00E+00	7.37E-05	1.96E-18	1.52E-14	2.41E-14	6.25E-15	7.14E-18	0.00E+00	2.20E-14	2.45E-13	1.22E-12	7.37E-05
	U-235	mSv/a	0.00E+00	0.00E+00	1.05E-04	8.21E-16	6.19E-15	2.60E-12	2.55E-15	4.87E-15	0.00E+00	8.98E-15	1.00E-13	4.98E-13	1.05E-04
	U-236	mSv/a	0.00E+00	0.00E+00	4.86E-05	6.90E-19	8.35E-15	1.14E-14	3.44E-15	2.11E-18	0.00E+00	1.21E-14	1.35E-13	6.72E-13	4.86E-05
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	7.46E-04	3.17E-17	3.95E-14	1.35E-11	1.63E-14	5.55E-15	0.00E+00	5.73E-14	6.39E-13	3.18E-12	7.46E-04
	Y-90	mSv/a	0.00E+00	0.00E+00	7.57E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.57E-06
	Total	**mSv/a**	**8.00E-08**	**8.61E-15**	**3.44E+00**	**1.42E-08**	**1.75E-11**	**5.16E-11**	**1.06E-05**	**4.14E-03**	**0.00E+00**	**4.95E-06**	**2.59E-06**	**1.21E-05**	**3.44E+00**

Table A-7: Estimated Radiation Dose for New On-site Farm Resident 3-month-old with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
3mo.-Nursing Infant	Ac-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-11	6.98E-11
	Ac-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-08	1.85E-08
	Ag-108m	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-05	1.31E-05
	Am-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.37E-26	6.37E-26
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-08	1.08E-08
	C-14	mSv/a	3.07E-12	8.61E-15	0.00E+00	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-04	5.39E-04
	Ca-41	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04	1.08E-04
	Cl-36	mSv/a	0.00E+00	0.00E+00	0.00E+00	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.49E-07	4.49E-07
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-17	1.10E-17
	Cs-137	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-06	2.66E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-15	1.72E-15
	HTO	mSv/a	4.42E-08	0.00E+00	0.00E+00	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.73E+00	2.73E+00
	I-129	mSv/a	2.34E-14	1.24E-18	0.00E+00	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-04	6.09E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-05	4.87E-05
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-03	4.97E-03
	Ni-63	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-17	5.96E-17
	Np-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-06	3.30E-06
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-01	2.13E-01
	Pa-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-14
	Pa-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-16
	Pb-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-06	2.37E-06
	Po-210	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.69E-02	2.69E-02
	Pu-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-11	9.38E-11
	Pu-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-03	1.07E-03
	Pu-240	mSv/a	0.00E+00	0.00E+00	0.00E+00	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-03	1.11E-03
	Pu-241	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-24	4.01E-24
	Ra-223	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.32E-08	9.32E-08
	Ra-224	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.19E-14	9.19E-14
	Ra-225	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-08	1.72E-08
	Ra-226	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-08	1.80E-08
	Ra-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-12	1.03E-12
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-03	4.81E-03
	Tc-99	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-04	2.48E-04
	Th-227	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-10	1.29E-10
	Th-228	mSv/a	0.00E+00	0.00E+00	0.00E+00	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.10E-15	6.10E-15
	Th-229	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-09	1.30E-09
	Th-230	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.67E-10	7.67E-10
	Th-231	mSv/a	0.00E+00	0.00E+00	0.00E+00	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-11	3.09E-11
	Th-232	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.56E-15	7.56E-15
	Th-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-09	2.43E-09
	U-233	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-08	4.24E-08
	U-234	mSv/a	0.00E+00	0.00E+00	0.00E+00	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-06	1.29E-06

Table A-7: Estimated Radiation Dose for New On-site Farm Resident 3-month-old with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	U-235	mSv/a	0.00E+00	0.00E+00	0.00E+00	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-06	1.74E-06
	U-236	mSv/a	0.00E+00	0.00E+00	0.00E+00	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-07	8.05E-07
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	0.00E+00	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-05	1.20E-05
	Y-90	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E-08	3.22E-08
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**0.00E+00**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.98E+00**	**2.98E+00**
3mo - Formula	Ac-225	mSv/a	0.00E+00	0.00E+00	2.81E-08	3.64E-18	4.72E-20	1.47E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-08
	Ac-227	mSv/a	0.00E+00	0.00E+00	7.46E-06	7.66E-20	1.79E-15	1.18E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.46E-06
	Ag-108m	mSv/a	0.00E+00	0.00E+00	3.07E-04	1.71E-16	5.27E-18	4.37E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-04
	Am-241	mSv/a	0.00E+00	0.00E+00	6.20E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-22
	Am-243	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Bi-210	mSv/a	0.00E+00	0.00E+00	2.17E-06	1.41E-16	2.22E-18	1.63E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-06
	C-14	mSv/a	3.07E-12	8.61E-15	2.77E-01	9.13E-13	6.21E-13	1.36E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-01
	Ca-41	mSv/a	0.00E+00	0.00E+00	4.43E-04	0.00E+00	1.05E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.43E-04
	Cl-36	mSv/a	0.00E+00	0.00E+00	3.43E-07	9.51E-18	5.69E-17	1.56E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-07
	Cm-244	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Co-60	mSv/a	0.00E+00	0.00E+00	7.22E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.22E-17
	Cs-137	mSv/a	0.00E+00	0.00E+00	2.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-06
	Eu-152	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-154	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Eu-155	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fe-55	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Gd-152	mSv/a	0.00E+00	0.00E+00	4.05E-13	0.00E+00	4.01E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-13
	HTO	mSv/a	4.42E-08	0.00E+00	2.25E+00	1.15E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E+00
	I-129	mSv/a	2.34E-14	1.24E-18	4.20E-04	2.78E-15	8.72E-14	5.33E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-04
	Nb-94	mSv/a	0.00E+00	0.00E+00	3.92E-02	3.13E-26	1.69E-27	9.45E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-02
	Nd-144	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Ni-59	mSv/a	0.00E+00	0.00E+00	2.92E-01	0.00E+00	1.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-01
	Ni-63	mSv/a	0.00E+00	0.00E+00	3.51E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-15
	Np-237	mSv/a	0.00E+00	0.00E+00	1.79E-02	1.49E-15	4.44E-13	2.65E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-02
	Np-239	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	OBT	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Pa-231	mSv/a	0.00E+00	0.00E+00	3.16E-06	6.42E-19	1.33E-15	1.71E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-06
	Pa-233	mSv/a	0.00E+00	0.00E+00	1.16E-07	1.51E-17	1.32E-20	1.44E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-07
	Pb-210	mSv/a	0.00E+00	0.00E+00	3.04E-05	1.68E-18	3.18E-14	7.97E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.04E-05
	Po-210	mSv/a	0.00E+00	0.00E+00	9.72E-01	1.11E-16	2.76E-11	4.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.72E-01
	Pu-238	mSv/a	0.00E+00	0.00E+00	8.82E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-07
	Pu-239	mSv/a	0.00E+00	0.00E+00	1.00E+01	1.93E-17	5.73E-12	2.19E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+01
	Pu-240	mSv/a	0.00E+00	0.00E+00	1.05E+01	4.77E-20	1.38E-14	1.12E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E+01
	Pu-241	mSv/a	0.00E+00	0.00E+00	3.78E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-20
	Ra-223	mSv/a	0.00E+00	0.00E+00	2.02E-05	8.58E-17	1.08E-17	3.27E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-05
	Ra-224	mSv/a	0.00E+00	0.00E+00	2.00E-11	2.03E-21	1.10E-23	3.32E-21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-11
	Ra-225	mSv/a	0.00E+00	0.00E+00	3.72E-06	2.78E-18	9.29E-18	1.95E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-06
	Ra-226	mSv/a	0.00E+00	0.00E+00	3.90E-06	7.92E-17	7.15E-15	1.45E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E-06
	Ra-228	mSv/a	0.00E+00	0.00E+00	2.24E-10	1.62E-21	6.73E-20	2.99E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-10
	Rn-222	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sm-148	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Sr-90	mSv/a	0.00E+00	0.00E+00	1.97E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-02
	Tc-99	mSv/a	0.00E+00	0.00E+00	5.00E-03	1.10E-15	1.62E-15	2.52E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03
	Th-227	mSv/a	0.00E+00	0.00E+00	1.25E-07	3.91E-18	1.10E-19	8.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-07
	Th-228	mSv/a	0.00E+00	0.00E+00	5.94E-12	5.14E-23	6.15E-22	1.36E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-12
	Th-229	mSv/a	0.00E+00	0.00E+00	1.27E-06	2.31E-18	1.91E-15	3.39E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-06

Table A-7: Estimated Radiation Dose for New On-site Farm Resident 3-month-old with a Groundwater Well during Post-Closure - Maximum

HumanType	Radionuclide	Unit	Air (internal)	Air (external)	Water (internal)	Water (external)	Soil (internal)	Soil (external)	Sediment (internal)	Sediment (external)	Aquatic plants	Aquatic animals	Terrestrial plants	Terrestrial animals	Total
	Th-230	mSv/a	0.00E+00	0.00E+00	7.47E-07	1.98E-20	1.37E-15	5.66E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-07
	Th-231	mSv/a	0.00E+00	0.00E+00	3.00E-08	2.61E-19	1.06E-22	5.17E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-08
	Th-232	mSv/a	0.00E+00	0.00E+00	7.36E-12	1.46E-25	9.99E-21	2.92E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-12
	Th-234	mSv/a	0.00E+00	0.00E+00	2.36E-06	7.45E-18	1.70E-19	2.79E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-06
	U-233	mSv/a	0.00E+00	0.00E+00	9.22E-06	1.41E-18	8.79E-15	2.50E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.22E-06
	U-234	mSv/a	0.00E+00	0.00E+00	2.80E-04	1.96E-18	2.69E-14	2.41E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-04
	U-235	mSv/a	0.00E+00	0.00E+00	3.78E-04	8.21E-16	1.04E-14	2.60E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-04
	U-236	mSv/a	0.00E+00	0.00E+00	1.75E-04	6.90E-19	1.40E-14	1.14E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-04
	U-237	mSv/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	U-238	mSv/a	0.00E+00	0.00E+00	2.82E-03	3.17E-17	6.98E-14	1.35E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-03
	Y-90	mSv/a	0.00E+00	0.00E+00	1.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-05
	Total	**mSv/a**	**4.42E-08**	**8.61E-15**	**2.44E+01**	**1.15E-08**	**3.48E-11**	**5.16E-11**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.44E+01**