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EXPOSURE SCENARIOS & UNIT FACTORS FOR THE HANFORD TANK WASTE PERFORMANCE ASSESSMENT [SEC 3 OF 3] [APPENDIX D PAGE D-1 THRU APPENDIX G PAGE G-14]

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This document was too large to scan as a single document. It has been divided into smaller sections.

SECTION 3

Document Information			
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APPENDIX D

UNIT FACTORS BY PATHWAY FOR SELECTED EXPOSURE SCENARIOS

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Unit Factors by Pathway for Selected Exposure Scenarios

In this appendix, the contributions from each pathway to the unit dose, unit hazard index, and unit incremental cancer risk factors are shown in tables. The order follows the exposure scenario presentation in the main text. A roadmap to the tables is shown in Table D1. The intrusion scenarios are shown first. For these scenarios, unit dose factors are the only parameter calculated. The irrigation scenarios are listed second. Tables of average annual radiation dose over the HSRAM exposure period are also given for the HSRAM scenarios. The average doses were used rather than the first year dose because the HSRAM scenarios are lifetime scenarios, i.e., they include both childhood and adulthood. The large number of pathways required the tables to be broken into parts. In addition, the chemical tables do not show the chemical names, only the CASRN.

Table D1. Overview of the Pathway Tables

Exposure Scenario	Radionuclides		Chemicals	
	Dose	Cancer Risk	Hazard Index	Cancer Risk
Well Driller	D2	na	na	na
Suburban Garden	D3	na	na	na
Rural Pasture	D4	na	na	na
Commercial Farm	D5	na	na	na
All Pathways Farmer	D6 a,b	D7 a,b	D8 a,b	D9 a,b
Native American	D10 a,b,c	D11 a,b,c	D12 a,b,c	D13 a,b,c
Columbia River Population	D14 a,b	D15 a,b	D16 a,b	D17 a,b
HSRAM Industrial	D18	D19	D20	D21
HSRAM Recreational	D22 a,b	D23 a,b	D24 a,b	D25 a,b
HSRAM Residential	D26 a,b,c	D27 a,b	D28 a,b	D29 a,b
HSRAM Agricultural	D26 a,b,c	D27 a,b	D28 a,b	D29 a,b

Table D2. Well Driller Doses by Pathway, mrem per Ci/kg (tailings)

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
H-3	3.25E+01	3.25E+01	0.00E+00	4.65E-01	3.20E+01
Be-10	7.84E+03	4.04E+03	3.79E+03	1.71E+03	2.33E+03
C-14	1.11E+03	1.06E+03	5.76E+01	1.01E+01	1.05E+03
Na-22	3.37E+07	5.79E+03	3.37E+07	3.71E+01	5.75E+03
Al-26	4.04E+07	7.36E+03	4.04E+07	7.06E+01	7.29E+03
Si-32+D	4.70E+04	1.05E+04	3.66E+04	4.99E+03	5.50E+03
Cl-36	9.18E+03	1.62E+03	7.56E+03	1.06E+02	1.52E+03
K-40	2.38E+06	9.36E+03	2.37E+06	6.00E+01	9.30E+03
Ca-41	6.43E+02	6.43E+02	0.00E+00	6.16E+00	6.36E+02
Ti-44+D	3.44E+07	1.45E+04	3.44E+07	2.19E+03	1.23E+04
V-49	3.24E+01	3.24E+01	0.00E+00	1.67E+00	3.07E+01
Mn-54	1.29E+07	1.42E+03	1.29E+07	3.24E+01	1.39E+03
Fe-55	3.10E+02	3.10E+02	0.00E+00	6.49E+00	3.04E+02
Fe-60+D	1.39E+05	7.75E+04	6.16E+04	1.31E+03	7.62E+04
Co-60	3.80E+07	1.36E+04	3.79E+07	1.60E+02	1.35E+04
Ni-59	1.09E+02	1.09E+02	0.00E+00	4.44E+00	1.05E+02

Table D2. Well Driller Doses by Pathway, mrem per Ci/kg (tailings)

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
Ni-63	3.00E+02	3.00E+02	0.00E+00	1.11E+01	2.89E+02
Se-79	4.46E+03	4.38E+03	7.92E+01	3.17E+01	4.35E+03
Rb-87	3.03E+03	2.48E+03	5.51E+02	1.56E+01	2.46E+03
Sr-90+D	1.51E+05	7.77E+04	7.34E+04	1.20E+03	7.65E+04
Zr-93	1.23E+03	1.23E+03	0.00E+00	4.03E+02	8.30E+02
Nb-91	3.29E+04	2.77E+02	3.27E+04	1.55E+01	2.61E+02
Nb-93m	7.52E+02	2.77E+02	4.75E+02	1.55E+01	2.61E+02
Nb-94	2.44E+07	3.74E+03	2.44E+07	1.75E+02	3.57E+03
Mo-93	3.51E+03	8.12E+02	2.69E+03	1.37E+02	6.75E+02
Tc-99	1.26E+03	7.70E+02	4.89E+02	4.03E+01	7.30E+02
Ru-106+D	3.37E+06	1.43E+04	3.35E+06	5.71E+02	1.37E+04
Pd-107	1.36E+02	1.36E+02	0.00E+00	6.20E+01	7.45E+01
Ag-108m+D	2.52E+07	3.93E+03	2.52E+07	1.22E+02	3.81E+03
Cd-109	6.57E+04	7.10E+03	5.86E+04	5.52E+02	6.55E+03
Cd-113m	9.02E+04	8.79E+04	2.31E+03	7.41E+03	8.05E+04
In-115	9.86E+04	9.71E+04	1.47E+03	1.81E+04	7.90E+04
Sn-121m+D	1.07E+04	1.18E+03	9.53E+03	5.76E+01	1.13E+03
Sn-126+D	3.09E+07	1.10E+04	3.09E+07	4.89E+02	1.05E+04
Sb-125	6.53E+06	1.46E+03	6.53E+06	5.90E+01	1.41E+03
Te-125m	6.98E+04	1.87E+03	6.80E+04	3.53E+01	1.84E+03
I-129	1.98E+05	1.39E+05	5.90E+04	8.42E+02	1.38E+05
Cs-134	2.42E+07	3.69E+04	2.41E+07	2.24E+02	3.67E+04
Cs-135	3.71E+03	3.56E+03	1.58E+02	2.20E+01	3.54E+03
Cs-137+D	8.80E+06	2.52E+04	8.78E+06	1.54E+02	2.50E+04
Ba-133	5.66E+06	1.74E+03	5.66E+06	3.78E+01	1.70E+03
Pm-147	9.10E+02	7.15E+02	1.95E+02	1.90E+02	5.25E+02
Sm-147	4.54E+05	4.54E+05	0.00E+00	3.62E+05	9.25E+04
Sm-151	3.44E+02	3.40E+02	4.49E+00	1.45E+02	1.95E+02
Eu-150	2.29E+07	4.48E+03	2.29E+07	1.30E+03	3.18E+03
Eu-152	1.73E+07	4.31E+03	1.73E+07	1.07E+03	3.24E+03
Eu-154	1.89E+07	6.16E+03	1.88E+07	1.38E+03	4.78E+03
Eu-155	6.78E+05	9.65E+02	6.77E+05	2.00E+02	7.65E+02
Gd-152	1.26E+06	1.26E+06	0.00E+00	1.18E+06	8.05E+04
Ho-166m	2.69E+07	7.78E+03	2.69E+07	3.74E+03	4.04E+03
Re-187	5.02E+00	5.02E+00	0.00E+00	2.63E-01	4.76E+00
Tl-204	1.71E+04	1.69E+03	1.54E+04	1.17E+01	1.68E+03
Pb-205	8.66E+02	8.34E+02	3.22E+01	1.90E+01	8.15E+02
Pb-210+D	2.77E+06	2.75E+06	2.28E+04	6.58E+04	2.69E+06
Bi-207	2.34E+07	2.84E+03	2.34E+07	9.68E+01	2.74E+03
Po-209	1.29E+06	1.24E+06	5.17E+04	5.18E+04	1.19E+06
Po-210	9.92E+05	9.92E+05	1.31E+02	4.15E+04	9.50E+05
Ra-226+D	2.75E+07	7.07E+05	2.68E+07	4.16E+04	6.65E+05
Ra-228+D	1.55E+07	7.44E+05	1.48E+07	2.35E+04	7.20E+05
Ac-227+D	2.17E+07	1.58E+07	5.89E+06	8.42E+06	7.40E+06
Th-228+D	2.51E+07	2.06E+06	2.31E+07	1.66E+06	4.06E+05
Th-229+D	1.50E+07	1.04E+07	4.57E+06	8.42E+06	2.02E+06
Th-230	1.55E+06	1.54E+06	4.45E+03	1.27E+06	2.74E+05
Th-232	6.93E+06	6.93E+06	2.01E+03	5.57E+06	1.37E+06

Table D2. Well Driller Doses by Pathway, mrem per Ci/kg (tailings)

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
Pa-231	1.20E+07	1.15E+07	5.51E+05	6.20E+06	5.30E+06
U-232	7.30E+05	7.27E+05	3.30E+03	7.21E+04	6.55E+05
U-233	1.88E+05	1.83E+05	4.52E+03	3.87E+04	1.45E+05
U-234	1.81E+05	1.80E+05	1.55E+03	3.81E+04	1.42E+05
U-235+D	2.56E+06	1.69E+05	2.40E+06	3.53E+04	1.34E+05
U-236	1.71E+05	1.71E+05	8.61E+02	3.60E+04	1.35E+05
U-238+D	5.28E+05	1.68E+05	3.60E+05	3.42E+04	1.34E+05
Np-237+D	8.11E+06	4.83E+06	3.28E+06	2.61E+06	2.22E+06
Pu-236	1.29E+06	1.29E+06	9.38E+02	7.02E+05	5.85E+05
Pu-238	3.50E+06	3.50E+06	6.48E+02	1.90E+06	1.60E+06
Pu-239	3.85E+06	3.85E+06	9.81E+02	2.08E+06	1.77E+06
Pu-240	3.85E+06	3.85E+06	6.34E+02	2.08E+06	1.77E+06
Pu-241+D	7.42E+04	7.42E+04	6.30E+01	3.99E+04	3.43E+04
Pu-242	3.67E+06	3.67E+06	5.48E+02	1.99E+06	1.68E+06
Pu-244+D	8.78E+06	3.61E+06	5.17E+06	1.95E+06	1.66E+06
Am-241	4.15E+06	3.97E+06	1.86E+05	2.15E+06	1.82E+06
Am-242m+D	4.04E+06	3.82E+06	2.20E+05	2.06E+06	1.76E+06
Am-243+D	6.89E+06	3.94E+06	2.94E+06	2.13E+06	1.82E+06
Cm-242	1.42E+05	1.41E+05	7.33E+02	8.37E+04	5.75E+04
Cm-243	4.57E+06	2.74E+06	1.82E+06	1.49E+06	1.26E+06
Cm-244	2.21E+06	2.21E+06	5.75E+02	1.20E+06	1.01E+06
Cm-245	5.24E+06	4.07E+06	1.17E+06	2.20E+06	1.87E+06
Cm-246	4.03E+06	4.03E+06	5.30E+02	2.18E+06	1.85E+06
Cm-247+D	8.92E+06	3.71E+06	5.21E+06	2.00E+06	1.71E+06
Cm-248	1.48E+07	1.48E+07	4.01E+02	7.99E+06	6.80E+06
Cm-250+D	8.93E+07	8.43E+07	4.96E+06	4.55E+07	3.89E+07
Bk-247	6.54E+06	5.13E+06	1.42E+06	2.78E+06	2.35E+06
Cf-248	3.82E+05	3.82E+05	5.69E+02	2.15E+05	1.67E+05
Cf-249	1.03E+07	5.16E+06	5.17E+06	2.79E+06	2.37E+06
Cf-250	2.33E+06	2.33E+06	5.41E+02	1.27E+06	1.07E+06
Cf-251	6.98E+06	5.27E+06	1.71E+06	2.85E+06	2.43E+06
Cf-252	1.20E+06	1.20E+06	7.37E+02	6.63E+05	5.40E+05

Notes:

- The individual inhales 4.84 mg tailings, ingests 0.5 g tailings, and is exposed for 40 hours to an external dose rate corresponding to the center of a large area 5 cm thick.
- "Total" is the sum of the "External" and "Internal" columns. "Internal" is the sum of the "Soil Ingestion" and "Soil Inhalation" columns.

Table D3. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
H-3	3.04E+00	0.00E+00	3.04E+00	2.89E+00	1.74E-03	1.52E-01
Be-10	1.24E+01	9.66E-01	1.14E+01	6.31E+00	3.73E+00	1.37E+00
C-14	6.22E+02	1.21E-02	6.22E+02	6.20E+02	1.65E+00	7.89E-03
Na-22	1.14E+04	1.01E+04	1.36E+03	1.35E+03	8.60E+00	2.60E-02
Al-26	1.32E+04	1.32E+04	2.48E+01	1.31E+01	1.17E+01	5.64E-02
Si-32+D	4.13E+02	1.02E+01	4.03E+02	3.90E+02	8.77E+00	3.96E+00
Cl-36	8.26E+04	1.90E+00	8.26E+04	8.26E+04	2.20E+00	7.32E-02
K-40	5.29E+03	7.71E+02	4.52E+03	4.51E+03	1.47E+01	4.72E-02
Ca-41	2.61E+02	0.00E+00	2.61E+02	2.60E+02	1.01E+00	4.83E-03
Ti-44+D	1.08E+04	1.08E+04	6.76E+01	4.63E+01	1.96E+01	1.73E+00
V-49	1.31E-01	0.00E+00	1.31E-01	8.93E-02	4.10E-02	9.39E-04
Mn-54	3.59E+03	3.36E+03	2.36E+02	2.34E+02	1.82E+00	1.77E-02
Fe-55	1.72E+00	0.00E+00	1.72E+00	1.26E+00	4.56E-01	4.58E-03
Fe-60+D	9.13E+02	4.15E+02	4.97E+02	3.74E+02	1.23E+02	1.05E+00
Co-60	1.25E+04	1.19E+04	5.85E+02	5.65E+02	2.08E+01	1.20E-01
Ni-59	5.70E+00	0.00E+00	5.70E+00	5.53E+00	1.68E-01	3.55E-03
Ni-63	1.56E+01	0.00E+00	1.56E+01	1.52E+01	4.61E-01	8.86E-03
Se-79	1.00E+02	1.61E-02	1.00E+02	9.33E+01	6.61E+00	2.34E-02
Rb-87	1.91E+03	1.28E-01	1.91E+03	1.90E+03	3.93E+00	1.25E-02
Sr-90+D	3.57E+04	2.09E+01	3.57E+04	3.56E+04	1.22E+02	9.43E-01
Zr-93	3.36E+00	1.01E-03	3.36E+00	1.70E+00	1.33E+00	3.22E-01
Nb-91	1.49E+01	1.03E+01	4.53E+00	4.10E+00	4.17E-01	1.24E-02
Nb-93m	4.56E+00	9.40E-02	4.46E+00	4.04E+00	4.13E-01	1.21E-02
Nb-94	7.78E+03	7.72E+03	6.20E+01	5.61E+01	5.71E+00	1.39E-01
Mo-93	4.60E+02	5.31E-01	4.59E+02	4.58E+02	1.07E+00	1.08E-01
Tc-99	5.06E+03	1.09E-01	5.06E+03	5.06E+03	1.11E+00	2.98E-02
Ru-106+D	1.35E+03	8.89E+02	4.64E+02	4.45E+02	1.86E+01	3.31E-01
Pd-107	3.10E+00	0.00E+00	3.10E+00	2.93E+00	1.19E-01	4.93E-02
Ag-108m+D	7.86E+03	7.85E+03	1.39E+01	7.70E+00	6.08E+00	9.74E-02
Cd-109	7.99E+02	1.17E+01	7.87E+02	7.77E+02	9.16E+00	3.39E-01
Cd-113m	1.15E+04	5.75E-01	1.15E+04	1.14E+04	1.27E+02	5.76E+00
In-115	2.67E+02	3.62E-01	2.66E+02	1.26E+02	1.26E+02	1.45E+01
Sn-121m+D	1.17E+01	1.92E+00	9.82E+00	7.98E+00	1.79E+00	4.57E-02
Sn-126+D	9.74E+03	9.65E+03	9.20E+01	7.48E+01	1.68E+01	3.90E-01
Sb-125	1.92E+03	1.90E+03	2.85E+01	2.59E+01	2.49E+00	4.62E-02
Te-125m	9.28E+00	5.61E+00	3.67E+00	2.47E+00	1.19E+00	6.37E-03
I-129	2.89E+03	1.17E+01	2.87E+03	2.65E+03	2.19E+02	6.65E-01
Cs-134	1.21E+04	7.02E+03	5.10E+03	5.05E+03	5.40E+01	1.52E-01
Cs-135	5.55E+02	3.49E-02	5.55E+02	5.50E+02	5.66E+00	1.76E-02
Cs-137+D	6.63E+03	2.74E+03	3.89E+03	3.85E+03	3.98E+01	1.22E-01
Ba-133	1.71E+03	1.65E+03	5.44E+01	5.17E+01	2.67E+00	2.91E-02
Pm-147	3.24E+00	4.27E-02	3.20E+00	2.28E+00	7.87E-01	1.33E-01
Sm-147	8.77E+02	0.00E+00	8.77E+02	4.41E+02	1.48E+02	2.89E+02
Sm-151	1.35E+00	8.96E-04	1.35E+00	9.24E-01	3.10E-01	1.15E-01
Eu-150	7.11E+03	7.09E+03	2.11E+01	1.51E+01	5.06E+00	1.03E+00

Table D3. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
Eu-152	5.44E+03	5.42E+03	2.11E+01	1.52E+01	5.12E+00	8.32E-01
Eu-154	5.92E+03	5.89E+03	3.07E+01	2.21E+01	7.49E+00	1.06E+00
Eu-155	1.65E+02	1.60E+02	4.79E+00	3.46E+00	1.18E+00	1.49E-01
Gd-152	1.45E+03	0.00E+00	1.45E+03	3.84E+02	1.29E+02	9.39E+02
Ho-166m	8.38E+03	8.35E+03	2.87E+01	1.92E+01	6.45E+00	2.99E+00
Re-187	1.64E+00	0.00E+00	1.64E+00	1.63E+00	7.60E-03	2.10E-04
Tl-204	8.60E+00	3.51E+00	5.09E+00	2.51E+00	2.57E+00	8.51E-03
Pb-205	7.47E+00	6.44E-03	7.47E+00	6.15E+00	1.30E+00	1.52E-02
Pb-210+D	2.70E+04	5.37E+00	2.70E+04	2.21E+04	4.78E+03	6.95E+01
Bi-207	7.38E+03	7.36E+03	2.21E+01	1.76E+01	4.36E+00	7.65E-02
Po-209	7.46E+03	1.61E+01	7.44E+03	5.51E+03	1.89E+03	4.12E+01
Po-210	3.33E+03	2.74E-02	3.33E+03	2.32E+03	9.96E+02	1.52E+01
Ra-226+D	1.41E+04	8.60E+03	5.47E+03	4.33E+03	1.10E+03	3.43E+01
Ra-228+D	1.09E+04	5.21E+03	5.71E+03	4.32E+03	1.17E+03	2.22E+02
Ac-227+D	3.13E+04	1.72E+03	2.96E+04	1.12E+04	1.17E+04	6.62E+03
Th-228+D	9.10E+03	6.91E+03	2.18E+03	4.79E+02	5.93E+02	1.11E+03
Th-229+D	1.40E+04	1.34E+03	1.26E+04	2.68E+03	3.22E+03	6.73E+03
Th-230	1.82E+03	2.02E+00	1.82E+03	3.65E+02	4.39E+02	1.01E+03
Th-232	8.82E+03	1.53E+02	8.67E+03	1.99E+03	2.22E+03	4.46E+03
Pa-231	2.14E+04	1.78E+02	2.12E+04	7.60E+03	8.57E+03	5.06E+03
U-232	7.54E+03	6.38E+02	6.90E+03	5.56E+03	1.08E+03	2.64E+02
U-233	1.48E+03	1.25E+00	1.47E+03	1.22E+03	2.28E+02	3.05E+01
U-234	1.44E+03	3.60E-01	1.44E+03	1.19E+03	2.23E+02	2.98E+01
U-235+D	2.02E+03	6.63E+02	1.36E+03	1.12E+03	2.10E+02	2.76E+01
U-236	1.37E+03	1.91E-01	1.37E+03	1.13E+03	2.12E+02	2.81E+01
U-238+D	1.47E+03	1.04E+02	1.37E+03	1.13E+03	2.11E+02	2.67E+01
Np-237+D	3.44E+04	9.46E+02	3.34E+04	2.78E+04	3.54E+03	2.07E+03
Pu-236	2.18E+03	1.24E+00	2.17E+03	7.90E+02	8.85E+02	5.00E+02
Pu-238	6.35E+03	1.37E-01	6.34E+03	2.28E+03	2.55E+03	1.51E+03
Pu-239	7.02E+03	2.59E-01	7.02E+03	2.53E+03	2.83E+03	1.66E+03
Pu-240	7.02E+03	1.34E-01	7.02E+03	2.53E+03	2.83E+03	1.66E+03
Pu-241+D	1.37E+02	3.24E-02	1.37E+02	4.95E+01	5.53E+01	3.25E+01
Pu-242	6.68E+03	1.17E-01	6.68E+03	2.40E+03	2.69E+03	1.59E+03
Pu-244+D	8.21E+03	1.63E+03	6.59E+03	2.37E+03	2.66E+03	1.56E+03
Am-241	7.24E+03	3.99E+01	7.20E+03	2.57E+03	2.91E+03	1.72E+03
Am-242m+D	7.09E+03	5.90E+01	7.03E+03	2.52E+03	2.84E+03	1.67E+03
Am-243+D	7.97E+03	7.96E+02	7.17E+03	2.57E+03	2.90E+03	1.70E+03
Cm-242	1.58E+02	1.08E-01	1.58E+02	5.22E+01	6.79E+01	3.77E+01
Cm-243	5.39E+03	5.12E+02	4.87E+03	1.71E+03	2.00E+03	1.17E+03
Cm-244	3.91E+03	1.14E-01	3.91E+03	1.37E+03	1.60E+03	9.41E+02
Cm-245	7.62E+03	3.08E+02	7.32E+03	2.56E+03	2.99E+03	1.76E+03
Cm-246	7.24E+03	1.06E-01	7.24E+03	2.54E+03	2.96E+03	1.74E+03
Cm-247+D	8.25E+03	1.57E+03	6.68E+03	2.34E+03	2.74E+03	1.60E+03
Cm-248	2.66E+04	8.01E-02	2.66E+04	9.32E+03	1.09E+04	6.38E+03
Cm-250+D	1.53E+05	1.54E+03	1.52E+05	5.33E+04	6.22E+04	3.63E+04
Bk-247	9.69E+03	3.85E+02	9.30E+03	3.33E+03	3.76E+03	2.22E+03
Cf-248	1.62E+03	9.56E-02	1.62E+03	1.25E+03	2.36E+02	1.35E+02

Table D3. Suburban Garden Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Garden Vegetables	Soil Ingestion	Soil Inhalation
Cf-249	3.06E+04	1.57E+03	2.90E+04	2.30E+04	3.79E+03	2.23E+03
Cf-250	1.28E+04	1.07E-01	1.28E+04	1.01E+04	1.68E+03	9.86E+02
Cf-251	3.02E+04	4.71E+02	2.97E+04	2.35E+04	3.88E+03	2.27E+03
Cf-252	6.04E+03	1.50E-01	6.04E+03	4.77E+03	8.10E+02	4.66E+02

Notes:

- The individual inhales 87 mg/y, ingests 18 g/y, and is exposed for 180 h/y to an external dose rate corresponding to the center of a 100 m^2 garden. The individual obtains 25% of his vegetables from the garden.
- "Total" is the sum of the "External" and "Internal" columns. "Internal" is the sum of the "Garden Vegetables", "Soil Ingestion", and "Soil Inhalation" columns.

Table D4. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
H-3	1.33E-01	0.00E+00	1.33E-01	1.12E-01	3.49E-05	2.15E-02
Be-10	1.67E-01	3.86E-02	1.28E-01	2.32E-04	7.45E-02	5.31E-02
C-14	1.36E+01	4.83E-04	1.36E+01	1.35E+01	3.29E-02	3.07E-04
Na-22	4.50E+02	4.03E+02	4.74E+01	4.72E+01	1.72E-01	1.01E-03
Al-26	5.28E+02	5.27E+02	3.84E-01	1.48E-01	2.33E-01	2.19E-03
Si-32+D	8.06E-01	4.09E-01	3.97E-01	6.84E-02	1.75E-01	1.54E-01
Cl-36	2.66E+03	7.58E-02	2.66E+03	2.66E+03	4.40E-02	2.85E-03
K-40	1.42E+02	3.08E+01	1.11E+02	1.11E+02	2.94E-01	1.83E-03
Ca-41	1.00E+01	0.00E+00	1.00E+01	1.00E+01	2.01E-02	1.88E-04
Ti-44+D	4.44E+02	4.30E+02	1.32E+01	1.28E+01	3.92E-01	6.74E-02
V-49	9.00E-04	0.00E+00	9.00E-04	4.46E-05	8.19E-04	3.65E-05
Mn-54	1.34E+02	1.34E+02	6.87E-02	3.16E-02	3.64E-02	6.89E-04
Fe-55	1.01E-02	0.00E+00	1.01E-02	8.21E-04	9.12E-03	1.78E-04
Fe-60+D	1.95E+01	1.66E+01	2.84E+00	3.50E-01	2.45E+00	4.08E-02
Co-60	4.80E+02	4.78E+02	2.00E+00	1.58E+00	4.16E-01	4.65E-03
Ni-59	3.23E-01	0.00E+00	3.23E-01	3.19E-01	3.36E-03	1.38E-04
Ni-63	8.83E-01	0.00E+00	8.83E-01	8.73E-01	9.22E-03	3.44E-04
Se-79	2.36E+00	6.45E-04	2.36E+00	2.22E+00	1.32E-01	9.11E-04
Rb-87	4.70E+01	5.12E-03	4.69E+01	4.69E+01	7.86E-02	4.84E-04
Sr-90+D	9.66E+02	8.37E-01	9.65E+02	9.63E+02	2.43E+00	3.66E-02
Zr-93	3.92E-02	4.05E-05	3.92E-02	4.48E-05	2.66E-02	1.25E-02
Nb-91	4.22E-01	4.13E-01	8.84E-03	1.33E-05	8.34E-03	4.81E-04
Nb-93m	1.25E-02	3.76E-03	8.74E-03	1.30E-05	8.26E-03	4.72E-04
Nb-94	3.09E+02	3.09E+02	1.20E-01	1.81E-04	1.14E-01	5.42E-03
Mo-93	1.65E+00	2.13E-02	1.63E+00	1.61E+00	2.14E-02	4.18E-03
Tc-99	2.54E+01	4.34E-03	2.54E+01	2.54E+01	2.22E-02	1.16E-03
Ru-106+D	3.60E+01	3.56E+01	3.97E-01	1.24E-02	3.71E-01	1.29E-02
Pd-107	2.45E-01	0.00E+00	2.45E-01	2.41E-01	2.38E-03	1.92E-03
Ag-108m+D	3.14E+02	3.14E+02	1.49E-01	2.36E-02	1.22E-01	3.78E-03
Cd-109	5.22E+00	4.70E-01	4.76E+00	4.56E+00	1.83E-01	1.32E-02
Cd-113m	7.59E+01	2.30E-02	7.59E+01	7.31E+01	2.54E+00	2.24E-01

Table D4. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
In-115	3.91E+00	1.45E-02	3.89E+00	8.04E-01	2.53E+00	5.62E-01
Sn-121m+D	2.72E-01	7.68E-02	1.95E-01	1.58E-01	3.59E-02	1.78E-03
Sn-126+D	3.88E+02	3.86E+02	1.83E+00	1.48E+00	3.36E-01	1.52E-02
Sb-125	7.59E+01	7.58E+01	8.21E-02	3.04E-02	4.99E-02	1.79E-03
Te-125m	2.70E-01	2.24E-01	4.59E-02	2.18E-02	2.39E-02	2.48E-04
I-129	2.23E+02	4.70E-01	2.22E+02	2.18E+02	4.38E+00	2.59E-02
Cs-134	4.70E+02	2.81E+02	1.89E+02	1.88E+02	1.08E+00	5.91E-03
Cs-135	2.19E+01	1.40E-03	2.19E+01	2.18E+01	1.13E-01	6.83E-04
Cs-137+D	2.62E+02	1.10E+02	1.53E+02	1.52E+02	7.95E-01	4.74E-03
Ba-133	6.65E+01	6.62E+01	3.08E-01	2.53E-01	5.34E-02	1.13E-03
Pm-147	2.36E-02	1.71E-03	2.19E-02	1.02E-03	1.57E-02	5.17E-03
Sm-147	1.44E+01	0.00E+00	1.44E+01	2.06E-01	2.96E+00	1.12E+01
Sm-151	1.12E-02	3.58E-05	1.11E-02	4.31E-04	6.21E-03	4.49E-03
Eu-150	2.84E+02	2.84E+02	1.48E-01	7.01E-03	1.01E-01	3.99E-02
Eu-152	2.17E+02	2.17E+02	1.42E-01	7.02E-03	1.02E-01	3.23E-02
Eu-154	2.36E+02	2.36E+02	2.01E-01	1.02E-02	1.50E-01	4.13E-02
Eu-155	6.44E+00	6.41E+00	3.09E-02	1.58E-03	2.36E-02	5.78E-03
Gd-152	3.92E+01	0.00E+00	3.92E+01	1.79E-01	2.58E+00	3.65E+01
Ho-166m	3.34E+02	3.34E+02	2.54E-01	8.98E-03	1.29E-01	1.16E-01
Re-187	1.71E-02	0.00E+00	1.71E-02	1.69E-02	1.52E-04	8.16E-06
Tl-204	5.04E-01	1.40E-01	3.64E-01	3.12E-01	5.14E-02	3.31E-04
Pb-205	4.96E-02	2.58E-04	4.94E-02	2.27E-02	2.61E-02	5.89E-04
Pb-210+D	1.90E+02	2.15E-01	1.89E+02	9.09E+01	9.57E+01	2.70E+00
Bi-207	2.95E+02	2.94E+02	2.91E-01	2.01E-01	8.72E-02	2.97E-03
Po-209	7.95E+01	6.43E-01	7.88E+01	3.94E+01	3.79E+01	1.60E+00
Po-210	3.47E+01	1.09E-03	3.47E+01	1.42E+01	1.99E+01	5.91E-01
Ra-226+D	5.14E+02	3.44E+02	1.70E+02	1.47E+02	2.20E+01	1.33E+00
Ra-228+D	3.88E+02	2.08E+02	1.80E+02	1.48E+02	2.34E+01	8.63E+00
Ac-227+D	5.76E+02	6.86E+01	5.07E+02	1.47E+01	2.35E+02	2.57E+02
Th-228+D	3.32E+02	2.77E+02	5.51E+01	1.67E-01	1.19E+01	4.31E+01
Th-229+D	3.80E+02	5.36E+01	3.27E+02	9.92E-01	6.45E+01	2.61E+02
Th-230	4.84E+01	8.08E-02	4.83E+01	1.68E-01	8.77E+00	3.94E+01
Th-232	2.34E+02	6.11E+00	2.28E+02	1.03E+01	4.44E+01	1.73E+02
Pa-231	3.78E+02	7.11E+00	3.71E+02	2.88E+00	1.71E+02	1.96E+02
U-232	8.51E+01	2.55E+01	5.96E+01	2.76E+01	2.17E+01	1.03E+01
U-233	1.19E+01	4.99E-02	1.19E+01	6.12E+00	4.55E+00	1.18E+00
U-234	1.16E+01	1.44E-02	1.16E+01	5.99E+00	4.46E+00	1.16E+00
U-235+D	3.74E+01	2.65E+01	1.09E+01	5.66E+00	4.21E+00	1.07E+00
U-236	1.10E+01	7.66E-03	1.10E+01	5.70E+00	4.24E+00	1.09E+00
U-238+D	1.51E+01	4.16E+00	1.09E+01	5.68E+00	4.22E+00	1.04E+00
Np-237+D	1.91E+02	3.78E+01	1.53E+02	1.66E+00	7.07E+01	8.06E+01
Pu-236	3.73E+01	4.95E-02	3.73E+01	1.87E-01	1.77E+01	1.94E+01
Pu-238	1.10E+02	5.50E-03	1.10E+02	1.68E-01	5.11E+01	5.87E+01
Pu-239	1.21E+02	1.04E-02	1.21E+02	1.87E-01	5.66E+01	6.44E+01
Pu-240	1.21E+02	5.35E-03	1.21E+02	1.87E-01	5.66E+01	6.44E+01
Pu-241+D	2.37E+00	1.30E-03	2.37E+00	3.74E-03	1.11E+00	1.26E+00
Pu-242	1.16E+02	4.67E-03	1.16E+02	1.77E-01	5.38E+01	6.17E+01

Table D4. Rural Pasture Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	External	Internal	Milk	Soil Ingestion	Soil Inhalation
Pu-244+D	1.79E+02	6.51E+01	1.14E+02	1.75E-01	5.31E+01	6.05E+01
Am-241	1.27E+02	1.60E+00	1.25E+02	2.63E-01	5.82E+01	6.66E+01
Am-242m+D	1.24E+02	2.36E+00	1.22E+02	3.42E-01	5.67E+01	6.50E+01
Am-243+D	1.56E+02	3.18E+01	1.24E+02	2.63E-01	5.81E+01	6.61E+01
Cm-242	2.88E+00	4.31E-03	2.88E+00	5.60E-02	1.36E+00	1.47E+00
Cm-243	1.08E+02	2.05E+01	8.79E+01	2.40E+00	3.99E+01	4.56E+01
Cm-244	7.05E+01	4.56E-03	7.05E+01	1.92E+00	3.20E+01	3.66E+01
Cm-245	1.44E+02	1.23E+01	1.32E+02	3.63E+00	5.98E+01	6.84E+01
Cm-246	1.31E+02	4.24E-03	1.31E+02	3.59E+00	5.92E+01	6.77E+01
Cm-247+D	1.83E+02	6.29E+01	1.20E+02	3.32E+00	5.47E+01	6.22E+01
Cm-248	4.79E+02	3.20E-03	4.79E+02	1.32E+01	2.18E+02	2.48E+02
Cm-250+D	2.79E+03	6.16E+01	2.73E+03	7.53E+01	1.24E+03	1.41E+03
Bk-247	1.77E+02	1.54E+01	1.62E+02	3.40E-01	7.52E+01	8.62E+01
Cf-248	9.99E+00	3.82E-03	9.98E+00	3.95E-02	4.72E+00	5.23E+00
Cf-249	2.25E+02	6.27E+01	1.63E+02	2.00E-01	7.58E+01	8.66E+01
Cf-250	7.20E+01	4.27E-03	7.20E+01	8.76E-02	3.36E+01	3.83E+01
Cf-251	1.85E+02	1.89E+01	1.66E+02	2.04E-01	7.76E+01	8.83E+01
Cf-252	3.43E+01	6.01E-03	3.43E+01	3.99E-02	1.62E+01	1.81E+01

Notes:

- The individual inhales 169 mg/y, ingests 18 g/y, and is exposed for 360 h/y to an external dose rate corresponding to the center of a 5,000 m^2 pasture/hay field. The individual obtains 50% of his milk from the cow.
- "Total" is the sum of the "External" and "Internal" columns. "Internal" is the sum of the "Milk", "Soil Ingestion", and "Soil Inhalation" columns.

Table D5. Commercial Farm Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
H-3	1.89E-03	1.89E-03	0.00E+00	1.89E-03	2.69E-07
Be-10	1.95E-03	1.36E-03	5.97E-04	7.80E-04	5.76E-04
C-14	2.66E-04	2.59E-04	7.47E-06	4.50E-06	2.54E-04
Na-22	6.23E+00	1.34E-03	6.22E+00	1.48E-05	1.33E-03
Al-26	8.15E+00	1.83E-03	8.15E+00	3.21E-05	1.80E-03
Si-32+D	9.93E-03	3.61E-03	6.32E-03	2.26E-03	1.35E-03
Cl-36	1.55E-03	3.82E-04	1.17E-03	4.18E-05	3.40E-04
K-40	4.79E-01	2.30E-03	4.77E-01	2.69E-05	2.27E-03
Ca-41	1.58E-04	1.58E-04	0.00E+00	2.76E-06	1.55E-04
Ti-44+D	6.66E+00	4.02E-03	6.65E+00	9.89E-04	3.03E-03
V-49	6.87E-06	6.87E-06	0.00E+00	5.35E-07	6.33E-06
Mn-54	2.08E+00	2.92E-04	2.08E+00	1.01E-05	2.82E-04
Fe-55	7.31E-05	7.31E-05	0.00E+00	2.61E-06	7.05E-05
Fe-60+D	2.76E-01	1.96E-02	2.57E-01	5.99E-04	1.90E-02
Co-60	7.39E+00	3.28E-03	7.39E+00	6.82E-05	3.21E-03
Ni-59	2.80E-05	2.80E-05	0.00E+00	2.02E-06	2.60E-05
Ni-63	7.63E-05	7.63E-05	0.00E+00	5.05E-06	7.12E-05
Se-79	1.04E-03	1.03E-03	9.98E-06	1.34E-05	1.02E-03
Rb-87	6.93E-04	6.14E-04	7.92E-05	7.10E-06	6.07E-04

Table D5. Commercial Farm Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
Sr-90+D	3.23E-02	1.93E-02	1.29E-02	5.37E-04	1.88E-02
Zr-93	3.90E-04	3.90E-04	6.26E-07	1.84E-04	2.06E-04
Nb-91	6.45E-03	7.16E-05	6.38E-03	7.07E-06	6.45E-05
Nb-93m	1.29E-04	7.07E-05	5.81E-05	6.92E-06	6.38E-05
Nb-94	4.77E+00	9.62E-04	4.77E+00	7.95E-05	8.82E-04
Mo-93	5.55E-04	2.27E-04	3.28E-04	6.14E-05	1.65E-04
Tc-99	2.56E-04	1.88E-04	6.71E-05	1.70E-05	1.71E-04
Ru-106+D	5.53E-01	3.06E-03	5.50E-01	1.89E-04	2.87E-03
Pd-107	4.65E-05	4.65E-05	0.00E+00	2.81E-05	1.84E-05
Ag-108m+D	4.85E+00	9.95E-04	4.85E+00	5.55E-05	9.40E-04
Cd-109	8.87E-03	1.61E-03	7.26E-03	1.93E-04	1.42E-03
Cd-113m	2.33E-02	2.29E-02	3.56E-04	3.28E-03	1.96E-02
In-115	2.80E-02	2.78E-02	2.24E-04	8.25E-03	1.95E-02
Sn-121m+D	1.49E-03	3.03E-04	1.19E-03	2.61E-05	2.77E-04
Sn-126+D	5.97E+00	2.82E-03	5.96E+00	2.23E-04	2.60E-03
Sb-125	1.17E+00	4.12E-04	1.17E+00	2.63E-05	3.85E-04
Te-125m	3.66E-03	1.88E-04	3.47E-03	3.63E-06	1.84E-04
I-129	4.15E-02	3.43E-02	7.26E-03	3.79E-04	3.39E-02
Cs-134	4.35E+00	8.43E-03	4.34E+00	8.67E-05	8.34E-03
Cs-135	9.06E-04	8.84E-04	2.16E-05	1.00E-05	8.74E-04
Cs-137+D	1.70E+00	6.22E-03	1.69E+00	6.95E-05	6.15E-03
Ba-133	1.02E+00	4.29E-04	1.02E+00	1.66E-05	4.13E-04
Pm-147	2.24E-04	1.98E-04	2.64E-05	7.59E-05	1.22E-04
Sm-147	1.87E-01	1.87E-01	0.00E+00	1.65E-01	2.29E-02
Sm-151	1.14E-04	1.14E-04	5.54E-07	6.59E-05	4.80E-05
Eu-150	4.39E+00	1.37E-03	4.38E+00	5.85E-04	7.82E-04
Eu-152	3.35E+00	1.27E-03	3.35E+00	4.75E-04	7.91E-04
Eu-154	3.64E+00	1.76E-03	3.64E+00	6.06E-04	1.16E-03
Eu-155	9.94E-02	2.67E-04	9.91E-02	8.48E-05	1.82E-04
Gd-152	5.56E-01	5.56E-01	0.00E+00	5.36E-01	1.99E-02
Ho-166m	5.16E+00	2.70E-03	5.16E+00	1.70E-03	9.97E-04
Re-187	1.29E-06	1.29E-06	0.00E+00	1.20E-07	1.17E-06
Tl-204	2.57E-03	4.02E-04	2.17E-03	4.85E-06	3.97E-04
Pb-205	2.14E-04	2.10E-04	3.98E-06	8.64E-06	2.02E-04
Pb-210+D	7.82E-01	7.79E-01	3.32E-03	3.96E-02	7.39E-01
Bi-207	4.55E+00	7.17E-04	4.55E+00	4.36E-05	6.74E-04
Po-209	3.26E-01	3.16E-01	9.94E-03	2.35E-02	2.93E-01
Po-210	1.63E-01	1.63E-01	1.69E-05	8.68E-03	1.54E-01
Ra-226+D	5.51E+00	1.90E-01	5.32E+00	1.95E-02	1.70E-01
Ra-228+D	3.53E+00	3.08E-01	3.22E+00	1.27E-01	1.81E-01
Ac-227+D	6.65E+00	5.59E+00	1.06E+00	3.78E+00	1.82E+00
Th-228+D	5.00E+00	7.24E-01	4.27E+00	6.33E-01	9.17E-02
Th-229+D	5.16E+00	4.33E+00	8.29E-01	3.84E+00	4.98E-01
Th-230	6.47E-01	6.46E-01	1.25E-03	5.78E-01	6.78E-02
Th-232	2.98E+00	2.88E+00	9.44E-02	2.54E+00	3.43E-01
Pa-231	4.32E+00	4.21E+00	1.10E-01	2.88E+00	1.33E+00
U-232	7.13E-01	3.18E-01	3.95E-01	1.51E-01	1.68E-01
U-233	5.34E-02	5.26E-02	7.71E-04	1.74E-02	3.52E-02

Table D5. Commercial Farm Doses by Pathway, mrem/y per Ci Exhumed

Nuclide	Total	Internal	External	Soil Inhaled	Soil Ingested
U-234	5.17E-02	5.14E-02	2.22E-04	1.70E-02	3.45E-02
U-235+D	4.58E-01	4.82E-02	4.10E-01	1.57E-02	3.25E-02
U-236	4.89E-02	4.88E-02	1.18E-04	1.60E-02	3.27E-02
U-238+D	1.12E-01	4.78E-02	6.43E-02	1.52E-02	3.26E-02
Np-237+D	2.31E+00	1.73E+00	5.85E-01	1.18E+00	5.47E-01
Pu-236	4.22E-01	4.22E-01	7.65E-04	2.85E-01	1.37E-01
Pu-238	1.26E+00	1.26E+00	8.50E-05	8.61E-01	3.95E-01
Pu-239	1.38E+00	1.38E+00	1.60E-04	9.46E-01	4.38E-01
Pu-240	1.38E+00	1.38E+00	8.27E-05	9.46E-01	4.38E-01
Pu-241+D	2.71E-02	2.71E-02	2.00E-05	1.85E-02	8.55E-03
Pu-242	1.32E+00	1.32E+00	7.22E-05	9.06E-01	4.15E-01
Pu-244+D	2.31E+00	1.30E+00	1.01E+00	8.89E-01	4.11E-01
Am-241	1.45E+00	1.43E+00	2.47E-02	9.78E-01	4.50E-01
Am-242m+D	1.43E+00	1.39E+00	3.65E-02	9.53E-01	4.38E-01
Am-243+D	1.91E+00	1.42E+00	4.92E-01	9.70E-01	4.49E-01
Cm-242	3.21E-02	3.20E-02	6.66E-05	2.15E-02	1.05E-02
Cm-243	1.29E+00	9.77E-01	3.16E-01	6.69E-01	3.08E-01
Cm-244	7.84E-01	7.84E-01	7.04E-05	5.37E-01	2.47E-01
Cm-245	1.66E+00	1.47E+00	1.90E-01	1.00E+00	4.63E-01
Cm-246	1.45E+00	1.45E+00	6.55E-05	9.94E-01	4.57E-01
Cm-247+D	2.31E+00	1.34E+00	9.73E-01	9.13E-01	4.23E-01
Cm-248	5.32E+00	5.32E+00	4.95E-05	3.64E+00	1.68E+00
Cm-250+D	3.13E+01	3.03E+01	9.51E-01	2.07E+01	9.61E+00
Bk-247	2.08E+00	1.85E+00	2.38E-01	1.27E+00	5.81E-01
Cf-248	1.13E-01	1.13E-01	5.91E-05	7.67E-02	3.65E-02
Cf-249	2.82E+00	1.86E+00	9.69E-01	1.27E+00	5.86E-01
Cf-250	8.23E-01	8.22E-01	6.60E-05	5.63E-01	2.60E-01
Cf-251	2.19E+00	1.90E+00	2.91E-01	1.30E+00	5.99E-01
Cf-252	3.91E-01	3.91E-01	9.29E-05	2.66E-01	1.25E-01

Notes:

- The individual inhales 321 mg/y soil, ingests 18 g/y soil, and is exposed for 1440 hours to an external dose rate corresponding to the center of a large area 15 cm thick.
- "Total" is the sum of the "External" and "Internal" columns. "Internal" is the sum of the "Soil Ingestion" and "Soil Inhalation" columns.

Table D6a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	River Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	4.77E-05	3.49E-05	4.61E-06	0.00E+00	0.00E+00	1.81E-10	2.53E-06
Be-10	4.61E-03	2.54E-03	3.89E-07	5.23E-07	1.37E-06	4.66E-07	3.99E-04
C-14	3.49E-01	1.14E-03	2.30E-09	3.05E-09	1.71E-08	2.06E-07	2.29E-04
Na-22	5.37E-02	6.27E-03	8.43E-09	1.02E-08	1.37E-02	1.04E-06	1.08E-03
Al-26	9.43E-02	7.95E-03	1.60E-08	2.16E-08	1.86E-02	1.46E-06	1.25E-03
Si-32+D	7.95E-03	6.00E-03	1.13E-06	1.52E-06	1.44E-05	1.10E-06	9.71E-04
Cl-36	2.54E-02	1.65E-03	2.41E-08	2.97E-08	2.71E-06	2.78E-07	6.93E-03
K-40	9.16E-02	1.01E-02	1.36E-08	1.82E-08	1.09E-03	1.84E-06	1.95E-03
Ca-41	1.32E-03	6.94E-04	1.40E-09	1.86E-09	0.00E+00	1.26E-07	1.27E-04
Ti-44+D	1.68E-01	1.34E-02	4.97E-07	6.64E-07	1.52E-02	2.45E-06	2.11E-03
V-49	8.20E-05	3.35E-05	3.80E-10	3.87E-10	0.00E+00	4.67E-09	5.05E-06
Mn-54	1.05E-02	1.51E-03	7.37E-09	7.36E-09	4.29E-03	2.06E-07	2.45E-04
Fe-55	9.94E-04	3.31E-04	1.47E-09	1.80E-09	0.00E+00	5.52E-08	5.13E-05
Fe-60+D	2.79E-01	8.31E-02	2.97E-07	4.01E-07	8.87E-04	1.54E-05	1.31E-02
Co-60	7.94E-02	1.47E-02	3.64E-08	4.64E-08	1.66E-02	2.56E-06	2.33E-03
Ni-59	4.30E-04	1.14E-04	1.01E-09	1.36E-09	0.00E+00	2.10E-08	1.84E-05
Ni-63	1.18E-03	3.14E-04	2.53E-09	3.39E-09	0.00E+00	5.76E-08	5.06E-05
Se-79	1.78E-02	4.74E-03	7.21E-09	9.25E-09	2.29E-08	8.32E-07	7.52E-04
Rb-87	4.08E-02	2.68E-03	3.55E-09	4.77E-09	1.81E-07	4.92E-07	5.75E-04
Sr-90+D	1.83E-01	8.34E-02	2.72E-07	3.62E-07	2.95E-05	1.52E-05	1.57E-02
Zr-93	2.69E-03	9.05E-04	9.16E-08	1.23E-07	2.22E-09	1.67E-07	1.42E-04
Nb-91	8.92E-04	2.84E-04	3.53E-09	4.74E-09	1.46E-05	5.22E-08	4.50E-05
Nb-93m	8.46E-04	2.84E-04	3.53E-09	4.66E-09	1.32E-07	5.14E-08	4.49E-05
Nb-94	4.63E-02	3.89E-03	3.97E-08	5.33E-08	1.09E-02	7.14E-07	6.16E-04
Mo-93	1.16E-03	7.36E-04	3.12E-08	4.15E-08	7.53E-07	1.34E-07	1.53E-04
Tc-99	1.85E-03	7.96E-04	9.16E-09	1.18E-08	1.54E-07	1.40E-07	3.62E-04
Ru-106+D	3.87E-02	1.49E-02	1.30E-07	1.36E-07	1.15E-03	2.13E-06	2.29E-03
Pd-107	2.03E-04	8.12E-05	1.41E-08	1.89E-08	0.00E+00	1.49E-08	1.30E-05
Ag-108m+D	3.93E-02	4.15E-03	2.78E-08	3.73E-08	1.11E-02	7.61E-07	6.53E-04
Cd-109	1.81E-02	7.14E-03	1.25E-07	1.37E-07	1.55E-05	1.07E-06	1.15E-03
Cd-113m	2.24E-01	8.77E-02	1.68E-06	2.22E-06	8.07E-07	1.58E-05	1.46E-02
In-115	5.21E+01	8.61E-02	4.11E-06	5.53E-06	5.11E-07	1.58E-05	1.35E-02
Sn-121m+D	2.68E-02	1.23E-03	1.31E-08	1.75E-08	2.71E-06	2.24E-07	1.93E-04
Sn-126+D	2.94E-01	1.14E-02	1.11E-07	1.49E-07	1.36E-02	2.10E-06	1.80E-03
Sb-125	6.60E-03	1.53E-03	1.34E-08	1.80E-08	2.59E-03	3.11E-07	2.52E-04
Te-125m	7.60E-03	2.00E-03	8.02E-09	3.14E-09	5.68E-06	1.07E-07	2.57E-04
I-129	5.62E-01	1.50E-01	1.91E-07	2.56E-07	1.66E-05	2.75E-05	2.38E-02
Cs-134	6.37E-01	3.99E-02	5.09E-08	6.03E-08	9.49E-03	6.46E-06	6.55E-03
Cs-135	6.10E-02	3.85E-03	5.01E-09	6.73E-09	4.93E-08	7.08E-07	6.48E-04
Cs-137+D	4.42E-01	2.73E-02	3.51E-08	4.67E-08	3.86E-03	4.96E-06	4.58E-03
Ba-133	7.43E-03	1.85E-03	8.59E-09	1.12E-08	2.32E-03	3.31E-07	2.94E-04
Pm-147	8.47E-04	5.72E-04	4.31E-08	5.24E-08	5.82E-08	9.50E-08	8.87E-05
Sm-147	1.48E-01	1.01E-01	8.22E-05	1.10E-04	0.00E+00	1.85E-05	1.59E-02
Sm-151	3.11E-04	2.12E-04	3.30E-08	4.42E-08	1.26E-09	3.88E-08	3.34E-05
Eu-150	3.41E-02	3.47E-03	2.95E-07	3.93E-07	9.99E-03	6.32E-07	5.45E-04

Table D6a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	River Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Eu-152	2.39E-02	3.53E-03	2.43E-07	3.20E-07	7.60E-03	6.36E-07	5.54E-04
Eu-154	2.59E-02	5.20E-03	3.15E-07	4.10E-07	8.23E-03	9.27E-07	8.16E-04
Eu-155	1.73E-03	8.34E-04	4.55E-08	5.78E-08	2.22E-04	1.45E-07	1.30E-04
Gd-152	1.25E-01	8.77E-02	2.67E-04	3.59E-04	0.00E+00	1.61E-05	1.38E-02
Ho-166m	4.40E-02	4.40E-03	8.50E-07	1.14E-06	1.18E-02	8.08E-07	6.92E-04
Re-187	1.22E-05	5.18E-06	5.98E-11	8.03E-11	0.00E+00	9.51E-10	9.38E-07
Tl-204	1.15E-01	1.83E-03	2.65E-09	3.32E-09	4.83E-06	3.14E-07	2.85E-04
Pb-205	2.70E-03	8.88E-04	4.31E-09	5.80E-09	9.10E-09	1.63E-07	1.40E-04
Pb-210+D	8.98E+00	2.93E+00	1.50E-05	2.57E-05	7.56E-06	6.18E-04	4.76E-01
Bi-207	3.32E-02	2.99E-03	2.20E-08	2.93E-08	1.04E-02	5.44E-07	4.70E-04
Po-209	2.40E+00	1.29E+00	1.18E-05	1.58E-05	2.27E-05	2.37E-04	2.03E-01
Po-210	1.84E+00	1.04E+00	9.44E-06	6.82E-06	3.17E-08	1.02E-04	1.48E-01
Ra-226+D	1.23E+00	7.25E-01	9.46E-06	1.30E-05	1.22E-02	1.40E-04	1.15E-01
Ra-228+D	1.30E+00	7.85E-01	5.35E-06	6.96E-05	7.68E-03	1.48E-04	1.24E-01
Ac-227+D	1.06E+01	8.07E+00	1.91E-03	2.54E-03	2.41E-03	1.46E-03	1.27E+00
Th-228+D	7.91E-01	4.42E-01	3.76E-04	4.41E-04	9.31E-03	7.08E-05	6.81E-02
Th-229+D	3.89E+00	2.20E+00	1.91E-03	2.57E-03	1.89E-03	4.03E-04	3.45E-01
Th-230	5.28E-01	2.99E-01	2.88E-04	3.87E-04	3.59E-06	5.49E-05	4.70E-02
Th-232	2.66E+00	1.49E+00	1.27E-03	1.70E-03	3.47E-04	2.80E-04	2.35E-01
Pa-231	7.07E+00	5.78E+00	1.41E-03	1.92E-03	2.62E-04	1.08E-03	9.11E-01
U-232	9.77E-01	7.14E-01	1.64E-05	8.55E-05	1.35E-03	1.39E-04	1.14E-01
U-233	2.12E-01	1.58E-01	8.79E-06	1.17E-05	1.79E-06	2.86E-05	2.48E-02
U-234	2.08E-01	1.54E-01	8.67E-06	1.15E-05	5.09E-07	2.79E-05	2.43E-02
U-235+D	1.98E-01	1.46E-01	8.02E-06	1.06E-05	9.38E-04	2.64E-05	2.30E-02
U-236	1.98E-01	1.47E-01	8.18E-06	1.08E-05	2.71E-07	2.66E-05	2.31E-02
U-238+D	1.97E-01	1.46E-01	7.77E-06	1.03E-05	1.47E-04	2.65E-05	2.30E-02
Np-237+D	3.20E+00	2.42E+00	5.94E-04	7.95E-04	1.34E-03	4.43E-04	3.82E-01
Pu-236	8.19E-01	6.38E-01	1.60E-04	1.96E-04	3.78E-06	1.07E-04	9.89E-02
Pu-238	2.25E+00	1.74E+00	4.31E-04	5.78E-04	1.94E-07	3.19E-04	2.74E-01
Pu-239	2.49E+00	1.93E+00	4.72E-04	6.34E-04	3.66E-07	3.54E-04	3.03E-01
Pu-240	2.49E+00	1.93E+00	4.72E-04	6.34E-04	1.89E-07	3.54E-04	3.03E-01
Pu-241+D	4.81E-02	3.73E-02	9.08E-06	1.24E-05	5.79E-08	6.96E-06	5.88E-03
Pu-242	2.36E+00	1.83E+00	4.52E-04	6.08E-04	1.65E-07	3.36E-04	2.88E-01
Pu-244+D	2.34E+00	1.81E+00	4.43E-04	5.96E-04	2.30E-03	3.32E-04	2.84E-01
Am-241	2.56E+00	1.98E+00	4.88E-04	6.56E-04	5.64E-05	3.64E-04	3.12E-01
Am-242m+D	2.47E+00	1.92E+00	4.69E-04	6.38E-04	8.33E-05	3.56E-04	3.02E-01
Am-243+D	2.55E+00	1.98E+00	4.84E-04	6.51E-04	1.12E-03	3.63E-04	3.11E-01
Cm-242	8.00E-02	6.27E-02	1.90E-05	1.62E-05	1.28E-07	7.40E-06	9.18E-03
Cm-243	1.77E+00	1.37E+00	3.38E-04	4.50E-04	7.20E-04	2.49E-04	2.15E-01
Cm-244	1.42E+00	1.10E+00	2.73E-04	3.61E-04	1.60E-07	1.99E-04	1.73E-01
Cm-245	2.63E+00	2.04E+00	5.01E-04	6.73E-04	4.35E-04	3.75E-04	3.20E-01
Cm-246	2.60E+00	2.02E+00	4.96E-04	6.67E-04	1.50E-07	3.70E-04	3.17E-01
Cm-247+D	2.41E+00	1.86E+00	4.55E-04	6.12E-04	2.22E-03	3.42E-04	2.93E-01
Cm-248	9.56E+00	7.41E+00	1.82E-03	2.44E-03	1.13E-07	1.36E-03	1.17E+00
Cm-250+D	5.46E+01	4.23E+01	1.03E-02	1.39E-02	2.17E-03	7.78E-03	6.66E+00
Bk-247	3.37E+00	2.56E+00	6.31E-04	8.49E-04	5.44E-04	4.70E-04	4.03E-01

Table D6a. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	River Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Cf-248	2.60E-01	1.82E-01	4.88E-05	5.41E-05	1.24E-07	2.78E-05	2.79E-02
Cf-249	3.79E+00	2.58E+00	6.35E-04	8.52E-04	2.21E-03	4.74E-04	4.08E-01
Cf-250	1.69E+00	1.16E+00	2.88E-04	3.79E-04	1.50E-07	2.09E-04	1.83E-01
Cf-251	3.87E+00	2.64E+00	6.47E-04	8.69E-04	6.66E-04	4.85E-04	4.17E-01
Cf-252	8.53E-01	5.89E-01	1.51E-04	1.83E-04	2.05E-07	9.78E-05	9.15E-02

The "River Total" column is the sum of all the pathways shown in Table D6a and D6b. The inland well case (Table 12 in the main text) omits the sediment and fish pathways.

Table D6b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
H-3	1.36E-06	3.13E-06	6.55E-07	3.34E-07	5.97E-12	0.00E+00	2.11E-07
Be-10	7.67E-05	2.61E-07	5.09E-05	1.18E-06	7.38E-06	3.01E-06	1.53E-03
C-14	1.74E-03	1.41E-03	2.44E-04	8.47E-05	1.90E-06	2.19E-08	3.44E-01
Na-22	1.43E-02	1.10E-02	3.17E-06	8.80E-04	3.33E-06	6.12E-03	3.03E-04
Al-26	3.60E-04	1.82E-04	1.19E-04	1.47E-04	2.35E-05	4.17E-02	2.40E-02
Si-32+D	7.36E-06	1.39E-05	6.09E-05	1.13E-04	1.52E-05	2.79E-05	7.24E-04
Cl-36	4.19E-03	1.18E-02	9.21E-06	2.84E-04	6.08E-07	8.23E-07	4.98E-04
K-40	6.42E-03	8.69E-03	2.12E-04	2.45E-04	1.98E-05	1.63E-03	6.12E-02
Ca-41	4.92E-05	2.72E-04	1.59E-06	7.37E-06	1.30E-06	0.00E+00	1.68E-04
Ti-44+D	1.21E-02	1.53E-02	2.69E-06	9.32E-07	3.41E-05	2.94E-02	8.09E-02
V-49	2.07E-06	6.64E-08	3.34E-07	6.18E-07	6.45E-09	0.00E+00	4.04E-05
Mn-54	1.89E-05	4.54E-06	3.85E-06	2.14E-06	2.69E-07	7.79E-04	3.65E-03
Fe-55	1.86E-04	1.08E-06	1.65E-05	7.66E-06	1.87E-07	0.00E+00	3.99E-04
Fe-60+D	5.03E-02	2.98E-04	4.16E-03	1.93E-03	2.73E-04	2.48E-02	1.00E-01
Co-60	4.32E-03	4.94E-04	1.48E-03	3.42E-05	1.44E-05	1.30E-02	2.66E-02
Ni-59	1.73E-05	2.10E-04	5.75E-09	2.66E-07	3.38E-07	0.00E+00	6.91E-05
Ni-63	4.75E-05	5.76E-04	1.58E-08	7.31E-07	8.66E-07	0.00E+00	1.90E-04
Se-79	2.15E-03	2.17E-03	2.14E-03	9.89E-04	3.24E-06	1.24E-08	4.87E-03
Rb-87	8.46E-04	3.82E-03	2.79E-04	1.93E-04	7.32E-06	3.75E-07	3.24E-02
Sr-90+D	2.30E-02	2.99E-02	3.76E-04	4.35E-04	1.89E-04	5.12E-05	3.02E-02
Zr-93	2.73E-08	5.70E-08	2.72E-09	4.20E-09	2.93E-06	9.88E-08	1.64E-03
Nb-91	2.58E-09	1.33E-08	4.28E-09	6.60E-09	8.10E-07	3.15E-05	5.15E-04
Nb-93m	2.55E-09	1.32E-08	4.28E-09	6.60E-09	5.46E-07	1.95E-07	5.15E-04
Nb-94	3.53E-08	1.83E-07	5.85E-08	9.02E-08	1.12E-05	2.38E-02	7.05E-03
Mo-93	2.31E-05	1.48E-04	3.81E-05	1.59E-05	1.45E-06	1.06E-06	4.44E-05
Tc-99	2.31E-05	1.04E-04	9.88E-06	4.57E-04	5.44E-07	8.36E-08	9.61E-05
Ru-106+D	1.90E-02	4.98E-06	1.80E-04	1.74E-06	3.16E-06	2.38E-04	9.01E-04
Pd-107	9.88E-06	9.34E-05	1.23E-09	7.57E-09	2.22E-07	0.00E+00	4.90E-06
Ag-108m+D	3.75E-04	2.37E-05	4.16E-04	4.81E-05	1.11E-05	2.25E-02	1.25E-04
Cd-109	7.63E-05	7.49E-04	2.91E-04	1.68E-05	1.86E-06	3.76E-06	8.62E-03
Cd-113m	1.07E-03	1.02E-02	3.60E-03	2.08E-04	1.56E-04	1.11E-06	1.06E-01
In-115	2.08E-02	9.85E-04	1.29E-03	1.60E-03	2.54E-04	1.14E-06	5.20E+01
Sn-121m+D	2.95E-03	1.40E-04	1.23E-05	2.28E-05	3.18E-06	5.35E-06	2.22E-02
Sn-126+D	2.77E-02	1.31E-03	1.15E-04	2.12E-04	3.37E-05	3.04E-02	2.07E-01

Table D6b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Sb-125	5.92E-05	1.39E-05	6.23E-07	3.11E-06	1.13E-06	1.22E-03	9.24E-04
Te-125m	1.60E-04	5.81E-05	5.94E-05	2.29E-04	6.62E-08	4.89E-07	4.83E-03
I-129	1.82E-01	1.59E-01	7.55E-05	1.05E-02	3.35E-04	2.82E-05	3.63E-02
Cs-134	5.63E-02	3.44E-02	4.06E-03	3.76E-04	1.71E-05	3.50E-03	4.82E-01
Cs-135	5.95E-03	3.55E-03	3.94E-04	3.64E-05	1.14E-05	1.10E-07	4.65E-02
Cs-137+D	4.18E-02	2.50E-02	2.78E-03	2.57E-04	6.41E-05	6.94E-03	3.29E-01
Ba-133	1.11E-05	1.01E-04	8.40E-07	3.89E-05	2.84E-06	2.76E-03	4.47E-05
Pm-147	8.05E-05	1.24E-06	5.73E-08	2.65E-07	3.11E-07	2.65E-08	1.04E-04
Sm-147	1.52E-02	2.31E-04	2.02E-05	1.64E-05	2.93E-04	0.00E+00	1.52E-02
Sm-151	3.19E-05	4.84E-07	4.25E-08	3.44E-08	5.70E-07	2.59E-09	3.20E-05
Eu-150	5.21E-04	7.90E-06	6.95E-07	5.62E-07	8.41E-06	1.85E-02	1.05E-03
Eu-152	5.26E-04	8.00E-06	7.08E-07	5.73E-07	6.39E-06	1.06E-02	1.07E-03
Eu-154	7.69E-04	1.17E-05	1.04E-06	8.44E-07	7.50E-06	9.27E-03	1.57E-03
Eu-155	1.21E-04	1.85E-06	1.67E-07	1.35E-07	7.71E-07	1.65E-04	2.52E-04
Gd-152	9.27E-03	2.01E-04	1.76E-05	1.42E-05	2.58E-04	0.00E+00	1.32E-02
Ho-166m	5.97E-04	1.01E-05	8.82E-07	7.14E-07	1.27E-05	2.58E-02	6.64E-04
Re-187	1.35E-06	9.45E-07	1.10E-08	5.11E-08	1.45E-08	0.00E+00	3.75E-06
Tl-204	2.10E-03	4.04E-04	2.75E-05	3.39E-05	1.41E-06	3.02E-06	1.11E-01
Pb-205	1.07E-05	2.54E-05	8.90E-06	1.65E-05	2.63E-06	2.04E-08	1.61E-03
Pb-210+D	9.22E-02	9.39E-02	2.97E-02	5.56E-02	8.63E-03	1.28E-05	5.30E+00
Bi-207	3.59E-05	1.70E-04	1.50E-05	5.54E-05	7.12E-06	1.89E-02	1.80E-04
Po-209	1.95E-01	5.02E-02	5.82E-02	2.10E-01	3.56E-03	4.75E-05	3.90E-01
Po-210	9.87E-02	2.95E-02	4.63E-02	1.67E-01	8.17E-05	3.53E-09	3.13E-01
Ra-226+D	2.04E-02	1.09E-01	1.10E-03	2.31E-05	5.11E-03	2.69E-02	2.19E-01
Ra-228+D	2.07E-02	1.14E-01	1.18E-03	4.07E-07	1.32E-03	1.39E-02	2.37E-01
Ac-227+D	6.03E-03	1.83E-02	1.62E-03	3.74E-04	1.75E-02	4.02E-03	1.22E+00
Th-228+D	7.26E-05	2.35E-04	8.84E-05	2.04E-05	1.76E-04	3.22E-03	2.67E-01
Th-229+D	3.98E-04	1.26E-03	4.40E-04	1.02E-04	6.50E-03	4.25E-03	1.33E+00
Th-230	5.65E-05	1.80E-04	5.99E-05	1.38E-05	9.03E-04	1.23E-04	1.80E-01
Th-232	9.58E-04	3.67E-03	2.99E-04	6.90E-05	6.53E-03	2.16E-02	8.98E-01
Pa-231	1.80E-03	3.42E-03	1.16E-03	2.68E-04	2.34E-02	1.97E-03	3.49E-01
U-232	6.46E-03	3.26E-02	3.58E-02	1.65E-02	1.74E-03	1.16E-02	4.31E-02
U-233	1.43E-03	7.21E-03	7.89E-03	3.65E-03	2.68E-04	5.01E-06	9.51E-03
U-234	1.40E-03	7.06E-03	7.73E-03	3.57E-03	2.58E-04	6.60E-07	9.31E-03
U-235+D	1.32E-03	6.66E-03	7.29E-03	3.37E-03	2.46E-04	1.20E-03	8.78E-03
U-236	1.33E-03	6.71E-03	7.35E-03	3.40E-03	2.45E-04	3.48E-07	8.85E-03
U-238+D	1.32E-03	6.68E-03	7.32E-03	3.39E-03	2.44E-04	1.89E-04	8.82E-03
Np-237+D	7.32E-02	1.39E-03	4.86E-04	1.12E-04	6.01E-03	2.53E-03	3.07E-01
Pu-236	1.97E-04	1.40E-04	9.79E-05	8.39E-06	4.45E-04	4.05E-04	8.08E-02
Pu-238	5.25E-04	2.19E-04	2.62E-04	2.02E-05	4.76E-03	4.03E-07	2.21E-01
Pu-239	5.82E-04	2.43E-04	2.90E-04	2.24E-05	5.71E-03	8.21E-07	2.45E-01
Pu-240	5.82E-04	2.43E-04	2.90E-04	2.24E-05	5.70E-03	4.23E-07	2.45E-01
Pu-241+D	1.22E-05	4.76E-06	5.62E-06	4.34E-07	1.40E-04	1.55E-06	4.73E-03
Pu-242	5.53E-04	2.30E-04	2.75E-04	2.12E-05	5.42E-03	3.70E-07	2.32E-01
Pu-244+D	5.46E-04	2.28E-04	2.72E-04	2.10E-05	5.36E-03	5.15E-03	2.29E-01
Am-241	2.39E-03	3.40E-04	5.96E-04	1.84E-04	5.76E-03	1.24E-04	2.51E-01

Table D6b. All Pathways Farmer Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Am-242m+D	2.32E-03	3.57E-04	5.78E-04	1.78E-04	5.83E-03	1.78E-04	2.43E-01
Am-243+D	2.39E-03	3.39E-04	5.95E-04	1.83E-04	5.84E-03	2.51E-03	2.51E-01
Cm-242	5.33E-06	1.09E-04	1.25E-05	2.89E-06	2.93E-05	1.74E-08	7.95E-03
Cm-243	1.44E-04	3.11E-03	2.74E-04	6.34E-05	3.18E-03	1.28E-03	1.73E-01
Cm-244	1.15E-04	2.50E-03	2.21E-04	5.10E-05	2.26E-03	2.52E-07	1.40E-01
Cm-245	2.15E-04	4.66E-03	4.08E-04	9.45E-05	6.08E-03	9.72E-04	2.58E-01
Cm-246	2.13E-04	4.61E-03	4.04E-04	9.35E-05	5.94E-03	3.35E-07	2.56E-01
Cm-247+D	1.97E-04	4.26E-03	3.74E-04	8.64E-05	5.51E-03	4.97E-03	2.36E-01
Cm-248	7.83E-04	1.70E-02	1.49E-03	3.44E-04	2.19E-02	2.53E-07	9.40E-01
Cm-250+D	4.82E-03	9.69E-02	8.49E-03	1.96E-03	1.25E-01	4.86E-03	5.37E+00
Bk-247	3.09E-03	4.39E-04	7.70E-04	2.37E-04	7.53E-03	1.21E-03	3.87E-01
Cf-248	2.25E-02	3.04E-05	3.64E-05	8.42E-06	1.43E-04	3.53E-08	2.75E-02
Cf-249	3.90E-01	2.22E-04	5.18E-04	1.20E-04	7.44E-03	4.83E-03	3.90E-01
Cf-250	1.73E-01	9.87E-05	2.33E-04	5.38E-05	2.09E-03	2.08E-07	1.75E-01
Cf-251	3.99E-01	2.27E-04	5.30E-04	1.23E-04	7.70E-03	1.47E-03	3.99E-01
Cf-252	8.28E-02	4.79E-05	1.18E-04	2.72E-05	3.22E-04	9.39E-08	8.88E-02
The sediment and fish pathways are only used when water comes from the Columbia River.							

Table D7a. All Pathways Farmer Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	2.66E-09	1.83E-09	2.87E-10	0.00E+00	0.00E+00	1.87E-14	2.67E-09
Be-10	1.53E-07	1.15E-07	3.10E-12	8.40E-11	5.79E-10	1.22E-09	2.56E-07
C-14	1.90E-07	2.53E-08	2.33E-13	4.76E-12	4.60E-12	1.27E-10	1.01E-05
Na-22	2.86E-06	1.57E-07	1.28E-13	7.57E-13	1.75E-06	2.60E-10	3.03E-06
Al-26	1.08E-05	2.83E-07	2.28E-12	6.23E-11	1.05E-05	2.87E-09	1.40E-05
Si-32+D	2.92E-07	2.03E-07	1.01E-11	2.52E-10	6.80E-09	1.79E-09	3.29E-07
Cl-36	4.71E-06	5.40E-08	8.25E-13	6.32E-12	3.84E-10	1.31E-10	4.73E-06
K-40	2.64E-06	4.04E-07	3.40E-13	7.54E-12	5.09E-07	3.06E-09	6.09E-06
Ca-41	1.90E-08	5.77E-09	6.90E-15	1.50E-13	0.00E+00	2.78E-11	2.08E-08
Ti-44+D	8.85E-06	4.45E-07	6.67E-12	1.58E-10	6.95E-06	3.78E-09	1.38E-05
V-49	2.71E-09	1.99E-09	4.85E-15	1.12E-14	0.00E+00	1.82E-12	6.25E-09
Mn-54	2.87E-07	3.73E-08	1.94E-13	4.15E-13	2.39E-07	2.45E-11	4.30E-07
Fe-55	2.94E-08	1.41E-08	2.64E-14	1.63E-13	0.00E+00	2.89E-11	5.24E-08
Fe-60+D	1.25E-05	2.94E-06	6.07E-12	1.86E-10	5.96E-06	2.30E-08	1.86E-05
Co-60	4.12E-06	2.57E-07	1.18E-12	1.20E-11	3.63E-06	9.14E-10	5.15E-06
Ni-59	1.97E-08	4.48E-09	1.54E-14	4.20E-13	0.00E+00	4.47E-11	2.36E-08
Ni-63	4.78E-08	1.10E-08	5.41E-14	1.38E-12	0.00E+00	1.02E-10	5.73E-08
Se-79	4.14E-07	1.19E-07	1.10E-13	1.33E-12	3.83E-12	4.32E-10	5.77E-07
Rb-87	5.74E-07	8.53E-08	7.06E-14	1.85E-12	6.89E-11	7.33E-10	1.97E-06
Sr-90+D	4.66E-06	1.21E-06	3.73E-12	7.98E-11	1.21E-08	6.89E-09	5.24E-06
Zr-93	2.22E-08	1.81E-08	2.41E-13	7.10E-12	9.61E-12	1.74E-10	6.51E-08
Nb-91	2.05E-08	1.31E-08	6.27E-14	1.67E-12	3.90E-09	1.38E-10	5.60E-08
Nb-93m	1.65E-08	1.31E-08	6.27E-14	1.15E-12	2.02E-11	9.45E-11	5.12E-08

Table D7a. All Pathways Farmer Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Nb-94	5.82E-06	1.27E-07	1.24E-12	3.35E-11	5.66E-06	1.23E-09	7.17E-06
Mo-93	1.40E-07	5.48E-08	4.19E-14	1.31E-12	1.37E-10	2.81E-10	1.44E-07
Tc-99	6.97E-07	4.50E-08	4.65E-13	5.62E-12	2.83E-11	2.07E-10	7.05E-07
Ru-106+D	2.22E-06	6.90E-07	3.37E-12	8.49E-12	7.02E-08	6.71E-10	2.28E-06
Pd-107	1.41E-08	4.09E-09	5.58E-14	1.46E-12	0.00E+00	4.25E-11	1.45E-08
Ag-108m+D	5.44E-06	1.33E-07	8.81E-13	2.23E-11	5.23E-06	1.08E-09	6.33E-06
Cd-109	1.20E-07	8.18E-08	4.88E-13	1.51E-12	7.76E-10	7.86E-11	2.52E-07
Cd-113m	7.63E-07	4.69E-07	4.29E-12	7.39E-11	2.21E-10	1.97E-09	1.48E-06
In-115	8.90E-07	5.53E-07	1.33E-11	3.63E-10	2.12E-10	3.57E-09	4.28E-04
Sn-121m+D	3.01E-07	5.72E-08	5.35E-13	1.29E-11	6.85E-10	5.39E-10	1.82E-06
Sn-126+D	9.26E-06	4.45E-07	3.33E-12	9.09E-11	6.93E-06	4.57E-09	2.22E-05
Sb-125	4.15E-07	7.14E-08	5.48E-13	3.94E-12	3.23E-07	1.83E-10	5.06E-07
Te-125m	8.39E-08	5.44E-08	3.86E-13	1.58E-13	8.20E-11	8.17E-12	2.69E-07
I-129	1.33E-05	2.42E-06	2.00E-12	4.75E-11	4.16E-09	1.44E-08	1.41E-05
Cs-134	3.96E-06	6.90E-07	5.45E-13	2.64E-12	9.91E-07	6.29E-10	1.42E-05
Cs-135	4.54E-07	7.75E-08	6.14E-14	1.68E-12	1.86E-11	4.38E-10	1.62E-06
Cs-137+D	4.34E-06	4.97E-07	3.93E-13	8.61E-12	1.60E-06	2.12E-09	1.20E-05
Ba-133	7.81E-07	1.11E-07	3.83E-13	5.79E-12	6.28E-07	4.70E-10	8.61E-07
Pm-147	3.99E-08	2.76E-08	5.31E-13	3.18E-12	5.52E-12	6.52E-11	4.73E-08
Sm-147	8.77E-07	6.11E-07	2.27E-10	6.15E-09	0.00E+00	4.59E-09	1.01E-06
Sm-151	1.34E-08	9.07E-09	1.61E-13	4.04E-12	2.60E-13	8.92E-11	1.56E-08
Eu-150	4.33E-06	7.08E-08	3.70E-12	8.36E-11	4.23E-06	5.46E-10	5.04E-06
Eu-152	2.77E-06	9.92E-08	3.00E-12	5.16E-11	2.62E-06	6.23E-10	3.16E-06
Eu-154	2.59E-06	1.68E-07	3.80E-12	5.31E-11	2.35E-06	8.91E-10	2.95E-06
Eu-155	7.91E-08	3.11E-08	4.88E-13	4.64E-12	3.39E-08	1.15E-10	9.63E-08
Gd-152	6.73E-07	4.86E-07	3.00E-10	8.18E-09	0.00E+00	3.83E-09	7.87E-07
Ho-166m	6.15E-06	1.31E-07	1.02E-11	2.75E-10	5.96E-06	1.26E-09	7.27E-06
Re-187	9.11E-10	2.93E-10	8.28E-16	2.20E-14	0.00E+00	2.86E-12	1.22E-09
Tl-204	3.10E-07	9.56E-08	8.09E-14	6.53E-13	6.42E-10	2.78E-10	8.45E-06
Pb-205	1.38E-08	1.03E-08	2.13E-14	5.81E-13	2.75E-12	7.70E-11	3.83E-08
Pb-210+D	2.46E-05	1.46E-05	1.02E-10	9.15E-09	2.48E-09	1.21E-07	6.00E-05
Bi-207	4.66E-06	9.25E-08	6.93E-13	1.54E-11	4.53E-06	7.39E-10	5.38E-06
Po-209	3.67E-05	7.68E-06	4.46E-10	1.14E-08	9.69E-09	5.66E-08	5.07E-05
Po-210	2.36E-05	6.16E-06	3.56E-10	3.45E-10	1.10E-12	1.72E-09	3.47E-05
Ra-226+D	1.69E-05	6.31E-06	3.83E-10	1.34E-08	6.62E-06	8.43E-08	2.09E-05
Ra-228+D	2.86E-05	1.70E-05	1.72E-10	4.74E-08	3.60E-06	7.36E-08	3.62E-05
Ac-227+D	1.07E-05	7.96E-06	4.62E-09	9.38E-08	8.59E-07	5.26E-08	1.27E-05
Th-228+D	7.05E-06	4.92E-06	4.72E-09	2.14E-08	1.02E-06	8.22E-09	1.16E-05
Th-229+D	1.17E-05	8.63E-06	7.29E-09	1.99E-07	9.12E-07	7.87E-08	1.94E-05
Th-230	1.87E-06	1.49E-06	9.41E-10	2.58E-08	2.96E-08	1.27E-08	3.12E-06
Th-232	7.75E-06	1.65E-06	1.43E-09	1.04E-07	5.07E-06	1.21E-07	1.07E-05
Pa-231	3.95E-06	2.83E-06	1.34E-09	6.90E-08	4.06E-07	4.10E-08	4.41E-06
U-232	1.05E-05	4.77E-06	6.44E-10	8.81E-08	3.62E-06	5.33E-08	1.14E-05
U-233	1.69E-06	1.17E-06	3.83E-10	7.98E-09	1.28E-09	7.37E-09	1.81E-06
U-234	1.66E-06	1.16E-06	3.76E-10	7.69E-09	1.50E-10	7.22E-09	1.78E-06

Table D7a. All Pathways Farmer Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
U-235+D	2.01E-06	1.17E-06	3.33E-10	6.82E-09	3.20E-07	7.45E-09	2.16E-06
U-236	1.57E-06	1.10E-06	3.47E-10	7.08E-09	7.36E-11	6.81E-09	1.68E-06
U-238+D	2.12E-06	1.42E-06	3.09E-10	6.31E-09	5.67E-08	9.59E-09	2.26E-06
Np-237+D	2.00E-06	1.10E-06	5.84E-10	1.46E-08	5.75E-07	9.07E-09	2.32E-06
Pu-236	1.61E-06	1.22E-06	7.52E-10	7.73E-09	1.16E-07	4.26E-09	1.87E-06
Pu-238	2.63E-06	2.14E-06	1.11E-09	2.80E-08	5.25E-11	1.54E-08	3.05E-06
Pu-239	2.71E-06	2.21E-06	1.10E-09	3.00E-08	1.57E-10	1.68E-08	3.15E-06
Pu-240	2.71E-06	2.21E-06	1.10E-09	3.00E-08	5.49E-11	1.69E-08	3.15E-06
Pu-241+D	3.58E-08	2.88E-08	1.10E-11	4.86E-10	2.56E-10	2.82E-10	4.16E-08
Pu-242	2.57E-06	2.09E-06	1.03E-09	2.82E-08	4.92E-11	1.61E-08	2.98E-06
Pu-244+D	4.09E-06	2.35E-06	9.67E-10	2.64E-08	1.20E-06	1.92E-08	4.78E-06
Am-241	2.11E-06	1.70E-06	9.27E-10	2.49E-08	2.13E-08	1.30E-08	2.46E-06
Am-242m+D	1.51E-06	1.19E-06	5.18E-10	2.54E-08	3.56E-08	1.35E-08	1.75E-06
Am-243+D	2.68E-06	1.77E-06	8.91E-10	2.43E-08	4.99E-07	1.41E-08	3.13E-06
Cm-242	7.63E-07	6.29E-07	4.98E-10	7.04E-10	2.79E-12	3.42E-10	9.00E-07
Cm-243	2.16E-06	1.55E-06	8.88E-10	1.92E-08	2.61E-07	9.93E-09	2.51E-06
Cm-244	1.68E-06	1.37E-06	8.35E-10	1.61E-08	2.69E-11	7.79E-09	1.95E-06
Cm-245	2.28E-06	1.70E-06	9.14E-10	2.51E-08	1.87E-07	1.34E-08	2.66E-06
Cm-246	2.05E-06	1.67E-06	9.14E-10	2.49E-08	3.59E-11	1.29E-08	2.39E-06
Cm-247+D	3.09E-06	1.64E-06	8.25E-10	2.25E-08	1.08E-06	1.29E-08	3.63E-06
Cm-248	7.52E-06	6.11E-06	3.26E-09	8.91E-08	2.69E-11	4.74E-08	8.74E-06
Cm-250+D	4.42E-05	3.50E-05	1.83E-08	5.00E-07	1.12E-06	2.72E-07	5.13E-05
Bk-247	2.74E-06	2.03E-06	1.08E-09	2.92E-08	2.42E-07	1.51E-08	3.25E-06
Cf-248	1.01E-06	7.26E-07	5.97E-10	2.11E-09	4.36E-12	9.64E-10	1.19E-06
Cf-249	4.05E-06	2.08E-06	1.12E-09	3.00E-08	1.05E-06	1.52E-08	4.72E-06
Cf-250	2.02E-06	1.41E-06	8.78E-10	1.50E-08	2.20E-11	7.06E-09	2.34E-06
Cf-251	3.41E-06	2.16E-06	1.12E-09	3.03E-08	2.92E-07	1.61E-08	3.96E-06
Cf-252	1.11E-06	7.93E-07	5.15E-10	3.10E-09	1.50E-11	1.40E-09	1.29E-06

The "Well Total" column is the sum of all the pathways shown in Table D7a and D7b minus the sediment and fish pathways. The total risk from 30 years of intakes is shown.

Table D7b. All Pathways Farmer Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
H-3	1.70E-10	9.15E-11	2.11E-10	4.42E-11	2.25E-11	6.16E-16	0.00E+00
Be-10	2.67E-08	5.35E-09	1.81E-11	4.43E-09	1.02E-10	1.61E-09	1.06E-10
C-14	2.25E-08	7.02E-08	5.60E-08	1.15E-08	3.98E-09	9.19E-11	4.62E-13
Na-22	4.63E-08	4.94E-07	3.79E-07	1.15E-10	3.18E-08	1.72E-10	1.61E-07
Al-26	6.48E-08	1.95E-08	9.76E-09	8.10E-09	9.99E-09	3.86E-09	1.96E-06
Si-32+D	6.60E-08	4.44E-10	8.29E-10	4.44E-09	8.22E-09	2.01E-09	1.07E-09
Cl-36	1.54E-06	7.67E-07	2.28E-06	1.96E-09	6.04E-08	4.61E-11	1.88E-11
K-40	3.50E-07	5.70E-07	7.60E-07	2.20E-08	2.54E-08	2.56E-09	5.92E-08
Ca-41	3.86E-09	1.40E-09	7.65E-09	5.21E-11	2.41E-10	2.23E-11	0.00E+00
Ti-44+D	1.02E-07	6.00E-07	7.52E-07	1.62E-10	5.63E-11	4.53E-09	1.16E-06

Table D7b. All Pathways Farmer Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
V-49	4.42E-10	1.82E-10	5.82E-12	2.97E-11	5.49E-11	1.11E-12	0.00E+00
Mn-54	8.85E-09	6.57E-10	1.57E-10	1.35E-10	7.47E-11	1.50E-11	2.03E-08
Fe-55	2.96E-09	1.08E-08	6.25E-11	1.01E-09	4.66E-10	1.94E-11	0.00E+00
Fe-60+D	6.46E-07	2.51E-06	1.60E-08	2.71E-07	1.20E-07	3.16E-08	1.38E-06
Co-60	6.40E-08	1.15E-07	1.31E-08	4.31E-08	9.96E-10	6.75E-10	3.73E-07
Ni-59	1.39E-09	1.06E-09	1.27E-08	4.37E-13	2.02E-11	6.04E-11	0.00E+00
Ni-63	3.34E-09	2.56E-09	3.08E-08	1.05E-12	4.85E-11	1.30E-10	0.00E+00
Se-79	2.68E-08	7.40E-08	7.45E-08	8.16E-08	3.77E-08	1.81E-10	2.23E-13
Rb-87	1.19E-07	6.03E-08	2.68E-07	2.37E-08	1.65E-08	8.93E-10	1.17E-11
Sr-90+D	9.14E-07	1.08E-06	1.39E-06	2.04E-08	2.36E-08	7.55E-09	1.84E-09
Zr-93	3.87E-09	7.56E-13	1.57E-12	1.26E-13	1.94E-13	2.64E-10	2.70E-12
Nb-91	3.35E-09	1.85E-13	9.48E-13	3.81E-13	5.88E-13	1.78E-10	7.01E-10
Nb-93m	3.24E-09	1.79E-13	9.24E-13	3.50E-13	5.40E-13	9.33E-11	2.77E-12
Nb-94	3.18E-08	1.75E-12	9.00E-12	3.63E-12	5.59E-12	1.61E-09	1.03E-06
Mo-93	5.29E-08	3.14E-09	1.98E-08	6.02E-09	2.51E-09	2.27E-10	1.47E-11
Tc-99	2.52E-07	1.30E-08	6.45E-08	6.83E-09	3.16E-07	8.66E-11	1.65E-12
Ru-106+D	1.56E-07	1.29E-06	3.37E-10	1.24E-08	1.19E-10	4.12E-10	6.00E-09
Pd-107	1.21E-09	8.44E-10	7.90E-09	1.29E-13	7.96E-13	5.18E-11	0.00E+00
Ag-108m+D	2.92E-08	1.74E-08	1.09E-09	2.38E-08	2.75E-09	1.32E-09	8.85E-07
Cd-109	1.90E-08	1.22E-09	1.19E-08	4.72E-09	2.73E-10	4.87E-11	6.68E-11
Cd-113m	1.57E-07	9.30E-09	8.69E-08	3.56E-08	2.06E-09	1.83E-09	2.86E-11
In-115	1.13E-07	1.81E-07	8.49E-09	1.41E-08	1.74E-08	4.81E-09	3.98E-11
Sn-121m+D	1.38E-08	2.15E-07	1.01E-08	1.09E-09	2.02E-09	6.56E-10	1.16E-10
Sn-126+D	1.06E-07	1.67E-06	7.83E-08	8.64E-09	1.60E-08	6.14E-09	1.30E-06
Sb-125	1.66E-08	2.38E-09	6.70E-10	7.59E-11	3.44E-10	1.23E-10	3.02E-08
Te-125m	9.87E-09	6.13E-09	2.23E-09	2.28E-09	8.80E-09	4.82E-12	6.74E-12
I-129	5.58E-07	4.12E-06	5.94E-06	2.08E-09	2.88E-07	1.37E-08	5.55E-10
Cs-134	1.59E-07	1.25E-06	7.62E-07	9.37E-08	8.67E-09	4.08E-10	8.94E-08
Cs-135	3.25E-08	2.05E-07	1.21E-07	1.65E-08	1.53E-09	5.91E-10	3.48E-12
Cs-137+D	1.85E-07	1.22E-06	7.22E-07	9.62E-08	8.90E-09	2.41E-09	2.53E-07
Ba-133	2.73E-08	1.00E-09	9.09E-09	8.64E-11	4.00E-09	4.06E-10	7.55E-08
Pm-147	6.33E-09	5.77E-09	8.89E-11	4.30E-12	1.99E-11	4.35E-11	5.13E-13
Sm-147	1.27E-07	1.25E-07	1.88E-09	2.07E-10	1.68E-10	6.06E-09	0.00E+00
Sm-151	2.14E-09	2.10E-09	3.16E-11	3.44E-12	2.78E-12	1.11E-10	4.50E-14
Eu-150	1.60E-08	1.57E-08	2.36E-10	2.52E-11	2.04E-11	6.32E-10	6.81E-07
Eu-152	2.28E-08	2.20E-08	3.33E-10	3.42E-11	2.77E-11	5.99E-10	3.51E-07
Eu-154	3.88E-08	3.71E-08	5.63E-10	5.66E-11	4.59E-11	7.66E-10	2.81E-07
Eu-155	7.15E-09	6.70E-09	1.02E-10	1.00E-11	8.11E-12	8.47E-11	3.49E-09
Gd-152	1.02E-07	7.07E-08	1.52E-09	1.68E-10	1.36E-10	5.13E-09	0.00E+00
Ho-166m	3.03E-08	2.69E-08	4.49E-10	4.94E-11	4.00E-11	1.66E-09	1.09E-06
Re-187	2.28E-10	2.22E-10	1.53E-10	2.15E-12	9.95E-12	3.59E-12	0.00E+00
Tl-204	2.10E-08	1.57E-07	3.01E-08	2.20E-09	2.71E-09	1.97E-10	6.34E-11
Pb-205	2.24E-09	1.73E-10	4.06E-10	1.80E-10	3.32E-10	1.04E-10	5.19E-13
Pb-210+D	3.86E-06	2.51E-06	1.01E-06	6.49E-07	1.91E-06	1.31E-07	3.73E-10
Bi-207	2.17E-08	1.70E-09	8.02E-09	8.55E-10	3.16E-09	8.45E-10	7.20E-07

Table D7b. All Pathways Farmer Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Po-209	7.45E-06	7.28E-06	1.86E-06	2.69E-06	9.68E-06	7.21E-08	1.72E-09
Po-210	5.26E-06	3.51E-06	1.05E-06	1.65E-06	5.94E-06	1.03E-09	9.14E-14
Ra-226+D	1.48E-06	3.45E-07	1.38E-06	1.67E-07	5.11E-07	1.45E-07	1.23E-06
Ra-228+D	3.74E-06	6.38E-07	3.50E-06	4.01E-08	5.07E-11	5.87E-08	4.17E-07
Ac-227+D	1.69E-06	8.34E-09	2.52E-08	2.65E-09	6.13E-10	5.65E-08	1.28E-07
Th-228+D	1.07E-06	1.15E-09	3.71E-09	1.44E-09	3.34E-10	5.29E-09	9.13E-08
Th-229+D	1.86E-06	2.24E-09	7.01E-09	3.10E-09	7.17E-10	1.06E-07	1.72E-07
Th-230	3.09E-07	6.80E-10	1.80E-09	8.97E-10	1.31E-09	1.77E-08	1.01E-08
Th-232	4.73E-07	5.70E-08	2.60E-07	8.75E-09	1.88E-10	2.10E-07	1.31E-06
Pa-231	5.94E-07	1.37E-09	2.69E-09	1.17E-09	2.70E-10	6.98E-08	1.09E-07
U-232	1.06E-06	5.94E-08	2.98E-07	3.85E-07	1.78E-07	4.03E-08	4.03E-07
U-233	2.61E-07	1.50E-08	7.52E-08	9.85E-08	4.56E-08	5.37E-09	2.15E-10
U-234	2.57E-07	1.48E-08	7.42E-08	9.71E-08	4.49E-08	5.21E-09	1.56E-11
U-235+D	2.63E-07	1.51E-08	7.58E-08	9.92E-08	4.59E-08	5.39E-09	3.21E-08
U-236	2.43E-07	1.40E-08	7.01E-08	9.18E-08	4.25E-08	4.91E-09	7.39E-12
U-238+D	3.26E-07	1.87E-08	9.40E-08	1.23E-07	5.69E-08	6.92E-09	5.70E-09
Np-237+D	2.54E-07	4.84E-08	9.08E-10	3.94E-10	9.11E-11	9.85E-09	8.69E-08
Pu-236	2.54E-07	6.96E-10	1.11E-09	2.72E-09	1.16E-09	3.30E-09	1.58E-08
Pu-238	4.38E-07	8.74E-10	3.62E-10	5.38E-10	4.17E-11	1.95E-08	9.27E-12
Pu-239	4.52E-07	9.06E-10	3.74E-10	5.65E-10	4.35E-11	2.28E-08	2.96E-11
Pu-240	4.52E-07	9.06E-10	3.74E-10	5.64E-10	4.35E-11	2.28E-08	1.03E-11
Pu-241+D	5.95E-09	1.44E-11	5.11E-12	9.28E-12	1.31E-12	4.33E-10	7.05E-11
Pu-242	4.28E-07	8.59E-10	3.55E-10	5.35E-10	4.13E-11	2.17E-08	9.25E-12
Pu-244+D	4.93E-07	9.89E-10	4.09E-10	6.17E-10	4.75E-11	2.60E-08	2.25E-07
Am-241	3.48E-07	2.79E-09	3.93E-10	8.66E-10	2.67E-10	1.73E-08	3.95E-09
Am-242m+D	2.46E-07	2.06E-09	7.20E-10	3.30E-09	1.42E-09	1.87E-08	6.41E-09
Am-243+D	3.69E-07	2.96E-09	4.17E-10	9.21E-10	2.84E-10	1.90E-08	9.36E-08
Cm-242	1.30E-07	6.54E-11	1.56E-09	1.80E-10	4.15E-11	2.57E-10	2.57E-13
Cm-243	3.18E-07	2.20E-10	4.74E-09	5.04E-10	1.17E-10	1.12E-08	4.09E-08
Cm-244	2.79E-07	1.92E-10	4.14E-09	4.32E-10	9.99E-11	8.07E-09	3.88E-12
Cm-245	3.50E-07	2.47E-10	5.28E-09	5.86E-10	1.35E-10	1.82E-08	3.51E-08
Cm-246	3.40E-07	2.39E-10	5.13E-09	5.67E-10	1.31E-10	1.74E-08	6.72E-12
Cm-247+D	3.40E-07	2.39E-10	5.13E-09	5.67E-10	1.31E-10	1.75E-08	2.02E-07
Cm-248	1.25E-06	8.75E-10	1.88E-08	2.08E-09	4.80E-10	6.39E-08	5.04E-12
Cm-250+D	7.14E-06	6.50E-09	1.08E-07	1.19E-08	2.75E-09	3.67E-07	2.11E-07
Bk-247	4.15E-07	3.33E-09	4.69E-10	1.04E-09	3.20E-10	2.03E-08	4.53E-08
Cf-248	1.55E-07	1.26E-07	1.09E-10	2.10E-10	4.86E-11	7.65E-10	4.55E-13
Cf-249	4.48E-07	4.27E-07	2.41E-10	7.06E-10	1.63E-10	2.00E-08	1.93E-07
Cf-250	3.00E-07	2.83E-07	1.61E-10	4.40E-10	1.02E-10	6.77E-09	2.94E-12
Cf-251	4.68E-07	4.45E-07	2.51E-10	7.38E-10	1.71E-10	2.14E-08	5.41E-08
Cf-252	1.62E-07	1.47E-07	8.48E-11	2.19E-10	5.06E-11	9.34E-10	1.39E-12

The sediment and fish pathways are only used when water comes from the Columbia River.

Table D8a. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	3.05E+01	na	na	1.73E+00	9.12E-04	4.39E-03	7.28E+00
57-12-5	1.07E+00	na	na	8.97E-03	1.15E-03	1.45E-03	3.02E+01
57-14-7	na	na	na	na	na	na	na
57-55-6	4.27E-02	9.90E-04	3.81E-04	2.04E-05	1.19E-05	4.42E-05	2.25E+00
58-89-9	7.11E+01	na	na	3.38E+00	1.94E-01	1.40E+00	1.16E+02
60-29-7	1.07E-01	na	na	6.35E-04	3.02E-06	1.79E-05	1.04E-01
60-34-4	na	na	na	na	na	na	na
60-57-1	4.27E+02	na	na	6.27E+01	2.92E+00	1.08E+01	1.67E+02
62-75-9	2.67E+03	na	na	2.33E+00	1.97E+00	7.30E+00	2.07E+05
64-18-6	1.07E-02	na	na	1.45E-05	4.39E-06	1.63E-05	4.72E-01
67-56-1	4.27E-02	na	na	3.04E-05	4.59E-06	2.73E-05	1.18E+00
67-64-1	2.37E-02	na	na	2.68E-05	1.46E-06	8.98E-06	1.96E-01
67-66-3	2.13E+00	1.84E+02	6.44E-05	1.57E-01	2.53E-04	3.75E-04	8.17E-01
67-72-1	2.13E+01	na	na	4.20E+00	1.02E-02	3.79E-02	6.18E+00
71-36-3	2.13E-01	2.19E+01	9.48E-05	2.00E-03	4.50E-05	1.67E-04	8.31E-01
71-43-2	5.33E+00	1.85E+01	9.20E-06	1.88E-01	1.85E-04	1.33E-03	2.20E+00
71-55-6	7.62E-02	2.52E-01	7.59E-08	2.39E-03	1.73E-06	1.15E-05	2.07E-02
72-20-8	7.11E+01	na	na	2.61E+02	1.26E+01	1.87E+00	3.27E+01
74-83-9	1.52E+01	1.11E+02	3.32E-05	1.10E-01	3.87E-04	2.29E-03	1.01E+01
74-87-3	na	6.16E+00	1.69E-06	na	na	na	na
75-00-3	5.33E-02	5.54E-02	1.46E-08	8.78E-04	1.20E-06	7.09E-06	2.62E-02
75-01-4	7.11E+00	5.54E+00	1.48E-06	1.33E-01	1.28E-04	9.52E-04	3.02E+00
75-05-8	na	9.26E+00	8.65E-06	na	na	na	na
75-07-0	na	6.16E+01	3.62E-05	na	na	na	na
75-09-2	3.56E-01	1.85E-01	6.21E-08	2.76E-03	8.52E-06	6.00E-05	2.41E-01
75-15-0	2.13E-01	7.92E-01	1.95E-07	8.72E-03	1.41E-04	2.63E-05	7.05E-02
75-21-8	na	na	na	na	na	na	na
75-34-3	2.13E-01	1.11E+00	3.81E-07	3.12E-03	4.97E-06	3.69E-05	9.22E-02
75-35-4	4.27E-01	2.77E+00	7.69E-07	1.12E-02	8.01E-06	5.94E-05	1.34E-01
75-45-6	na	1.11E-02	3.00E-09	na	na	na	na
75-68-3	na	1.11E-02	3.00E-09	na	na	na	na
75-69-4	7.11E-02	7.92E-01	2.08E-07	8.83E-03	5.52E-06	9.41E-06	1.83E-02
75-71-8	1.07E-01	2.77E+00	7.21E-07	9.11E-03	8.17E-06	1.39E-05	3.21E-02
76-13-1	7.11E-04	1.85E-02	5.21E-09	3.52E-05	1.70E-08	1.01E-07	1.57E-04
76-44-8	4.27E+01	na	na	2.11E+01	1.64E-01	8.77E-01	1.10E+01
78-83-1	7.11E-02	na	na	3.42E-04	8.60E-06	5.10E-05	2.98E-01
78-87-5	na	1.39E+02	6.73E-05	na	na	na	na
78-93-3	3.56E-02	1.11E-01	9.90E-08	8.15E-05	2.69E-06	1.60E-05	1.75E-01
79-00-5	5.33E+00	na	na	6.99E-02	3.66E-04	2.20E-03	3.75E+00
79-01-6	7.11E+01	1.39E+01	4.78E-06	1.23E+01	1.11E-02	1.23E-02	2.09E+01
79-10-7	4.27E-02	8.38E+00	1.11E-03	1.73E-04	1.16E-05	4.31E-05	4.11E-01
79-34-5	3.56E-01	na	na	7.52E-03	5.39E-05	2.80E-04	2.46E-01
79-46-9	na	2.77E+01	3.32E-05	na	na	na	na
82-68-8	7.11E+00	na	na	8.70E-01	1.47E-02	8.71E-02	3.30E+00

Table D8a. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
83-32-9	3.56E-01	na	na	2.52E-01	1.18E-03	2.72E-03	2.33E-01
84-66-2	2.67E-02	na	na	2.15E-04	2.69E-05	1.79E-04	8.70E-02
84-74-2	2.13E-01	na	na	2.11E-02	4.32E-04	3.20E-03	1.25E-01
85-68-7	1.07E-01	na	na	1.56E-02	6.39E-04	2.89E-03	7.50E-02
87-68-3	7.11E+01	na	na	2.84E+01	9.87E-03	3.66E-02	1.44E+01
87-86-5	7.11E-01	na	na	2.29E-01	2.12E-03	1.57E-02	3.16E-01
88-06-2	2.13E+02	na	na	3.49E+01	8.41E-01	3.12E+00	2.84E+02
88-85-7	2.13E+01	na	na	1.55E+00	1.26E-01	4.66E-01	4.61E+01
91-20-3	1.07E+00	1.85E+02	1.07E-03	1.53E-01	5.24E-04	3.11E-03	7.00E-01
92-52-4	4.27E-01	na	na	2.06E-01	7.38E-04	2.73E-03	2.38E-01
95-47-6	1.07E-01	5.54E+00	4.34E-06	1.55E-02	7.08E-06	4.20E-05	3.02E-02
95-48-7	4.27E-01	na	na	1.42E-02	1.09E-03	4.03E-03	3.40E+00
95-50-1	2.37E-01	2.77E+00	3.93E-06	3.22E-02	2.85E-05	1.69E-04	7.17E-02
95-57-8	4.27E+00	na	na	1.48E-01	7.53E-03	2.79E-02	1.92E+01
95-63-6	4.27E-01	9.26E+01	9.72E-05	1.17E-01	3.79E-05	2.25E-04	1.08E-01
95-95-4	2.13E-01	na	na	3.67E-02	8.60E-04	3.19E-03	2.79E-01
98-86-2	2.13E-01	na	na	2.06E-03	8.89E-05	5.28E-04	9.01E-01
98-95-3	4.27E+01	2.72E+02	1.77E-03	5.05E-01	1.91E-02	1.37E-01	1.58E+02
100-25-4	2.13E+02	na	na	1.37E+00	4.57E-01	1.70E+00	2.78E+03
100-41-4	2.13E-01	5.54E-01	4.11E-07	2.68E-02	1.11E-05	7.95E-05	5.86E-02
100-42-5	1.07E-01	5.54E-01	7.01E-07	1.21E-02	1.14E-05	6.79E-05	4.08E-02
100-51-6	7.11E-02	na	na	4.48E-04	3.45E-05	1.69E-04	5.37E-01
106-42-3	1.07E-01	5.54E+00	3.98E-06	1.63E-02	6.49E-06	3.85E-05	2.90E-02
106-44-5	4.27E+00	na	na	1.08E-01	8.03E-03	3.87E-02	3.33E+01
106-46-7	7.11E-01	6.92E-01	8.68E-07	8.73E-02	6.73E-05	4.49E-04	2.05E-01
106-93-4	na	2.77E+03	3.76E-03	na	na	na	na
106-99-0	na	2.77E+02	7.03E-05	na	na	na	na
107-02-8	4.27E+01	2.77E+04	1.52E-02	7.51E-02	1.98E-03	1.17E-02	1.92E+02
107-05-1	4.27E-01	5.54E+02	1.65E-04	1.35E-02	1.08E-05	6.41E-05	1.55E-01
107-06-2	7.11E-01	1.13E+02	5.84E-05	6.27E-03	2.49E-05	1.84E-04	5.29E-01
107-13-1	2.13E+01	2.77E+02	1.79E-04	5.99E-02	1.17E-03	6.92E-03	8.08E+01
108-10-1	2.67E-01	1.85E-01	1.63E-07	2.19E-03	1.99E-05	1.18E-04	3.70E-01
108-38-3	1.07E-01	5.54E+00	4.08E-06	1.77E-02	6.66E-06	3.95E-05	2.87E-02
108-39-4	4.27E-01	na	na	1.45E-02	1.06E-03	3.92E-03	3.28E+00
108-67-8	4.27E-01	9.26E+01	8.38E-05	8.31E-02	3.27E-05	1.94E-04	1.12E-01
108-87-2	na	1.85E-01	4.88E-08	na	na	na	na
108-88-3	1.07E-01	1.39E+00	7.79E-07	9.97E-03	5.07E-06	3.01E-05	3.22E-02
108-90-7	1.07E+00	9.32E+00	7.97E-06	2.31E-01	2.00E-04	4.59E-04	3.62E-01
108-94-1	4.27E-03	na	na	1.59E-05	1.05E-06	6.25E-06	3.16E-02
108-95-2	7.11E-02	na	na	7.21E-04	8.66E-05	5.78E-04	9.45E-01
109-99-9	1.02E-01	1.85E+00	1.45E-06	4.93E-04	1.08E-05	4.02E-05	3.57E-01
110-00-9	2.13E+01	na	na	2.88E-01	7.12E-04	4.22E-03	1.49E+01
110-54-3	3.56E-01	2.77E+00	6.89E-07	2.45E-01	7.48E-06	4.44E-05	7.07E-02
110-80-5	5.33E-02	5.33E-02	5.51E-06	5.60E-05	1.44E-05	5.33E-05	1.23E+00
110-82-7	na	9.26E-02	2.53E-08	na	na	na	na
110-86-1	2.13E+01	na	na	1.28E-01	1.07E-02	3.97E-02	2.38E+02

Table D8a. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
111-76-2	4.27E-02	2.79E-03	8.31E-08	1.99E-04	1.13E-05	4.17E-05	2.14E-01
111-90-0	3.56E-01	1.68E-04	4.06E-04	1.41E-04	1.06E-04	3.94E-04	1.20E+01
117-81-7	1.07E+00	na	na	1.83E+01	2.64E-02	3.72E-02	2.28E-01
117-84-0	5.33E-01	na	na	4.35E+00	2.78E-03	1.86E-02	1.11E-01
118-74-1	2.67E+01	na	na	3.59E+01	1.59E-02	5.89E-02	5.43E+00
120-82-1	2.13E+00	1.39E+02	4.29E-04	3.89E-01	4.60E-04	3.31E-03	6.28E-01
121-14-2	1.07E+01	na	na	7.79E-02	1.73E-02	1.09E-01	8.78E+01
121-44-8	na	7.92E+01	1.72E-04	na	na	na	na
122-39-4	8.53E-01	na	na	1.52E-01	3.43E-03	1.27E-02	1.44E+00
123-91-1	na	na	na	na	na	na	na
126-73-8	1.07E-01	na	na	1.10E-02	5.55E-04	2.06E-03	1.25E-01
126-98-7	2.13E+02	7.92E+02	5.41E-04	9.95E-01	1.24E-02	7.33E-02	4.99E+02
127-18-4	2.13E+00	9.32E-01	3.18E-07	1.69E-01	4.93E-05	3.66E-04	4.62E-01
129-00-0	7.11E-01	na	na	1.23E+00	9.22E-03	2.12E-02	4.63E-01
141-78-6	2.37E-02	na	na	8.90E-05	1.49E-06	8.84E-06	5.63E-02
156-59-2	2.13E+00	na	na	5.25E-02	5.61E-05	4.16E-04	9.37E-01
206-44-0	5.33E-01	na	na	1.46E+00	7.05E-03	1.62E-02	2.75E-01
309-00-2	7.11E+02	na	na	1.10E+03	5.77E+00	2.14E+01	1.79E+02
319-84-6	4.27E+01	na	na	2.03E+00	1.07E-01	7.69E-01	5.91E+01
319-85-7	1.07E+02	na	na	5.40E+00	3.34E-01	2.26E+00	1.72E+02
541-73-1	2.37E+01	na	na	3.79E+00	2.63E-03	1.56E-02	6.66E+00
542-75-6	7.11E-01	2.77E+01	1.43E-05	2.37E-02	4.51E-05	1.84E-04	3.23E-01
621-64-7	na	na	na	na	na	na	na
1314-62-1	2.37E+00	na	na	3.74E-01	5.96E-03	8.84E-02	5.49E-01
1330-20-7	1.07E-01	5.54E+00	4.24E-06	1.35E-02	6.01E-06	4.10E-05	3.00E-02
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	2.67E+02	na	na	5.67E-04	2.68E+00	9.95E+00	5.51E+01
7429-90-5	2.13E-02	3.01E-05	8.22E-03	7.54E-04	1.07E-04	7.96E-04	4.46E-03
7439-89-6	7.11E-02	na	na	1.93E-04	2.39E-04	2.65E-03	1.71E-02
7439-93-2	1.07E+00	na	na	1.08E-03	6.67E-04	3.96E-02	2.67E-01
7439-96-5	4.57E-01	3.01E-03	8.22E-01	2.41E-02	5.75E-03	1.70E-02	4.42E-01
7439-97-6	na	5.03E-04	3.85E-02	na	na	na	na
7439-98-7	4.27E+00	na	na	1.33E-02	4.35E-03	1.23E-01	2.71E+01
7440-02-0	1.07E+00	na	na	2.15E-03	1.99E-03	3.98E-02	8.46E-01
7440-22-4	4.27E+00	na	na	2.38E-02	1.17E-02	1.56E-01	9.02E-01
7440-24-6	3.56E-02	na	na	2.37E-04	8.85E-05	1.31E-03	2.17E-01
7440-28-0	3.23E+02	na	na	5.59E-01	1.08E+00	1.21E+01	6.68E+01
7440-31-5	3.56E-02	na	na	1.69E-03	1.79E-04	1.32E-03	9.66E-03
7440-36-0	5.33E+01	na	na	4.80E+00	1.34E+00	1.99E+00	2.07E+01
7440-38-2	7.11E+01	na	na	5.53E-01	8.64E-02	2.63E+00	1.96E+01
7440-39-3	3.05E-01	3.01E-04	7.94E-02	2.90E-03	2.12E-03	1.10E-02	1.65E-01
7440-41-7	1.07E+01	7.55E-03	2.04E+00	1.16E+00	5.33E-01	3.95E-01	2.34E+00
7440-42-8	2.37E-01	7.55E-06	1.17E-03	9.92E-04	7.51E-05	5.02E-03	2.90E+00
7440-43-9	4.27E+01	na	na	4.93E-01	4.18E+00	1.55E+00	3.90E+01
7440-45-1	na	7.55E-04	2.06E-01	na	na	na	na

Table D8a. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
7440-48-4	1.07E+00	7.55E-03	1.99E+00	2.66E-03	6.48E-04	3.85E-02	7.97E-01
7440-50-8	5.33E-01	na	na	9.01E-04	8.43E-04	1.88E-02	4.09E+00
7440-62-2	3.05E+00	na	na	6.79E-01	1.53E-01	1.14E-01	7.06E-01
7440-66-6	7.11E-02	na	na	2.01E-04	1.77E-04	2.63E-03	1.58E+01
7487-94-7	7.11E+01	na	na	4.93E-02	4.19E-01	2.18E+00	1.50E+02
7664-41-7	na	7.81E-01	1.38E-05	na	na	na	na
7723-14-0	1.07E+03	na	na	6.68E+00	2.16E+00	3.20E+01	3.01E+04
7782-41-4	3.56E-01	na	na	9.74E-04	1.82E-04	1.31E-02	1.01E-01
7782-49-2	4.27E+00	na	na	1.45E-02	2.26E-03	7.38E-02	1.34E+00
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	1.07E+03	na	na	2.52E+03	2.01E+01	2.24E+01	2.36E+02
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	3.05E+02	na	na	2.80E+02	4.34E+00	4.82E+00	8.74E+01
14797-55-8	1.33E-02	na	na	4.93E-05	3.24E-06	1.20E-04	0.00E+00
14797-65-0	2.13E-01	na	na	7.61E-04	5.19E-05	1.92E-03	0.00E+00
16065-83-1	1.42E-02	na	na	4.70E-03	1.39E-03	5.15E-04	2.99E-03
16984-48-8	3.56E-01	na	na	9.74E-04	1.82E-04	1.31E-02	1.01E-01
18540-29-9	7.11E+00	1.88E-02	9.93E-02	5.87E-01	4.32E-02	6.41E-02	1.38E+00
53469-21-9	na	na	na	na	na	na	na
Uranium	3.56E+01	na	na	6.91E-02	1.60E-02	1.01E+00	9.59E+00
Cr Mixture	1.03E+00	2.69E-03	1.42E-02	8.79E-02	7.36E-03	9.60E-03	2.00E-01

The scenario totals for Well Water and the Columbia River are shown in Table 15.
"na" means that one or more of the reference doses were not available.

Table D8b. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	3.91E-03	4.16E-03	0.00E+00	1.40E-03	3.03E-03	1.28E-03	5.54E+00
57-12-5	9.27E-06	1.07E-05	0.00E+00	2.56E-06	1.04E-03	1.68E-03	2.04E-02
57-14-7	na	na	na	na	na	na	na
57-55-6	1.47E-07	1.70E-07	0.00E+00	4.05E-08	3.04E-05	1.66E-05	8.14E-04
58-89-9	4.32E-01	4.75E-01	0.00E+00	2.22E-01	2.17E+00	6.11E-01	6.27E+01
60-29-7	4.88E-07	5.49E-07	0.00E+00	1.47E-07	1.24E-05	4.22E-06	2.04E-03
60-34-4	na	na	na	na	na	na	na
60-57-1	5.81E+01	5.91E+01	0.00E+00	5.41E+01	2.21E+01	1.21E+01	7.39E+03
62-75-9	3.03E-02	3.50E-02	0.00E+00	8.35E-03	5.60E+00	3.06E+00	5.09E+01
64-18-6	7.40E-08	8.55E-08	0.00E+00	2.04E-08	1.11E-05	6.05E-06	2.04E-04
67-56-1	1.10E-07	1.27E-07	0.00E+00	3.02E-08	1.90E-05	6.49E-06	8.14E-04
67-64-1	6.22E-08	7.16E-08	0.00E+00	1.73E-08	6.25E-06	2.06E-06	4.52E-04
67-66-3	5.34E-05	5.82E-05	0.00E+00	1.79E-05	2.59E-04	3.54E-04	8.45E-02

Table D8b. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
67-72-1	7.09E-02	7.36E-02	0.00E+00	3.01E-02	2.78E-02	1.52E-02	3.96E+01
71-36-3	3.53E-06	4.05E-06	0.00E+00	1.01E-06	1.16E-04	6.37E-05	4.07E-03
71-43-2	2.06E-04	2.24E-04	0.00E+00	6.87E-05	9.25E-04	2.61E-04	2.80E-01
71-55-6	4.89E-06	5.24E-06	0.00E+00	1.72E-06	7.97E-06	2.42E-06	7.58E-03
72-20-8	6.62E+00	6.79E+00	0.00E+00	5.96E+00	4.00E+00	5.46E+01	8.64E+02
74-83-9	9.88E-05	1.10E-04	0.00E+00	3.09E-05	1.58E-03	5.41E-04	1.51E-01
74-87-3	na	na	na	na	na	na	na
75-00-3	4.69E-07	5.17E-07	0.00E+00	1.51E-07	4.90E-06	1.67E-06	8.11E-04
75-01-4	8.61E-05	9.44E-05	0.00E+00	2.83E-05	6.57E-04	1.80E-04	1.51E-01
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	2.71E-06	3.02E-06	0.00E+00	8.45E-07	4.15E-05	1.19E-05	3.93E-03
75-15-0	4.44E-06	4.81E-06	0.00E+00	1.51E-06	1.82E-05	1.97E-04	8.01E-03
75-21-8	na	na	na	na	na	na	na
75-34-3	3.88E-06	4.25E-06	0.00E+00	1.28E-06	2.55E-05	6.97E-06	6.14E-03
75-35-4	1.32E-05	1.43E-05	0.00E+00	4.54E-06	4.10E-05	1.12E-05	2.24E-02
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	4.81E-06	5.14E-06	0.00E+00	1.70E-06	6.50E-06	7.73E-06	7.60E-03
75-71-8	3.44E-06	3.70E-06	0.00E+00	1.18E-06	9.62E-06	1.14E-05	5.92E-03
76-13-1	1.85E-07	1.95E-07	0.00E+00	6.69E-08	6.96E-08	2.38E-08	2.32E-04
76-44-8	2.26E+01	2.25E+01	0.00E+00	2.18E+01	1.42E+00	5.40E-01	2.56E+03
78-83-1	9.59E-07	1.10E-06	0.00E+00	2.72E-07	3.56E-05	1.22E-05	1.36E-03
78-87-5	na	na	na	na	na	na	na
78-93-3	1.90E-07	2.18E-07	0.00E+00	5.35E-08	1.12E-05	3.81E-06	6.79E-04
79-00-5	1.85E-04	2.05E-04	0.00E+00	5.85E-05	1.54E-03	5.19E-04	1.83E-01
79-01-6	4.11E-03	4.42E-03	0.00E+00	1.43E-03	8.50E-03	1.55E-02	6.25E+00
79-10-7	5.06E-07	5.82E-07	0.00E+00	1.41E-07	2.97E-05	1.62E-05	8.14E-04
79-34-5	3.89E-05	4.29E-05	0.00E+00	1.27E-05	1.98E-04	7.75E-05	2.96E-02
79-46-9	na	na	na	na	na	na	na
82-68-8	1.39E-01	1.44E-01	0.00E+00	9.31E-02	1.02E-01	3.49E-02	3.20E+01
83-32-9	1.49E-03	1.59E-03	0.00E+00	7.49E-04	2.73E-03	2.40E-03	4.47E-01
84-66-2	1.34E-05	1.52E-05	0.00E+00	4.39E-06	1.69E-04	5.15E-05	2.34E-03
84-74-2	3.66E-03	3.84E-03	0.00E+00	2.45E-03	4.12E-03	1.13E-03	7.50E-01
85-68-7	4.17E-03	4.37E-03	0.00E+00	3.31E-03	6.45E-03	2.89E-03	5.63E-01
87-68-3	7.53E-01	7.81E-01	0.00E+00	2.93E-01	2.57E-02	1.41E-02	4.10E+02
87-86-5	5.03E-02	5.17E-02	0.00E+00	4.30E-02	2.73E-02	7.46E-03	2.99E+00
88-06-2	9.83E-01	1.08E+00	0.00E+00	4.89E-01	3.95E+00	2.16E+00	7.10E+01
88-85-7	1.14E-01	1.26E-01	0.00E+00	5.50E-02	7.97E-01	4.36E-01	1.42E+01
91-20-3	9.65E-04	1.05E-03	0.00E+00	3.74E-04	2.46E-03	8.40E-04	4.46E-01
92-52-4	1.78E-03	1.89E-03	0.00E+00	8.89E-04	2.61E-03	1.43E-03	5.96E-01
95-47-6	3.06E-05	3.26E-05	0.00E+00	1.11E-05	2.93E-05	1.00E-05	3.24E-02
95-48-7	1.71E-04	1.96E-04	0.00E+00	5.22E-05	4.25E-03	2.33E-03	1.63E-02
95-50-1	1.49E-04	1.58E-04	0.00E+00	5.53E-05	1.20E-04	4.09E-05	1.25E-01
95-57-8	1.55E-03	1.77E-03	0.00E+00	4.86E-04	2.66E-02	1.46E-02	2.32E-01
95-63-6	3.71E-04	3.91E-04	0.00E+00	1.39E-04	1.58E-04	5.42E-05	3.21E-01

Table D8b. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
95-95-4	1.04E-03	1.14E-03	0.00E+00	5.26E-04	4.09E-03	2.24E-03	7.49E-02
98-86-2	1.93E-05	2.21E-05	0.00E+00	5.67E-06	3.99E-04	1.36E-04	6.12E-04
98-95-3	6.37E-03	7.26E-03	0.00E+00	1.91E-03	1.10E-01	3.10E-02	1.37E+00
100-25-4	4.44E-02	5.10E-02	0.00E+00	1.29E-02	1.69E+00	9.23E-01	3.42E+00
100-41-4	6.41E-05	6.83E-05	0.00E+00	2.32E-05	5.55E-05	1.57E-05	6.84E-02
100-42-5	2.62E-05	2.82E-05	0.00E+00	9.25E-06	4.79E-05	1.64E-05	2.40E-02
100-51-6	3.75E-06	4.30E-06	0.00E+00	1.07E-06	1.25E-04	5.17E-05	1.35E-04
106-42-3	3.18E-05	3.38E-05	0.00E+00	1.15E-05	2.69E-05	9.19E-06	3.42E-02
106-44-5	1.63E-03	1.87E-03	0.00E+00	4.98E-04	4.04E-02	1.70E-02	1.60E-01
106-46-7	4.40E-04	4.65E-04	0.00E+00	1.63E-04	3.17E-04	9.63E-05	3.81E-01
106-93-4	na	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na	na
107-02-8	1.04E-04	1.20E-04	0.00E+00	2.93E-05	8.13E-03	2.78E-03	8.14E-01
107-05-1	9.35E-06	1.02E-05	0.00E+00	3.14E-06	4.42E-05	1.51E-05	1.57E-02
107-06-2	9.99E-06	1.12E-05	0.00E+00	3.11E-06	1.28E-04	3.50E-05	1.18E-02
107-13-1	8.03E-05	9.21E-05	0.00E+00	2.27E-05	4.81E-03	1.64E-03	4.07E-01
108-10-1	4.46E-06	5.04E-06	0.00E+00	1.33E-06	8.27E-05	2.83E-05	3.28E-03
108-38-3	3.54E-05	3.76E-05	0.00E+00	1.29E-05	2.76E-05	9.43E-06	3.74E-02
108-39-4	1.69E-04	1.93E-04	0.00E+00	5.15E-05	4.10E-03	2.24E-03	1.66E-02
108-67-8	2.33E-04	2.46E-04	0.00E+00	8.58E-05	1.36E-04	4.65E-05	2.21E-01
108-87-2	na	na	na	na	na	na	na
108-88-3	1.30E-05	1.39E-05	0.00E+00	4.56E-06	2.09E-05	7.14E-06	1.63E-02
108-90-7	1.84E-04	1.98E-04	0.00E+00	6.46E-05	3.21E-04	2.83E-04	1.98E-01
108-94-1	1.13E-07	1.30E-07	0.00E+00	3.18E-08	4.45E-06	1.52E-06	8.14E-05
108-95-2	1.51E-05	1.74E-05	0.00E+00	4.39E-06	5.81E-04	1.76E-04	1.14E-03
109-99-9	5.77E-07	6.61E-07	0.00E+00	1.64E-07	2.80E-05	1.53E-05	1.94E-03
110-00-9	2.05E-04	2.29E-04	0.00E+00	6.40E-05	2.92E-03	9.98E-04	2.76E-01
110-54-3	4.73E-04	4.98E-04	0.00E+00	1.74E-04	3.07E-05	1.05E-05	4.31E-01
110-80-5	3.21E-07	3.70E-07	0.00E+00	8.86E-08	3.67E-05	2.00E-05	1.02E-03
110-82-7	na	na	na	na	na	na	na
110-86-1	5.86E-04	6.74E-04	0.00E+00	1.64E-04	2.89E-02	1.58E-02	4.07E-01
111-76-2	8.05E-07	9.23E-07	0.00E+00	2.28E-07	2.87E-05	1.57E-05	8.14E-04
111-90-0	1.88E-06	2.17E-06	0.00E+00	5.19E-07	2.70E-04	1.48E-04	6.79E-03
117-81-7	2.30E+01	2.27E+01	0.00E+00	2.69E+01	1.30E-01	1.87E-01	1.98E+00
117-84-0	3.60E+01	3.56E+01	0.00E+00	4.24E+01	6.46E-02	1.96E-02	2.05E-01
118-74-1	2.86E+00	2.87E+00	0.00E+00	1.38E+00	4.44E-02	2.43E-02	8.29E+02
120-82-1	5.37E-03	5.60E-03	0.00E+00	2.22E-03	2.40E-03	6.77E-04	3.20E+00
121-14-2	4.73E-03	5.42E-03	0.00E+00	1.45E-03	1.18E-01	3.80E-02	4.30E-01
121-44-8	na	na	na	na	na	na	na
122-39-4	3.06E-03	3.39E-03	0.00E+00	1.42E-03	1.63E-02	8.92E-03	5.09E-01
123-91-1	na	na	na	na	na	na	na
126-73-8	9.61E-04	1.04E-03	0.00E+00	5.55E-04	3.13E-03	1.71E-03	2.56E-02
126-98-7	1.36E-03	1.55E-03	0.00E+00	3.92E-04	5.10E-02	1.74E-02	4.07E+00
127-18-4	9.53E-04	1.01E-03	0.00E+00	3.48E-04	2.53E-04	6.91E-05	1.07E+00
129-00-0	3.92E-02	4.09E-02	0.00E+00	3.32E-02	5.50E-02	4.85E-02	4.90E+00
141-78-6	1.72E-07	1.96E-07	0.00E+00	4.96E-08	6.16E-06	2.11E-06	4.52E-04

Table D8b. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
156-59-2	4.62E-05	5.06E-05	0.00E+00	1.52E-05	2.88E-04	7.87E-05	6.95E-02
206-44-0	5.08E-02	5.23E-02	0.00E+00	4.66E-02	4.35E-02	3.83E-02	6.04E+00
309-00-2	1.15E+03	1.15E+03	0.00E+00	1.26E+03	5.64E+01	3.08E+01	8.66E+04
319-84-6	2.71E-01	2.96E-01	0.00E+00	1.43E-01	1.11E+00	3.14E-01	4.33E+01
319-85-7	7.48E-01	8.20E-01	0.00E+00	3.97E-01	3.73E+00	1.12E+00	1.05E+02
541-73-1	1.77E-02	1.87E-02	0.00E+00	6.63E-03	1.10E-02	3.77E-03	1.49E+01
542-75-6	2.35E-05	2.57E-05	0.00E+00	7.76E-06	1.28E-04	6.34E-05	3.13E-02
621-64-7	na	na	na	na	na	na	na
1314-62-1	1.36E-01	3.42E-03	8.65E-02	1.60E-01	3.56E-01	4.87E-02	2.86E+00
1330-20-7	3.04E-05	3.24E-05	0.00E+00	1.10E-05	2.87E-05	8.52E-06	3.24E-02
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	2.40E+02	3.74E+01	1.45E+01	1.79E+01	4.02E+01	2.20E+01	1.61E+04
7429-90-5	7.21E-04	3.00E-04	1.16E-03	1.43E-03	3.22E-03	8.80E-04	6.44E-02
7439-89-6	3.30E-02	1.56E-04	1.30E-02	6.02E-03	1.08E-02	1.96E-03	8.58E-02
7439-93-2	2.49E-01	1.57E+00	1.95E-03	5.40E-01	1.57E-01	5.38E-03	6.44E-03
7439-96-5	6.16E-03	1.30E-03	2.21E-03	1.23E-03	6.90E-02	4.72E-02	3.68E-01
7439-97-6	na	na	na	na	na	na	na
7439-98-7	6.50E-01	3.96E+00	1.67E+00	6.94E-01	2.68E-01	1.93E-02	2.58E-01
7440-02-0	1.88E-01	1.99E+00	2.19E-04	1.01E-02	1.61E-01	1.63E-02	6.44E-01
7440-22-4	2.85E-01	1.48E-02	1.52E+00	1.76E-01	5.91E-01	8.98E-02	1.29E-01
7440-24-6	4.28E-02	5.35E-02	1.19E-03	1.37E-03	5.15E-03	7.04E-04	1.29E-02
7440-28-0	2.91E+02	4.54E+01	1.76E+01	2.17E+01	4.87E+01	8.89E+00	1.95E+04
7440-31-5	6.79E-02	2.68E-03	1.31E-03	2.42E-03	5.34E-03	1.46E-03	6.44E-01
7440-36-0	5.64E-02	1.13E-01	6.05E-02	3.27E-01	8.07E+00	1.10E+01	3.22E+01
7440-38-2	3.39E+00	3.21E-01	1.08E+01	4.81E+00	1.04E+01	6.90E-01	1.05E+02
7440-39-3	1.78E-03	1.39E-02	5.20E-04	2.41E-02	4.04E-02	1.58E-02	7.36E-03
7440-41-7	2.41E-01	6.81E-04	7.72E-01	1.79E-02	1.56E+00	4.27E+00	6.44E+00
7440-42-8	5.26E-02	3.58E-01	2.82E-02	5.22E-02	7.14E-03	2.17E-04	7.15E-03
7440-43-9	4.89E-01	4.22E+00	4.14E+00	2.39E-01	5.80E+00	3.17E+01	2.58E+01
7440-45-1	na	na	na	na	na	na	na
7440-48-4	3.60E-01	3.57E-02	4.22E-01	9.77E-03	1.42E-01	4.84E-03	1.93E+00
7440-50-8	8.81E-01	5.28E-01	1.26E-01	5.83E-02	6.46E-02	5.89E-03	6.44E-01
7440-62-2	1.75E-01	4.40E-03	1.11E-01	2.06E-01	4.58E-01	1.25E+00	3.68E+00
7440-66-6	3.43E+01	1.25E+01	4.52E+00	8.97E-01	1.04E-02	1.42E-03	1.08E-01
7487-94-7	1.09E+03	7.11E+00	4.88E-01	1.50E+00	5.40E+00	2.11E+00	4.29E+02
7664-41-7	na	na	na	na	na	na	na
7723-14-0	3.35E+04	3.90E+04	2.59E+02	6.30E+03	7.61E+01	1.04E+01	9.66E+03
7782-41-4	1.28E+00	2.70E-02	6.50E-04	6.01E-02	5.11E-02	1.44E-03	2.15E-02
7782-49-2	1.07E+00	9.08E-01	3.74E+00	1.73E+00	8.85E-02	5.50E-03	4.38E+00
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	2.66E+03	2.63E+03	0.00E+00	2.68E+03	3.70E+01	6.75E+01	9.06E+05
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na

Table D8b. All Pathways Farmer Scenario Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
12674-11-2	4.92E+01	4.94E+01	0.00E+00	4.22E+01	6.43E+00	1.17E+01	3.25E+04
14797-55-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04	5.92E-06	2.54E-04
14797-65-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-03	9.48E-05	4.07E-03
16065-83-1	2.83E-03	9.83E-06	5.03E-04	9.31E-04	1.91E-03	1.05E-02	1.72E-02
16984-48-8	1.28E+00	2.70E-02	6.50E-04	6.01E-02	5.11E-02	1.44E-03	2.15E-02
18540-29-9	6.83E-01	2.37E-03	7.94E-02	1.47E-01	5.78E-02	7.90E-02	8.58E+00
53469-21-9	na	na	na	na	na	na	na
Uranium	2.16E-01	9.08E-01	5.14E+00	2.38E+00	2.15E+00	6.92E-02	2.15E+00
Cr Mixture	1.00E-01	3.46E-04	1.18E-02	2.18E-02	9.89E-03	2.02E-02	1.24E+00

The sediment and fish pathways are only used when water comes from the Columbia River.
Zero values for poultry indicate the poultry uptake factors were not available.

Table D9a. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
50-32-8	6.67E-02	3.91E-03	1.48E-05	4.41E-01	4.72E-04	2.37E-03	2.01E-02
53-70-3	6.67E-02	1.05E-03	1.52E-05	5.97E-01	4.86E-04	2.44E-03	1.64E-02
56-23-5	1.19E-03	3.53E-03	1.01E-09	6.76E-05	1.63E-08	1.71E-07	2.84E-04
57-12-5	na	na	na	na	na	na	na
57-14-7	2.74E-02	3.32E-03	5.89E-06	1.06E-05	8.57E-06	6.95E-05	4.55E+00
57-55-6	na	na	na	na	na	na	na
58-89-9	1.19E-02	na	na	5.64E-04	1.48E-05	2.34E-04	1.94E-02
60-29-7	na	na	na	na	na	na	na
60-34-4	2.74E-02	1.51E-03	5.20E-06	1.62E-05	7.57E-06	6.14E-05	3.40E+00
60-57-1	1.46E-01	4.44E-01	5.49E-05	2.15E-02	4.58E-04	3.72E-03	5.73E-02
62-75-9	4.66E-01	2.58E-01	1.89E-05	4.08E-04	1.57E-04	1.28E-03	3.62E+01
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	2.10E-06	5.46E-03	1.91E-09	1.55E-07	1.14E-10	3.70E-10	8.06E-07
67-72-1	1.28E-04	9.50E-04	3.36E-09	2.52E-05	2.80E-08	2.27E-07	3.71E-05
71-36-3	na	na	na	na	na	na	na
71-43-2	5.03E-04	1.85E-03	9.22E-10	1.77E-05	7.99E-09	1.26E-07	2.08E-04
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	1.19E-04	4.28E-04	1.17E-10	1.02E-06	1.26E-09	1.64E-08	9.71E-05
75-00-3	2.65E-05	na	na	4.37E-07	2.72E-10	3.53E-09	1.30E-05
75-01-4	1.28E-02	2.09E-03	5.57E-10	2.39E-04	1.06E-07	1.71E-06	5.44E-03
75-05-8	na	na	na	na	na	na	na
75-07-0	na	5.23E-04	3.07E-10	na	na	na	na
75-09-2	6.86E-05	1.12E-04	3.76E-11	5.32E-07	7.51E-10	1.16E-08	4.65E-05
75-15-0	na	na	na	na	na	na	na
75-21-8	9.32E-03	2.38E-02	1.11E-08	1.21E-05	1.68E-07	2.18E-06	5.20E-02

Table D9a. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	4.11E-02	3.05E-01	1.25E-05	2.04E-02	7.24E-05	8.46E-04	1.06E-02
78-83-1	na	na	na	na	na	na	na
78-87-5	6.22E-04	na	na	1.38E-05	1.26E-08	1.51E-07	2.83E-04
78-93-3	na	na	na	na	na	na	na
79-00-5	5.21E-04	3.87E-03	3.17E-09	6.83E-06	1.63E-08	2.15E-07	3.66E-04
79-01-6	3.66E-03	2.72E-02	9.34E-09	6.32E-04	2.60E-07	6.33E-07	1.07E-03
79-10-7	na	na	na	na	na	na	na
79-34-5	1.83E-03	1.36E-02	2.13E-08	3.87E-05	1.27E-07	1.44E-06	1.26E-03
79-46-9	na	6.38E-01	7.64E-07	na	na	na	na
82-68-8	2.38E-03	na	na	2.91E-04	2.24E-06	2.91E-05	1.10E-03
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	7.13E-04	5.29E-03	5.42E-09	2.85E-04	4.53E-08	3.67E-07	1.44E-04
87-86-5	1.10E-03	na	na	3.53E-04	1.50E-06	2.43E-05	4.87E-04
88-06-2	1.01E-04	7.94E-05	2.17E-08	1.65E-05	1.81E-07	1.47E-06	1.34E-04
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	2.61E-04	1.94E-10	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	2.19E-04	1.49E-03	1.88E-09	2.69E-05	9.49E-09	1.39E-07	6.33E-05
106-93-4	7.77E-01	5.23E-02	7.09E-08	5.37E-03	4.08E-05	5.30E-04	7.50E-01
106-99-0	na	7.13E-03	1.81E-09	na	na	na	na
107-02-8	na	na	na	na	na	na	na

Table D9a. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
107-05-1	na	na	na	na	na	na	na
107-06-2	8.32E-04	6.18E-03	3.19E-09	7.34E-06	1.33E-08	2.16E-07	6.19E-04
107-13-1	4.94E-03	1.62E-02	1.04E-08	1.39E-05	1.23E-07	1.60E-06	1.87E-02
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	6.95E-05	4.62E-04	3.63E-10	3.37E-07	3.39E-09	2.75E-08	2.44E-04
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	1.28E-04	na	na	2.19E-03	1.45E-06	4.47E-06	2.74E-05
117-84-0	na	na	na	na	na	na	na
118-74-1	1.46E-02	1.09E-01	4.77E-07	1.97E-02	3.99E-06	3.23E-05	2.98E-03
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	1.01E-04	na	na	7.39E-08	4.57E-09	5.93E-08	1.33E-03
126-73-8	4.94E-05	na	na	5.10E-06	1.18E-07	9.53E-07	5.77E-05
126-98-7	na	na	na	na	na	na	na
127-18-4	4.75E-04	1.38E-04	4.70E-11	3.78E-05	5.02E-09	8.15E-08	1.03E-04
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	1.55E-01	1.15E+00	6.90E-05	2.40E-01	5.76E-04	4.67E-03	3.90E-02
319-84-6	5.76E-02	2.13E-01	1.53E-05	2.74E-03	6.59E-05	1.04E-03	7.98E-02
319-85-7	1.65E-02	2.20E-03	5.14E-06	8.33E-04	2.36E-05	3.48E-04	2.66E-02
541-73-1	na	na	na	na	na	na	na
542-75-6	9.14E-04	9.50E-04	4.89E-10	3.05E-05	2.65E-08	2.37E-07	4.15E-04
621-64-7	6.40E-02	na	na	1.20E-03	1.28E-04	5.19E-04	9.68E-01
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	3.66E-03	2.72E-02	4.54E-06	6.19E-03	1.26E-04	3.07E-04	4.29E-03
1336-36-3	6.40E-04	2.72E-02	4.54E-06	1.08E-03	1.26E-04	3.07E-04	4.29E-03

Table D9a. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	1.37E-02	3.24E-06	7.53E-05	1.07E-04	7.62E-06	5.07E-04	3.78E-03
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	1.55E-07	4.20E-05	na	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	1.16E-07	3.09E-05	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	1.81E-07	4.77E-05	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	1.01E-02	1.83E-02	4.94E-06	2.40E-03	4.12E-05	3.35E-04	3.53E-03
11096-82-5	3.66E-03	2.72E-02	6.89E-06	3.68E-02	1.92E-04	4.66E-04	3.68E-03
11097-69-1	3.66E-03	2.72E-02	5.67E-06	8.66E-03	1.58E-04	3.84E-04	4.04E-03
11104-28-2	3.66E-03	2.72E-02	2.24E-06	1.49E-03	6.22E-05	1.51E-04	7.53E-03
11141-16-5	3.66E-03	2.72E-02	2.24E-06	1.49E-03	6.22E-05	1.51E-04	7.53E-03
12672-29-6	3.66E-03	2.72E-02	3.47E-06	6.66E-03	9.65E-05	2.35E-04	4.06E-03
12674-11-2	6.40E-04	2.72E-02	4.27E-06	5.87E-04	1.19E-04	2.89E-04	5.24E-03
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	7.76E-07	5.11E-05	na	na	na	na
53469-21-9	3.66E-03	2.72E-02	4.29E-06	6.19E-03	1.19E-04	2.91E-04	4.24E-03
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	1.11E-07	7.30E-06	na	na	na	na

The scenario totals for Well Water and the Columbia River are shown in Table 15.
"na" means that one or more of the cancer induction slope factors was not available.

Table D9b. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	5.36E-02	5.37E-02	0.00E+00	5.92E-02	8.66E-03	3.49E-03	4.22E+00
53-70-3	2.16E-01	2.15E-01	0.00E+00	2.50E-01	9.49E-03	3.83E-03	1.27E+01
56-23-5	1.52E-07	1.62E-07	0.00E+00	5.46E-08	1.18E-07	2.28E-08	2.16E-04
57-12-5	na	na	na	na	na	na	na
57-14-7	1.59E-07	1.84E-07	0.00E+00	4.38E-08	5.20E-05	1.30E-05	5.24E-04
57-55-6	na	na	na	na	na	na	na
58-89-9	7.22E-05	7.93E-05	0.00E+00	3.71E-05	3.62E-04	4.67E-05	1.05E-02
60-29-7	na	na	na	na	na	na	na
60-34-4	1.65E-07	1.90E-07	0.00E+00	4.53E-08	4.52E-05	1.13E-05	5.24E-04
60-57-1	1.99E-02	2.02E-02	0.00E+00	1.86E-02	7.59E-03	1.90E-03	2.53E+00
62-75-9	5.30E-06	6.12E-06	0.00E+00	1.46E-06	9.79E-04	2.45E-04	8.90E-03
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	5.27E-11	5.74E-11	0.00E+00	1.76E-11	2.55E-10	1.60E-10	8.33E-08
67-72-1	4.26E-07	4.41E-07	0.00E+00	1.81E-07	1.67E-07	4.17E-08	2.38E-04
71-36-3	na	na	na	na	na	na	na
71-43-2	1.94E-08	2.12E-08	0.00E+00	6.48E-09	8.72E-08	1.12E-08	2.64E-05
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	4.86E-10	5.45E-10	0.00E+00	1.49E-10	1.13E-08	1.77E-09	2.27E-06
75-00-3	2.33E-10	2.57E-10	0.00E+00	7.51E-11	2.43E-09	3.80E-10	4.03E-07
75-01-4	1.55E-07	1.70E-07	0.00E+00	5.09E-08	1.18E-06	1.48E-07	2.72E-04
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	5.22E-10	5.82E-10	0.00E+00	1.63E-10	7.99E-09	1.05E-09	7.58E-07
75-15-0	na	na	na	na	na	na	na
75-21-8	1.44E-08	1.66E-08	0.00E+00	4.04E-09	1.51E-06	2.36E-07	1.78E-04
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	2.18E-02	2.17E-02	0.00E+00	2.10E-02	1.37E-03	2.38E-04	2.47E+00
78-83-1	na	na	na	na	na	na	na
78-87-5	1.83E-08	2.01E-08	0.00E+00	6.04E-09	1.05E-07	1.77E-08	2.51E-05
78-93-3	na	na	na	na	na	na	na
79-00-5	1.80E-08	2.00E-08	0.00E+00	5.72E-09	1.50E-07	2.32E-08	1.79E-05
79-01-6	2.11E-07	2.27E-07	0.00E+00	7.36E-08	4.37E-07	3.64E-07	3.22E-04
79-10-7	na	na	na	na	na	na	na
79-34-5	2.00E-07	2.21E-07	0.00E+00	6.55E-08	1.02E-06	1.82E-07	1.52E-04

Table D9b. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
79-46-9	na	na	na	na	na	na	na
82-68-8	4.64E-05	4.82E-05	0.00E+00	3.11E-05	3.41E-05	5.33E-06	1.07E-02
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	7.55E-06	7.84E-06	0.00E+00	2.94E-06	2.58E-07	6.45E-08	4.12E-03
87-86-5	7.77E-05	7.97E-05	0.00E+00	6.64E-05	4.21E-05	5.26E-06	4.61E-03
88-06-2	4.63E-07	5.08E-07	0.00E+00	2.30E-07	1.86E-06	4.66E-07	3.35E-05
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	1.36E-07	1.44E-07	0.00E+00	5.03E-08	9.78E-08	1.36E-08	1.18E-04
106-93-4	4.20E-05	4.70E-05	0.00E+00	1.31E-05	3.74E-04	5.85E-05	3.02E-02
106-99-0	na	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	1.17E-08	1.30E-08	0.00E+00	3.64E-09	1.50E-07	1.87E-08	1.38E-05
107-13-1	1.86E-08	2.13E-08	0.00E+00	5.26E-09	1.11E-06	1.74E-07	9.42E-05
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	3.95E-10	4.52E-10	0.00E+00	1.12E-10	1.92E-08	4.79E-09	1.33E-06
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na

Table D9b. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	2.76E-03	2.73E-03	0.00E+00	3.23E-03	1.56E-05	1.03E-05	2.38E-04
117-84-0	na	na	na	na	na	na	na
118-74-1	1.57E-03	1.57E-03	0.00E+00	7.58E-04	2.44E-05	6.09E-06	4.55E-01
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	3.93E-10	4.52E-10	0.00E+00	1.09E-10	4.13E-08	6.46E-09	1.92E-06
126-73-8	4.45E-07	4.82E-07	0.00E+00	2.57E-07	1.45E-06	3.63E-07	1.19E-05
126-98-7	na	na	na	na	na	na	na
127-18-4	2.12E-07	2.24E-07	0.00E+00	7.76E-08	5.63E-08	7.04E-09	2.38E-04
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	2.52E-01	2.51E-01	0.00E+00	2.75E-01	1.23E-02	3.08E-03	1.89E+01
319-84-6	3.66E-04	4.00E-04	0.00E+00	1.93E-04	1.50E-03	1.94E-04	5.85E-02
319-85-7	1.15E-04	1.27E-04	0.00E+00	6.12E-05	5.76E-04	7.91E-05	1.61E-02
541-73-1	na	na	na	na	na	na	na
542-75-6	3.02E-08	3.31E-08	0.00E+00	9.97E-09	1.64E-07	3.73E-08	4.03E-05
621-64-7	1.23E-05	1.41E-05	0.00E+00	3.54E-06	5.24E-04	2.62E-04	8.59E-04
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	1.32E-02	1.31E-02	0.00E+00	1.21E-02	4.26E-04	3.55E-04	6.40E+00
1336-36-3	1.32E-02	1.31E-02	0.00E+00	1.21E-02	4.26E-04	3.55E-04	6.40E+00
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	6.54E-04	6.19E-05	2.08E-03	9.28E-04	2.00E-03	6.09E-05	2.02E-02
7440-39-3	na	na	na	na	na	na	na

Table D9b. All Pathways Farmer Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
7440-41-7	na	na	na	na	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	3.63E-03	3.66E-03	0.00E+00	3.80E-03	1.06E-03	2.66E-04	3.42E-01
11096-82-5	1.50E+00	1.47E+00	0.00E+00	1.63E+00	9.59E-04	7.99E-04	5.41E-01
11097-69-1	4.56E-02	4.51E-02	0.00E+00	4.59E-02	6.35E-04	5.29E-04	1.55E+01
11104-28-2	2.34E-04	2.43E-04	0.00E+00	1.41E-04	1.55E-04	1.29E-04	6.78E-02
11141-16-5	2.34E-04	2.43E-04	0.00E+00	1.41E-04	1.55E-04	1.29E-04	6.78E-02
12672-29-6	1.29E-02	1.28E-02	0.00E+00	1.09E-02	2.82E-04	2.35E-04	6.99E+00
12674-11-2	2.95E-03	2.97E-03	0.00E+00	2.53E-03	3.86E-04	3.22E-04	1.95E+00
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na	na
53469-21-9	1.28E-02	1.27E-02	0.00E+00	1.16E-02	3.89E-04	3.24E-04	6.40E+00
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na	na

The sediment and fish pathways are only used when water comes from the Columbia River.
Zero values for poultry indicate the poultry uptake factors were not available.

Table D10a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
H-3	1.04E-04	1.19E-04	7.01E-05	1.01E-05	0.00E+00	0.00E+00
Be-10	2.28E-02	1.15E-01	5.10E-03	1.61E-02	1.06E-06	2.32E-06
C-14	1.10E-02	2.06E+01	2.29E-03	9.53E-05	6.19E-09	2.91E-08
Na-22	9.99E-02	4.79E-01	1.26E-02	3.49E-04	2.08E-08	2.33E-02
Al-26	5.42E-02	3.95E+00	1.60E-02	6.65E-04	4.38E-08	3.17E-02
Si-32+D	6.28E-02	1.09E-01	1.20E-02	4.70E-02	3.08E-06	2.46E-05
Cl-36	8.00E-02	1.10E-01	3.32E-03	9.99E-04	6.04E-08	4.61E-06
K-40	7.13E-02	3.83E+00	2.04E-02	5.65E-04	3.69E-08	1.85E-03
Ca-41	3.03E-03	1.32E-02	1.39E-03	5.80E-05	3.78E-09	0.00E+00
Ti-44+D	1.54E-01	6.74E+00	2.69E-02	2.06E-02	1.35E-06	2.58E-02
V-49	1.05E-04	2.52E-03	6.72E-05	1.57E-05	7.87E-10	0.00E+00
Mn-54	1.16E-02	2.76E-01	3.03E-03	3.06E-04	1.50E-08	7.30E-03
Fe-55	1.15E-03	2.51E-02	6.65E-04	6.11E-05	3.65E-09	0.00E+00
Fe-60+D	2.91E-01	7.78E+00	1.67E-01	1.23E-02	8.15E-07	1.51E-03
Co-60	7.59E-02	2.43E+00	2.95E-02	1.51E-03	9.44E-08	2.82E-02
Ni-59	1.18E-03	5.34E-03	2.30E-04	4.19E-05	2.76E-09	0.00E+00
Ni-63	3.22E-03	1.47E-02	6.32E-04	1.05E-04	6.89E-09	0.00E+00
Se-79	2.68E-02	3.20E-01	9.53E-03	2.99E-04	1.88E-08	3.90E-08
Rb-87	2.39E-02	1.96E+00	5.39E-03	1.47E-04	9.68E-09	3.08E-07
Sr-90+D	3.78E-01	2.20E+00	1.68E-01	1.13E-02	7.34E-07	5.01E-05
Zr-93	6.13E-03	1.04E-01	1.82E-03	3.80E-03	2.50E-07	3.77E-09
Nb-91	9.04E-04	3.37E-02	5.72E-04	1.46E-04	9.63E-09	2.48E-05
Nb-93m	8.79E-04	3.18E-02	5.72E-04	1.46E-04	9.48E-09	2.24E-07
Nb-94	3.02E-02	1.85E+00	7.82E-03	1.65E-03	1.08E-07	1.85E-02
Mo-93	3.98E-03	6.83E-03	1.48E-03	1.30E-03	8.44E-08	1.28E-06
Tc-99	4.23E-03	1.01E-02	1.60E-03	3.80E-04	2.39E-08	2.62E-07
Ru-106+D	6.69E-02	1.36E-01	3.00E-02	5.38E-03	2.75E-07	1.96E-03
Pd-107	1.17E-03	1.48E-03	1.63E-04	5.84E-04	3.84E-08	0.00E+00
Ag-108m+D	3.17E-02	1.36E+00	8.34E-03	1.15E-03	7.58E-08	1.88E-02
Cd-109	2.70E-02	5.44E-01	1.43E-02	5.20E-03	2.79E-07	2.63E-05
Cd-113m	3.43E-01	6.70E+00	1.76E-01	6.98E-02	4.50E-06	1.37E-06
In-115	4.22E-01	3.11E+03	1.73E-01	1.71E-01	1.12E-05	8.69E-07
Sn-121m+D	7.58E-03	1.34E+00	2.46E-03	5.43E-04	3.56E-08	4.61E-06
Sn-126+D	9.35E-02	1.43E+01	2.30E-02	4.61E-03	3.03E-07	2.32E-02
Sb-125	9.06E-03	1.37E-01	3.08E-03	5.56E-04	3.66E-08	4.40E-03
Te-125m	6.01E-03	2.95E-01	4.02E-03	3.32E-04	6.38E-09	9.67E-06
I-129	1.23E+00	3.44E+00	3.02E-01	7.93E-03	5.19E-07	2.82E-05
Cs-134	3.23E-01	2.94E+01	8.03E-02	2.11E-03	1.22E-07	1.61E-02
Cs-135	3.12E-02	2.82E+00	7.74E-03	2.07E-04	1.37E-08	8.39E-08
Cs-137+D	2.26E-01	2.03E+01	5.48E-02	1.45E-03	9.50E-08	6.56E-03
Ba-133	9.52E-03	1.75E-01	3.72E-03	3.56E-04	2.28E-08	3.94E-03
Pm-147	3.35E-03	9.58E-03	1.15E-03	1.79E-03	1.06E-07	9.89E-08
Sm-147	3.68E+00	4.62E+00	2.03E-01	3.41E+00	2.24E-04	0.00E+00
Sm-151	1.95E-03	3.91E-03	4.26E-04	1.37E-03	8.98E-08	2.15E-09
Eu-150	3.87E-02	1.19E+00	6.96E-03	1.22E-02	7.99E-07	1.70E-02

Table D10a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
Eu-152	3.27E-02	7.24E-01	7.10E-03	1.01E-02	6.51E-07	1.29E-02
Eu-154	4.13E-02	6.82E-01	1.05E-02	1.30E-02	8.33E-07	1.40E-02
Eu-155	4.55E-03	2.94E-02	1.68E-03	1.89E-03	1.17E-07	3.77E-04
Gd-152	1.13E+01	1.21E+01	1.76E-01	1.11E+01	7.30E-04	0.00E+00
Ho-166m	6.73E-02	1.63E+00	8.84E-03	3.52E-02	2.32E-06	2.01E-02
Re-187	2.15E-05	2.47E-04	1.04E-05	2.48E-06	1.63E-10	0.00E+00
Tl-204	8.80E-03	6.63E+00	3.68E-03	1.10E-04	6.75E-09	8.22E-06
Pb-205	2.60E-03	9.92E-02	1.78E-03	1.79E-04	1.18E-08	1.55E-08
Pb-210+D	8.77E+00	3.27E+02	5.88E+00	6.20E-01	5.22E-05	1.29E-05
Bi-207	2.70E-02	1.15E+00	6.00E-03	9.12E-04	5.96E-08	1.76E-02
Po-209	4.52E+00	2.82E+01	2.60E+00	4.88E-01	3.21E-05	3.86E-05
Po-210	3.46E+00	2.23E+01	2.08E+00	3.91E-01	1.39E-05	5.39E-08
Ra-226+D	2.73E+00	1.78E+01	1.46E+00	3.92E-01	2.64E-05	2.07E-02
Ra-228+D	2.72E+00	1.78E+01	1.58E+00	2.22E-01	1.41E-04	1.31E-02
Ac-227+D	1.00E+02	1.75E+02	1.62E+01	7.93E+01	5.16E-03	4.11E-03
Th-228+D	1.67E+01	3.29E+01	8.88E-01	1.56E+01	8.96E-04	1.58E-02
Th-229+D	8.50E+01	1.65E+02	4.41E+00	7.93E+01	5.23E-03	3.22E-03
Th-230	1.27E+01	2.36E+01	6.00E-01	1.19E+01	7.87E-04	6.10E-06
Th-232	5.63E+01	1.12E+02	2.99E+00	5.24E+01	3.46E-03	5.91E-04
Pa-231	7.33E+01	9.61E+01	1.16E+01	5.84E+01	3.91E-03	4.45E-04
U-232	2.72E+00	6.13E+00	1.43E+00	6.79E-01	1.74E-04	2.30E-03
U-233	8.12E-01	1.41E+00	3.16E-01	3.64E-01	2.39E-05	3.04E-06
U-234	7.98E-01	1.38E+00	3.10E-01	3.59E-01	2.33E-05	8.66E-07
U-235+D	7.48E-01	1.37E+00	2.92E-01	3.32E-01	2.16E-05	1.60E-03
U-236	7.56E-01	1.31E+00	2.95E-01	3.39E-01	2.20E-05	4.61E-07
U-238+D	7.37E-01	1.30E+00	2.93E-01	3.22E-01	2.09E-05	2.50E-04
Np-237+D	3.09E+01	4.99E+01	4.86E+00	2.46E+01	1.62E-03	2.27E-03
Pu-236	8.25E+00	1.31E+01	1.28E+00	6.61E+00	3.98E-04	6.43E-06
Pu-238	2.24E+01	3.60E+01	3.50E+00	1.79E+01	1.17E-03	3.30E-07
Pu-239	2.45E+01	3.96E+01	3.88E+00	1.96E+01	1.29E-03	6.23E-07
Pu-240	2.45E+01	3.96E+01	3.88E+00	1.96E+01	1.29E-03	3.21E-07
Pu-241+D	4.72E-01	7.67E-01	7.50E-02	3.76E-01	2.51E-05	9.85E-08
Pu-242	2.35E+01	3.78E+01	3.68E+00	1.87E+01	1.23E-03	2.81E-07
Pu-244+D	2.30E+01	3.75E+01	3.64E+00	1.84E+01	1.21E-03	3.91E-03
Am-241	2.54E+01	4.09E+01	3.99E+00	2.02E+01	1.33E-03	9.60E-05
Am-242m+D	2.44E+01	3.94E+01	3.85E+00	1.94E+01	1.30E-03	1.42E-04
Am-243+D	2.52E+01	4.08E+01	3.97E+00	2.01E+01	1.32E-03	1.91E-03
Cm-242	9.48E-01	1.43E+00	1.26E-01	7.89E-01	3.28E-05	2.18E-07
Cm-243	1.75E+01	2.82E+01	2.75E+00	1.40E+01	9.13E-04	1.23E-03
Cm-244	1.41E+01	2.27E+01	2.21E+00	1.13E+01	7.34E-04	2.72E-07
Cm-245	2.60E+01	4.20E+01	4.10E+00	2.07E+01	1.37E-03	7.40E-04
Cm-246	2.58E+01	4.15E+01	4.05E+00	2.06E+01	1.35E-03	2.55E-07
Cm-247+D	2.37E+01	3.86E+01	3.74E+00	1.89E+01	1.24E-03	3.78E-03
Cm-248	9.44E+01	1.52E+02	1.49E+01	7.52E+01	4.96E-03	1.92E-07
Cm-250+D	5.38E+02	8.69E+02	8.51E+01	4.29E+02	2.82E-02	3.70E-03
Bk-247	3.28E+01	5.66E+01	5.15E+00	2.62E+01	1.72E-03	9.25E-04
Cf-248	2.52E+00	4.17E+00	3.66E-01	2.02E+00	1.10E-04	2.10E-07

Table D10a. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
Cf-249	3.34E+01	5.76E+01	5.19E+00	2.63E+01	1.73E-03	3.76E-03
Cf-250	1.51E+01	2.58E+01	2.33E+00	1.19E+01	7.71E-04	2.55E-07
Cf-251	3.41E+01	5.86E+01	5.31E+00	2.68E+01	1.77E-03	1.13E-03
Cf-252	7.85E+00	1.32E+01	1.18E+00	6.25E+00	3.72E-04	3.49E-07

"River Total" is the sum of all the pathways shown in Tables D10a, D10b, and D10c.
"Well Total" excludes the pathways shown in Table D10c.

Table D10b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
H-3	3.62E-10	8.98E-06	1.51E-06	1.22E-05	7.13E-07	3.78E-07
Be-10	9.33E-07	1.43E-03	8.54E-05	1.02E-06	5.54E-05	1.33E-06
C-14	4.13E-07	8.18E-04	1.94E-03	5.48E-03	2.66E-04	9.60E-05
Na-22	2.08E-06	3.85E-03	1.59E-02	4.29E-02	3.45E-06	9.96E-04
Al-26	2.92E-06	4.47E-03	4.00E-04	7.08E-04	1.30E-04	1.67E-04
Si-32+D	2.19E-06	3.47E-03	8.19E-06	5.42E-05	6.63E-05	1.28E-04
Cl-36	5.57E-07	2.46E-02	4.67E-03	4.60E-02	1.00E-05	3.22E-04
K-40	3.69E-06	6.96E-03	7.15E-03	3.39E-02	2.30E-04	2.77E-04
Ca-41	2.52E-07	4.55E-04	5.47E-05	1.06E-03	1.73E-06	8.34E-06
Ti-44+D	4.90E-06	7.54E-03	1.35E-02	5.96E-02	2.92E-06	1.06E-06
V-49	9.33E-09	1.81E-05	2.31E-06	2.59E-07	3.64E-07	7.00E-07
Mn-54	4.12E-07	8.76E-04	2.11E-05	1.77E-05	4.19E-06	2.42E-06
Fe-55	1.10E-07	1.84E-04	2.08E-04	4.20E-06	1.80E-05	8.67E-06
Fe-60+D	3.08E-05	4.68E-02	5.60E-02	1.16E-03	4.53E-03	2.18E-03
Co-60	5.11E-06	8.32E-03	4.80E-03	1.93E-03	1.61E-03	3.88E-05
Ni-59	4.21E-08	6.59E-05	1.93E-05	8.18E-04	6.26E-09	3.01E-07
Ni-63	1.15E-07	1.81E-04	5.29E-05	2.24E-03	1.72E-08	8.27E-07
Se-79	1.66E-06	2.69E-03	2.39E-03	8.46E-03	2.33E-03	1.12E-03
Rb-87	9.83E-07	2.05E-03	9.42E-04	1.49E-02	3.04E-04	2.19E-04
Sr-90+D	3.03E-05	5.60E-02	2.56E-02	1.16E-01	4.09E-04	4.92E-04
Zr-93	3.34E-07	5.09E-04	3.04E-08	2.22E-07	2.96E-09	4.75E-09
Nb-91	1.04E-07	1.61E-04	2.87E-09	5.20E-08	4.66E-09	7.47E-09
Nb-93m	1.03E-07	1.61E-04	2.84E-09	5.16E-08	4.66E-09	7.47E-09
Nb-94	1.43E-06	2.20E-03	3.93E-08	7.11E-07	6.37E-08	1.02E-07
Mo-93	2.69E-07	5.45E-04	2.57E-05	5.76E-04	4.14E-05	1.80E-05
Tc-99	2.79E-07	1.30E-03	2.57E-05	4.06E-04	1.08E-05	5.18E-04
Ru-106+D	4.26E-06	8.20E-03	2.11E-02	1.94E-05	1.96E-04	1.96E-06
Pd-107	2.98E-08	4.64E-05	1.10E-05	3.64E-04	1.34E-09	8.58E-09
Ag-108m+D	1.52E-06	2.33E-03	4.18E-04	9.24E-05	4.53E-04	5.45E-05
Cd-109	2.14E-06	4.10E-03	8.50E-05	2.92E-03	3.16E-04	1.90E-05
Cd-113m	3.16E-05	5.23E-02	1.20E-03	3.96E-02	3.91E-03	2.35E-04
In-115	3.16E-05	4.84E-02	2.31E-02	3.84E-03	1.41E-03	1.81E-03
Sn-121m+D	4.48E-07	6.91E-04	3.29E-03	5.46E-04	1.34E-05	2.58E-05
Sn-126+D	4.20E-06	6.45E-03	3.08E-02	5.11E-03	1.25E-04	2.41E-04
Sb-125	6.21E-07	9.00E-04	6.60E-05	5.43E-05	6.78E-07	3.53E-06
Te-125m	2.14E-07	9.20E-04	1.78E-04	2.26E-04	6.47E-05	2.59E-04

Table D10b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
I-129	5.49E-05	8.52E-02	2.03E-01	6.18E-01	8.22E-05	1.19E-02
Cs-134	1.29E-05	2.34E-02	6.26E-02	1.34E-01	4.42E-03	4.26E-04
Cs-135	1.42E-06	2.32E-03	6.62E-03	1.38E-02	4.28E-04	4.12E-05
Cs-137+D	9.92E-06	1.64E-02	4.65E-02	9.73E-02	3.03E-03	2.91E-04
Ba-133	6.63E-07	1.05E-03	1.23E-05	3.93E-04	9.15E-07	4.40E-05
Pm-147	1.90E-07	3.17E-04	8.96E-05	4.84E-06	6.23E-08	3.00E-07
Sm-147	3.70E-05	5.68E-02	1.69E-02	8.99E-04	2.20E-05	1.85E-05
Sm-151	7.76E-08	1.19E-04	3.56E-05	1.89E-06	4.63E-08	3.90E-08
Eu-150	1.26E-06	1.95E-03	5.80E-04	3.08E-05	7.56E-07	6.37E-07
Eu-152	1.27E-06	1.98E-03	5.85E-04	3.12E-05	7.70E-07	6.49E-07
Eu-154	1.85E-06	2.92E-03	8.56E-04	4.57E-05	1.14E-06	9.56E-07
Eu-155	2.89E-07	4.65E-04	1.35E-04	7.22E-06	1.82E-07	1.53E-07
Gd-152	3.22E-05	4.94E-02	1.03E-02	7.82E-04	1.91E-05	1.61E-05
Ho-166m	1.62E-06	2.48E-03	6.65E-04	3.92E-05	9.60E-07	8.08E-07
Re-187	1.90E-09	3.35E-06	1.50E-06	3.68E-06	1.20E-08	5.78E-08
Tl-204	6.27E-07	1.02E-03	2.34E-03	1.57E-03	2.99E-05	3.84E-05
Pb-205	3.26E-07	5.01E-04	1.19E-05	9.90E-05	9.69E-06	1.87E-05
Pb-210+D	1.24E-03	1.70E+00	1.03E-01	3.66E-01	3.23E-02	6.29E-02
Bi-207	1.09E-06	1.68E-03	4.00E-05	6.63E-04	1.63E-05	6.28E-05
Po-209	4.73E-04	7.27E-01	2.17E-01	1.95E-01	6.34E-02	2.37E-01
Po-210	2.04E-04	5.29E-01	1.10E-01	1.15E-01	5.04E-02	1.89E-01
Ra-226+D	2.81E-04	4.11E-01	2.27E-02	4.23E-01	1.20E-03	2.62E-05
Ra-228+D	2.95E-04	4.44E-01	2.30E-02	4.45E-01	1.29E-03	4.60E-07
Ac-227+D	2.93E-03	4.53E+00	6.72E-03	7.14E-02	1.76E-03	4.23E-04
Th-228+D	1.42E-04	2.43E-01	8.09E-05	9.17E-04	9.62E-05	2.31E-05
Th-229+D	8.07E-04	1.23E+00	4.43E-04	4.89E-03	4.79E-04	1.15E-04
Th-230	1.10E-04	1.68E-01	6.29E-05	7.03E-04	6.52E-05	1.57E-05
Th-232	5.60E-04	8.39E-01	1.07E-03	1.43E-02	3.26E-04	7.81E-05
Pa-231	2.16E-03	3.26E+00	2.00E-03	1.33E-02	1.26E-03	3.03E-04
U-232	2.78E-04	4.07E-01	7.19E-03	1.27E-01	3.89E-02	1.87E-02
U-233	5.71E-05	8.88E-02	1.59E-03	2.81E-02	8.59E-03	4.13E-03
U-234	5.59E-05	8.70E-02	1.56E-03	2.75E-02	8.41E-03	4.05E-03
U-235+D	5.28E-05	8.21E-02	1.47E-03	2.59E-02	7.94E-03	3.82E-03
U-236	5.31E-05	8.27E-02	1.48E-03	2.61E-02	7.99E-03	3.85E-03
U-238+D	5.29E-05	8.24E-02	1.47E-03	2.60E-02	7.97E-03	3.83E-03
Np-237+D	8.86E-04	1.37E+00	8.15E-02	5.40E-03	5.29E-04	1.27E-04
Pu-236	2.15E-04	3.54E-01	2.20E-04	5.44E-04	1.07E-04	9.49E-06
Pu-238	6.39E-04	9.80E-01	5.85E-04	8.53E-04	2.85E-04	2.29E-05
Pu-239	7.09E-04	1.08E+00	6.48E-04	9.46E-04	3.16E-04	2.53E-05
Pu-240	7.09E-04	1.08E+00	6.48E-04	9.46E-04	3.16E-04	2.53E-05
Pu-241+D	1.39E-05	2.10E-02	1.35E-05	1.85E-05	6.11E-06	4.92E-07
Pu-242	6.73E-04	1.03E+00	6.15E-04	8.98E-04	3.00E-04	2.40E-05
Pu-244+D	6.65E-04	1.02E+00	6.08E-04	8.87E-04	2.96E-04	2.37E-05
Am-241	7.28E-04	1.12E+00	2.66E-03	1.33E-03	6.49E-04	2.08E-04
Am-242m+D	7.12E-04	1.08E+00	2.59E-03	1.39E-03	6.29E-04	2.02E-04
Am-243+D	7.27E-04	1.11E+00	2.66E-03	1.32E-03	6.47E-04	2.08E-04
Cm-242	1.48E-05	3.28E-02	5.94E-06	4.26E-04	1.36E-05	3.27E-06

Table D10b. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
Cm-243	4.98E-04	7.68E-01	1.60E-04	1.21E-02	2.98E-04	7.18E-05
Cm-244	3.99E-04	6.17E-01	1.28E-04	9.74E-03	2.40E-04	5.78E-05
Cm-245	7.49E-04	1.15E+00	2.40E-04	1.82E-02	4.45E-04	1.07E-04
Cm-246	7.41E-04	1.13E+00	2.37E-04	1.80E-02	4.40E-04	1.06E-04
Cm-247+D	6.85E-04	1.05E+00	2.19E-04	1.66E-02	4.07E-04	9.78E-05
Cm-248	2.72E-03	4.17E+00	8.72E-04	6.61E-02	1.62E-03	3.89E-04
Cm-250+D	1.56E-02	2.38E+01	5.37E-03	3.77E-01	9.24E-03	2.22E-03
Bk-247	9.41E-04	1.44E+00	3.44E-03	1.71E-03	8.38E-04	2.69E-04
Cf-248	5.55E-05	9.97E-02	2.50E-02	1.19E-04	3.96E-05	9.53E-06
Cf-249	9.48E-04	1.46E+00	4.34E-01	8.64E-04	5.64E-04	1.36E-04
Cf-250	4.18E-04	6.53E-01	1.92E-01	3.84E-04	2.53E-04	6.09E-05
Cf-251	9.71E-04	1.49E+00	4.44E-01	8.84E-04	5.77E-04	1.39E-04
Cf-252	1.96E-04	3.27E-01	9.22E-02	1.87E-04	1.28E-04	3.09E-05

Table D10c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
H-3	6.24E-07	1.10E-06	6.06E-07	4.61E-10	0.00E+00	1.26E-05
Be-10	1.54E-06	1.79E-05	4.47E-07	5.69E-04	1.77E-04	9.18E-02
C-14	3.37E-05	8.35E-05	3.13E-05	1.47E-04	1.29E-06	2.06E+01
Na-22	2.91E-04	1.10E-06	3.31E-04	2.57E-04	3.61E-01	1.81E-02
Al-26	7.22E-06	4.20E-05	5.60E-05	1.81E-03	2.45E+00	1.44E+00
Si-32+D	1.45E-07	2.11E-05	4.22E-05	1.17E-03	1.64E-03	4.33E-02
Cl-36	2.00E-05	8.73E-07	2.91E-05	4.69E-05	4.85E-05	2.98E-02
K-40	1.23E-04	7.14E-05	8.93E-05	1.53E-03	9.60E-02	3.66E+00
Ca-41	8.40E-07	4.89E-07	2.44E-06	1.00E-04	0.00E+00	1.00E-02
Ti-44+D	2.43E-04	9.45E-07	3.54E-07	2.63E-03	1.73E+00	4.85E+00
V-49	4.49E-08	1.18E-07	2.36E-07	4.97E-07	0.00E+00	2.42E-03
Mn-54	4.01E-07	1.33E-06	7.98E-07	2.07E-05	4.59E-02	2.18E-01
Fe-55	3.84E-06	5.83E-06	2.91E-06	1.44E-05	0.00E+00	2.39E-02
Fe-60+D	1.01E-03	1.46E-03	7.32E-04	2.11E-02	1.46E+00	6.01E+00
Co-60	8.69E-05	5.16E-04	1.29E-05	1.11E-03	7.64E-01	1.59E+00
Ni-59	3.46E-07	2.02E-09	1.01E-07	2.61E-05	0.00E+00	4.14E-03
Ni-63	9.51E-07	5.54E-09	2.77E-07	6.68E-05	0.00E+00	1.14E-02
Se-79	4.31E-05	7.52E-04	3.76E-04	2.50E-04	7.32E-07	2.91E-01
Rb-87	1.62E-05	9.45E-05	7.08E-05	5.64E-04	2.21E-05	1.94E+00
Sr-90+D	4.02E-04	1.18E-04	1.47E-04	1.46E-02	3.02E-03	1.81E+00
Zr-93	5.48E-10	9.56E-10	1.59E-09	2.26E-04	5.82E-06	9.81E-02
Nb-91	5.17E-11	1.50E-09	2.51E-09	6.25E-05	1.86E-03	3.09E-02
Nb-93m	5.13E-11	1.50E-09	2.51E-09	4.22E-05	1.15E-05	3.09E-02
Nb-94	7.07E-10	2.06E-08	3.43E-08	8.64E-04	1.40E+00	4.22E-01
Mo-93	4.45E-07	1.30E-05	5.83E-06	1.12E-04	6.21E-05	2.66E-03
Tc-99	4.82E-08	4.20E-07	2.10E-05	4.20E-05	4.93E-06	5.75E-03
Ru-106+D	4.05E-04	6.31E-05	6.58E-07	2.44E-04	1.40E-02	5.40E-02
Pd-107	1.97E-07	4.29E-10	2.86E-09	1.71E-05	0.00E+00	2.94E-04
Ag-108m+D	7.54E-06	1.46E-04	1.83E-05	8.54E-04	1.32E+00	7.51E-03

Table D10c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Cd-109	1.58E-06	1.01E-04	6.29E-06	1.44E-04	2.21E-04	5.16E-01
Cd-113m	2.11E-05	1.24E-03	7.73E-05	1.20E-02	6.52E-05	6.34E+00
In-115	4.17E-04	4.55E-04	6.07E-04	1.96E-02	6.73E-05	3.11E+03
Sn-121m+D	5.93E-05	4.32E-06	8.64E-06	2.46E-04	3.15E-04	1.33E+00
Sn-126+D	5.54E-04	4.03E-05	8.06E-05	2.60E-03	1.79E+00	1.24E+01
Sb-125	9.23E-07	1.62E-07	9.44E-07	8.69E-05	7.20E-02	5.54E-02
Te-125m	4.50E-06	2.11E-05	8.81E-05	5.10E-06	2.88E-05	2.89E-01
I-129	3.64E-03	2.65E-05	3.97E-03	2.58E-02	1.66E-03	2.17E+00
Cs-134	1.15E-03	1.41E-03	1.41E-04	1.32E-03	2.06E-01	2.89E+01
Cs-135	1.17E-04	1.36E-04	1.36E-05	8.78E-04	6.51E-06	2.79E+00
Cs-137+D	8.22E-04	9.60E-04	9.60E-05	4.95E-03	4.09E-01	1.97E+01
Ba-133	2.22E-07	2.94E-07	1.47E-05	2.19E-04	1.63E-01	2.68E-03
Pm-147	1.66E-06	2.02E-08	1.01E-07	2.40E-05	1.56E-06	6.21E-03
Sm-147	3.05E-04	7.10E-06	6.22E-06	2.26E-02	0.00E+00	9.11E-01
Sm-151	6.41E-07	1.49E-08	1.31E-08	4.40E-05	1.52E-07	1.92E-03
Eu-150	1.05E-05	2.44E-07	2.14E-07	6.49E-04	1.09E+00	6.26E-02
Eu-152	1.06E-05	2.49E-07	2.18E-07	4.93E-04	6.27E-01	6.38E-02
Eu-154	1.56E-05	3.67E-07	3.21E-07	5.78E-04	5.46E-01	9.41E-02
Eu-155	2.46E-06	5.88E-08	5.14E-08	5.95E-05	9.70E-03	1.51E-02
Gd-152	1.86E-04	6.18E-06	5.41E-06	1.99E-02	0.00E+00	7.93E-01
Ho-166m	1.20E-05	3.10E-07	2.71E-07	9.80E-04	1.52E+00	3.97E-02
Re-187	2.51E-08	3.65E-09	1.83E-08	1.12E-06	0.00E+00	2.25E-04
Tl-204	4.30E-05	9.68E-06	1.29E-05	1.09E-04	1.78E-04	6.62E+00
Pb-205	2.15E-07	3.13E-06	6.26E-06	2.03E-04	1.20E-06	9.63E-02
Pb-210+D	1.48E-03	1.03E-02	2.06E-02	6.66E-01	7.51E-04	3.17E+02
Bi-207	7.21E-07	5.26E-06	2.10E-05	5.49E-04	1.11E+00	1.08E-02
Po-209	3.91E-03	2.05E-02	7.96E-02	2.74E-01	2.80E-03	2.33E+01
Po-210	2.36E-03	1.64E-02	6.38E-02	6.30E-03	2.08E-07	1.87E+01
Ra-226+D	4.01E-04	3.83E-04	1.28E-07	3.94E-01	1.59E+00	1.31E+01
Ra-228+D	4.19E-04	4.15E-04	1.38E-07	1.02E-01	8.21E-01	1.42E+01
Ac-227+D	1.21E-04	5.68E-04	1.42E-04	1.35E+00	2.37E-01	7.29E+01
Th-228+D	1.51E-06	3.11E-05	7.79E-06	1.36E-02	1.90E-01	1.60E+01
Th-229+D	7.98E-06	1.55E-04	3.87E-05	5.01E-01	2.50E-01	7.94E+01
Th-230	1.11E-06	2.10E-05	5.26E-06	6.96E-02	7.27E-03	1.08E+01
Th-232	1.38E-05	1.05E-04	2.62E-05	5.04E-01	1.27E+00	5.38E+01
Pa-231	3.56E-05	4.07E-04	1.02E-04	1.81E+00	1.16E-01	2.09E+01
U-232	1.30E-04	1.26E-02	6.29E-03	1.34E-01	6.83E-01	2.58E+00
U-233	2.86E-05	2.77E-03	1.39E-03	2.06E-02	2.95E-04	5.69E-01
U-234	2.80E-05	2.72E-03	1.36E-03	1.99E-02	3.89E-05	5.58E-01
U-235+D	2.64E-05	2.56E-03	1.28E-03	1.90E-02	7.10E-02	5.26E-01
U-236	2.66E-05	2.58E-03	1.29E-03	1.89E-02	2.05E-05	5.30E-01
U-238+D	2.65E-05	2.57E-03	1.29E-03	1.88E-02	1.11E-02	5.28E-01
Np-237+D	1.47E-03	1.70E-04	4.26E-05	4.64E-01	1.49E-01	1.84E+01
Pu-236	3.92E-06	3.37E-05	2.81E-06	3.43E-02	2.38E-02	4.84E+00
Pu-238	1.05E-05	9.22E-05	7.68E-06	3.67E-01	2.37E-05	1.32E+01
Pu-239	1.17E-05	1.02E-04	8.50E-06	4.40E-01	4.83E-05	1.46E+01
Pu-240	1.17E-05	1.02E-04	8.50E-06	4.40E-01	2.49E-05	1.46E+01

Table D10c. Native American Doses by Pathway, mrem/y per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Pu-241+D	2.37E-07	1.97E-06	1.64E-07	1.08E-02	9.11E-05	2.83E-01
Pu-242	1.11E-05	9.68E-05	8.06E-06	4.18E-01	2.18E-05	1.39E+01
Pu-244+D	1.10E-05	9.56E-05	7.97E-06	4.13E-01	3.04E-01	1.37E+01
Am-241	4.80E-05	2.10E-04	6.99E-05	4.44E-01	7.32E-03	1.51E+01
Am-242m+D	4.65E-05	2.03E-04	6.76E-05	4.49E-01	1.05E-02	1.46E+01
Am-243+D	4.79E-05	2.09E-04	6.97E-05	4.50E-01	1.48E-01	1.50E+01
Cm-242	1.16E-07	4.42E-06	1.10E-06	2.26E-03	1.02E-06	4.76E-01
Cm-243	2.89E-06	9.64E-05	2.41E-05	2.45E-01	7.55E-02	1.04E+01
Cm-244	2.32E-06	7.76E-05	1.94E-05	1.74E-01	1.49E-05	8.36E+00
Cm-245	4.32E-06	1.44E-04	3.59E-05	4.69E-01	5.73E-02	1.55E+01
Cm-246	4.27E-06	1.42E-04	3.55E-05	4.58E-01	1.97E-05	1.53E+01
Cm-247+D	3.95E-06	1.31E-04	3.28E-05	4.25E-01	2.93E-01	1.41E+01
Cm-248	1.57E-05	5.22E-04	1.31E-04	1.69E+00	1.49E-05	5.63E+01
Cm-250+D	9.40E-05	2.98E-03	7.46E-04	9.65E+00	2.86E-01	3.21E+02
Bk-247	6.20E-05	2.71E-04	9.02E-05	5.81E-01	7.15E-02	2.31E+01
Cf-248	4.88E-04	1.28E-05	3.21E-06	1.10E-02	2.08E-06	1.64E+00
Cf-249	7.82E-03	1.82E-04	4.55E-05	5.74E-01	2.84E-01	2.33E+01
Cf-250	3.48E-03	8.18E-05	2.04E-05	1.61E-01	1.22E-05	1.05E+01
Cf-251	8.00E-03	1.86E-04	4.66E-05	5.94E-01	8.66E-02	2.39E+01
Cf-252	1.71E-03	4.15E-05	1.04E-05	2.48E-02	5.53E-06	5.32E+00
The "Well Total" column in Table 10a excludes the pathways shown in this table.						

Table D11a. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
H-3	1.38E-08	1.61E-08	8.58E-09	1.46E-09	0.00E+00	0.00E+00
Be-10	1.12E-06	1.57E-05	5.39E-07	3.00E-07	9.09E-10	5.25E-09
C-14	1.31E-06	1.38E-03	1.19E-07	2.26E-08	3.79E-11	3.06E-11
Na-22	1.34E-05	3.71E-05	7.37E-07	1.24E-08	3.86E-12	7.46E-06
Al-26	9.80E-05	6.93E-04	1.33E-06	2.21E-07	6.81E-10	9.57E-05
Si-32+D	2.80E-06	8.25E-06	9.50E-07	9.74E-07	2.48E-09	5.60E-08
Cl-36	3.97E-05	4.28E-05	2.53E-07	7.98E-08	3.33E-11	1.69E-09
K-40	2.15E-05	5.04E-04	1.89E-06	3.29E-08	6.47E-11	3.66E-06
Ca-41	1.90E-07	4.36E-07	2.71E-08	6.67E-10	1.26E-12	0.00E+00
Ti-44+D	6.59E-05	8.14E-04	2.08E-06	6.45E-07	1.45E-09	5.35E-05
V-49	1.43E-08	5.08E-07	9.35E-09	4.69E-10	5.41E-14	0.00E+00
Mn-54	1.24E-06	2.12E-05	1.75E-07	1.88E-08	2.00E-12	9.68E-07
Fe-55	1.26E-07	3.33E-06	6.61E-08	2.55E-09	8.36E-13	0.00E+00
Fe-60+D	9.97E-05	1.09E-03	1.38E-05	5.87E-07	2.09E-09	7.05E-05
Co-60	1.93E-05	1.63E-04	1.20E-06	1.14E-07	6.67E-11	1.69E-05
Ni-59	1.70E-07	7.24E-07	2.10E-08	1.49E-09	4.59E-12	0.00E+00
Ni-63	4.06E-07	1.75E-06	5.14E-08	5.23E-09	1.38E-11	0.00E+00
Se-79	1.99E-06	2.48E-05	5.59E-07	1.06E-08	7.77E-12	1.87E-11
Rb-87	6.41E-06	2.02E-04	4.00E-07	6.83E-09	1.93E-11	6.00E-10
Sr-90+D	4.10E-05	1.22E-04	5.67E-06	3.61E-07	6.63E-10	8.40E-08

Table D11a. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
Zr-93	1.46E-07	6.19E-06	8.51E-08	2.33E-08	8.14E-11	1.48E-10
Nb-91	1.35E-07	5.17E-06	6.15E-08	6.06E-09	1.78E-11	3.46E-08
Nb-93m	9.65E-08	4.96E-06	6.15E-08	6.06E-09	8.36E-12	1.23E-10
Nb-94	5.20E-05	3.13E-04	5.96E-07	1.20E-07	3.60E-10	5.09E-05
Mo-93	1.20E-06	1.83E-06	2.57E-07	4.05E-09	1.31E-11	9.62E-10
Tc-99	4.67E-06	5.79E-06	2.11E-07	4.50E-08	3.29E-11	1.39E-10
Ru-106+D	8.53E-06	1.79E-05	3.23E-06	3.26E-07	4.12E-11	2.85E-07
Pd-107	1.24E-07	1.88E-07	1.92E-08	5.39E-09	1.52E-11	0.00E+00
Ag-108m+D	4.46E-05	2.16E-04	6.24E-07	8.52E-08	2.21E-10	4.35E-05
Cd-109	7.17E-07	1.92E-05	3.83E-07	4.72E-08	7.37E-12	3.18E-09
Cd-113m	5.20E-06	1.06E-04	2.20E-06	4.15E-07	5.15E-10	1.29E-09
In-115	5.57E-06	5.97E-02	2.59E-06	1.29E-06	3.97E-09	1.94E-09
Sn-121m+D	1.15E-06	2.13E-04	2.68E-07	5.17E-08	1.21E-10	5.38E-09
Sn-126+D	7.24E-05	1.97E-03	2.08E-06	3.22E-07	9.92E-10	6.34E-05
Sb-125	1.93E-06	1.46E-05	3.35E-07	5.30E-08	2.02E-11	1.38E-06
Te-125m	4.41E-07	2.64E-05	2.55E-07	3.73E-08	7.51E-13	3.26E-10
I-129	8.68E-05	1.97E-04	1.13E-05	1.94E-07	4.37E-10	3.21E-08
Cs-134	1.93E-05	1.45E-03	3.23E-06	5.27E-08	1.32E-11	4.16E-06
Cs-135	3.14E-06	1.65E-04	3.63E-07	5.94E-09	1.83E-11	1.70E-10
Cs-137+D	2.79E-05	1.10E-03	2.33E-06	3.80E-08	7.31E-11	1.14E-05
Ba-133	4.29E-06	1.58E-05	5.22E-07	3.70E-08	3.74E-11	3.39E-06
Pm-147	2.50E-07	1.28E-06	1.30E-07	5.14E-08	1.62E-11	2.36E-11
Sm-147	2.64E-05	4.45E-05	2.87E-06	2.20E-05	6.65E-08	0.00E+00
Sm-151	8.36E-08	3.90E-07	4.25E-08	1.56E-08	3.98E-11	2.14E-12
Eu-150	3.19E-05	1.57E-04	3.32E-07	3.58E-07	7.33E-10	3.10E-05
Eu-152	1.63E-05	7.56E-05	4.65E-07	2.90E-07	3.59E-10	1.53E-05
Eu-154	1.38E-05	6.45E-05	7.89E-07	3.67E-07	3.29E-10	1.22E-05
Eu-155	4.27E-07	2.84E-06	1.46E-07	4.72E-08	2.54E-11	1.55E-07
Gd-152	3.26E-05	4.73E-05	2.28E-06	2.90E-05	8.92E-08	0.00E+00
Ho-166m	5.56E-05	2.89E-04	6.15E-07	9.86E-07	2.95E-09	5.36E-05
Re-187	8.34E-09	5.17E-08	1.37E-09	8.01E-11	2.33E-13	0.00E+00
Tl-204	1.33E-06	1.14E-03	4.48E-07	7.82E-09	3.46E-12	2.85E-09
Pb-205	7.76E-08	3.52E-06	4.85E-08	2.06E-09	6.36E-12	2.53E-11
Pb-210+D	1.40E-04	5.09E-03	6.82E-05	9.86E-06	7.40E-08	1.65E-08
Bi-207	3.34E-05	1.60E-04	4.34E-07	6.70E-08	1.32E-10	3.26E-05
Po-209	2.23E-04	2.19E-03	3.60E-05	4.31E-05	1.14E-07	8.14E-08
Po-210	1.46E-04	1.70E-03	2.89E-05	3.45E-05	1.65E-09	4.40E-12
Ra-226+D	1.67E-04	8.32E-04	2.96E-05	3.70E-05	1.73E-07	6.01E-05
Ra-228+D	1.80E-04	1.24E-03	7.97E-05	1.66E-05	2.91E-07	1.80E-05
Ac-227+D	5.06E-04	7.64E-04	3.73E-05	4.47E-04	7.41E-07	5.69E-06
Th-228+D	4.93E-04	1.09E-03	2.31E-05	4.56E-04	1.07E-07	4.26E-06
Th-229+D	7.73E-04	1.83E-03	4.05E-05	7.05E-04	2.18E-06	8.36E-06
Th-230	1.02E-04	2.75E-04	6.98E-06	9.10E-05	2.83E-07	6.18E-07
Th-232	2.28E-04	7.99E-04	7.74E-06	1.38E-04	1.49E-06	6.66E-05
Pa-231	1.56E-04	2.41E-04	1.33E-05	1.30E-04	1.04E-06	5.90E-06
U-232	1.24E-04	2.45E-04	2.24E-05	6.22E-05	7.13E-07	2.49E-05

Table D11a. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Water	Water Inhalation	Soil Inhalation	External
U-233	4.61E-05	6.06E-05	5.50E-06	3.70E-05	6.53E-08	1.54E-08
U-234	4.53E-05	5.96E-05	5.42E-06	3.64E-05	6.12E-08	1.06E-09
U-235+D	4.34E-05	6.28E-05	5.50E-06	3.22E-05	5.45E-08	2.13E-06
U-236	4.19E-05	5.54E-05	5.14E-06	3.35E-05	5.64E-08	4.90E-10
U-238+D	4.13E-05	6.03E-05	6.68E-06	2.98E-05	5.02E-08	3.78E-07
Np-237+D	6.91E-05	1.13E-04	5.17E-06	5.65E-05	1.44E-07	4.73E-06
Pu-236	8.17E-05	1.13E-04	5.73E-06	7.28E-05	5.23E-08	9.43E-07
Pu-238	1.21E-04	1.75E-04	1.00E-05	1.07E-04	2.78E-07	4.36E-10
Pu-239	1.21E-04	1.78E-04	1.03E-05	1.06E-04	3.29E-07	1.44E-09
Pu-240	1.21E-04	1.78E-04	1.03E-05	1.06E-04	3.28E-07	5.02E-10
Pu-241+D	1.27E-06	2.08E-06	1.35E-07	1.07E-06	6.54E-09	3.73E-09
Pu-242	1.14E-04	1.68E-04	9.81E-06	9.99E-05	3.09E-07	4.51E-10
Pu-244+D	1.20E-04	2.31E-04	1.10E-05	9.35E-05	2.90E-07	1.10E-05
Am-241	1.01E-04	1.46E-04	7.97E-06	8.97E-05	2.67E-07	1.91E-07
Am-242m+D	5.86E-05	9.14E-05	5.56E-06	5.01E-05	2.86E-07	3.06E-07
Am-243+D	1.03E-04	1.69E-04	8.28E-06	8.62E-05	2.66E-07	4.57E-06
Cm-242	5.23E-05	6.82E-05	2.95E-06	4.82E-05	4.10E-09	1.23E-11
Cm-243	9.79E-05	1.43E-04	7.26E-06	8.59E-05	1.62E-07	1.84E-06
Cm-244	8.97E-05	1.23E-04	6.41E-06	8.08E-05	1.22E-07	1.70E-10
Cm-245	1.02E-04	1.53E-04	7.97E-06	8.84E-05	2.79E-07	1.71E-06
Cm-246	9.96E-05	1.42E-04	7.82E-06	8.84E-05	2.72E-07	3.28E-10
Cm-247+D	1.01E-04	1.87E-04	7.67E-06	7.98E-05	2.47E-07	9.87E-06
Cm-248	3.57E-04	5.14E-04	2.87E-05	3.16E-04	9.74E-07	2.46E-10
Cm-250+D	2.01E-03	2.96E-03	1.64E-04	1.77E-03	5.47E-06	1.03E-05
Bk-247	1.20E-04	1.90E-04	9.50E-06	1.04E-04	3.18E-07	2.21E-06
Cf-248	6.28E-05	8.44E-05	3.40E-06	5.78E-05	1.25E-08	2.09E-11
Cf-249	1.33E-04	2.35E-04	9.73E-06	1.09E-04	3.18E-07	9.36E-06
Cf-250	9.50E-05	1.35E-04	6.61E-06	8.49E-05	1.04E-07	1.28E-10
Cf-251	1.27E-04	2.03E-04	1.01E-05	1.09E-04	3.27E-07	2.64E-06
Cf-252	5.53E-05	7.72E-05	3.72E-06	4.98E-05	1.58E-08	6.41E-11

"River Total" is the sum of all the pathways shown in Tables D10a, D10b, and D10c.
"Well Total" excludes the pathways shown in Table D10c.
The total risk from 70 years of intakes is shown.

Table D11b. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
H-3	8.72E-14	1.41E-09	2.38E-10	1.92E-09	1.12E-10	5.95E-11
Be-10	1.30E-08	2.28E-07	1.50E-08	1.75E-10	1.50E-08	3.61E-10
C-14	9.96E-10	2.83E-07	2.20E-07	6.12E-07	3.74E-08	1.35E-08
Na-22	1.30E-09	3.94E-07	1.29E-06	3.46E-06	2.94E-10	8.49E-08
Al-26	3.09E-08	5.50E-07	5.45E-08	9.44E-08	2.75E-08	3.53E-08
Si-32+D	1.73E-08	7.40E-07	1.44E-09	9.32E-09	1.58E-08	3.04E-08
Cl-36	6.79E-10	1.42E-05	2.19E-06	2.29E-05	5.49E-09	1.76E-07
K-40	2.59E-08	4.65E-06	1.96E-06	9.10E-06	7.83E-08	9.42E-08

Table D11b. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
Ca-41	2.30E-10	4.97E-08	5.53E-09	1.06E-07	2.07E-10	9.96E-10
Ti-44+D	3.42E-08	8.68E-07	1.63E-06	7.12E-06	5.02E-10	1.81E-10
V-49	8.67E-12	3.69E-09	4.73E-10	5.29E-11	7.54E-11	1.45E-10
Mn-54	1.17E-10	7.40E-08	1.71E-09	1.43E-09	3.42E-10	1.98E-10
Fe-55	1.46E-10	2.47E-08	2.81E-08	5.69E-10	2.57E-09	1.24E-09
Fe-60+D	2.53E-07	5.80E-06	7.10E-06	1.83E-07	9.68E-07	4.25E-07
Co-60	5.00E-09	5.44E-07	3.04E-07	1.21E-07	1.12E-07	2.71E-09
Ni-59	4.82E-10	1.58E-08	3.09E-09	1.28E-07	1.52E-12	7.32E-11
Ni-63	1.01E-09	3.60E-08	7.32E-09	3.05E-07	3.46E-12	1.67E-10
Se-79	2.49E-09	2.27E-07	1.94E-07	6.81E-07	2.14E-07	1.03E-07
Rb-87	7.51E-09	1.97E-06	2.35E-07	3.62E-06	9.78E-08	7.06E-08
Sr-90+D	5.63E-08	1.18E-05	4.18E-06	1.87E-05	7.90E-08	9.50E-08
Zr-93	2.20E-09	3.55E-08	2.13E-12	1.56E-11	6.33E-13	1.02E-12
Nb-91	1.44E-09	3.14E-08	5.18E-13	9.22E-12	1.28E-12	2.05E-12
Nb-93m	6.77E-10	2.80E-08	4.76E-13	8.58E-12	9.82E-13	1.58E-12
Nb-94	1.31E-08	2.99E-07	4.93E-12	8.77E-11	1.23E-11	1.97E-11
Mo-93	2.43E-09	6.80E-07	1.01E-08	2.21E-07	2.00E-08	8.66E-09
Tc-99	1.19E-09	2.60E-06	4.13E-08	7.19E-07	2.13E-08	1.03E-06
Ru-106+D	3.21E-09	1.30E-06	3.35E-06	3.07E-09	3.15E-08	3.15E-10
Pd-107	4.36E-10	1.27E-08	2.57E-09	8.33E-08	4.50E-13	2.89E-12
Ag-108m+D	1.06E-08	2.47E-07	4.77E-08	1.04E-08	7.63E-08	9.17E-09
Cd-109	3.79E-10	1.59E-07	3.17E-09	1.08E-07	1.20E-08	7.23E-10
Cd-113m	1.35E-08	1.55E-06	2.68E-08	8.74E-07	1.05E-07	6.32E-09
In-115	3.84E-08	9.53E-07	5.05E-07	8.21E-08	4.78E-08	6.13E-08
Sn-121m+D	4.98E-09	1.20E-07	5.96E-07	9.73E-08	3.45E-09	6.63E-09
Sn-126+D	4.91E-08	9.41E-07	4.76E-06	7.73E-07	2.96E-08	5.71E-08
Sb-125	9.23E-10	1.39E-07	6.21E-09	6.12E-09	2.03E-10	9.50E-10
Te-125m	3.82E-11	8.25E-08	1.59E-08	2.03E-08	5.80E-09	2.33E-08
I-129	1.30E-07	5.13E-06	1.15E-05	5.75E-05	6.52E-09	9.41E-07
Cs-134	3.10E-09	1.34E-06	3.27E-06	6.95E-06	2.40E-07	2.31E-08
Cs-135	4.72E-09	4.57E-07	7.36E-07	1.50E-06	6.54E-08	6.29E-09
Cs-137+D	1.77E-08	2.12E-06	3.81E-06	7.81E-06	3.17E-07	3.05E-08
Ba-133	2.99E-09	2.37E-07	2.69E-09	8.51E-08	2.36E-10	1.14E-08
Pm-147	3.27E-10	5.28E-08	1.50E-08	8.09E-10	1.10E-11	5.29E-11
Sm-147	4.89E-08	1.10E-06	3.50E-07	1.82E-08	7.01E-10	5.90E-10
Sm-151	8.64E-10	1.84E-08	5.79E-09	3.02E-10	1.10E-11	9.29E-12
Eu-150	4.71E-09	1.37E-07	4.25E-08	2.23E-09	7.64E-11	6.44E-11
Eu-152	4.27E-09	1.92E-07	5.82E-08	3.07E-09	9.43E-11	7.94E-11
Eu-154	5.44E-09	3.26E-07	9.74E-08	5.16E-09	1.51E-10	1.27E-10
Eu-155	6.17E-10	5.97E-08	1.75E-08	9.33E-10	2.59E-11	2.18E-11
Gd-152	4.11E-08	8.91E-07	1.98E-07	1.47E-08	5.69E-10	4.79E-10
Ho-166m	1.34E-08	2.63E-07	7.52E-08	4.35E-09	1.66E-10	1.40E-10
Re-187	2.97E-11	3.54E-09	9.57E-10	2.30E-09	9.60E-12	4.62E-11
Tl-204	1.45E-09	1.76E-07	4.10E-07	2.74E-07	5.64E-09	7.24E-09
Pb-205	8.30E-10	1.99E-08	4.86E-10	3.95E-09	6.12E-10	1.18E-09
Pb-210+D	9.52E-07	3.37E-05	6.97E-06	9.61E-06	2.47E-06	7.97E-06
Bi-207	6.26E-09	1.87E-07	4.66E-09	7.63E-08	2.58E-09	9.94E-09

Table D11b. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Soil Ingestion	Vegetables	Beef	Milk	Poultry	Egg
Po-209	5.59E-07	6.43E-05	2.00E-05	1.78E-05	8.69E-06	3.25E-05
Po-210	8.09E-09	4.39E-05	9.12E-06	9.52E-06	4.19E-06	1.57E-05
Ra-226+D	1.25E-06	1.53E-05	1.66E-06	1.45E-05	1.68E-06	5.76E-06
Ra-228+D	4.19E-07	3.13E-05	1.67E-06	3.21E-05	1.05E-07	1.65E-10
Ac-227+D	4.09E-07	1.42E-05	2.23E-08	2.34E-07	7.64E-09	1.84E-09
Th-228+D	4.04E-08	8.92E-06	2.99E-09	3.38E-08	3.68E-09	8.85E-10
Th-229+D	8.48E-07	1.57E-05	6.24E-09	6.77E-08	1.05E-08	2.53E-09
Th-230	1.44E-07	2.64E-06	6.99E-09	4.02E-08	1.07E-08	3.03E-08
Th-232	1.73E-06	5.78E-06	3.42E-07	5.65E-06	6.57E-08	9.71E-10
Pa-231	5.98E-07	5.15E-06	4.82E-09	3.49E-08	5.29E-09	1.27E-09
U-232	4.12E-07	9.09E-06	1.58E-07	2.76E-06	1.09E-06	5.22E-07
U-233	5.84E-08	2.24E-06	4.02E-08	7.02E-07	2.85E-07	1.37E-07
U-234	5.65E-08	2.21E-06	3.96E-08	6.92E-07	2.81E-07	1.35E-07
U-235+D	5.85E-08	2.26E-06	4.05E-08	7.07E-07	2.87E-07	1.38E-07
U-236	5.33E-08	2.09E-06	3.75E-08	6.55E-07	2.66E-07	1.28E-07
U-238+D	7.51E-08	2.80E-06	5.02E-08	8.77E-07	3.56E-07	1.71E-07
Np-237+D	8.77E-08	2.29E-06	1.36E-07	8.83E-09	1.28E-09	3.07E-10
Pu-236	2.85E-08	2.13E-06	1.99E-09	1.28E-08	1.20E-08	5.51E-09
Pu-238	1.50E-07	3.69E-06	2.40E-09	3.45E-09	1.73E-09	1.41E-10
Pu-239	1.82E-07	3.82E-06	2.52E-09	3.61E-09	1.91E-09	1.53E-10
Pu-240	1.82E-07	3.82E-06	2.52E-09	3.61E-09	1.91E-09	1.53E-10
Pu-241+D	3.56E-09	5.08E-08	5.05E-11	5.23E-11	4.28E-11	9.25E-12
Pu-242	1.73E-07	3.62E-06	2.39E-09	3.42E-09	1.81E-09	1.46E-10
Pu-244+D	2.07E-07	4.17E-06	2.76E-09	3.94E-09	2.09E-09	1.68E-10
Am-241	1.37E-07	2.94E-06	7.74E-09	3.78E-09	2.90E-09	9.30E-10
Am-242m+D	1.50E-07	2.14E-06	6.60E-09	2.05E-08	3.55E-08	1.67E-08
Am-243+D	1.52E-07	3.12E-06	8.23E-09	4.02E-09	3.12E-09	1.00E-09
Cm-242	2.01E-09	1.08E-06	1.71E-10	1.42E-08	4.58E-10	1.10E-10
Cm-243	8.22E-08	2.67E-06	5.92E-10	4.44E-08	1.49E-09	3.59E-10
Cm-244	5.81E-08	2.34E-06	5.10E-10	3.84E-08	1.23E-09	2.95E-10
Cm-245	1.47E-07	2.96E-06	7.04E-10	5.09E-08	2.01E-09	4.84E-10
Cm-246	1.39E-07	2.87E-06	6.65E-10	4.94E-08	1.92E-09	4.61E-10
Cm-247+D	1.40E-07	2.87E-06	6.68E-10	4.94E-08	1.92E-09	4.63E-10
Cm-248	5.10E-07	1.05E-05	2.44E-09	1.81E-07	7.04E-09	1.69E-09
Cm-250+D	2.93E-06	6.03E-05	2.45E-08	1.04E-06	4.03E-08	9.71E-09
Bk-247	1.62E-07	3.51E-06	9.27E-09	4.52E-09	3.50E-09	1.12E-09
Cf-248	5.71E-09	1.29E-06	3.28E-07	1.03E-09	5.41E-10	1.30E-10
Cf-249	1.59E-07	4.04E-06	1.19E-06	2.34E-09	2.36E-09	5.68E-10
Cf-250	4.83E-08	2.55E-06	7.49E-07	1.49E-09	1.21E-09	2.92E-10
Cf-251	1.71E-07	4.23E-06	1.25E-06	2.43E-09	2.49E-09	5.99E-10
Cf-252	7.03E-09	1.35E-06	3.82E-07	7.71E-10	5.59E-10	1.34E-10

Table D11c. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
H-3	9.82E-11	1.74E-10	9.55E-11	1.11E-13	0.00E+00	1.99E-09
Be-10	2.36E-10	2.74E-09	6.85E-11	4.46E-07	2.25E-08	1.41E-05
C-14	2.26E-09	5.59E-09	2.10E-09	1.78E-08	6.83E-11	1.38E-03
Na-22	2.23E-08	8.47E-11	2.54E-08	3.09E-08	2.21E-05	1.39E-06
Al-26	8.63E-10	5.02E-09	6.69E-09	1.09E-06	4.22E-04	1.72E-04
Si-32+D	1.60E-11	2.33E-09	4.65E-09	4.83E-07	1.96E-07	4.77E-06
Cl-36	2.05E-09	8.95E-11	2.98E-09	8.30E-09	2.58E-09	3.06E-06
K-40	1.58E-08	9.22E-09	1.15E-08	5.22E-07	9.21E-06	4.73E-04
Ca-41	2.02E-11	1.17E-11	5.87E-11	4.48E-09	0.00E+00	2.41E-07
Ti-44+D	2.68E-08	1.04E-10	3.90E-11	1.09E-06	2.14E-04	5.34E-04
V-49	9.16E-12	2.41E-11	4.81E-11	2.00E-10	0.00E+00	4.94E-07
Mn-54	3.15E-11	1.04E-10	6.27E-11	2.69E-09	2.79E-06	1.72E-05
Fe-55	5.14E-10	7.80E-10	3.90E-10	3.50E-09	0.00E+00	3.20E-06
Fe-60+D	1.11E-07	1.61E-07	8.03E-08	8.99E-06	3.26E-04	6.59E-04
Co-60	5.04E-09	3.00E-08	7.49E-10	1.23E-07	5.17E-05	9.23E-05
Ni-59	4.49E-11	2.61E-13	1.31E-11	1.70E-08	0.00E+00	5.36E-07
Ni-63	1.10E-10	6.39E-13	3.20E-11	3.39E-08	0.00E+00	1.31E-06
Se-79	3.36E-09	5.86E-08	2.93E-08	3.26E-08	3.07E-11	2.27E-05
Rb-87	1.63E-09	9.50E-09	7.13E-09	2.30E-07	2.30E-09	1.95E-04
Sr-90+D	1.75E-08	5.12E-09	6.40E-09	1.67E-06	3.11E-07	7.89E-05
Zr-93	3.33E-14	5.81E-14	9.68E-14	8.08E-08	7.35E-10	5.96E-06
Nb-91	8.11E-15	2.36E-13	3.93E-13	4.81E-08	1.45E-07	4.84E-06
Nb-93m	8.05E-15	2.36E-13	3.93E-13	1.89E-08	4.29E-10	4.84E-06
Nb-94	7.69E-14	2.24E-12	3.73E-12	4.40E-07	2.14E-04	4.59E-05
Mo-93	9.66E-11	2.81E-09	1.26E-09	4.64E-08	2.23E-09	5.76E-07
Tc-99	9.24E-12	8.06E-11	4.03E-09	1.56E-08	2.27E-10	1.10E-06
Ru-106+D	6.32E-08	9.85E-09	1.03E-10	7.41E-08	8.24E-07	8.43E-06
Pd-107	3.39E-11	7.40E-14	4.93E-13	1.34E-08	0.00E+00	5.06E-08
Ag-108m+D	7.75E-10	1.51E-08	1.88E-09	3.32E-07	1.70E-04	7.72E-07
Cd-109	5.67E-11	3.60E-09	2.25E-10	8.76E-09	9.19E-09	1.85E-05
Cd-113m	3.34E-10	1.96E-08	1.22E-09	3.61E-07	4.30E-09	1.00E-04
In-115	8.00E-09	8.73E-09	1.16E-08	1.36E-06	8.57E-09	5.97E-02
Sn-121m+D	9.44E-09	6.88E-10	1.38E-09	1.61E-07	2.18E-08	2.12E-04
Sn-126+D	7.24E-08	5.27E-09	1.05E-08	1.73E-06	2.78E-04	1.62E-03
Sb-125	8.50E-11	2.48E-11	1.44E-10	2.22E-08	4.15E-06	8.47E-06
Te-125m	4.03E-10	1.90E-09	7.90E-09	8.68E-10	9.27E-10	2.59E-05
I-129	1.78E-07	1.30E-09	1.95E-07	3.00E-06	9.24E-08	1.06E-04
Cs-134	5.62E-08	6.91E-08	6.91E-09	7.34E-08	1.23E-05	1.42E-03
Cs-135	6.79E-09	7.90E-09	7.90E-10	1.67E-07	7.51E-10	1.62E-04
Cs-137+D	4.30E-08	5.03E-08	5.03E-09	5.45E-07	4.38E-05	1.03E-03
Ba-133	4.31E-11	5.71E-11	2.85E-09	7.70E-08	1.09E-05	5.21E-07
Pm-147	2.74E-10	3.33E-12	1.67E-11	7.83E-09	7.05E-11	1.03E-06
Sm-147	5.51E-09	1.28E-10	1.12E-10	1.68E-06	0.00E+00	1.64E-05
Sm-151	9.31E-11	2.17E-12	1.90E-12	2.81E-08	8.72E-12	2.78E-07
Eu-150	6.99E-10	1.63E-11	1.43E-11	1.47E-07	1.21E-04	4.19E-06

Table D11c. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Eu-152	9.96E-10	2.34E-11	2.05E-11	1.19E-07	5.32E-05	6.00E-06
Eu-154	1.70E-09	4.01E-11	3.50E-11	1.44E-07	4.03E-05	1.03E-05
Eu-155	3.12E-10	7.45E-12	6.52E-12	1.54E-08	4.83E-07	1.91E-06
Gd-152	3.11E-09	1.03E-10	9.06E-11	1.44E-06	0.00E+00	1.33E-05
Ho-166m	1.18E-09	3.06E-11	2.68E-11	4.56E-07	2.29E-04	3.93E-06
Re-187	4.73E-12	6.88E-13	3.44E-12	9.52E-10	0.00E+00	4.24E-08
Tl-204	7.40E-09	1.66E-09	2.22E-09	3.56E-08	8.73E-09	1.14E-03
Pb-205	7.62E-12	1.11E-10	2.22E-10	2.95E-08	1.12E-10	3.41E-06
Pb-210+D	7.53E-08	1.60E-07	3.20E-07	2.84E-05	6.16E-08	4.92E-03
Bi-207	7.49E-11	5.47E-10	2.19E-09	1.93E-07	1.26E-04	1.12E-06
Po-209	3.24E-07	1.70E-06	6.61E-06	1.87E-05	3.41E-07	1.94E-03
Po-210	1.95E-07	1.36E-06	5.29E-06	1.85E-07	1.26E-11	1.55E-03
Ra-226+D	1.10E-08	1.04E-08	3.46E-12	4.90E-05	2.61E-04	3.55E-04
Ra-228+D	2.92E-08	2.88E-08	9.61E-12	1.07E-05	5.84E-05	9.86E-04
Ac-227+D	3.76E-10	1.76E-09	4.39E-10	1.21E-05	2.11E-05	2.25E-04
Th-228+D	5.54E-11	1.14E-09	2.85E-10	9.52E-07	1.25E-05	5.85E-04
Th-229+D	9.92E-11	1.92E-09	4.81E-10	3.01E-05	3.70E-05	9.87E-04
Th-230	1.73E-11	3.20E-10	8.00E-11	5.30E-06	3.59E-06	1.64E-04
Th-232	6.00E-10	3.58E-10	8.94E-11	6.58E-05	3.22E-04	1.83E-04
Pa-231	5.42E-11	6.07E-10	1.52E-10	2.35E-05	3.01E-05	3.12E-05
U-232	2.67E-09	2.59E-07	1.29E-07	7.72E-06	5.93E-05	5.31E-05
U-233	6.72E-10	6.51E-08	3.26E-08	1.05E-06	4.94E-08	1.34E-05
U-234	6.62E-10	6.42E-08	3.21E-08	1.01E-06	2.54E-09	1.32E-05
U-235+D	6.76E-10	6.56E-08	3.28E-08	1.05E-06	4.75E-06	1.35E-05
U-236	6.26E-10	6.07E-08	3.03E-08	9.50E-07	1.09E-09	1.25E-05
U-238+D	8.39E-10	8.13E-08	4.07E-08	1.34E-06	8.42E-07	1.67E-05
Np-237+D	2.10E-09	2.45E-10	6.12E-11	2.33E-06	1.57E-05	2.64E-05
Pu-236	2.63E-11	2.00E-10	1.67E-11	6.22E-07	2.40E-06	2.87E-05
Pu-238	3.90E-11	3.41E-10	2.84E-11	5.02E-06	1.83E-09	4.89E-05
Pu-239	4.02E-11	3.51E-10	2.92E-11	6.43E-06	6.38E-09	5.04E-05
Pu-240	4.02E-11	3.51E-10	2.92E-11	6.44E-06	2.22E-09	5.04E-05
Pu-241+D	5.55E-13	4.60E-12	3.83E-13	1.32E-07	1.87E-08	6.60E-07
Pu-242	3.81E-11	3.33E-10	2.77E-11	6.13E-06	2.00E-09	4.78E-05
Pu-244+D	4.39E-11	3.83E-10	3.19E-11	7.34E-06	4.85E-05	5.50E-05
Am-241	1.24E-10	5.40E-10	1.80E-10	4.78E-06	8.34E-07	3.88E-05
Am-242m+D	8.42E-11	3.64E-10	1.21E-10	5.34E-06	1.30E-06	2.61E-05
Am-243+D	1.31E-10	5.73E-10	1.91E-10	5.36E-06	2.01E-05	4.11E-05
Cm-242	3.51E-12	1.47E-10	3.68E-11	5.40E-08	3.82E-11	1.59E-05
Cm-243	9.91E-12	3.31E-10	8.27E-11	2.51E-06	7.02E-06	3.56E-05
Cm-244	8.68E-12	2.90E-10	7.26E-11	1.69E-06	6.19E-10	3.13E-05
Cm-245	1.09E-11	3.63E-10	9.07E-11	5.22E-06	7.56E-06	3.91E-05
Cm-246	1.06E-11	3.52E-10	8.80E-11	4.89E-06	1.44E-09	3.79E-05
Cm-247+D	1.06E-11	3.52E-10	8.80E-11	4.93E-06	4.35E-05	3.79E-05
Cm-248	3.88E-11	1.29E-09	3.23E-10	1.80E-05	1.09E-09	1.39E-04
Cm-250+D	2.38E-10	7.39E-09	1.85E-09	1.03E-04	4.53E-05	7.96E-04
Bk-247	1.48E-10	6.45E-10	2.15E-10	5.69E-06	9.71E-06	5.52E-05

Table D11c. Native American Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment External	Fish
Cf-248	6.36E-09	1.67E-10	4.18E-11	1.50E-07	6.71E-11	2.14E-05
Cf-249	1.88E-08	4.38E-10	1.10E-10	5.46E-06	4.02E-05	5.62E-05
Cf-250	1.28E-08	3.01E-10	7.53E-11	1.34E-06	4.44E-10	3.86E-05
Cf-251	1.96E-08	4.57E-10	1.14E-10	5.93E-06	1.14E-05	5.86E-05
Cf-252	6.97E-09	1.69E-10	4.23E-11	1.68E-07	1.92E-10	2.17E-05
The "Well Total" column in Table 11a excludes the pathways shown in this table.						

Table D12a. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	1.01E+02	4.41E+02	6.12E+01	na	na	1.41E+01	2.11E+01
57-12-5	1.11E+02	1.13E+02	2.14E+00	na	na	7.28E-02	1.09E-01
57-14-7	na	na	na	na	na	na	na
57-55-6	1.02E+01	1.03E+01	8.57E-02	2.08E+00	7.80E-04	1.66E-04	2.48E-04
58-89-9	6.99E+02	5.08E+03	1.43E+02	na	na	2.74E+01	4.11E+01
60-29-7	5.92E-01	7.20E-01	2.14E-01	na	na	5.15E-03	7.71E-03
60-34-4	na	na	na	na	na	na	na
60-57-1	2.68E+03	4.55E+05	8.57E+02	na	na	5.09E+02	7.62E+02
62-75-9	7.54E+05	7.59E+05	5.36E+03	na	na	1.89E+01	2.84E+01
64-18-6	1.72E+00	1.73E+00	2.14E-02	na	na	1.18E-04	1.77E-04
67-56-1	4.34E+00	4.40E+00	8.57E-02	na	na	2.46E-04	3.69E-04
67-64-1	7.53E-01	7.82E-01	4.76E-02	na	na	2.18E-04	3.26E-04
67-66-3	2.68E+02	2.74E+02	4.29E+00	2.60E+02	1.32E-04	1.27E+00	1.91E+00
67-72-1	9.95E+01	2.50E+03	4.29E+01	na	na	3.41E+01	5.10E+01
71-36-3	3.43E+01	3.46E+01	4.29E-01	3.09E+01	1.94E-04	1.62E-02	2.43E-02
71-43-2	4.62E+01	6.40E+01	1.07E+01	2.60E+01	1.88E-05	1.52E+00	2.28E+00
71-55-6	6.01E-01	1.07E+00	1.53E-01	3.55E-01	1.55E-07	1.94E-02	2.91E-02
72-20-8	2.64E+03	7.71E+04	1.43E+02	na	na	2.12E+03	3.18E+03
74-83-9	2.24E+02	2.34E+02	3.06E+01	1.56E+02	6.79E-05	8.95E-01	1.34E+00
74-87-3	8.69E+00	8.69E+00	na	8.69E+00	3.46E-06	na	na
75-00-3	2.86E-01	3.40E-01	1.07E-01	7.80E-02	3.00E-08	7.13E-03	1.07E-02
75-01-4	3.40E+01	4.38E+01	1.43E+01	7.80E+00	3.02E-06	1.08E+00	1.61E+00
75-05-8	1.31E+01	1.31E+01	na	1.31E+01	1.77E-05	na	na
75-07-0	8.69E+01	8.69E+01	na	8.69E+01	7.41E-05	na	na
75-09-2	1.86E+00	2.12E+00	7.14E-01	2.60E-01	1.27E-07	2.24E-02	3.35E-02
75-15-0	1.87E+00	2.46E+00	4.29E-01	1.12E+00	3.98E-07	7.07E-02	1.06E-01
75-21-8	na	na	na	na	na	na	na
75-34-3	2.34E+00	2.73E+00	4.29E-01	1.56E+00	7.80E-07	2.53E-02	3.79E-02
75-35-4	5.33E+00	6.73E+00	8.57E-01	3.91E+00	1.57E-06	9.09E-02	1.36E-01
75-45-6	1.56E-02	1.56E-02	na	1.56E-02	6.14E-09	na	na
75-68-3	1.56E-02	1.56E-02	na	1.56E-02	6.14E-09	na	na
75-69-4	1.40E+00	1.89E+00	1.43E-01	1.12E+00	4.27E-07	7.16E-02	1.07E-01

Table D12a. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
75-71-8	4.31E+00	4.71E+00	2.14E-01	3.91E+00	1.48E-06	7.39E-02	1.11E-01
76-13-1	2.83E-02	4.24E-02	1.43E-03	2.60E-02	1.07E-08	2.86E-04	4.28E-04
76-44-8	4.70E+02	1.54E+05	8.57E+01	na	na	1.71E+02	2.57E+02
78-83-1	1.22E+00	1.31E+00	1.43E-01	na	na	2.77E-03	4.16E-03
78-87-5	1.96E+02	1.96E+02	na	1.96E+02	1.38E-04	na	na
78-93-3	8.58E-01	9.02E-01	7.14E-02	1.56E-01	2.03E-07	6.61E-04	9.90E-04
79-00-5	2.47E+01	3.64E+01	1.07E+01	na	na	5.67E-01	8.50E-01
79-01-6	3.37E+02	7.68E+02	1.43E+02	1.96E+01	9.78E-06	9.97E+01	1.49E+02
79-10-7	1.34E+01	1.34E+01	8.57E-02	1.18E+01	2.28E-03	1.41E-03	2.11E-03
79-34-5	1.66E+00	3.53E+00	7.14E-01	na	na	6.10E-02	9.14E-02
79-46-9	3.91E+01	3.91E+01	na	3.91E+01	6.80E-05	na	na
82-68-8	3.51E+01	1.99E+03	1.43E+01	na	na	7.06E+00	1.06E+01
83-32-9	3.65E+00	3.28E+01	7.14E-01	na	na	2.04E+00	3.06E+00
84-66-2	3.80E-01	5.70E-01	5.36E-02	na	na	1.74E-03	2.61E-03
84-74-2	1.13E+00	4.73E+01	4.29E-01	na	na	1.71E-01	2.56E-01
85-68-7	7.79E-01	3.70E+01	2.14E-01	na	na	1.27E-01	1.90E-01
87-68-3	4.29E+02	2.51E+04	1.43E+02	na	na	2.30E+02	3.45E+02
87-86-5	5.11E+00	1.93E+02	1.43E+00	na	na	1.86E+00	2.78E+00
88-06-2	1.88E+03	7.77E+03	4.29E+02	na	na	2.83E+02	4.25E+02
88-85-7	2.78E+02	1.44E+03	4.29E+01	na	na	1.26E+01	1.88E+01
91-20-3	2.66E+02	2.94E+02	2.14E+00	2.60E+02	2.22E-03	1.24E+00	1.86E+00
92-52-4	3.42E+00	4.10E+01	8.57E-01	na	na	1.67E+00	2.50E+00
95-47-6	8.25E+00	1.03E+01	2.14E-01	7.80E+00	8.87E-06	1.26E-01	1.88E-01
95-48-7	1.40E+01	1.67E+01	8.57E-01	na	na	1.15E-01	1.73E-01
95-50-1	4.90E+00	1.26E+01	4.76E-01	3.91E+00	8.05E-06	2.62E-01	3.92E-01
95-57-8	8.12E+01	1.06E+02	8.57E+00	na	na	1.20E+00	1.80E+00
95-63-6	1.33E+02	1.52E+02	8.57E-01	1.31E+02	1.99E-04	9.50E-01	1.42E+00
95-95-4	1.89E+00	8.06E+00	4.29E-01	na	na	2.98E-01	4.46E-01
98-86-2	3.70E+00	3.86E+00	4.29E-01	na	na	1.67E-02	2.50E-02
98-95-3	1.05E+03	1.16E+03	8.57E+01	3.83E+02	3.67E-03	4.10E+00	6.14E+00
100-25-4	1.09E+04	1.18E+04	4.29E+02	na	na	1.11E+01	1.67E+01
100-41-4	1.64E+00	5.86E+00	4.29E-01	7.80E-01	8.40E-07	2.18E-01	3.26E-01
100-42-5	1.24E+00	2.74E+00	2.14E-01	7.80E-01	1.43E-06	9.79E-02	1.47E-01
100-51-6	2.08E+00	2.14E+00	1.43E-01	na	na	3.64E-03	5.45E-03
106-42-3	8.25E+00	1.04E+01	2.14E-01	7.80E+00	8.14E-06	1.32E-01	1.98E-01
106-44-5	1.37E+02	1.60E+02	8.57E+00	na	na	8.75E-01	1.31E+00
106-46-7	3.85E+00	2.71E+01	1.43E+00	9.75E-01	1.78E-06	7.08E-01	1.06E+00
106-93-4	3.91E+03	3.91E+03	na	3.91E+03	7.70E-03	na	na
106-99-0	3.91E+02	3.91E+02	na	3.91E+02	1.44E-04	na	na
107-02-8	3.99E+04	3.99E+04	8.57E+01	3.91E+04	3.11E-02	6.09E-01	9.13E-01
107-05-1	7.82E+02	7.83E+02	8.57E-01	7.80E+02	3.38E-04	1.09E-01	1.64E-01
107-06-2	1.63E+02	1.64E+02	1.43E+00	1.59E+02	1.19E-04	5.09E-02	7.62E-02
107-13-1	7.24E+02	7.50E+02	4.29E+01	3.91E+02	3.66E-04	4.86E-01	7.28E-01
108-10-1	2.14E+00	2.37E+00	5.36E-01	2.60E-01	3.33E-07	1.77E-02	2.66E-02
108-38-3	8.26E+00	1.06E+01	2.14E-01	7.80E+00	8.35E-06	1.43E-01	2.15E-01
108-39-4	1.35E+01	1.61E+01	8.57E-01	na	na	1.18E-01	1.76E-01

Table D12a. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
108-67-8	1.32E+02	1.46E+02	8.57E-01	1.31E+02	1.72E-04	6.74E-01	1.01E+00
108-87-2	2.60E-01	2.60E-01	na	2.60E-01	1.00E-07	na	na
108-88-3	2.37E+00	3.39E+00	2.14E-01	1.96E+00	1.60E-06	8.09E-02	1.21E-01
108-90-7	1.84E+01	3.14E+01	2.14E+00	1.31E+01	1.63E-05	1.88E+00	2.81E+00
108-94-1	1.22E-01	1.29E-01	8.57E-03	na	na	1.29E-04	1.93E-04
108-95-2	3.72E+00	3.96E+00	1.43E-01	na	na	5.85E-03	8.77E-03
109-99-9	4.09E+00	4.22E+00	2.04E-01	2.60E+00	2.97E-06	4.00E-03	5.99E-03
110-00-9	9.86E+01	1.17E+02	4.29E+01	na	na	2.34E+00	3.51E+00
110-54-3	6.87E+00	3.37E+01	7.14E-01	3.91E+00	1.41E-06	1.99E+00	2.98E+00
110-80-5	4.59E+00	4.67E+00	1.07E-01	7.51E-02	1.13E-05	4.54E-04	6.81E-04
110-82-7	1.31E-01	1.31E-01	na	1.31E-01	5.18E-08	na	na
110-86-1	9.03E+02	9.39E+02	4.29E+01	na	na	1.04E+00	1.56E+00
111-76-2	8.59E-01	9.20E-01	8.57E-02	3.93E-03	1.70E-07	1.61E-03	2.41E-03
111-90-0	4.58E+01	4.64E+01	7.14E-01	2.08E+00	8.32E-04	1.14E-03	1.71E-03
117-81-7	4.14E+02	8.81E+02	2.14E+00	na	na	1.48E+02	2.22E+02
117-84-0	4.46E+02	7.38E+02	1.07E+00	na	na	3.53E+01	5.29E+01
118-74-1	3.81E+02	5.03E+04	5.36E+01	na	na	2.91E+02	4.37E+02
120-82-1	2.06E+02	3.99E+02	4.29E+00	1.96E+02	8.80E-04	3.15E+00	4.72E+00
121-14-2	3.62E+02	4.23E+02	2.14E+01	na	na	6.32E-01	9.47E-01
121-44-8	1.12E+02	1.12E+02	na	1.12E+02	3.53E-04	na	na
122-39-4	8.91E+00	4.62E+01	1.71E+00	na	na	1.23E+00	1.85E+00
123-91-1	na	na	na	na	na	na	na
126-73-8	8.70E-01	3.64E+00	2.14E-01	na	na	8.94E-02	1.34E-01
126-98-7	3.34E+03	3.61E+03	4.29E+02	1.12E+03	1.11E-03	8.07E+00	1.21E+01
127-18-4	8.62E+00	7.32E+01	4.29E+00	1.31E+00	6.50E-07	1.37E+00	2.06E+00
129-00-0	1.45E+01	3.44E+02	1.43E+00	na	na	9.95E+00	1.49E+01
141-78-6	2.50E-01	2.80E-01	4.76E-02	na	na	7.22E-04	1.08E-03
156-59-2	8.06E+00	1.25E+01	4.29E+00	na	na	4.26E-01	6.38E-01
206-44-0	1.50E+01	4.08E+02	1.07E+00	na	na	1.18E+01	1.77E+01
309-00-2	2.24E+04	5.25E+06	1.43E+03	na	na	8.90E+03	1.33E+04
319-84-6	3.62E+02	3.28E+03	8.57E+01	na	na	1.64E+01	2.46E+01
319-85-7	1.07E+03	8.45E+03	2.14E+02	na	na	4.38E+01	6.56E+01
541-73-1	1.02E+02	1.01E+03	4.76E+01	na	na	3.08E+01	4.61E+01
542-75-6	4.19E+01	4.39E+01	1.43E+00	3.91E+01	2.92E-05	1.92E-01	2.88E-01
621-64-7	na	na	na	na	na	na	na
1314-62-1	1.17E+01	3.13E+02	4.76E+00	na	na	3.03E+00	4.54E+00
1330-20-7	8.24E+00	1.02E+01	2.14E-01	7.80E+00	8.67E-06	1.09E-01	1.64E-01
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	1.72E+03	9.89E+05	5.36E+02	na	na	4.60E-03	6.89E-03
7429-90-5	1.37E+00	6.64E+00	4.29E-02	1.25E+00	3.85E-02	6.11E-03	9.16E-03
7439-89-6	3.57E-01	9.74E+00	1.43E-01	na	na	1.57E-03	2.35E-03
7439-93-2	1.71E+01	6.70E+01	2.14E+00	na	na	8.75E-03	1.31E-02
7439-96-5	1.34E+02	2.02E+02	9.18E-01	1.25E+02	3.86E+00	1.96E-01	2.93E-01
7439-97-6	2.09E+01	2.09E+01	na	2.08E+01	8.58E-02	na	na
7439-98-7	2.01E+02	2.82E+02	8.57E+00	na	na	1.08E-01	1.62E-01

Table D12a. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
7440-02-0	2.48E+01	1.18E+02	2.14E+00	na	na	1.74E-02	2.61E-02
7440-22-4	1.80E+01	2.40E+02	8.57E+00	na	na	1.93E-01	2.90E-01
7440-24-6	2.36E+00	4.94E+00	7.14E-02	na	na	1.93E-03	2.89E-03
7440-28-0	2.05E+03	1.19E+06	6.49E+02	na	na	4.53E+00	6.79E+00
7440-31-5	3.18E-01	4.12E+01	7.14E-02	na	na	1.37E-02	2.06E-02
7440-36-0	3.05E+02	1.08E+04	1.07E+02	na	na	3.89E+01	5.83E+01
7440-38-2	3.05E+02	9.88E+03	1.43E+02	na	na	4.48E+00	6.72E+00
7440-39-3	1.48E+01	3.41E+01	6.12E-01	1.25E+01	3.56E-01	2.35E-02	3.52E-02
7440-41-7	3.77E+02	3.57E+03	2.14E+01	3.13E+02	9.48E+00	9.43E+00	1.41E+01
7440-42-8	1.67E+01	1.87E+01	4.76E-01	3.13E-01	3.21E-03	8.04E-03	1.21E-02
7440-43-9	5.06E+02	2.03E+04	8.57E+01	na	na	4.00E+00	5.99E+00
7440-45-1	3.22E+01	3.22E+01	na	3.13E+01	9.64E-01	na	na
7440-48-4	3.31E+02	4.88E+02	2.14E+00	3.13E+02	8.91E+00	2.16E-02	3.24E-02
7440-50-8	3.83E+01	9.60E+01	1.07E+00	na	na	7.31E-03	1.10E-02
7440-62-2	1.93E+01	1.08E+03	6.12E+00	na	na	5.51E+00	8.26E+00
7440-66-6	3.36E+02	3.47E+02	1.43E-01	na	na	1.63E-03	2.44E-03
7487-94-7	3.20E+03	3.09E+04	1.43E+02	na	na	4.00E-01	5.99E-01
7664-41-7	1.10E+00	1.10E+00	na	1.10E+00	2.84E-05	na	na
7723-14-0	5.35E+05	1.14E+06	2.14E+03	na	na	5.42E+01	8.12E+01
7782-41-4	4.37E+00	2.07E+01	7.14E-01	na	na	7.90E-03	1.18E-02
7782-49-2	2.67E+01	3.58E+02	8.57E+00	na	na	1.17E-01	1.76E-01
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	4.36E+04	5.44E+07	2.14E+03	na	na	2.05E+04	3.07E+04
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	3.59E+03	1.96E+06	6.12E+02	na	na	2.27E+03	3.40E+03
14797-55-8	2.75E-02	6.45E-02	2.68E-02	na	na	4.00E-04	5.99E-04
14797-65-0	4.39E-01	1.03E+00	4.29E-01	na	na	6.17E-03	9.25E-03
16065-83-1	1.15E-01	7.15E+00	2.86E-02	na	na	3.81E-02	5.71E-02
16984-48-8	4.37E+00	2.07E+01	7.14E-01	na	na	7.90E-03	1.18E-02
18540-29-9	8.06E+02	1.36E+03	1.43E+01	7.80E+02	2.17E-01	4.76E+00	7.14E+00
53469-21-9	na	na	na	na	na	na	na
Uranium	1.35E+02	7.54E+02	7.14E+01	na	na	5.60E-01	8.40E-01
Cr Mixture	1.15E+02	2.01E+02	2.07E+00	1.11E+02	3.10E-02	7.13E-01	1.07E+00

"na" means that one or more of the reference doses was not available.

Table D12b. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	7.45E-03	8.85E-03	2.60E+01	4.36E-03	1.62E-02	0.00E+00	1.59E-03

Table D12b. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
57-12-5	9.43E-03	2.93E-03	1.09E+02	1.04E-05	4.21E-05	0.00E+00	2.93E-06
57-14-7	na	na	na	na	na	na	na
57-55-6	9.75E-05	8.92E-05	8.08E+00	1.65E-07	6.68E-07	0.00E+00	4.63E-08
58-89-9	2.05E+00	3.64E+00	5.20E+02	6.02E-01	2.32E+00	0.00E+00	3.19E-01
60-29-7	2.47E-05	3.61E-05	3.73E-01	5.47E-07	2.16E-06	0.00E+00	1.68E-07
60-34-4	na	na	na	na	na	na	na
60-57-1	3.62E+01	3.31E+01	7.53E+02	8.81E+01	3.14E+02	0.00E+00	8.97E+01
62-75-9	1.62E+01	1.48E+01	7.49E+05	3.43E-02	1.39E-01	0.00E+00	9.61E-03
64-18-6	3.60E-05	3.29E-05	1.70E+00	8.34E-08	3.37E-07	0.00E+00	2.34E-08
67-56-1	3.76E-05	5.49E-05	4.26E+00	1.23E-07	4.98E-07	0.00E+00	3.46E-08
67-64-1	1.19E-05	1.81E-05	7.05E-01	6.99E-08	2.82E-07	0.00E+00	1.98E-08
67-66-3	2.07E-03	7.55E-04	2.92E+00	5.97E-05	2.28E-04	0.00E+00	2.03E-05
67-72-1	8.38E-02	7.67E-02	2.21E+01	7.93E-02	2.88E-01	0.00E+00	3.42E-02
71-36-3	3.68E-04	3.37E-04	2.98E+00	3.97E-06	1.59E-05	0.00E+00	1.15E-06
71-43-2	1.52E-03	2.69E-03	7.88E+00	2.30E-04	8.78E-04	0.00E+00	7.81E-05
71-55-6	1.41E-05	2.33E-05	7.40E-02	5.46E-06	2.05E-05	0.00E+00	1.95E-06
72-20-8	1.60E+02	5.86E+00	1.54E+02	1.04E+01	3.72E+01	0.00E+00	1.02E+01
74-83-9	3.16E-03	4.62E-03	3.61E+01	1.11E-04	4.31E-04	0.00E+00	3.51E-05
74-87-3	na	na	na	na	na	na	na
75-00-3	9.77E-06	1.43E-05	9.38E-02	5.24E-07	2.02E-06	0.00E+00	1.72E-07
75-01-4	1.05E-03	1.92E-03	1.08E+01	9.63E-05	3.69E-04	0.00E+00	3.22E-05
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	6.96E-05	1.21E-04	8.63E-01	3.03E-06	1.18E-05	0.00E+00	9.62E-07
75-15-0	1.15E-03	5.31E-05	2.52E-01	4.96E-06	1.88E-05	0.00E+00	1.71E-06
75-21-8	na	na	na	na	na	na	na
75-34-3	4.06E-05	7.43E-05	3.30E-01	4.34E-06	1.66E-05	0.00E+00	1.45E-06
75-35-4	6.55E-05	1.20E-04	4.77E-01	1.48E-05	5.58E-05	0.00E+00	5.15E-06
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	4.51E-05	1.90E-05	6.54E-02	5.37E-06	2.01E-05	0.00E+00	1.93E-06
75-71-8	6.68E-05	2.81E-05	1.15E-01	3.84E-06	1.45E-05	0.00E+00	1.34E-06
76-13-1	1.39E-07	2.03E-07	5.58E-04	2.06E-07	7.62E-07	0.00E+00	7.58E-08
76-44-8	1.77E+00	2.34E+00	4.26E+01	3.01E+01	1.05E+02	0.00E+00	3.16E+01
78-83-1	7.03E-05	1.03E-04	1.07E+00	1.08E-06	4.32E-06	0.00E+00	3.11E-07
78-87-5	na	na	na	na	na	na	na
78-93-3	2.20E-05	3.22E-05	6.30E-01	2.14E-07	8.58E-07	0.00E+00	6.11E-08
79-00-5	2.99E-03	4.43E-03	1.34E+01	2.07E-04	8.04E-04	0.00E+00	6.67E-05
79-01-6	9.04E-02	2.48E-02	7.45E+01	4.59E-03	1.73E-02	0.00E+00	1.62E-03
79-10-7	9.52E-05	8.70E-05	1.48E+00	5.69E-07	2.29E-06	0.00E+00	1.62E-07
79-34-5	4.41E-04	5.64E-04	8.81E-01	4.36E-05	1.68E-04	0.00E+00	1.45E-05
79-46-9	na	na	na	na	na	na	na
82-68-8	1.34E-01	1.96E-01	1.26E+01	1.66E-01	6.05E-01	0.00E+00	1.16E-01
83-32-9	1.02E-02	5.77E-03	8.64E-01	1.72E-03	6.45E-03	0.00E+00	8.86E-04
84-66-2	2.29E-04	3.77E-04	3.24E-01	1.56E-05	6.18E-05	0.00E+00	5.19E-06
84-74-2	4.12E-03	7.54E-03	4.98E-01	4.57E-03	1.68E-02	0.00E+00	3.19E-03

Table D12b. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
85-68-7	8.33E-03	9.29E-03	3.83E-01	6.80E-03	2.50E-02	0.00E+00	5.80E-03
87-68-3	8.07E-02	7.38E-02	5.12E+01	8.39E-01	3.05E+00	0.00E+00	3.33E-01
87-86-5	2.39E-02	4.37E-02	1.37E+00	7.09E-02	2.55E-01	0.00E+00	6.52E-02
88-06-2	7.98E+00	7.30E+00	1.15E+03	1.24E+00	4.77E+00	0.00E+00	6.34E-01
88-85-7	1.40E+00	1.28E+00	2.19E+02	1.68E-01	6.53E-01	0.00E+00	8.36E-02
91-20-3	4.33E-03	6.33E-03	2.52E+00	1.09E-03	4.12E-03	0.00E+00	4.28E-04
92-52-4	6.26E-03	5.72E-03	8.72E-01	2.04E-03	7.59E-03	0.00E+00	1.04E-03
95-47-6	5.78E-05	8.46E-05	1.08E-01	3.42E-05	1.28E-04	0.00E+00	1.25E-05
95-48-7	9.53E-03	8.71E-03	1.30E+01	2.04E-04	8.20E-04	0.00E+00	6.35E-05
95-50-1	2.33E-04	3.41E-04	2.56E-01	1.66E-04	6.17E-04	0.00E+00	6.28E-05
95-57-8	6.40E-02	5.85E-02	7.13E+01	1.80E-03	7.19E-03	0.00E+00	5.74E-04
95-63-6	3.10E-04	4.54E-04	3.86E-01	4.14E-04	1.52E-03	0.00E+00	1.58E-04
95-95-4	8.21E-03	7.51E-03	1.14E+00	1.33E-03	5.09E-03	0.00E+00	6.86E-04
98-86-2	7.32E-04	1.07E-03	3.25E+00	2.18E-05	8.73E-05	0.00E+00	6.51E-06
98-95-3	1.58E-01	2.80E-01	5.72E+02	7.21E-03	2.88E-02	0.00E+00	2.20E-03
100-25-4	3.94E+00	3.60E+00	1.05E+04	5.24E-02	2.11E-01	0.00E+00	1.55E-02
100-41-4	9.03E-05	1.60E-04	2.09E-01	7.16E-05	2.67E-04	0.00E+00	2.63E-05
100-42-5	9.35E-05	1.37E-04	1.46E-01	2.93E-05	1.10E-04	0.00E+00	1.05E-05
100-51-6	2.84E-04	3.43E-04	1.94E+00	4.23E-06	1.70E-05	0.00E+00	1.23E-06
106-42-3	5.31E-05	7.76E-05	1.04E-01	3.55E-05	1.32E-04	0.00E+00	1.31E-05
106-44-5	7.01E-02	8.34E-02	1.27E+02	1.95E-03	7.81E-03	0.00E+00	6.04E-04
106-46-7	5.50E-04	9.05E-04	7.32E-01	4.91E-04	1.82E-03	0.00E+00	1.85E-04
106-93-4	na	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na	na
107-02-8	1.62E-02	2.37E-02	6.88E+02	1.17E-04	4.71E-04	0.00E+00	3.35E-05
107-05-1	8.82E-05	1.29E-04	5.55E-01	1.04E-05	3.98E-05	0.00E+00	3.57E-06
107-06-2	2.03E-04	3.72E-04	1.89E+00	1.12E-05	4.37E-05	0.00E+00	3.54E-06
107-13-1	9.53E-03	1.39E-02	2.90E+02	9.03E-05	3.62E-04	0.00E+00	2.60E-05
108-10-1	1.63E-04	2.38E-04	1.33E+00	5.00E-06	1.98E-05	0.00E+00	1.52E-06
108-38-3	5.44E-05	7.96E-05	1.02E-01	3.95E-05	1.47E-04	0.00E+00	1.46E-05
108-39-4	9.24E-03	8.45E-03	1.25E+01	2.01E-04	8.06E-04	0.00E+00	6.25E-05
108-67-8	2.67E-04	3.91E-04	3.99E-01	2.60E-04	9.62E-04	0.00E+00	9.74E-05
108-87-2	na	na	na	na	na	na	na
108-88-3	4.14E-05	6.06E-05	1.15E-01	1.45E-05	5.44E-05	0.00E+00	5.17E-06
108-90-7	1.63E-03	9.25E-04	1.29E+00	2.05E-04	7.73E-04	0.00E+00	7.34E-05
108-94-1	8.63E-06	1.26E-05	1.14E-01	1.27E-07	5.10E-07	0.00E+00	3.64E-08
108-95-2	7.48E-04	1.23E-03	3.57E+00	1.78E-05	7.17E-05	0.00E+00	5.27E-06
109-99-9	8.85E-05	8.09E-05	1.28E+00	6.48E-07	2.60E-06	0.00E+00	1.87E-07
110-00-9	5.82E-03	8.51E-03	5.33E+01	2.30E-04	8.97E-04	0.00E+00	7.29E-05
110-54-3	6.12E-05	8.95E-05	2.52E-01	5.27E-04	1.94E-03	0.00E+00	1.97E-04
110-80-5	1.18E-04	1.07E-04	4.41E+00	3.60E-07	1.45E-06	0.00E+00	1.01E-07
110-82-7	na	na	na	na	na	na	na
110-86-1	8.78E-02	8.03E-02	8.59E+02	6.60E-04	2.66E-03	0.00E+00	1.88E-04
111-76-2	9.21E-05	8.42E-05	7.68E-01	9.05E-07	3.63E-06	0.00E+00	2.61E-07
111-90-0	8.70E-04	7.95E-04	4.31E+01	2.12E-06	8.55E-06	0.00E+00	5.94E-07
117-81-7	4.52E-01	1.57E-01	9.20E-01	4.53E+01	1.56E+02	0.00E+00	6.12E+01

Table D12b. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
117-84-0	4.74E-02	7.80E-02	4.33E-01	7.06E+01	2.43E+02	0.00E+00	9.60E+01
118-74-1	1.31E-01	1.19E-01	1.93E+01	3.19E+00	1.12E+01	0.00E+00	1.57E+00
120-82-1	3.77E-03	6.69E-03	2.24E+00	6.01E-03	2.19E-02	0.00E+00	2.52E-03
121-14-2	1.54E-01	2.39E-01	3.40E+02	5.72E-03	2.29E-02	0.00E+00	1.78E-03
121-44-8	na	na	na	na	na	na	na
122-39-4	3.27E-02	2.99E-02	5.88E+00	3.91E-03	1.51E-02	0.00E+00	1.85E-03
123-91-1	na	na	na	na	na	na	na
126-73-8	5.81E-03	5.32E-03	5.48E-01	1.32E-03	5.01E-03	0.00E+00	7.89E-04
126-98-7	1.01E-01	1.48E-01	1.79E+03	1.53E-03	6.10E-03	0.00E+00	4.47E-04
127-18-4	4.03E-04	7.37E-04	1.65E+00	1.06E-03	3.93E-03	0.00E+00	3.95E-04
129-00-0	1.32E-01	7.46E-02	2.52E+00	6.91E-02	2.53E-01	0.00E+00	6.34E-02
141-78-6	1.22E-05	1.78E-05	2.02E-01	1.93E-07	7.72E-07	0.00E+00	5.66E-08
156-59-2	4.59E-04	8.39E-04	3.35E+00	5.17E-05	1.98E-04	0.00E+00	1.73E-05
206-44-0	1.03E-01	5.81E-02	1.46E+00	9.00E-02	3.25E-01	0.00E+00	9.07E-02
309-00-2	8.31E+01	7.59E+01	7.56E+02	1.96E+03	6.78E+03	0.00E+00	2.42E+03
319-84-6	1.09E+00	1.92E+00	2.55E+02	3.64E-01	1.39E+00	0.00E+00	1.98E-01
319-85-7	3.66E+00	6.09E+00	7.99E+02	1.08E+00	4.15E+00	0.00E+00	5.91E-01
541-73-1	2.15E-02	3.14E-02	2.38E+01	1.98E-02	7.32E-02	0.00E+00	7.53E-03
542-75-6	3.69E-04	3.71E-04	1.16E+00	2.63E-05	1.01E-04	0.00E+00	8.82E-06
621-64-7	na	na	na	na	na	na	na
1314-62-1	1.11E-01	4.07E-01	2.43E+00	2.92E-01	2.56E-02	2.07E-01	3.98E-01
1330-20-7	4.91E-05	8.27E-05	1.07E-01	3.40E-05	1.27E-04	0.00E+00	1.25E-05
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	5.02E+01	4.59E+01	2.19E+02	5.12E+02	2.79E+02	3.47E+01	4.45E+01
7429-90-5	2.01E-03	3.67E-03	1.79E-02	1.54E-03	2.24E-03	2.78E-03	3.57E-03
7439-89-6	4.47E-03	1.23E-02	7.79E-02	7.11E-02	1.17E-03	3.11E-02	1.50E-02
7439-93-2	1.24E-02	1.81E-01	1.25E+00	5.32E-01	1.17E+01	4.61E-03	1.33E+00
7439-96-5	1.08E-01	7.87E-02	3.46E+00	1.50E-02	1.11E-02	5.36E-03	3.10E-03
7439-97-6	na	na	na	na	na	na	na
7439-98-7	6.00E-02	4.17E-01	1.61E+02	1.20E+00	2.57E+01	3.02E+00	1.31E+00
7440-02-0	3.72E-02	1.84E-01	5.97E+00	4.29E-01	1.60E+01	5.26E-04	2.53E-02
7440-22-4	2.12E-01	6.97E-01	3.64E+00	5.92E-01	1.07E-01	3.52E+00	4.24E-01
7440-24-6	1.63E-03	5.97E-03	1.71E+00	1.05E-01	4.60E-01	2.86E-03	3.44E-03
7440-28-0	2.03E+01	5.56E+01	2.65E+02	6.21E+02	3.38E+02	4.21E+01	5.40E+01
7440-31-5	3.34E-03	6.11E-03	4.79E-02	1.47E-01	2.02E-02	3.12E-03	6.01E-03
7440-36-0	2.52E+01	9.20E+00	1.23E+02	1.24E-01	8.70E-01	1.45E-01	8.14E-01
7440-38-2	1.60E+00	1.20E+01	9.76E+01	7.24E+00	2.39E+00	2.55E+01	1.18E+01
7440-39-3	3.78E-02	4.84E-02	1.04E+00	3.82E-03	1.05E-01	1.19E-03	5.73E-02
7440-41-7	9.86E+00	1.80E+00	9.84E+00	5.12E-01	5.03E-03	1.83E+00	4.39E-02
7440-42-8	8.26E-04	1.36E-02	1.39E+01	7.84E-02	1.87E+00	4.11E-02	7.91E-02
7440-43-9	7.53E+01	6.89E+00	2.89E+02	1.13E+00	3.42E+01	9.64E+00	5.80E-01
7440-45-1	na	na	na	na	na	na	na
7440-48-4	1.16E-02	1.70E-01	5.35E+00	7.84E-01	2.73E-01	9.68E-01	2.33E-02
7440-50-8	1.46E-02	8.01E-02	3.04E+01	2.04E+00	4.28E+00	2.86E-01	1.38E-01
7440-62-2	2.86E+00	5.24E-01	3.12E+00	3.76E-01	3.29E-02	2.66E-01	5.11E-01

Table D12b. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
7440-66-6	3.27E-03	1.20E-02	1.26E+02	8.62E+01	1.10E+02	1.11E+01	2.29E+00
7487-94-7	6.17E+00	7.89E+00	9.22E+02	2.07E+03	4.77E+01	9.30E-01	2.98E+00
7664-41-7	na	na	na	na	na	na	na
7723-14-0	3.11E+01	1.14E+02	1.88E+05	6.53E+04	2.66E+05	4.93E+02	1.25E+04
7782-41-4	3.35E-03	5.94E-02	5.13E-01	2.72E+00	2.00E-01	1.53E-03	1.47E-01
7782-49-2	2.27E-02	1.82E-01	5.19E+00	1.35E+00	4.03E+00	4.87E+00	2.34E+00
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	2.20E+02	6.03E+01	8.81E+02	3.57E+03	1.23E+04	0.00E+00	3.93E+03
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	4.21E+01	1.15E+01	3.31E+02	6.09E+01	2.14E+02	0.00E+00	5.55E+01
14797-55-8	2.83E-05	2.59E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
14797-65-0	4.53E-04	4.14E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
16065-83-1	2.49E-02	2.28E-03	1.20E-02	5.82E-03	7.04E-05	1.15E-03	2.22E-03
16984-48-8	3.35E-03	5.94E-02	5.13E-01	2.72E+00	2.00E-01	1.53E-03	1.47E-01
18540-29-9	3.78E-01	1.38E-01	4.93E+00	7.83E-01	9.47E-03	9.13E-02	1.76E-01
53469-21-9	na	na	na	na	na	na	na
Uranium	2.18E-01	3.38E+00	4.10E+01	3.49E-01	5.13E+00	8.98E+00	4.32E+00
Cr Mixture	7.53E-02	2.17E-02	7.14E-01	1.17E-01	1.41E-03	1.40E-02	2.70E-02

Zero values for poultry indicate the poultry uptake factors were not available.

Table D12c. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na
56-23-5	6.24E-06	0.00E+00	7.26E-02	5.46E-01	4.59E-01	3.32E+02
57-12-5	1.82E-10	0.00E+00	2.11E-06	1.88E-01	6.05E-01	1.22E+00
57-14-7	na	na	na	na	na	na
57-55-6	1.55E-12	0.00E+00	1.81E-08	5.47E-03	5.98E-03	4.88E-02
58-89-9	1.13E-04	0.00E+00	1.31E+00	3.93E+02	2.22E+02	3.75E+03
60-29-7	2.51E-10	0.00E+00	2.92E-06	2.22E-03	1.52E-03	1.22E-01
60-34-4	na	na	na	na	na	na
60-57-1	3.24E-02	0.00E+00	3.78E+02	4.18E+03	4.57E+03	4.43E+05
62-75-9	2.17E-07	0.00E+00	2.53E-03	1.01E+03	1.10E+03	3.05E+03
64-18-6	9.31E-13	0.00E+00	1.08E-08	1.99E-03	2.18E-03	1.22E-02
67-56-1	2.19E-12	0.00E+00	2.55E-08	3.42E-03	2.34E-03	4.88E-02
67-64-1	4.13E-12	0.00E+00	4.80E-08	1.13E-03	7.41E-04	2.71E-02
67-66-3	6.03E-08	0.00E+00	7.01E-04	4.66E-02	1.27E-01	5.06E+00
67-72-1	8.91E-05	0.00E+00	1.04E+00	5.00E+00	5.47E+00	2.37E+03
71-36-3	4.90E-10	0.00E+00	5.70E-06	2.10E-02	2.29E-02	2.44E-01
71-43-2	2.18E-07	0.00E+00	2.53E-03	1.66E-01	9.38E-02	1.68E+01
71-55-6	7.13E-09	0.00E+00	8.29E-05	1.43E-03	8.72E-04	4.54E-01

Table D12c. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
72-20-8	3.41E-03	0.00E+00	3.97E+01	7.63E+02	2.09E+04	5.18E+04
74-83-9	7.14E-08	0.00E+00	8.31E-04	2.85E-01	1.95E-01	9.06E+00
74-87-3	na	na	na	na	na	na
75-00-3	4.35E-10	0.00E+00	5.06E-06	8.81E-04	6.03E-04	4.85E-02
75-01-4	8.97E-08	0.00E+00	1.04E-03	1.18E-01	6.47E-02	9.06E+00
75-05-8	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na
75-09-2	1.91E-09	0.00E+00	2.23E-05	7.46E-03	4.30E-03	2.35E-01
75-15-0	5.62E-09	0.00E+00	6.55E-05	3.27E-03	7.10E-02	4.80E-01
75-21-8	na	na	na	na	na	na
75-34-3	3.98E-09	0.00E+00	4.63E-05	4.59E-03	2.51E-03	3.68E-01
75-35-4	1.74E-08	0.00E+00	2.03E-04	7.39E-03	4.04E-03	1.34E+00
75-45-6	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na
75-69-4	7.29E-09	0.00E+00	8.49E-05	1.17E-03	2.78E-03	4.55E-01
75-71-8	4.67E-09	0.00E+00	5.43E-05	1.73E-03	4.12E-03	3.54E-01
76-13-1	3.11E-10	0.00E+00	3.62E-06	1.25E-05	8.57E-06	1.39E-02
76-44-8	1.63E-02	0.00E+00	1.89E+02	2.59E+02	1.96E+02	1.53E+05
78-83-1	1.24E-10	0.00E+00	1.44E-06	6.40E-03	4.38E-03	8.13E-02
78-87-5	na	na	na	na	na	na
78-93-3	2.10E-11	0.00E+00	2.44E-07	2.01E-03	1.37E-03	4.06E-02
79-00-5	1.25E-07	0.00E+00	1.46E-03	2.77E-01	1.87E-01	1.10E+01
79-01-6	5.66E-06	0.00E+00	6.59E-02	1.53E+00	5.58E+00	3.74E+02
79-10-7	2.89E-11	0.00E+00	3.36E-07	5.35E-03	5.85E-03	4.88E-02
79-34-5	2.64E-08	0.00E+00	3.07E-04	3.57E-02	2.79E-02	1.78E+00
79-46-9	na	na	na	na	na	na
82-68-8	9.40E-05	0.00E+00	1.09E+00	1.84E+01	1.26E+01	1.92E+03
83-32-9	8.95E-07	0.00E+00	1.04E-02	4.91E-01	8.66E-01	2.68E+01
84-66-2	2.12E-09	0.00E+00	2.47E-05	3.05E-02	1.85E-02	1.40E-01
84-74-2	2.04E-06	0.00E+00	2.38E-02	7.41E-01	4.05E-01	4.49E+01
85-68-7	1.73E-06	0.00E+00	2.02E-02	1.25E+00	1.12E+00	3.37E+01
87-68-3	1.30E-03	0.00E+00	1.51E+01	4.63E+00	5.07E+00	2.46E+04
87-86-5	2.84E-05	0.00E+00	3.30E-01	5.00E+00	2.74E+00	1.79E+02
88-06-2	3.16E-04	0.00E+00	3.68E+00	7.12E+02	7.78E+02	4.25E+03
88-85-7	2.34E-05	0.00E+00	2.73E-01	1.46E+02	1.60E+02	8.48E+02
91-20-3	6.44E-07	0.00E+00	7.50E-03	4.42E-01	3.02E-01	2.67E+01
92-52-4	1.23E-06	0.00E+00	1.44E-02	4.69E-01	5.13E-01	3.57E+01
95-47-6	4.26E-08	0.00E+00	4.95E-04	5.28E-03	3.61E-03	1.94E+00
95-48-7	1.15E-08	0.00E+00	1.34E-04	7.66E-01	8.37E-01	9.76E-01
95-50-1	1.93E-07	0.00E+00	2.25E-03	2.15E-02	1.47E-02	7.48E+00
95-57-8	1.82E-07	0.00E+00	2.12E-03	4.79E+00	5.24E+00	1.39E+01
95-63-6	5.51E-07	0.00E+00	6.41E-03	2.85E-02	1.95E-02	1.92E+01
95-95-4	3.39E-07	0.00E+00	3.94E-03	7.36E-01	8.05E-01	4.48E+00
98-86-2	2.46E-09	0.00E+00	2.86E-05	7.19E-02	4.91E-02	3.66E-02
98-95-3	9.14E-07	0.00E+00	1.06E-02	1.98E+01	1.12E+01	8.18E+01
100-25-4	1.86E-06	0.00E+00	2.17E-02	3.04E+02	3.32E+02	2.05E+02

Table D12c. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
100-41-4	9.12E-08	0.00E+00	1.06E-03	9.99E-03	5.63E-03	4.10E+00
100-42-5	2.88E-08	0.00E+00	3.35E-04	8.63E-03	5.90E-03	1.44E+00
100-51-6	2.71E-10	0.00E+00	3.15E-06	2.25E-02	1.86E-02	8.07E-03
106-42-3	4.56E-08	0.00E+00	5.31E-04	4.84E-03	3.31E-03	2.05E+00
106-44-5	1.12E-07	0.00E+00	1.31E-03	7.27E+00	6.12E+00	9.59E+00
106-46-7	5.93E-07	0.00E+00	6.90E-03	5.71E-02	3.47E-02	2.28E+01
106-93-4	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na
107-02-8	1.26E-08	0.00E+00	1.47E-04	1.46E+00	1.00E+00	4.88E+01
107-05-1	1.10E-08	0.00E+00	1.28E-04	7.96E-03	5.44E-03	9.42E-01
107-06-2	6.50E-09	0.00E+00	7.56E-05	2.30E-02	1.26E-02	7.07E-01
107-13-1	1.15E-08	0.00E+00	1.34E-04	8.66E-01	5.92E-01	2.44E+01
108-10-1	1.65E-09	0.00E+00	1.92E-05	1.49E-02	1.02E-02	1.96E-01
108-38-3	5.12E-08	0.00E+00	5.95E-04	4.97E-03	3.39E-03	2.24E+00
108-39-4	1.18E-08	0.00E+00	1.37E-04	7.39E-01	8.08E-01	9.94E-01
108-67-8	3.40E-07	0.00E+00	3.95E-03	2.45E-02	1.67E-02	1.32E+01
108-87-2	na	na	na	na	na	na
108-88-3	1.73E-08	0.00E+00	2.02E-04	3.76E-03	2.57E-03	9.73E-01
108-90-7	2.23E-07	0.00E+00	2.60E-03	5.79E-02	1.02E-01	1.18E+01
108-94-1	8.34E-12	0.00E+00	9.70E-08	8.01E-04	5.47E-04	4.88E-03
108-95-2	6.21E-10	0.00E+00	7.22E-06	1.05E-01	6.35E-02	6.83E-02
109-99-9	8.87E-11	0.00E+00	1.03E-06	5.04E-03	5.51E-03	1.16E-01
110-00-9	1.41E-07	0.00E+00	1.64E-03	5.26E-01	3.59E-01	1.66E+01
110-54-3	8.55E-07	0.00E+00	9.95E-03	5.52E-03	3.77E-03	2.58E+01
110-80-5	7.73E-12	0.00E+00	8.99E-08	6.60E-03	7.22E-03	6.10E-02
110-82-7	na	na	na	na	na	na
110-86-1	2.88E-08	0.00E+00	3.36E-04	5.21E+00	5.70E+00	2.44E+01
111-76-2	8.73E-11	0.00E+00	1.02E-06	5.17E-03	5.66E-03	4.88E-02
111-90-0	3.10E-11	0.00E+00	3.61E-07	4.86E-02	5.32E-02	4.06E-01
117-81-7	1.29E-02	0.00E+00	1.50E+02	3.22E+01	9.27E+01	1.19E+02
117-84-0	2.03E-02	0.00E+00	2.37E+02	1.59E+01	9.67E+00	1.22E+01
118-74-1	4.34E-03	0.00E+00	5.04E+01	8.00E+00	8.75E+00	4.97E+04
120-82-1	6.76E-06	0.00E+00	7.87E-02	4.32E-01	2.44E-01	1.92E+02
121-14-2	3.08E-07	0.00E+00	3.59E-03	2.13E+01	1.37E+01	2.57E+01
121-44-8	na	na	na	na	na	na
122-39-4	8.17E-07	0.00E+00	9.51E-03	2.94E+00	3.21E+00	3.05E+01
123-91-1	na	na	na	na	na	na
126-73-8	3.23E-07	0.00E+00	3.76E-03	5.68E-01	6.21E-01	1.53E+00
126-98-7	3.09E-07	0.00E+00	3.60E-03	9.19E+00	6.28E+00	2.44E+02
127-18-4	1.62E-06	0.00E+00	1.89E-02	4.55E-02	2.49E-02	6.38E+01
129-00-0	1.63E-05	0.00E+00	1.90E-01	1.13E+01	1.99E+01	2.93E+02
141-78-6	3.85E-11	0.00E+00	4.48E-07	1.11E-03	7.58E-04	2.71E-02
156-59-2	4.68E-08	0.00E+00	5.44E-04	5.18E-02	2.83E-02	4.16E+00
206-44-0	2.33E-05	0.00E+00	2.72E-01	9.05E+00	1.60E+01	3.62E+02
309-00-2	6.81E-01	0.00E+00	7.92E+03	1.16E+04	1.27E+04	5.19E+06
319-84-6	8.15E-05	0.00E+00	9.48E-01	2.01E+02	1.13E+02	2.59E+03

Table D12c. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
319-85-7	1.95E-04	0.00E+00	2.26E+00	6.81E+02	4.09E+02	6.26E+03
541-73-1	2.43E-05	0.00E+00	2.83E-01	1.98E+00	1.36E+00	8.93E+02
542-75-6	2.31E-08	0.00E+00	2.68E-04	2.30E-02	2.28E-02	1.88E+00
621-64-7	na	na	na	na	na	na
1314-62-1	7.18E-05	4.17E-01	8.35E-01	1.00E+02	2.74E+01	1.71E+02
1330-20-7	4.26E-08	0.00E+00	4.95E-04	5.16E-03	3.07E-03	1.94E+00
1336-36-3	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na
6533-73-9	1.29E-01	7.05E+01	9.39E+01	1.13E+04	1.24E+04	9.64E+05
7429-90-5	3.87E-07	5.64E-03	7.51E-03	9.07E-01	4.96E-01	3.86E+00
7439-89-6	1.72E-05	6.26E-02	3.13E-02	3.04E+00	1.11E+00	5.14E+00
7439-93-2	1.29E-04	9.39E-03	2.82E+00	4.37E+01	2.99E+00	3.86E-01
7439-96-5	9.23E-07	6.71E-03	4.03E-03	1.95E+01	2.66E+01	2.20E+01
7439-97-6	na	na	na	na	na	na
7439-98-7	5.17E-05	3.76E+00	1.69E+00	5.23E+01	7.52E+00	1.54E+01
7440-02-0	6.46E-05	9.39E-04	4.70E-02	4.55E+01	9.21E+00	3.86E+01
7440-22-4	1.55E-04	7.51E+00	9.39E-01	1.58E+02	4.79E+01	7.71E+00
7440-24-6	3.44E-06	2.50E-03	3.13E-03	1.41E+00	3.87E-01	7.71E-01
7440-28-0	1.57E-01	8.54E+01	1.14E+02	1.37E+04	5.01E+03	1.17E+06
7440-31-5	3.44E-05	6.26E-03	1.25E-02	1.50E+00	8.21E-01	3.86E+01
7440-36-0	2.58E-05	2.82E-01	1.64E+00	2.28E+03	6.24E+03	1.93E+03
7440-38-2	1.72E-03	5.20E+01	2.50E+01	2.85E+03	3.80E+02	6.27E+03
7440-39-3	7.38E-07	2.42E-03	1.21E-01	1.05E+01	8.20E+00	4.41E-01
7440-41-7	1.29E-04	3.76E+00	9.39E-02	4.32E+02	2.36E+03	3.86E+02
7440-42-8	2.30E-06	4.17E-02	8.35E-02	1.30E+00	7.87E-02	4.28E-01
7440-43-9	1.03E-04	1.50E+01	9.39E-01	1.53E+03	1.67E+04	1.54E+03
7440-45-1	na	na	na	na	na	na
7440-48-4	1.29E-04	1.88E+00	4.70E-02	3.68E+01	2.51E+00	1.16E+02
7440-50-8	5.81E-05	2.35E-01	1.17E-01	1.59E+01	2.91E+00	3.86E+01
7440-62-2	9.23E-05	5.37E-01	1.07E+00	1.29E+02	7.05E+02	2.20E+02
7440-66-6	8.61E-05	4.38E-01	9.39E-02	2.85E+00	7.79E-01	6.48E+00
7487-94-7	2.15E-01	1.88E+00	6.26E+00	1.10E+03	8.60E+02	2.57E+04
7664-41-7	na	na	na	na	na	na
7723-14-0	6.46E-01	1.78E+02	4.70E+03	1.53E+04	4.17E+03	5.78E+05
7782-41-4	6.46E-04	3.13E-03	3.13E-01	1.39E+01	7.85E-01	1.29E+00
7782-49-2	7.75E-04	3.38E+01	1.69E+01	1.60E+01	1.98E+00	2.62E+02
8001-35-2	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na
11097-69-1	1.99E+00	0.00E+00	2.32E+04	6.75E+03	2.46E+04	5.42E+07
11104-28-2	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na
12674-11-2	3.85E-02	0.00E+00	4.48E+02	1.16E+03	4.23E+03	1.95E+06
14797-55-8	0.00E+00	0.00E+00	0.00E+00	1.95E-02	2.13E-03	1.52E-02
14797-65-0	0.00E+00	0.00E+00	0.00E+00	3.12E-01	3.41E-02	2.44E-01
16065-83-1	1.55E-06	2.50E-03	5.01E-03	5.01E-01	5.48E+00	1.03E+00

Table D12c. Native American Scenario Hazard Index by Pathway, per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
16984-48-8	6.46E-04	3.13E-03	3.13E-01	1.39E+01	7.85E-01	1.29E+00
18540-29-9	7.75E-04	1.25E+00	2.50E+00	1.04E+01	2.84E+01	5.14E+02
53469-21-9	na	na	na	na	na	na
Uranium	1.29E-04	3.13E+01	1.57E+01	4.16E+02	2.68E+01	1.29E+02
Cr Mixture	1.12E-04	1.81E-01	3.62E-01	1.91E+00	8.76E+00	7.43E+01

The wild game, sediment, and fish pathways are only used when the contaminated water source is the Columbia River.
Zero values for wild birds indicate the poultry uptake factors were not available.

Table D13a. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
50-32-8	1.04E+01	6.14E+02	3.13E-01	1.28E-02	1.52E-04	8.34E+00	1.25E+01
53-70-3	1.80E+01	1.81E+03	3.13E-01	5.50E-03	1.62E-04	1.13E+01	1.69E+01
56-23-5	2.08E-02	5.17E-02	5.57E-03	1.16E-02	4.83E-09	1.28E-03	1.92E-03
57-12-5	na	na	na	na	na	na	na
57-14-7	3.85E+01	3.86E+01	1.29E-01	3.07E-02	2.83E-05	2.01E-04	3.01E-04
57-55-6	na	na	na	na	na	na	na
58-89-9	2.72E-01	1.93E+00	5.57E-02	na	na	1.07E-02	1.60E-02
60-29-7	na	na	na	na	na	na	na
60-34-4	2.88E+01	2.89E+01	1.29E-01	3.07E-02	2.50E-05	3.07E-04	4.60E-04
60-57-1	3.59E+00	3.63E+02	6.86E-01	1.46E+00	3.97E-04	4.07E-01	6.10E-01
62-75-9	3.09E+02	3.10E+02	2.19E+00	8.47E-01	9.09E-05	7.72E-03	1.16E-02
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	1.80E-02	1.80E-02	9.86E-06	1.80E-02	9.12E-09	2.93E-06	4.39E-06
67-72-1	4.52E-03	3.81E-02	6.00E-04	3.12E-03	1.61E-08	4.77E-04	7.15E-04
71-36-3	na	na	na	na	na	na	na
71-43-2	1.05E-02	1.44E-02	2.36E-03	6.09E-03	4.40E-09	3.35E-04	5.03E-04
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	2.79E-03	3.13E-03	5.57E-04	1.41E-03	5.60E-10	1.93E-05	2.89E-05
75-00-3	2.41E-04	3.03E-04	1.24E-04	na	na	8.27E-06	1.24E-05
75-01-4	1.17E-01	1.58E-01	6.00E-02	6.87E-03	2.66E-09	4.52E-03	6.77E-03
75-05-8	na	na	na	na	na	na	na
75-07-0	1.72E-03	1.72E-03	na	1.72E-03	1.47E-09	na	na
75-09-2	1.09E-03	1.20E-03	3.21E-04	3.68E-04	1.80E-10	1.01E-05	1.51E-05
75-15-0	na	na	na	na	na	na	na
75-21-8	5.58E-01	5.83E-01	4.37E-02	7.81E-02	5.28E-08	2.29E-04	3.43E-04
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na

Table D13a. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	2.06E+00	3.48E+02	1.93E-01	1.00E+00	7.88E-05	3.86E-01	5.78E-01
78-83-1	na	na	na	na	na	na	na
78-87-5	5.54E-03	9.23E-03	2.91E-03	na	na	2.60E-04	3.90E-04
78-93-3	na	na	na	na	na	na	na
79-00-5	1.84E-02	2.10E-02	2.44E-03	1.27E-02	1.51E-08	1.29E-04	1.94E-04
79-01-6	1.27E-01	1.79E-01	1.71E-02	8.93E-02	4.46E-08	1.20E-02	1.79E-02
79-10-7	na	na	na	na	na	na	na
79-34-5	6.45E-02	8.68E-02	8.57E-03	4.46E-02	1.02E-07	7.32E-04	1.10E-03
79-46-9	2.10E+00	2.10E+00	na	2.10E+00	3.65E-06	na	na
82-68-8	2.73E-02	1.55E+00	1.11E-02	na	na	5.51E-03	8.25E-03
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	2.74E-02	6.06E-01	3.34E-03	1.74E-02	2.59E-08	5.39E-03	8.08E-03
87-86-5	1.84E-02	6.89E-01	5.14E-03	na	na	6.69E-03	1.00E-02
88-06-2	2.33E-03	8.34E-03	4.71E-04	2.61E-04	1.20E-07	3.12E-04	4.67E-04
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	8.59E-04	8.59E-04	na	8.59E-04	9.25E-10	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	6.98E-03	2.37E-02	1.03E-03	4.91E-03	8.96E-09	5.10E-04	7.64E-04
106-93-4	1.02E+01	1.47E+01	3.64E+00	1.72E-01	3.39E-07	1.02E-01	1.52E-01
106-99-0	2.34E-02	2.34E-02	na	2.34E-02	8.62E-09	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	2.95E-02	3.16E-02	3.90E-03	2.03E-02	1.52E-08	1.39E-04	2.08E-04
107-13-1	2.33E-01	2.47E-01	2.31E-02	5.31E-02	4.98E-08	2.62E-04	3.93E-04

Table D13a. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	3.89E-03	4.09E-03	3.26E-04	1.52E-03	1.73E-09	6.38E-06	9.57E-06
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	1.16E-01	2.33E-01	6.00E-04	na	na	4.15E-02	6.22E-02
117-84-0	na	na	na	na	na	na	na
118-74-1	8.44E-01	6.47E+01	6.86E-02	3.57E-01	2.29E-06	3.73E-01	5.59E-01
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	1.17E-02	1.19E-02	4.71E-04	na	na	1.40E-06	2.10E-06
126-73-8	9.36E-04	3.57E-03	2.31E-04	na	na	9.66E-05	1.45E-04
126-98-7	na	na	na	na	na	na	na
127-18-4	4.26E-03	3.78E-02	2.23E-03	4.53E-04	2.24E-10	7.15E-04	1.07E-03
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	1.52E+01	2.68E+03	7.29E-01	3.79E+00	5.81E-04	4.54E+00	6.80E+00
319-84-6	1.84E+00	1.08E+01	2.70E-01	7.01E-01	9.10E-05	5.18E-02	7.76E-02
319-85-7	3.93E-01	2.97E+00	7.71E-02	7.23E-03	3.29E-05	1.58E-02	2.36E-02
541-73-1	na	na	na	na	na	na	na
542-75-6	1.15E-02	1.75E-02	4.29E-03	3.12E-03	2.34E-09	5.77E-04	8.64E-04
621-64-7	8.85E+00	9.42E+00	3.00E-01	na	na	2.26E-02	3.39E-02
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	4.74E-01	8.95E+02	1.71E-02	8.93E-02	2.63E-05	1.17E-01	1.75E-01
1336-36-3	3.64E-01	8.95E+02	3.00E-03	8.93E-02	2.63E-05	2.05E-02	3.07E-02
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na

Table D13a. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	1.65E-01	4.38E+00	6.43E-02	2.70E-02	8.14E-04	2.02E-03	3.02E-03
7440-39-3	na	na	na	na	na	na	na
7440-41-7	1.55E-02	1.55E-02	na	1.50E-02	4.54E-04	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	1.16E-02	1.16E-02	na	1.12E-02	3.25E-04	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	1.80E-02	1.80E-02	na	1.75E-02	4.98E-04	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	2.92E-01	4.90E+01	4.71E-02	6.02E-02	4.66E-05	4.55E-02	6.82E-02
11096-82-5	3.00E+01	1.35E+02	1.71E-02	8.93E-02	4.99E-05	6.96E-01	1.04E+00
11097-69-1	1.10E+00	2.17E+03	1.71E-02	8.93E-02	3.62E-05	1.64E-01	2.45E-01
11104-28-2	2.05E-01	9.86E+00	1.71E-02	8.93E-02	1.13E-05	2.82E-02	4.22E-02
11141-16-5	2.05E-01	9.86E+00	1.71E-02	8.93E-02	1.13E-05	2.82E-02	4.22E-02
12672-29-6	4.61E-01	9.78E+02	1.71E-02	8.93E-02	1.87E-05	1.26E-01	1.89E-01
12674-11-2	2.00E-01	2.73E+02	3.00E-03	8.93E-02	2.42E-05	1.11E-02	1.67E-02
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	7.53E-02	7.53E-02	na	7.50E-02	2.61E-04	na	na
53469-21-9	4.64E-01	8.95E+02	1.71E-02	8.93E-02	2.44E-05	1.17E-01	1.75E-01
Uranium	na	na	na	na	na	na	na
Cr Mixture	1.08E-02	1.08E-02	na	1.07E-02	3.73E-05	na	na

"na" means that one or more of the cancer induction slope factors was not available.

Table D13b. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
50-32-8	1.93E-02	2.40E-02	2.39E-01	2.56E-01	8.95E-01	0.00E+00	3.22E-01
53-70-3	2.07E-02	2.57E-02	1.76E-01	1.06E+00	3.67E+00	0.00E+00	1.42E+00
56-23-5	3.10E-07	8.06E-07	2.36E-03	3.97E-07	1.48E-06	0.00E+00	1.44E-07
57-12-5	na	na	na	na	na	na	na
57-14-7	1.65E-04	3.29E-04	3.83E+01	4.21E-07	1.70E-06	0.00E+00	1.18E-07
57-55-6	na	na	na	na	na	na	na
58-89-9	3.66E-04	1.42E-03	2.03E-01	2.35E-04	9.05E-04	0.00E+00	1.25E-04
60-29-7	na	na	na	na	na	na	na
60-34-4	1.45E-04	2.91E-04	2.86E+01	4.34E-07	1.75E-06	0.00E+00	1.21E-07
60-57-1	1.32E-02	2.65E-02	6.02E-01	7.05E-02	2.51E-01	0.00E+00	7.18E-02
62-75-9	3.03E-03	6.06E-03	3.06E+02	1.40E-05	5.66E-05	0.00E+00	3.92E-06
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	2.17E-09	1.74E-09	6.72E-06	1.37E-10	5.24E-10	0.00E+00	4.68E-11
67-72-1	5.37E-07	1.07E-06	3.09E-04	1.11E-06	4.03E-06	0.00E+00	4.79E-07
71-36-3	na	na	na	na	na	na	na
71-43-2	1.52E-07	5.91E-07	1.73E-03	5.06E-08	1.93E-07	0.00E+00	1.72E-08
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	2.41E-08	7.70E-08	8.12E-04	1.27E-09	4.99E-09	0.00E+00	3.95E-10
75-00-3	5.18E-09	1.66E-08	1.09E-04	6.08E-10	2.35E-09	0.00E+00	1.99E-10
75-01-4	2.01E-06	8.06E-06	4.54E-02	4.04E-07	1.55E-06	0.00E+00	1.35E-07
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	1.43E-08	5.44E-08	3.88E-04	1.36E-09	5.32E-09	0.00E+00	4.33E-10
75-15-0	na	na	na	na	na	na	na
75-21-8	3.21E-06	1.03E-05	4.35E-01	3.78E-08	1.52E-07	0.00E+00	1.08E-08
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	1.82E-03	5.25E-03	9.58E-02	6.78E-02	2.36E-01	0.00E+00	7.12E-02
78-83-1	na	na	na	na	na	na	na
78-87-5	2.41E-07	7.12E-07	2.36E-03	4.78E-08	1.84E-07	0.00E+00	1.60E-08
78-93-3	na	na	na	na	na	na	na
79-00-5	3.12E-07	1.01E-06	3.06E-03	4.71E-08	1.83E-07	0.00E+00	1.52E-08
79-01-6	4.96E-06	2.97E-06	8.94E-03	5.50E-07	2.07E-06	0.00E+00	1.95E-07
79-10-7	na	na	na	na	na	na	na
79-34-5	2.42E-06	6.77E-06	1.06E-02	5.23E-07	2.02E-06	0.00E+00	1.74E-07
79-46-9	na	na	na	na	na	na	na

Table D13b. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
82-68-8	4.77E-05	1.53E-04	9.81E-03	1.30E-04	4.72E-04	0.00E+00	9.04E-05
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	8.63E-07	1.73E-06	1.20E-03	1.96E-05	7.13E-05	0.00E+00	7.78E-06
87-86-5	3.93E-05	1.57E-04	4.92E-03	2.55E-04	9.18E-04	0.00E+00	2.35E-04
88-06-2	4.01E-06	8.03E-06	1.27E-03	1.37E-06	5.25E-06	0.00E+00	6.98E-07
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	1.81E-07	6.51E-07	5.27E-04	3.53E-07	1.31E-06	0.00E+00	1.33E-07
106-93-4	7.79E-04	2.49E-03	6.28E+00	1.10E-04	4.30E-04	0.00E+00	3.48E-05
106-99-0	na	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	2.54E-07	1.01E-06	5.17E-03	3.06E-08	1.19E-07	0.00E+00	9.68E-09
107-13-1	2.35E-06	7.53E-06	1.57E-01	4.87E-08	1.96E-07	0.00E+00	1.40E-08
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	6.46E-08	1.29E-07	2.04E-03	1.03E-09	4.15E-09	0.00E+00	2.99E-10
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na

Table D13b. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	5.78E-05	4.39E-05	2.58E-04	1.27E-02	4.36E-02	0.00E+00	1.71E-02
117-84-0	na	na	na	na	na	na	na
118-74-1	7.65E-05	1.53E-04	2.48E-02	4.08E-03	1.43E-02	0.00E+00	2.01E-03
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	8.71E-08	2.79E-07	1.12E-02	1.03E-09	4.15E-09	0.00E+00	2.90E-10
126-73-8	2.87E-06	5.74E-06	5.92E-04	1.42E-06	5.41E-06	0.00E+00	8.52E-07
126-98-7	na	na	na	na	na	na	na
127-18-4	9.58E-08	3.83E-07	8.56E-04	5.52E-07	2.04E-06	0.00E+00	2.05E-07
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	1.94E-02	3.87E-02	3.86E-01	9.98E-01	3.46E+00	0.00E+00	1.23E+00
319-84-6	1.56E-03	6.06E-03	8.03E-01	1.15E-03	4.39E-03	0.00E+00	6.24E-04
319-85-7	6.03E-04	2.19E-03	2.88E-01	3.88E-04	1.49E-03	0.00E+00	2.13E-04
541-73-1	na	na	na	na	na	na	na
542-75-6	5.05E-07	1.11E-06	3.47E-03	7.88E-08	3.02E-07	0.00E+00	2.65E-08
621-64-7	2.58E-03	2.58E-03	8.52E+00	3.38E-05	1.36E-04	0.00E+00	9.92E-06
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	2.92E-03	1.75E-03	3.71E-02	3.83E-02	1.33E-01	0.00E+00	3.79E-02
1336-36-3	2.92E-03	1.75E-03	3.71E-02	3.83E-02	1.33E-01	0.00E+00	3.79E-02
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	3.29E-04	5.39E-03	4.39E-02	3.26E-03	1.08E-03	1.15E-02	5.32E-03
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	na	na	na	na	na	na

Table D13b. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Garden Vegetables	Beef	Milk	Poultry	Egg
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	1.55E-03	3.10E-03	4.25E-02	1.61E-02	5.69E-02	0.00E+00	1.91E-02
11096-82-5	5.55E-03	3.33E-03	3.16E-02	5.17E+00	1.77E+01	0.00E+00	6.30E+00
11097-69-1	4.02E-03	2.41E-03	3.52E-02	1.43E-01	4.92E-01	0.00E+00	1.57E-01
11104-28-2	1.26E-03	7.53E-04	6.47E-02	6.30E-04	2.29E-03	0.00E+00	3.90E-04
11141-16-5	1.26E-03	7.53E-04	6.47E-02	6.30E-04	2.29E-03	0.00E+00	3.90E-04
12672-29-6	2.07E-03	1.24E-03	3.44E-02	3.56E-02	1.23E-01	0.00E+00	3.20E-02
12674-11-2	2.69E-03	1.62E-03	4.64E-02	8.53E-03	2.99E-02	0.00E+00	7.77E-03
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na	na
53469-21-9	2.71E-03	1.62E-03	3.65E-02	3.67E-02	1.27E-01	0.00E+00	3.56E-02
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na	na

Zero values for poultry indicate the poultry uptake factors were not available.

Table D13c. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	6.36E-05	0.00E+00	7.40E-01	5.17E+00	4.17E+00	5.90E+02
53-70-3	2.65E-04	0.00E+00	3.08E+00	6.00E+00	4.84E+00	1.77E+03
56-23-5	5.68E-10	0.00E+00	6.60E-06	4.97E-05	1.91E-05	3.02E-02
57-12-5	na	na	na	na	na	na
57-14-7	1.25E-12	0.00E+00	1.46E-08	2.19E-02	1.09E-02	7.31E-02
57-55-6	na	na	na	na	na	na
58-89-9	4.41E-08	0.00E+00	5.13E-04	1.53E-01	3.95E-02	1.46E+00
60-29-7	na	na	na	na	na	na
60-34-4	1.73E-12	0.00E+00	2.01E-08	1.90E-02	9.49E-03	7.31E-02
60-57-1	2.60E-05	0.00E+00	3.02E-01	3.35E+00	1.67E+00	3.54E+02
62-75-9	8.86E-11	0.00E+00	1.03E-06	4.11E-01	2.06E-01	1.24E+00

Table D13c. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
64-18-6	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na
67-66-3	1.39E-13	0.00E+00	1.61E-09	1.07E-07	1.34E-07	1.16E-05
67-72-1	1.25E-09	0.00E+00	1.45E-05	7.00E-05	3.50E-05	3.32E-02
71-36-3	na	na	na	na	na	na
71-43-2	4.79E-11	0.00E+00	5.58E-07	3.66E-05	9.44E-06	3.69E-03
71-55-6	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na
74-87-3	6.82E-13	0.00E+00	7.94E-09	4.75E-06	1.48E-06	3.17E-04
75-00-3	5.04E-13	0.00E+00	5.87E-09	1.02E-06	3.20E-07	5.63E-05
75-01-4	3.77E-10	0.00E+00	4.39E-06	4.97E-04	1.24E-04	3.81E-02
75-05-8	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na
75-09-2	8.61E-13	0.00E+00	1.00E-08	3.36E-06	8.84E-07	1.06E-04
75-15-0	na	na	na	na	na	na
75-21-8	3.30E-12	0.00E+00	3.84E-08	6.34E-04	1.98E-04	2.49E-02
75-34-3	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na
76-44-8	3.66E-05	0.00E+00	4.26E-01	5.82E-01	2.02E-01	3.45E+02
78-83-1	na	na	na	na	na	na
78-87-5	4.19E-11	0.00E+00	4.88E-07	4.41E-05	1.49E-05	3.50E-03
78-93-3	na	na	na	na	na	na
79-00-5	2.86E-11	0.00E+00	3.32E-07	6.31E-05	1.95E-05	2.50E-03
79-01-6	6.79E-10	0.00E+00	7.91E-06	1.83E-04	3.06E-04	4.49E-02
79-10-7	na	na	na	na	na	na
79-34-5	3.17E-10	0.00E+00	3.69E-06	4.28E-04	1.53E-04	2.13E-02
79-46-9	na	na	na	na	na	na
82-68-8	7.33E-08	0.00E+00	8.53E-04	1.43E-02	4.48E-03	1.50E+00
83-32-9	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na
87-68-3	3.04E-08	0.00E+00	3.53E-04	1.08E-04	5.42E-05	5.75E-01
87-86-5	1.02E-07	0.00E+00	1.19E-03	1.80E-02	4.50E-03	6.44E-01
88-06-2	3.48E-10	0.00E+00	4.05E-06	7.83E-04	3.91E-04	4.67E-03
88-85-7	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na

Table D13c. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
95-47-6	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na
106-46-7	4.27E-10	0.00E+00	4.97E-06	4.11E-05	1.14E-05	1.64E-02
106-93-4	5.01E-08	0.00E+00	5.83E-04	1.57E-01	4.91E-02	4.22E+00
106-99-0	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na
107-06-2	1.77E-11	0.00E+00	2.07E-07	6.28E-05	1.57E-05	1.93E-03
107-13-1	6.20E-12	0.00E+00	7.22E-08	4.68E-04	1.46E-04	1.32E-02
108-10-1	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na
109-99-9	1.42E-13	0.00E+00	1.65E-09	8.05E-06	4.02E-06	1.85E-04
110-00-9	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na
117-81-7	3.60E-06	0.00E+00	4.19E-02	9.02E-03	1.19E-02	3.32E-02
117-84-0	na	na	na	na	na	na
118-74-1	5.55E-06	0.00E+00	6.46E-02	1.02E-02	5.12E-03	6.36E+01
120-82-1	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na

Table D13c. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
123-91-1	3.81E-14	0.00E+00	4.44E-10	1.74E-05	5.42E-06	2.68E-04
126-73-8	3.49E-10	0.00E+00	4.06E-06	6.14E-04	3.07E-04	1.66E-03
126-98-7	na	na	na	na	na	na
127-18-4	8.44E-10	0.00E+00	9.82E-06	2.36E-05	5.91E-06	3.32E-02
129-00-0	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na
309-00-2	3.47E-04	0.00E+00	4.04E+00	5.94E+00	2.97E+00	2.65E+03
319-84-6	2.57E-07	0.00E+00	2.99E-03	6.34E-01	1.63E-01	8.17E+00
319-85-7	7.00E-08	0.00E+00	8.15E-04	2.45E-01	6.73E-02	2.25E+00
541-73-1	na	na	na	na	na	na
542-75-6	6.92E-11	0.00E+00	8.05E-07	6.89E-05	3.13E-05	5.63E-03
621-64-7	1.04E-09	0.00E+00	1.21E-05	2.20E-01	2.20E-01	1.20E-01
1314-62-1	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na
1336-36-3	2.52E-05	0.00E+00	2.93E-01	1.79E-01	2.99E-01	8.94E+02
1336-36-3	2.52E-05	0.00E+00	2.93E-01	1.79E-01	2.99E-01	8.94E+02
6533-73-9	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na
7440-38-2	7.75E-07	2.34E-02	1.13E-02	1.28E+00	7.82E-02	2.82E+00
7440-39-3	na	na	na	na	na	na
7440-41-7	na	na	na	na	na	na
7440-42-8	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na
7440-45-1	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na

Table D13c. Native American Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Game	Wild Birds	Bird Eggs	Sediment Ingestion	Sediment Dermal	Fish
7782-49-2	na	na	na	na	na	na
8001-35-2	4.28E-06	0.00E+00	4.98E-02	5.71E-01	2.85E-01	4.78E+01
11096-82-5	2.41E-03	0.00E+00	2.80E+01	4.23E-01	7.05E-01	7.55E+01
11097-69-1	7.96E-05	0.00E+00	9.27E-01	2.70E-01	4.50E-01	2.17E+03
11104-28-2	4.38E-07	0.00E+00	5.09E-03	6.51E-02	1.09E-01	9.47E+00
11141-16-5	4.38E-07	0.00E+00	5.09E-03	6.51E-02	1.09E-01	9.47E+00
12672-29-6	2.83E-05	0.00E+00	3.29E-01	1.18E-01	1.97E-01	9.77E+02
12674-11-2	5.38E-06	0.00E+00	6.27E-02	1.62E-01	2.71E-01	2.73E+02
14797-55-8	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na
53469-21-9	2.52E-05	0.00E+00	2.93E-01	1.63E-01	2.72E-01	8.94E+02
Uranium	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na

The wild game, sediment, and fish pathways are only used when the contaminated water source is the Columbia River.
Zero values for wild birds indicate the poultry uptake factors were not available.

Table D14a. Columbia River Population Doses by Pathway, person-rem per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	2.48E-01	1.74E-01	2.21E-02	0.00E+00	0.00E+00	8.88E-07	2.48E-02
Be-10	1.63E+01	1.27E+01	1.32E-03	1.52E-03	5.60E-03	1.80E-03	3.08E+00
C-14	2.27E+01	5.70E+00	7.76E-06	8.84E-06	7.02E-05	7.96E-04	1.77E+00
Na-22	2.13E+02	3.13E+01	2.85E-05	2.96E-05	5.63E+01	4.01E-03	8.32E+00
Al-26	2.24E+02	3.97E+01	5.42E-05	6.25E-05	7.64E+01	5.63E-03	9.64E+00
Si-32+D	3.84E+01	3.00E+01	3.83E-03	4.40E-03	5.92E-02	4.23E-03	7.49E+00
Cl-36	1.25E+02	8.26E+00	8.14E-05	8.62E-05	1.11E-02	1.07E-03	5.35E+01
K-40	1.35E+02	5.07E+01	4.61E-05	5.26E-05	4.47E+00	7.12E-03	1.50E+01
Ca-41	5.75E+00	3.47E+00	4.73E-06	5.40E-06	0.00E+00	4.86E-04	9.81E-01
Ti-44+D	3.21E+02	6.70E+01	1.68E-03	1.93E-03	6.22E+01	9.45E-03	1.63E+01
V-49	2.19E-01	1.67E-01	1.28E-06	1.12E-06	0.00E+00	1.80E-05	3.90E-02
Mn-54	2.89E+01	7.55E+00	2.49E-05	2.13E-05	1.76E+01	7.95E-04	1.89E+00
Fe-55	2.89E+00	1.65E+00	4.98E-06	5.21E-06	0.00E+00	2.13E-04	3.96E-01
Fe-60+D	8.02E+02	4.15E+02	1.00E-03	1.16E-03	3.64E+00	5.94E-02	1.01E+02
Co-60	2.14E+02	7.33E+01	1.23E-04	1.35E-04	6.80E+01	9.86E-03	1.80E+01
Ni-59	1.61E+00	5.72E-01	3.41E-06	3.93E-06	0.00E+00	8.11E-05	1.42E-01
Ni-63	4.42E+00	1.57E+00	8.54E-06	9.83E-06	0.00E+00	2.22E-04	3.90E-01
Se-79	5.92E+01	2.37E+01	2.43E-05	2.68E-05	9.40E-05	3.21E-03	5.81E+00
Rb-87	3.82E+01	1.34E+01	1.20E-05	1.38E-05	7.42E-04	1.90E-03	4.43E+00
Sr-90+D	7.50E+02	4.17E+02	9.18E-04	1.05E-03	1.21E-01	5.85E-02	1.21E+02
Zr-93	5.64E+00	4.52E+00	3.09E-04	3.57E-04	9.09E-06	6.44E-04	1.10E+00
Nb-91	1.91E+00	1.42E+00	1.19E-05	1.37E-05	5.98E-02	2.01E-04	3.47E-01
Nb-93m	1.77E+00	1.42E+00	1.19E-05	1.35E-05	5.41E-04	1.98E-04	3.47E-01
Nb-94	1.23E+02	1.95E+01	1.34E-04	1.55E-04	4.47E+01	2.76E-03	4.75E+00
Mo-93	5.76E+00	3.68E+00	1.06E-04	1.20E-04	3.09E-03	5.18E-04	1.18E+00
Tc-99	9.08E+00	3.98E+00	3.09E-05	3.41E-05	6.33E-04	5.39E-04	2.79E+00
Ru-106+D	1.73E+02	7.47E+01	4.38E-04	3.93E-04	4.73E+00	8.23E-03	1.77E+01
Pd-107	9.13E-01	4.06E-01	4.76E-05	5.48E-05	0.00E+00	5.75E-05	1.00E-01
Ag-108m+D	1.26E+02	2.08E+01	9.40E-05	1.08E-04	4.54E+01	2.93E-03	5.04E+00
Cd-109	4.92E+01	3.57E+01	4.24E-04	3.98E-04	6.34E-02	4.12E-03	8.85E+00
Cd-113m	6.12E+02	4.39E+02	5.68E-03	6.43E-03	3.31E-03	6.09E-02	1.13E+02
In-115	8.71E+02	4.31E+02	1.39E-02	1.60E-02	2.10E-03	6.10E-02	1.04E+02
Sn-121m+D	2.01E+01	6.13E+00	4.42E-05	5.08E-05	1.11E-02	8.65E-04	1.49E+00
Sn-126+D	3.13E+02	5.72E+01	3.75E-04	4.33E-04	5.59E+01	8.11E-03	1.39E+01
Sb-125	2.33E+01	7.66E+00	4.53E-05	5.22E-05	1.06E+01	1.20E-03	1.94E+00
Te-125m	1.41E+01	1.00E+01	2.71E-05	9.11E-06	2.33E-02	4.13E-04	1.98E+00
I-129	2.32E+03	7.52E+02	6.46E-04	7.41E-04	6.81E-02	1.06E-01	1.84E+02
Cs-134	6.74E+02	2.00E+02	1.72E-04	1.75E-04	3.89E+01	2.49E-02	5.05E+01
Cs-135	6.36E+01	1.93E+01	1.69E-05	1.95E-05	2.02E-04	2.73E-03	5.00E+00
Cs-137+D	4.80E+02	1.36E+02	1.19E-04	1.36E-04	1.58E+01	1.91E-02	3.53E+01
Ba-133	2.79E+01	9.27E+00	2.90E-05	3.26E-05	9.50E+00	1.28E-03	2.27E+00
Pm-147	3.87E+00	2.86E+00	1.46E-04	1.52E-04	2.39E-04	3.67E-04	6.85E-01
Sm-147	6.90E+02	5.04E+02	2.78E-01	3.20E-01	0.00E+00	7.14E-02	1.22E+02
Sm-151	1.45E+00	1.06E+00	1.11E-04	1.28E-04	5.19E-06	1.50E-04	2.57E-01
Eu-150	1.07E+02	1.73E+01	9.96E-04	1.14E-03	4.10E+01	2.44E-03	4.21E+00

Table D14a. Columbia River Population Doses by Pathway, person-rem per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Eu-152	7.94E+01	1.77E+01	8.21E-04	9.28E-04	3.12E+01	2.45E-03	4.28E+00
Eu-154	9.03E+01	2.60E+01	1.06E-03	1.19E-03	3.38E+01	3.58E-03	6.29E+00
Eu-155	6.95E+00	4.17E+00	1.54E-04	1.68E-04	9.10E-01	5.58E-04	1.00E+00
Gd-152	5.86E+02	4.39E+02	9.03E-01	1.04E+00	0.00E+00	6.22E-02	1.07E+02
Ho-166m	1.37E+02	2.20E+01	2.87E-03	3.31E-03	4.84E+01	3.12E-03	5.34E+00
Re-187	4.25E-02	2.59E-02	2.02E-07	2.33E-07	0.00E+00	3.67E-06	7.24E-03
Tl-204	2.20E+01	9.16E+00	8.95E-06	9.63E-06	1.98E-02	1.21E-03	2.20E+00
Pb-205	5.78E+00	4.44E+00	1.46E-05	1.68E-05	3.73E-05	6.30E-04	1.08E+00
Pb-210+D	1.94E+04	1.46E+04	5.05E-02	7.44E-02	3.10E-02	2.39E+00	3.67E+03
Bi-207	1.05E+02	1.49E+01	7.43E-05	8.50E-05	4.25E+01	2.10E-03	3.63E+00
Po-209	1.01E+04	6.46E+03	3.98E-02	4.57E-02	9.31E-02	9.13E-01	1.57E+03
Po-210	7.69E+03	5.18E+03	3.19E-02	1.98E-02	1.30E-04	3.94E-01	1.14E+03
Ra-226+D	5.15E+03	3.62E+03	3.19E-02	3.77E-02	4.98E+01	5.42E-01	8.88E+02
Ra-228+D	5.49E+03	3.92E+03	1.81E-02	2.02E-01	3.15E+01	5.70E-01	9.58E+02
Ac-227+D	5.03E+04	4.03E+04	6.46E+00	7.37E+00	9.90E+00	5.65E+00	9.77E+03
Th-228+D	2.79E+03	2.21E+03	1.27E+00	1.28E+00	3.82E+01	2.73E-01	5.25E+02
Th-229+D	1.37E+04	1.10E+04	6.46E+00	7.46E+00	7.77E+00	1.56E+00	2.66E+03
Th-230	1.86E+03	1.49E+03	9.73E-01	1.12E+00	1.47E-02	2.12E-01	3.62E+02
Th-232	9.36E+03	7.44E+03	4.27E+00	4.94E+00	1.42E+00	1.08E+00	1.81E+03
Pa-231	3.60E+04	2.89E+04	4.76E+00	5.58E+00	1.07E+00	4.16E+00	7.03E+03
U-232	4.85E+03	3.57E+03	5.54E-02	2.48E-01	5.54E+00	5.37E-01	8.79E+02
U-233	1.06E+03	7.88E+02	2.97E-02	3.40E-02	7.34E-03	1.10E-01	1.92E+02
U-234	1.04E+03	7.71E+02	2.93E-02	3.33E-02	2.09E-03	1.08E-01	1.88E+02
U-235+D	9.87E+02	7.28E+02	2.71E-02	3.09E-02	3.85E+00	1.02E-01	1.77E+02
U-236	9.88E+02	7.33E+02	2.76E-02	3.15E-02	1.11E-03	1.02E-01	1.78E+02
U-238+D	9.85E+02	7.30E+02	2.62E-02	2.98E-02	6.04E-01	1.02E-01	1.78E+02
Np-237+D	1.54E+04	1.21E+04	2.01E+00	2.31E+00	5.49E+00	1.71E+00	2.95E+03
Pu-236	3.96E+03	3.19E+03	5.39E-01	5.68E-01	1.55E-02	4.14E-01	7.63E+02
Pu-238	1.09E+04	8.72E+03	1.46E+00	1.68E+00	7.95E-04	1.23E+00	2.11E+03
Pu-239	1.20E+04	9.65E+03	1.59E+00	1.84E+00	1.50E-03	1.37E+00	2.34E+03
Pu-240	1.20E+04	9.65E+03	1.59E+00	1.84E+00	7.75E-04	1.37E+00	2.34E+03
Pu-241+D	2.33E+02	1.87E+02	3.06E-02	3.59E-02	2.37E-04	2.68E-02	4.54E+01
Pu-242	1.14E+04	9.16E+03	1.53E+00	1.76E+00	6.77E-04	1.30E+00	2.22E+03
Pu-244+D	1.13E+04	9.05E+03	1.50E+00	1.73E+00	9.43E+00	1.28E+00	2.19E+03
Am-241	1.24E+04	9.92E+03	1.65E+00	1.90E+00	2.31E-01	1.41E+00	2.41E+03
Am-242m+D	1.20E+04	9.59E+03	1.58E+00	1.85E+00	3.42E-01	1.37E+00	2.33E+03
Am-243+D	1.23E+04	9.89E+03	1.63E+00	1.89E+00	4.61E+00	1.40E+00	2.40E+03
Cm-242	3.85E+02	3.13E+02	6.43E-02	4.68E-02	5.25E-04	2.85E-02	7.08E+01
Cm-243	8.53E+03	6.84E+03	1.14E+00	1.30E+00	2.95E+00	9.60E-01	1.66E+03
Cm-244	6.86E+03	5.50E+03	9.21E-01	1.05E+00	6.57E-04	7.69E-01	1.33E+03
Cm-245	1.27E+04	1.02E+04	1.69E+00	1.95E+00	1.78E+00	1.45E+00	2.47E+03
Cm-246	1.26E+04	1.01E+04	1.68E+00	1.93E+00	6.14E-04	1.43E+00	2.45E+03
Cm-247+D	1.16E+04	9.32E+03	1.54E+00	1.77E+00	9.12E+00	1.32E+00	2.26E+03
Cm-248	4.62E+04	3.71E+04	6.13E+00	7.07E+00	4.64E-04	5.25E+00	8.99E+03
Cm-250+D	2.64E+05	2.12E+05	3.49E+01	4.03E+01	8.92E+00	3.00E+01	5.14E+04
Bk-247	1.60E+04	1.28E+04	2.13E+00	2.46E+00	2.23E+00	1.82E+00	3.11E+03

Table D14a. Columbia River Population Doses by Pathway, person-rem per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Cf-248	1.22E+03	9.10E+02	1.65E-01	1.57E-01	5.07E-04	1.07E-01	2.15E+02
Cf-249	1.77E+04	1.29E+04	2.14E+00	2.47E+00	9.08E+00	1.83E+00	3.15E+03
Cf-250	7.91E+03	5.80E+03	9.73E-01	1.10E+00	6.14E-04	8.06E-01	1.41E+03
Cf-251	1.81E+04	1.32E+04	2.18E+00	2.52E+00	2.73E+00	1.87E+00	3.22E+03
Cf-252	3.98E+03	2.94E+03	5.09E-01	5.31E-01	8.41E-04	3.77E-01	7.06E+02
The "Total" column is the sum of all pathways in Table 14a and 14b.							

Table D14b. Columbia River Population Doses by Pathway, person-rem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
H-3	6.73E-03	1.55E-02	3.26E-03	1.66E-03	2.13E-08	0.00E+00	9.60E-07
Be-10	3.03E-01	1.03E-03	2.06E-01	4.76E-03	2.64E-02	6.83E-03	6.99E-03
C-14	6.86E+00	5.52E+00	9.86E-01	3.42E-01	6.79E-03	4.99E-05	1.57E+00
Na-22	5.64E+01	4.32E+01	1.28E-02	3.56E+00	1.19E-02	1.39E+01	1.38E-03
Al-26	1.42E+00	7.13E-01	4.83E-01	5.96E-01	8.38E-02	9.47E+01	1.09E-01
Si-32+D	2.90E-02	5.45E-02	2.46E-01	4.56E-01	5.43E-02	6.33E-02	3.30E-03
Cl-36	1.63E+01	4.58E+01	3.60E-02	1.11E+00	2.17E-03	1.87E-03	2.27E-03
K-40	2.53E+01	3.41E+01	8.54E-01	9.87E-01	7.07E-02	3.70E+00	2.79E-01
Ca-41	1.93E-01	1.07E+00	6.40E-03	2.96E-02	4.64E-03	0.00E+00	7.64E-04
Ti-44+D	4.77E+01	6.00E+01	1.09E-02	3.77E-03	1.22E-01	6.69E+01	3.69E-01
V-49	8.19E-03	2.61E-04	1.35E-03	2.50E-03	2.30E-05	0.00E+00	1.84E-04
Mn-54	7.48E-02	1.79E-02	1.55E-02	8.63E-03	9.60E-04	1.77E+00	1.66E-02
Fe-55	7.36E-01	4.24E-03	6.69E-02	3.10E-02	6.68E-04	0.00E+00	1.82E-03
Fe-60+D	1.98E+02	1.17E+00	1.68E+01	7.78E+00	9.75E-01	5.64E+01	4.57E-01
Co-60	1.70E+01	1.94E+00	5.98E+00	1.38E-01	5.13E-02	2.95E+01	1.21E-01
Ni-59	6.83E-02	8.23E-01	2.32E-05	1.07E-03	1.21E-03	0.00E+00	3.15E-04
Ni-63	1.87E-01	2.26E+00	6.38E-05	2.95E-03	3.09E-03	0.00E+00	8.66E-04
Se-79	8.48E+00	8.51E+00	8.64E+00	4.00E+00	1.16E-02	2.83E-05	2.22E-02
Rb-87	3.33E+00	1.50E+01	1.13E+00	7.81E-01	2.61E-02	8.52E-04	1.48E-01
Sr-90+D	9.05E+01	1.17E+02	1.51E+00	1.75E+00	6.77E-01	1.16E-01	1.38E-01
Zr-93	1.08E-04	2.24E-04	1.10E-05	1.70E-05	1.05E-02	2.25E-04	7.47E-03
Nb-91	1.02E-05	5.23E-05	1.73E-05	2.67E-05	2.89E-03	7.16E-02	2.35E-03
Nb-93m	1.01E-05	5.19E-05	1.73E-05	2.67E-05	1.95E-03	4.44E-04	2.35E-03
Nb-94	1.39E-04	7.16E-04	2.37E-04	3.65E-04	4.00E-02	5.41E+01	3.21E-02
Mo-93	9.10E-02	5.79E-01	1.54E-01	6.40E-02	5.18E-03	2.40E-03	2.03E-04
Tc-99	8.94E-02	4.03E-01	3.83E-02	1.77E+00	1.94E-03	1.90E-04	4.38E-04
Ru-106+D	7.50E+01	1.96E-02	7.28E-01	7.01E-03	1.13E-02	5.41E-01	4.11E-03
Pd-107	3.90E-02	3.66E-01	4.96E-06	3.06E-05	7.91E-04	0.00E+00	2.24E-05
Ag-108m+D	1.48E+00	9.30E-02	1.68E+00	1.95E-01	3.96E-02	5.10E+01	5.72E-04
Cd-109	3.01E-01	2.94E+00	1.17E+00	6.79E-02	6.66E-03	8.54E-03	3.93E-02
Cd-113m	4.23E+00	3.98E+01	1.45E+01	8.40E-01	5.56E-01	2.52E-03	4.83E-01
In-115	8.20E+01	3.86E+00	5.23E+00	6.45E+00	9.08E-01	2.60E-03	2.37E+02
Sn-121m+D	1.17E+01	5.49E-01	4.97E-02	9.20E-02	1.14E-02	1.22E-02	1.01E-01
Sn-126+D	1.09E+02	5.14E+00	4.64E-01	8.59E-01	1.20E-01	6.91E+01	9.45E-01

Table D14b. Columbia River Population Doses by Pathway, person-rem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Sb-125	2.33E-01	5.40E-02	2.49E-03	1.25E-02	4.02E-03	2.78E+00	4.22E-03
Te-125m	6.35E-01	2.31E-01	2.40E-01	9.27E-01	2.36E-04	1.11E-03	2.20E-02
I-129	7.18E+02	6.22E+02	3.05E-01	4.24E+01	1.19E+00	6.40E-02	1.66E-01
Cs-134	2.22E+02	1.35E+02	1.64E+01	1.52E+00	6.12E-02	7.96E+00	2.20E+00
Cs-135	2.35E+01	1.39E+01	1.59E+00	1.47E-01	4.07E-02	2.51E-04	2.12E-01
Cs-137+D	1.65E+02	9.79E+01	1.12E+01	1.04E+00	2.29E-01	1.58E+01	1.50E+00
Ba-133	4.37E-02	3.96E-01	3.40E-03	1.57E-01	1.01E-02	6.28E+00	2.04E-04
Pm-147	3.18E-01	4.88E-03	2.32E-04	1.07E-03	1.11E-03	6.01E-05	4.73E-04
Sm-147	6.01E+01	9.05E-01	8.17E-02	6.61E-02	1.05E+00	0.00E+00	6.94E-02
Sm-151	1.26E-01	1.90E-03	1.72E-04	1.39E-04	2.04E-03	5.88E-06	1.46E-04
Eu-150	2.05E+00	3.10E-02	2.81E-03	2.27E-03	3.01E-02	4.21E+01	4.77E-03
Eu-152	2.07E+00	3.14E-02	2.86E-03	2.32E-03	2.28E-02	2.42E+01	4.86E-03
Eu-154	3.03E+00	4.60E-02	4.22E-03	3.41E-03	2.68E-02	2.11E+01	7.16E-03
Eu-155	4.77E-01	7.27E-03	6.75E-04	5.47E-04	2.75E-03	3.74E-01	1.15E-03
Gd-152	3.66E+01	7.87E-01	7.11E-02	5.76E-02	9.21E-01	0.00E+00	6.04E-02
Ho-166m	2.36E+00	3.95E-02	3.56E-03	2.89E-03	4.54E-02	5.87E+01	3.03E-03
Re-187	5.30E-03	3.70E-03	4.45E-05	2.06E-04	5.18E-05	0.00E+00	1.71E-05
Tl-204	8.30E+00	1.58E+00	1.11E-01	1.37E-01	5.02E-03	6.86E-03	5.04E-01
Pb-205	4.23E-02	9.96E-02	3.60E-02	6.66E-02	9.39E-03	4.64E-05	7.34E-03
Pb-210+D	3.62E+02	3.68E+02	1.20E+02	2.24E+02	3.08E+01	2.90E-02	2.42E+01
Bi-207	1.42E-01	6.68E-01	6.06E-02	2.24E-01	2.54E-02	4.29E+01	8.22E-04
Po-209	7.68E+02	1.97E+02	2.35E+02	8.47E+02	1.27E+01	1.08E-01	1.78E+00
Po-210	3.91E+02	1.16E+02	1.87E+02	6.74E+02	2.92E-01	8.02E-06	1.43E+00
Ra-226+D	8.04E+01	4.26E+02	4.45E+00	8.93E-02	1.82E+01	6.12E+01	9.98E-01
Ra-228+D	8.16E+01	4.48E+02	4.77E+00	1.64E-03	4.70E+00	3.17E+01	1.08E+00
Ac-227+D	2.38E+01	7.19E+01	6.53E+00	1.51E+00	6.25E+01	9.13E+00	5.55E+00
Th-228+D	2.87E-01	9.24E-01	3.57E-01	8.27E-02	6.29E-01	7.33E+00	1.22E+00
Th-229+D	1.57E+00	4.93E+00	1.78E+00	4.12E-01	2.32E+01	9.65E+00	6.05E+00
Th-230	2.23E-01	7.07E-01	2.42E-01	5.60E-02	3.22E+00	2.81E-01	8.22E-01
Th-232	3.76E+00	1.42E+01	1.21E+00	2.79E-01	2.33E+01	4.91E+01	4.10E+00
Pa-231	7.08E+00	1.34E+01	4.68E+00	1.08E+00	8.36E+01	4.48E+00	1.59E+00
U-232	2.55E+01	1.28E+02	1.45E+02	6.69E+01	6.20E+00	2.63E+01	1.97E-01
U-233	5.63E+00	2.83E+01	3.19E+01	1.48E+01	9.56E-01	1.14E-02	4.34E-02
U-234	5.51E+00	2.77E+01	3.12E+01	1.45E+01	9.21E-01	1.50E-03	4.25E-02
U-235+D	5.20E+00	2.61E+01	2.95E+01	1.36E+01	8.80E-01	2.74E+00	4.01E-02
U-236	5.24E+00	2.63E+01	2.97E+01	1.37E+01	8.75E-01	7.91E-04	4.04E-02
U-238+D	5.22E+00	2.62E+01	2.96E+01	1.37E+01	8.72E-01	4.30E-01	4.02E-02
Np-237+D	2.89E+02	5.43E+00	1.96E+00	4.54E-01	2.15E+01	5.74E+00	1.40E+00
Pu-236	7.78E-01	5.44E-01	3.95E-01	3.37E-02	1.59E+00	9.20E-01	3.69E-01
Pu-238	2.07E+00	8.59E-01	1.06E+00	8.17E-02	1.70E+01	9.15E-04	1.01E+00
Pu-239	2.30E+00	9.52E-01	1.17E+00	9.04E-02	2.04E+01	1.86E-03	1.12E+00
Pu-240	2.30E+00	9.52E-01	1.17E+00	9.04E-02	2.04E+01	9.61E-04	1.12E+00
Pu-241+D	4.79E-02	1.87E-02	2.27E-02	1.76E-03	5.01E-01	3.51E-03	2.16E-02
Pu-242	2.18E+00	9.03E-01	1.11E+00	8.58E-02	1.93E+01	8.41E-04	1.06E+00
Pu-244+D	2.15E+00	8.93E-01	1.10E+00	8.48E-02	1.91E+01	1.17E+01	1.05E+00
Am-241	9.44E+00	1.33E+00	2.41E+00	7.43E-01	2.06E+01	2.82E-01	1.15E+00

Table D14b. Columbia River Population Doses by Pathway, person-rem/y per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Am-242m+D	9.17E+00	1.40E+00	2.34E+00	7.21E-01	2.08E+01	4.04E-01	1.11E+00
Am-243+D	9.42E+00	1.33E+00	2.40E+00	7.41E-01	2.08E+01	5.71E+00	1.14E+00
Cm-242	2.11E-02	4.31E-01	5.05E-02	1.17E-02	1.05E-01	3.95E-05	3.62E-02
Cm-243	5.66E-01	1.22E+01	1.11E+00	2.56E-01	1.14E+01	2.91E+00	7.91E-01
Cm-244	4.54E-01	9.80E+00	8.92E-01	2.06E-01	8.06E+00	5.73E-04	6.36E-01
Cm-245	8.50E-01	1.83E+01	1.65E+00	3.82E-01	2.17E+01	2.21E+00	1.18E+00
Cm-246	8.40E-01	1.81E+01	1.63E+00	3.78E-01	2.12E+01	7.60E-04	1.17E+00
Cm-247+D	7.77E-01	1.67E+01	1.51E+00	3.49E-01	1.97E+01	1.13E+01	1.08E+00
Cm-248	3.09E+00	6.65E+01	6.00E+00	1.39E+00	7.81E+01	5.75E-04	4.28E+00
Cm-250+D	1.90E+01	3.80E+02	3.43E+01	7.93E+00	4.47E+02	1.10E+01	2.45E+01
Bk-247	1.22E+01	1.72E+00	3.11E+00	9.60E-01	2.69E+01	2.76E+00	1.76E+00
Cf-248	8.89E+01	1.18E-01	1.47E-01	3.40E-02	5.12E-01	8.02E-05	1.25E-01
Cf-249	1.54E+03	8.69E-01	2.09E+00	4.84E-01	2.66E+01	1.10E+01	1.78E+00
Cf-250	6.82E+02	3.87E-01	9.40E-01	2.18E-01	7.45E+00	4.73E-04	7.99E-01
Cf-251	1.57E+03	8.89E-01	2.14E+00	4.95E-01	2.75E+01	3.34E+00	1.82E+00
Cf-252	3.27E+02	1.88E-01	4.76E-01	1.10E-01	1.15E+00	2.13E-04	4.05E-01

Table D15a. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	3.28E-02	2.14E-02	3.20E-03	0.00E+00	0.00E+00	2.14E-07	3.90E-03
Be-10	2.00E+00	1.34E+00	2.44E-05	1.30E-03	1.27E-02	2.51E-02	4.93E-01
C-14	2.59E+00	2.96E-01	1.84E-06	5.40E-05	7.39E-05	1.92E-03	6.14E-01
Na-22	2.99E+01	1.84E+00	1.01E-06	5.51E-06	1.80E+01	2.51E-03	8.53E-01
Al-26	2.52E+02	3.30E+00	1.80E-05	9.72E-04	2.31E+02	5.95E-02	1.19E+00
Si-32+D	4.34E+00	2.37E+00	7.93E-05	3.54E-03	1.35E-01	3.33E-02	1.60E+00
Cl-36	6.22E+01	6.29E-01	6.50E-06	4.75E-05	4.08E-03	1.31E-03	3.07E+01
K-40	4.06E+01	4.71E+00	2.68E-06	9.24E-05	8.83E+00	5.00E-02	1.01E+01
Ca-41	3.04E-01	6.73E-02	5.44E-08	1.80E-06	0.00E+00	4.45E-04	1.07E-01
Ti-44+D	1.57E+02	5.19E+00	5.25E-05	2.07E-03	1.29E+02	6.60E-02	1.87E+00
V-49	3.38E-02	2.33E-02	3.82E-08	7.73E-08	0.00E+00	1.67E-05	7.96E-03
Mn-54	3.05E+00	4.35E-01	1.53E-06	2.86E-06	2.33E+00	2.25E-04	1.60E-01
Fe-55	3.33E-01	1.64E-01	2.08E-07	1.19E-06	0.00E+00	2.81E-04	5.33E-02
Fe-60+D	2.61E+02	3.43E+01	4.78E-05	2.99E-03	1.70E+02	4.88E-01	1.25E+01
Co-60	4.85E+01	2.99E+00	9.31E-06	9.51E-05	4.07E+01	9.65E-03	1.17E+00
Ni-59	2.28E-01	5.23E-02	1.21E-07	6.56E-06	0.00E+00	9.29E-04	3.41E-02
Ni-63	5.42E-01	1.28E-01	4.26E-07	1.98E-05	0.00E+00	1.94E-03	7.78E-02
Se-79	4.41E+00	1.39E+00	8.66E-07	1.11E-05	4.52E-05	4.80E-03	4.91E-01
Rb-87	1.03E+01	9.96E-01	5.57E-07	2.75E-05	1.45E-03	1.45E-02	4.27E+00
Sr-90+D	7.37E+01	1.41E+01	2.94E-05	9.46E-04	2.03E-01	1.09E-01	2.54E+01
Zr-93	2.97E-01	2.12E-01	1.90E-06	1.16E-04	3.56E-04	4.24E-03	7.66E-02
Nb-91	3.16E-01	1.53E-01	4.94E-07	2.53E-05	8.35E-02	2.78E-03	6.78E-02
Nb-93m	2.17E-01	1.53E-01	4.94E-07	1.19E-05	2.97E-04	1.31E-03	6.05E-02

Table D15a. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Nb-94	1.33E+02	1.48E+00	9.80E-06	5.14E-04	1.23E+02	2.52E-02	6.47E-01
Mo-93	2.48E+00	6.39E-01	3.30E-07	1.87E-05	2.32E-03	4.70E-03	1.48E+00
Tc-99	1.06E+01	5.25E-01	3.67E-06	4.69E-05	3.34E-04	2.30E-03	5.59E+00
Ru-106+D	2.36E+01	8.05E+00	2.65E-05	5.88E-05	6.88E-01	6.18E-03	2.81E+00
Pd-107	1.69E-01	4.77E-02	4.39E-07	2.17E-05	0.00E+00	8.40E-04	2.74E-02
Ag-108m+D	1.14E+02	1.55E+00	6.94E-06	3.15E-04	1.05E+02	2.04E-02	5.33E-01
Cd-109	1.48E+00	9.54E-01	3.85E-06	1.05E-05	7.66E-03	7.30E-04	3.44E-01
Cd-113m	1.03E+01	5.47E+00	3.38E-05	7.35E-04	3.10E-03	2.60E-02	3.36E+00
In-115	1.55E+01	6.45E+00	1.05E-04	5.66E-03	4.68E-03	7.41E-02	2.06E+00
Sn-121m+D	3.21E+00	6.68E-01	4.21E-06	1.73E-04	1.30E-02	9.61E-03	2.58E-01
Sn-126+D	1.89E+02	5.19E+00	2.63E-05	1.42E-03	1.53E+02	9.48E-02	2.03E+00
Sb-125	4.67E+00	8.34E-01	4.32E-06	2.88E-05	3.34E+00	1.78E-03	2.99E-01
Te-125m	9.98E-01	6.35E-01	3.04E-06	1.07E-06	7.86E-04	7.36E-05	1.78E-01
I-129	1.41E+02	2.82E+01	1.58E-05	6.24E-04	7.74E-02	2.51E-01	1.11E+01
Cs-134	4.11E+01	8.05E+00	4.29E-06	1.89E-05	1.00E+01	5.99E-03	2.89E+00
Cs-135	6.26E+00	9.04E-01	4.84E-07	2.62E-05	4.10E-04	9.10E-03	9.90E-01
Cs-137+D	6.22E+01	5.80E+00	3.09E-06	1.04E-04	2.75E+01	3.42E-02	4.59E+00
Ba-133	1.06E+01	1.30E+00	3.02E-06	5.33E-05	8.17E+00	5.76E-03	5.12E-01
Pm-147	4.92E-01	3.22E-01	4.19E-06	2.31E-05	5.69E-05	6.31E-04	1.14E-01
Sm-147	1.10E+01	7.13E+00	1.79E-03	9.50E-02	0.00E+00	9.44E-02	2.38E+00
Sm-151	1.70E-01	1.06E-01	1.27E-06	5.68E-05	5.17E-06	1.67E-03	3.98E-02
Eu-150	8.08E+01	8.26E-01	2.91E-05	1.05E-03	7.49E+01	9.09E-03	2.96E-01
Eu-152	4.07E+01	1.16E+00	2.37E-05	5.13E-04	3.69E+01	8.23E-03	4.14E-01
Eu-154	3.40E+01	1.96E+00	2.99E-05	4.70E-04	2.94E+01	1.05E-02	7.02E-01
Eu-155	9.49E-01	3.62E-01	3.85E-06	3.62E-05	3.74E-01	1.19E-03	1.29E-01
Gd-152	8.58E+00	5.67E+00	2.37E-03	1.27E-01	0.00E+00	7.93E-02	1.92E+00
Ho-166m	1.41E+02	1.53E+00	8.04E-05	4.21E-03	1.29E+02	2.58E-02	5.69E-01
Re-187	1.70E-02	3.41E-03	6.53E-09	3.32E-07	0.00E+00	5.73E-05	7.67E-03
Tl-204	3.37E+00	1.12E+00	6.37E-07	4.94E-06	6.88E-03	2.80E-03	3.79E-01
Pb-205	1.79E-01	1.21E-01	1.67E-07	9.08E-06	6.09E-05	1.60E-03	4.31E-02
Pb-210+D	3.17E+02	1.70E+02	8.04E-04	1.06E-01	3.98E-02	1.84E+00	7.28E+01
Bi-207	8.51E+01	1.08E+00	5.46E-06	1.89E-04	7.86E+01	1.21E-02	4.03E-01
Po-209	4.65E+02	8.97E+01	3.51E-03	1.63E-01	1.96E-01	1.08E+00	1.39E+02
Po-210	2.80E+02	7.19E+01	2.81E-03	2.35E-03	1.06E-05	1.56E-02	9.46E+01
Ra-226+D	3.13E+02	7.36E+01	3.02E-03	2.47E-01	1.45E+02	2.42E+00	3.31E+01
Ra-228+D	3.52E+02	1.98E+02	1.35E-03	4.15E-01	4.33E+01	8.09E-01	6.76E+01
Ac-227+D	1.41E+02	9.29E+01	3.64E-02	1.06E+00	1.37E+01	7.90E-01	3.06E+01
Th-228+D	8.78E+01	5.74E+01	3.72E-02	1.52E-01	1.03E+01	7.79E-02	1.92E+01
Th-229+D	1.63E+02	1.01E+02	5.75E-02	3.11E+00	2.02E+01	1.64E+00	3.39E+01
Th-230	2.58E+01	1.74E+01	7.41E-03	4.04E-01	1.49E+00	2.77E-01	5.70E+00
Th-232	2.20E+02	1.93E+01	1.13E-02	2.13E+00	1.61E+02	3.34E+00	1.25E+01
Pa-231	6.33E+01	3.30E+01	1.06E-02	1.48E+00	1.42E+01	1.15E+00	1.11E+01
U-232	1.49E+02	5.57E+01	5.07E-03	1.02E+00	5.99E+01	7.95E-01	1.96E+01
U-233	2.12E+01	1.37E+01	3.02E-03	9.31E-02	3.72E-02	1.13E-01	4.84E+00
U-234	2.08E+01	1.35E+01	2.96E-03	8.74E-02	2.55E-03	1.09E-01	4.77E+00

Table D15a. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
U-235+D	2.65E+01	1.37E+01	2.63E-03	7.78E-02	5.14E+00	1.13E-01	4.88E+00
U-236	1.97E+01	1.28E+01	2.73E-03	8.04E-02	1.18E-03	1.03E-01	4.51E+00
U-238+D	2.69E+01	1.66E+01	2.43E-03	7.16E-02	9.11E-01	1.45E-01	6.04E+00
Np-237+D	3.08E+01	1.29E+01	4.60E-03	2.05E-01	1.14E+01	1.69E-01	4.95E+00
Pu-236	2.15E+01	1.42E+01	5.93E-03	7.46E-02	2.27E+00	5.50E-02	4.60E+00
Pu-238	3.39E+01	2.50E+01	8.74E-03	3.97E-01	1.05E-03	2.89E-01	7.97E+00
Pu-239	3.51E+01	2.58E+01	8.66E-03	4.69E-01	3.48E-03	3.50E-01	8.24E+00
Pu-240	3.51E+01	2.58E+01	8.66E-03	4.68E-01	1.21E-03	3.51E-01	8.24E+00
Pu-241+D	4.78E-01	3.36E-01	8.69E-05	9.33E-03	9.00E-03	6.87E-03	1.10E-01
Pu-242	3.33E+01	2.44E+01	8.14E-03	4.41E-01	1.09E-03	3.34E-01	7.82E+00
Pu-244+D	6.60E+01	2.75E+01	7.62E-03	4.14E-01	2.64E+01	4.00E-01	9.00E+00
Am-241	2.76E+01	1.98E+01	7.31E-03	3.81E-01	4.61E-01	2.65E-01	6.34E+00
Am-242m+D	2.04E+01	1.38E+01	4.08E-03	4.08E-01	7.38E-01	2.89E-01	4.61E+00
Am-243+D	4.01E+01	2.06E+01	7.02E-03	3.79E-01	1.10E+01	2.93E-01	6.72E+00
Cm-242	9.72E+00	7.34E+00	3.93E-03	5.85E-03	2.97E-05	3.87E-03	2.34E+00
Cm-243	2.91E+01	1.81E+01	7.00E-03	2.31E-01	4.43E+00	1.59E-01	5.76E+00
Cm-244	2.14E+01	1.59E+01	6.58E-03	1.74E-01	4.11E-04	1.12E-01	5.04E+00
Cm-245	3.16E+01	1.98E+01	7.20E-03	3.98E-01	4.13E+00	2.83E-01	6.39E+00
Cm-246	2.66E+01	1.95E+01	7.20E-03	3.88E-01	7.90E-04	2.68E-01	6.20E+00
Cm-247+D	5.17E+01	1.91E+01	6.50E-03	3.52E-01	2.38E+01	2.69E-01	6.20E+00
Cm-248	9.75E+01	7.13E+01	2.57E-02	1.39E+00	5.93E-04	9.84E-01	2.27E+01
Cm-250+D	5.85E+02	4.08E+02	1.44E-01	7.81E+00	2.48E+01	5.65E+00	1.30E+02
Bk-247	3.80E+01	2.37E+01	8.48E-03	4.54E-01	5.32E+00	3.12E-01	7.58E+00
Cf-248	1.25E+01	8.47E+00	4.71E-03	1.79E-02	5.04E-05	1.10E-02	2.79E+00
Cf-249	6.23E+01	2.42E+01	8.84E-03	4.54E-01	2.26E+01	3.06E-01	8.72E+00
Cf-250	2.49E+01	1.64E+01	6.92E-03	1.49E-01	3.09E-04	9.31E-02	5.51E+00
Cf-251	4.66E+01	2.52E+01	8.84E-03	4.66E-01	6.36E+00	3.30E-01	9.13E+00
Cf-252	1.36E+01	9.25E+00	4.06E-03	2.26E-02	1.55E-04	1.36E-02	2.92E+00

The "Total" column is the sum of all pathways in Table 15a and 15b.
The total risk from 70 years of intakes is shown.

Table D15b. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
H-3	1.06E-03	2.45E-03	5.14E-04	2.62E-04	5.13E-09	0.00E+00	1.51E-07
Be-10	5.29E-02	1.76E-04	5.45E-02	1.26E-03	2.07E-02	8.67E-04	1.07E-03
C-14	7.74E-01	6.12E-01	1.35E-01	4.70E-02	8.22E-04	2.63E-06	1.05E-01
Na-22	4.57E+00	3.48E+00	1.09E-03	3.01E-01	1.43E-03	8.54E-01	1.06E-04
Al-26	1.92E-01	9.49E-02	1.00E-01	1.23E-01	5.04E-02	1.63E+01	1.31E-02
Si-32+D	5.06E-03	9.32E-03	5.72E-02	1.06E-01	2.24E-02	7.55E-03	3.63E-04
Cl-36	7.60E+00	2.27E+01	1.95E-02	6.01E-01	3.84E-04	9.97E-05	2.33E-04
K-40	6.87E+00	9.08E+00	2.82E-01	3.26E-01	2.41E-02	3.55E-01	3.60E-02
Ca-41	1.93E-02	1.05E-01	7.40E-04	3.42E-03	2.07E-04	0.00E+00	1.84E-05
Ti-44+D	5.78E+00	7.16E+00	1.83E-03	6.36E-04	5.07E-02	8.25E+00	4.06E-02

Table D15b. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
V-49	1.68E-03	5.34E-05	2.80E-04	5.18E-04	9.27E-06	0.00E+00	3.76E-05
Mn-54	6.05E-03	1.44E-03	1.27E-03	7.04E-04	1.25E-04	1.08E-01	1.31E-03
Fe-55	9.98E-02	5.73E-04	9.53E-03	4.41E-03	1.62E-04	0.00E+00	2.44E-04
Fe-60+D	2.51E+01	1.83E-01	3.52E+00	1.49E+00	4.16E-01	1.26E+01	5.02E-02
Co-60	1.08E+00	1.22E-01	4.14E-01	9.59E-03	5.67E-03	1.99E+00	7.02E-03
Ni-59	1.09E-02	1.29E-01	5.53E-06	2.56E-04	7.89E-04	0.00E+00	4.08E-05
Ni-63	2.59E-02	3.06E-01	1.26E-05	5.83E-04	1.57E-03	0.00E+00	9.99E-05
Se-79	6.86E-01	6.86E-01	7.89E-01	3.65E-01	1.51E-03	1.18E-06	1.73E-03
Rb-87	8.21E-01	3.61E+00	3.51E-01	2.44E-01	1.07E-02	8.87E-05	1.48E-02
Sr-90+D	1.46E+01	1.86E+01	2.83E-01	3.27E-01	7.73E-02	1.20E-02	6.00E-03
Zr-93	7.54E-06	1.57E-05	2.27E-06	3.51E-06	3.74E-03	2.84E-05	4.54E-04
Nb-91	1.83E-06	9.26E-06	4.66E-06	7.18E-06	2.23E-03	5.58E-03	3.69E-04
Nb-93m	1.69E-06	8.62E-06	3.61E-06	5.56E-06	8.74E-04	1.65E-05	3.69E-04
Nb-94	1.74E-05	8.81E-05	4.46E-05	6.88E-05	2.04E-02	8.26E+00	3.50E-03
Mo-93	3.53E-02	2.21E-01	7.24E-02	3.01E-02	2.15E-03	8.62E-05	4.39E-05
Tc-99	1.43E-01	7.13E-01	7.57E-02	3.50E+00	7.23E-04	8.77E-06	8.40E-05
Ru-106+D	1.19E+01	3.09E-03	1.17E-01	1.12E-03	3.43E-03	3.18E-02	6.42E-04
Pd-107	9.05E-03	8.35E-02	1.63E-06	1.01E-05	6.19E-04	0.00E+00	3.85E-06
Ag-108m+D	1.69E-01	1.04E-02	2.78E-01	3.22E-02	1.54E-02	6.57E+00	5.88E-05
Cd-109	1.12E-02	1.09E-01	4.45E-02	2.57E-03	4.05E-04	3.54E-04	1.41E-03
Cd-113m	9.44E-02	8.75E-01	3.82E-01	2.21E-02	1.67E-02	1.66E-04	7.64E-03
In-115	1.79E+00	8.25E-02	1.74E-01	2.15E-01	6.27E-02	3.31E-04	4.55E+00
Sn-121m+D	2.11E+00	9.78E-02	1.26E-02	2.33E-02	7.46E-03	8.39E-04	1.61E-02
Sn-126+D	1.68E+01	7.76E-01	1.08E-01	2.00E-01	7.99E-02	1.07E+01	1.23E-01
Sb-125	2.19E-02	6.10E-03	7.32E-04	3.31E-03	1.03E-03	1.60E-01	6.45E-04
Te-125m	5.70E-02	2.07E-02	2.16E-02	8.31E-02	4.02E-05	3.58E-05	1.97E-03
I-129	4.06E+01	5.78E+01	2.38E-02	3.30E+00	1.39E-01	3.57E-03	8.11E-03
Cs-134	1.16E+01	7.00E+00	8.86E-01	8.19E-02	3.40E-03	4.74E-01	1.08E-01
Cs-135	2.58E+00	1.50E+00	2.36E-01	2.18E-02	7.72E-03	2.90E-05	1.23E-02
Cs-137+D	1.34E+01	7.81E+00	1.15E+00	1.06E-01	2.52E-02	1.69E+00	7.85E-02
Ba-133	9.51E-03	8.55E-02	8.66E-04	4.01E-02	3.57E-03	4.22E-01	3.96E-05
Pm-147	5.32E-02	8.15E-04	4.07E-05	1.88E-04	3.62E-04	2.72E-06	7.81E-05
Sm-147	1.24E+00	1.83E-02	2.55E-03	2.07E-03	7.76E-02	0.00E+00	1.25E-03
Sm-151	2.05E-02	3.04E-04	4.02E-05	3.26E-05	1.30E-03	3.37E-07	2.12E-05
Eu-150	1.50E-01	2.24E-03	2.79E-04	2.26E-04	6.79E-03	4.65E+00	3.19E-04
Eu-152	2.06E-01	3.09E-03	3.47E-04	2.81E-04	5.49E-03	2.05E+00	4.57E-04
Eu-154	3.45E-01	5.19E-03	5.55E-04	4.49E-04	6.66E-03	1.55E+00	7.82E-04
Eu-155	6.19E-02	9.39E-04	9.56E-05	7.74E-05	7.11E-04	1.86E-02	1.45E-04
Gd-152	7.00E-01	1.48E-02	2.07E-03	1.68E-03	6.66E-02	0.00E+00	1.01E-03
Ho-166m	2.66E-01	4.37E-03	6.06E-04	4.91E-04	2.11E-02	8.82E+00	2.99E-04
Re-187	3.34E-03	2.29E-03	3.44E-05	1.59E-04	4.41E-05	0.00E+00	3.23E-06
Tl-204	1.45E+00	2.76E-01	2.09E-02	2.58E-02	1.65E-03	3.37E-04	8.66E-02
Pb-205	1.72E-03	3.97E-03	2.23E-03	4.12E-03	1.36E-03	4.32E-06	2.60E-04
Pb-210+D	2.45E+01	9.60E+00	8.84E+00	2.73E+01	1.32E+00	2.38E-03	3.75E-01
Bi-207	1.65E-02	7.67E-02	9.44E-03	3.49E-02	8.94E-03	4.85E+00	8.55E-05

Table D15b. Columbia River Population Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment External	Fish
Po-209	7.08E+01	1.78E+01	3.17E+01	1.14E+02	8.68E-01	1.32E-02	1.48E-01
Po-210	3.24E+01	9.64E+00	1.56E+01	5.60E+01	8.56E-03	4.85E-07	1.18E-01
Ra-226+D	5.80E+00	1.46E+01	5.98E+00	1.96E+01	2.27E+00	1.01E+01	2.70E-02
Ra-228+D	5.91E+00	3.23E+01	3.86E-01	5.68E-04	4.97E-01	2.25E+00	7.51E-02
Ac-227+D	7.89E-02	2.36E-01	2.80E-02	6.48E-03	5.62E-01	8.13E-01	1.72E-02
Th-228+D	1.06E-02	3.40E-02	1.36E-02	3.15E-03	4.41E-02	4.84E-01	4.45E-02
Th-229+D	2.21E-02	6.80E-02	3.83E-02	8.85E-03	1.39E+00	1.43E+00	7.52E-02
Th-230	2.43E-02	4.00E-02	3.82E-02	1.03E-01	2.46E-01	1.39E-01	1.25E-02
Th-232	1.19E+00	5.60E+00	2.33E-01	3.35E-03	3.05E+00	1.24E+01	1.40E-02
Pa-231	1.69E-02	3.48E-02	1.91E-02	4.41E-03	1.09E+00	1.16E+00	2.37E-03
U-232	5.59E-01	2.78E+00	3.98E+00	1.84E+00	3.58E-01	2.29E+00	4.04E-03
U-233	1.42E-01	7.06E-01	1.05E+00	4.84E-01	4.88E-02	1.91E-03	1.02E-03
U-234	1.40E-01	6.96E-01	1.03E+00	4.77E-01	4.67E-02	9.78E-05	1.00E-03
U-235+D	1.43E-01	7.11E-01	1.05E+00	4.87E-01	4.84E-02	1.83E-01	1.02E-03
U-236	1.33E-01	6.58E-01	9.74E-01	4.51E-01	4.40E-02	4.21E-05	9.48E-04
U-238+D	1.78E-01	8.82E-01	1.31E+00	6.04E-01	6.20E-02	3.25E-02	1.27E-03
Np-237+D	4.79E-01	8.87E-03	4.65E-03	1.07E-03	1.08E-01	6.05E-01	2.01E-03
Pu-236	7.01E-03	1.27E-02	4.28E-02	1.88E-02	2.88E-02	9.26E-02	2.19E-03
Pu-238	8.48E-03	3.46E-03	6.31E-03	4.95E-04	2.33E-01	7.05E-05	3.73E-03
Pu-239	8.92E-03	3.63E-03	6.96E-03	5.37E-04	2.98E-01	2.46E-04	3.84E-03
Pu-240	8.91E-03	3.63E-03	6.96E-03	5.36E-04	2.98E-01	8.57E-05	3.84E-03
Pu-241+D	1.77E-04	5.25E-05	1.54E-04	3.17E-05	6.11E-03	7.20E-04	5.03E-05
Pu-242	8.45E-03	3.44E-03	6.61E-03	5.09E-04	2.84E-01	7.70E-05	3.64E-03
Pu-244+D	9.74E-03	3.96E-03	7.61E-03	5.87E-04	3.40E-01	1.87E+00	4.19E-03
Am-241	2.73E-02	3.79E-03	1.06E-02	3.25E-03	2.22E-01	3.22E-02	2.95E-03
Am-242m+D	2.32E-02	2.03E-02	1.26E-01	5.70E-02	2.47E-01	5.02E-02	1.99E-03
Am-243+D	2.91E-02	4.04E-03	1.14E-02	3.50E-03	2.48E-01	7.76E-01	3.13E-03
Cm-242	6.07E-04	1.44E-02	1.70E-03	3.92E-04	2.50E-03	1.47E-06	1.21E-03
Cm-243	2.10E-03	4.46E-02	5.46E-03	1.26E-03	1.16E-01	2.71E-01	2.71E-03
Cm-244	1.81E-03	3.86E-02	4.49E-03	1.04E-03	7.81E-02	2.39E-05	2.38E-03
Cm-245	2.49E-03	5.12E-02	7.30E-03	1.69E-03	2.42E-01	2.92E-01	2.98E-03
Cm-246	2.35E-03	4.97E-02	6.98E-03	1.61E-03	2.26E-01	5.57E-05	2.89E-03
Cm-247+D	2.36E-03	4.97E-02	7.00E-03	1.62E-03	2.28E-01	1.68E+00	2.89E-03
Cm-248	8.62E-03	1.82E-01	2.56E-02	5.92E-03	8.33E-01	4.19E-05	1.06E-02
Cm-250+D	8.59E-02	1.04E+00	1.47E-01	3.40E-02	4.78E+00	1.75E+00	6.06E-02
Bk-247	3.28E-02	4.54E-03	1.27E-02	3.93E-03	2.64E-01	3.75E-01	4.20E-03
Cf-248	1.16E+00	1.04E-03	2.01E-03	4.64E-04	6.95E-03	2.59E-06	1.63E-03
Cf-249	4.21E+00	2.35E-03	8.60E-03	1.99E-03	2.53E-01	1.55E+00	4.28E-03
Cf-250	2.65E+00	1.50E-03	4.45E-03	1.03E-03	6.20E-02	1.71E-05	2.94E-03
Cf-251	4.41E+00	2.44E-03	9.07E-03	2.10E-03	2.75E-01	4.42E-01	4.46E-03
Cf-252	1.35E+00	7.77E-04	2.07E-03	4.78E-04	7.79E-03	7.40E-06	1.65E-03

Table D16a. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	3.05E+01	na	na	1.86E+00	5.67E-04	3.42E-03	1.13E+01
57-12-5	1.07E+00	na	na	9.62E-03	7.17E-04	1.13E-03	4.71E+01
57-14-7	na	na	na	na	na	na	na
57-55-6	4.27E-02	9.90E-04	2.23E-04	2.19E-05	7.42E-06	3.44E-05	3.50E+00
58-89-9	7.11E+01	na	na	3.62E+00	1.56E-01	1.40E+00	2.26E+02
60-29-7	1.07E-01	na	na	6.81E-04	1.88E-06	1.39E-05	1.62E-01
60-34-4	na	na	na	na	na	na	na
60-57-1	4.27E+02	na	na	6.72E+01	2.75E+00	1.28E+01	3.27E+02
62-75-9	2.67E+03	na	na	2.50E+00	1.24E+00	5.73E+00	3.25E+05
64-18-6	1.07E-02	na	na	1.56E-05	2.74E-06	1.27E-05	7.36E-01
67-56-1	4.27E-02	na	na	3.26E-05	2.86E-06	2.12E-05	1.85E+00
67-64-1	2.37E-02	na	na	2.88E-05	9.08E-07	6.98E-06	3.06E-01
67-66-3	2.13E+00	1.84E+02	3.76E-05	1.68E-01	1.57E-04	2.91E-04	1.27E+00
67-72-1	2.13E+01	na	na	4.50E+00	6.38E-03	2.96E-02	9.57E+00
71-36-3	2.13E-01	2.19E+01	5.54E-05	2.15E-03	2.80E-05	1.30E-04	1.29E+00
71-43-2	5.33E+00	1.85E+01	5.37E-06	2.02E-01	1.15E-04	1.04E-03	3.42E+00
71-55-6	7.62E-02	2.52E-01	4.43E-08	2.56E-03	1.08E-06	8.97E-06	3.21E-02
72-20-8	7.11E+01	na	na	2.80E+02	1.22E+01	2.26E+00	6.70E+01
74-83-9	1.52E+01	1.11E+02	1.94E-05	1.18E-01	2.40E-04	1.78E-03	1.56E+01
74-87-3	na	6.16E+00	9.86E-07	na	na	na	na
75-00-3	5.33E-02	5.54E-02	8.56E-09	9.42E-04	7.43E-07	5.51E-06	4.07E-02
75-01-4	7.11E+00	5.54E+00	8.62E-07	1.42E-01	7.99E-05	7.40E-04	4.69E+00
75-05-8	na	9.26E+00	5.05E-06	na	na	na	na
75-07-0	na	6.16E+01	2.11E-05	na	na	na	na
75-09-2	3.56E-01	1.85E-01	3.62E-08	2.96E-03	5.30E-06	4.67E-05	3.74E-01
75-15-0	2.13E-01	7.92E-01	1.14E-07	9.35E-03	8.77E-05	2.05E-05	1.09E-01
75-21-8	na	na	na	na	na	na	na
75-34-3	2.13E-01	1.11E+00	2.23E-07	3.35E-03	3.09E-06	2.87E-05	1.43E-01
75-35-4	4.27E-01	2.77E+00	4.49E-07	1.20E-02	4.98E-06	4.62E-05	2.07E-01
75-45-6	na	1.11E-02	1.75E-09	na	na	na	na
75-68-3	na	1.11E-02	1.75E-09	na	na	na	na
75-69-4	7.11E-02	7.92E-01	1.22E-07	9.47E-03	3.43E-06	7.32E-06	2.84E-02
75-71-8	1.07E-01	2.77E+00	4.21E-07	9.77E-03	5.08E-06	1.08E-05	4.97E-02
76-13-1	7.11E-04	1.85E-02	3.04E-09	3.78E-05	1.06E-08	7.84E-08	2.42E-04
76-44-8	4.27E+01	na	na	2.27E+01	1.35E-01	9.01E-01	1.85E+01
78-83-1	7.11E-02	na	na	3.67E-04	5.35E-06	3.97E-05	4.64E-01
78-87-5	na	1.39E+02	3.93E-05	na	na	na	na
78-93-3	3.56E-02	1.11E-01	5.78E-08	8.74E-05	1.67E-06	1.24E-05	2.73E-01
79-00-5	5.33E+00	na	na	7.50E-02	2.28E-04	1.71E-03	5.83E+00
79-01-6	7.11E+01	1.39E+01	2.79E-06	1.32E+01	6.88E-03	9.56E-03	3.23E+01
79-10-7	4.27E-02	8.38E+00	6.51E-04	1.86E-04	7.24E-06	3.36E-05	6.40E-01
79-34-5	3.56E-01	na	na	8.07E-03	3.36E-05	2.18E-04	3.82E-01
79-46-9	na	2.77E+01	1.94E-05	na	na	na	na
82-68-8	7.11E+00	na	na	9.33E-01	1.02E-02	7.55E-02	5.45E+00

Table D16a. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
83-32-9	3.56E-01	na	na	2.70E-01	7.74E-04	2.23E-03	3.75E-01
84-66-2	2.67E-02	na	na	2.30E-04	1.74E-05	1.45E-04	1.40E-01
84-74-2	2.13E-01	na	na	2.26E-02	3.14E-04	2.91E-03	2.16E-01
85-68-7	1.07E-01	na	na	1.68E-02	6.34E-04	3.59E-03	1.66E-01
87-68-3	7.11E+01	na	na	3.05E+01	6.14E-03	2.85E-02	2.22E+01
87-86-5	7.11E-01	na	na	2.46E-01	1.82E-03	1.69E-02	5.93E-01
88-06-2	2.13E+02	na	na	3.75E+01	6.07E-01	2.81E+00	4.99E+02
88-85-7	2.13E+01	na	na	1.66E+00	1.07E-01	4.95E-01	9.51E+01
91-20-3	1.07E+00	1.85E+02	6.32E-04	1.64E-01	3.29E-04	2.44E-03	1.09E+00
92-52-4	4.27E-01	na	na	2.21E-01	4.76E-04	2.21E-03	3.78E-01
95-47-6	1.07E-01	5.54E+00	2.53E-06	1.66E-02	4.40E-06	3.26E-05	4.68E-02
95-48-7	4.27E-01	na	na	1.53E-02	7.25E-04	3.36E-03	5.65E+00
95-50-1	2.37E-01	2.77E+00	2.30E-06	3.46E-02	1.77E-05	1.31E-04	1.11E-01
95-57-8	4.27E+00	na	na	1.59E-01	4.87E-03	2.26E-02	3.09E+01
95-63-6	4.27E-01	9.26E+01	5.68E-05	1.26E-01	2.36E-05	1.75E-04	1.67E-01
95-95-4	2.13E-01	na	na	3.94E-02	6.25E-04	2.90E-03	4.93E-01
98-86-2	2.13E-01	na	na	2.21E-03	5.57E-05	4.13E-04	1.41E+00
98-95-3	4.27E+01	2.72E+02	1.05E-03	5.42E-01	1.20E-02	1.08E-01	2.48E+02
100-25-4	2.13E+02	na	na	1.47E+00	3.00E-01	1.39E+00	4.54E+03
100-41-4	2.13E-01	5.54E-01	2.40E-07	2.88E-02	6.88E-06	6.18E-05	9.07E-02
100-42-5	1.07E-01	5.54E-01	4.09E-07	1.29E-02	7.11E-06	5.28E-05	6.32E-02
100-51-6	7.11E-02	na	na	4.81E-04	2.16E-05	1.32E-04	8.40E-01
106-42-3	1.07E-01	5.54E+00	2.32E-06	1.74E-02	4.04E-06	2.99E-05	4.49E-02
106-44-5	4.27E+00	na	na	1.16E-01	5.34E-03	3.22E-02	5.50E+01
106-46-7	7.11E-01	6.92E-01	5.07E-07	9.36E-02	4.18E-05	3.49E-04	3.18E-01
106-93-4	na	2.77E+03	2.20E-03	na	na	na	na
106-99-0	na	2.77E+02	4.10E-05	na	na	na	na
107-02-8	4.27E+01	2.77E+04	8.86E-03	8.06E-02	1.23E-03	9.12E-03	2.99E+02
107-05-1	4.27E-01	5.54E+02	9.66E-05	1.44E-02	6.71E-06	4.98E-05	2.41E-01
107-06-2	7.11E-01	1.13E+02	3.41E-05	6.72E-03	1.55E-05	1.43E-04	8.22E-01
107-13-1	2.13E+01	2.77E+02	1.05E-04	6.42E-02	7.25E-04	5.38E-03	1.26E+02
108-10-1	2.67E-01	1.85E-01	9.51E-08	2.34E-03	1.24E-05	9.19E-05	5.76E-01
108-38-3	1.07E-01	5.54E+00	2.38E-06	1.89E-02	4.14E-06	3.07E-05	4.44E-02
108-39-4	4.27E-01	na	na	1.56E-02	7.03E-04	3.26E-03	5.43E+00
108-67-8	4.27E-01	9.26E+01	4.89E-05	8.92E-02	2.03E-05	1.51E-04	1.73E-01
108-87-2	na	1.85E-01	2.85E-08	na	na	na	na
108-88-3	1.07E-01	1.39E+00	4.55E-07	1.07E-02	3.15E-06	2.34E-05	4.99E-02
108-90-7	1.07E+00	9.32E+00	4.66E-06	2.48E-01	1.24E-04	3.57E-04	5.62E-01
108-94-1	4.27E-03	na	na	1.70E-05	6.57E-07	4.87E-06	4.93E-02
108-95-2	7.11E-02	na	na	7.74E-04	5.69E-05	4.75E-04	1.55E+00
109-99-9	1.02E-01	1.85E+00	8.49E-07	5.29E-04	6.74E-06	3.12E-05	5.55E-01
110-00-9	2.13E+01	na	na	3.09E-01	4.43E-04	3.28E-03	2.31E+01
110-54-3	3.56E-01	2.77E+00	4.02E-07	2.63E-01	4.65E-06	3.45E-05	1.09E-01
110-80-5	5.33E-02	5.33E-02	3.22E-06	6.01E-05	8.95E-06	4.15E-05	1.91E+00
110-82-7	na	9.26E-02	1.48E-08	na	na	na	na
110-86-1	2.13E+01	na	na	1.38E-01	6.68E-03	3.10E-02	3.72E+02

Table D16a. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
111-76-2	4.27E-02	2.79E-03	4.86E-08	2.13E-04	7.01E-06	3.25E-05	3.33E-01
111-90-0	3.56E-01	1.68E-04	2.37E-04	1.51E-04	6.62E-05	3.07E-04	1.87E+01
117-81-7	1.07E+00	na	na	1.96E+01	3.44E-02	6.06E-02	3.99E-01
117-84-0	5.33E-01	na	na	4.67E+00	3.61E-03	3.01E-02	1.88E-01
118-74-1	2.67E+01	na	na	3.85E+01	9.94E-03	4.61E-02	8.39E+00
120-82-1	2.13E+00	1.39E+02	2.51E-04	4.17E-01	2.87E-04	2.58E-03	9.72E-01
121-14-2	1.07E+01	na	na	8.36E-02	1.17E-02	9.21E-02	1.47E+02
121-44-8	na	7.92E+01	1.01E-04	na	na	na	na
122-39-4	8.53E-01	na	na	1.63E-01	2.49E-03	1.15E-02	2.55E+00
123-91-1	na	na	na	na	na	na	na
126-73-8	1.07E-01	na	na	1.18E-02	4.42E-04	2.05E-03	2.38E-01
126-98-7	2.13E+02	7.92E+02	3.16E-04	1.07E+00	7.68E-03	5.70E-02	7.77E+02
127-18-4	2.13E+00	9.32E-01	1.86E-07	1.82E-01	3.07E-05	2.84E-04	7.14E-01
129-00-0	7.11E-01	na	na	1.32E+00	1.00E-02	2.88E-02	1.09E+00
141-78-6	2.37E-02	na	na	9.55E-05	9.27E-07	6.87E-06	8.76E-02
156-59-2	2.13E+00	na	na	5.63E-02	3.49E-05	3.24E-04	1.45E+00
206-44-0	5.33E-01	na	na	1.56E+00	7.81E-03	2.24E-02	6.35E-01
309-00-2	7.11E+02	na	na	1.18E+03	6.32E+00	2.93E+01	3.28E+02
319-84-6	4.27E+01	na	na	2.17E+00	8.26E-02	7.43E-01	1.11E+02
319-85-7	1.07E+02	na	na	5.79E+00	2.79E-01	2.35E+00	3.47E+02
541-73-1	2.37E+01	na	na	4.07E+00	1.63E-03	1.21E-02	1.03E+01
542-75-6	7.11E-01	2.77E+01	8.34E-06	2.54E-02	2.80E-05	1.43E-04	5.01E-01
621-64-7	na	na	na	na	na	na	na
1314-62-1	2.37E+00	na	na	4.01E-01	8.47E-03	1.57E-01	1.05E+00
1330-20-7	1.07E-01	5.54E+00	2.47E-06	1.45E-02	3.74E-06	3.19E-05	4.64E-02
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	2.67E+02	na	na	6.08E-04	3.82E+00	1.77E+01	9.48E+01
7429-90-5	2.13E-02	2.03E-05	1.10E-02	8.08E-04	1.53E-04	1.42E-03	7.76E-03
7439-89-6	7.11E-02	na	na	2.07E-04	3.40E-04	4.73E-03	3.38E-02
7439-93-2	1.07E+00	na	na	1.16E-03	9.42E-04	6.99E-02	5.41E-01
7439-96-5	4.57E-01	2.03E-03	1.10E+00	2.59E-02	8.19E-03	3.04E-02	1.50E+00
7439-97-6	na	3.39E-04	2.45E-02	na	na	na	na
7439-98-7	4.27E+00	na	na	1.43E-02	4.57E-03	1.61E-01	6.96E+01
7440-02-0	1.07E+00	na	na	2.30E-03	2.83E-03	7.09E-02	2.59E+00
7440-22-4	4.27E+00	na	na	2.56E-02	1.61E-02	2.69E-01	1.58E+00
7440-24-6	3.56E-02	na	na	2.55E-04	1.24E-04	2.30E-03	7.42E-01
7440-28-0	3.23E+02	na	na	5.99E-01	1.54E+00	2.15E+01	1.15E+02
7440-31-5	3.56E-02	na	na	1.81E-03	2.54E-04	2.36E-03	2.08E-02
7440-36-0	5.33E+01	na	na	5.15E+00	1.91E+00	3.55E+00	5.33E+01
7440-38-2	7.11E+01	na	na	5.93E-01	1.22E-01	4.62E+00	4.23E+01
7440-39-3	3.05E-01	2.03E-04	1.02E-01	3.11E-03	2.88E-03	1.87E-02	4.53E-01
7440-41-7	1.07E+01	5.09E-03	2.70E+00	1.25E+00	7.51E-01	6.96E-01	4.27E+00
7440-42-8	2.37E-01	5.09E-06	9.17E-04	1.06E-03	6.29E-05	5.25E-03	6.01E+00
7440-43-9	4.27E+01	na	na	5.29E-01	5.73E+00	2.66E+00	1.25E+02
7440-45-1	na	5.09E-04	2.75E-01	na	na	na	na

Table D16a. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
7440-48-4	1.07E+00	5.09E-03	2.54E+00	2.86E-03	8.82E-04	6.54E-02	2.32E+00
7440-50-8	5.33E-01	na	na	9.66E-04	1.11E-03	3.09E-02	1.32E+01
7440-62-2	3.05E+00	na	na	7.29E-01	2.18E-01	2.02E-01	1.35E+00
7440-66-6	7.11E-02	na	na	2.15E-04	2.49E-04	4.62E-03	5.49E+01
7487-94-7	7.11E+01	na	na	5.29E-02	4.69E-01	3.05E+00	4.00E+02
7664-41-7	na	7.81E-01	8.10E-06	na	na	na	na
7723-14-0	1.07E+03	na	na	7.17E+00	2.36E+00	4.38E+01	8.15E+04
7782-41-4	3.56E-01	na	na	1.05E-03	2.55E-04	2.29E-02	2.22E-01
7782-49-2	4.27E+00	na	na	1.55E-02	1.72E-03	7.03E-02	2.25E+00
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	1.07E+03	na	na	2.71E+03	1.67E+01	2.33E+01	3.82E+02
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	3.05E+02	na	na	3.00E+02	3.20E+00	4.45E+00	1.44E+02
14797-55-8	1.33E-02	na	na	5.29E-05	2.16E-06	9.99E-05	0.00E+00
14797-65-0	2.13E-01	na	na	8.16E-04	3.45E-05	1.60E-03	0.00E+00
16065-83-1	1.42E-02	na	na	5.04E-03	1.90E-03	8.80E-04	5.19E-03
16984-48-8	3.56E-01	na	na	1.05E-03	2.55E-04	2.29E-02	2.22E-01
18540-29-9	7.11E+00	1.27E-02	6.20E-02	6.30E-01	2.87E-02	5.33E-02	2.14E+00
53469-21-9	na	na	na	na	na	na	na
Uranium	3.56E+01	na	na	7.41E-02	1.66E-02	1.31E+00	1.78E+01
Cr Mixture	1.03E+00	1.81E-03	8.86E-03	9.43E-02	5.73E-03	8.37E-03	3.10E-01

The scenario totals are shown in Table 21.
"na" means that one or more of the reference doses were not available.

Table D16b. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	3.29E-03	3.45E-03	0.00E+00	1.22E-03	5.06E-03	1.70E-03	5.06E-03
57-12-5	7.23E-06	8.34E-06	0.00E+00	2.00E-06	1.74E-03	2.24E-03	1.86E-05
57-14-7	na	na	na	na	na	na	na
57-55-6	1.15E-07	1.32E-07	0.00E+00	3.16E-08	5.06E-05	2.21E-05	7.43E-07
58-89-9	4.22E-01	4.64E-01	0.00E+00	2.20E-01	3.64E+00	8.21E-01	5.71E-02
60-29-7	3.90E-07	4.36E-07	0.00E+00	1.20E-07	2.06E-05	5.63E-06	1.86E-06
60-34-4	na	na	na	na	na	na	na
60-57-1	6.24E+01	6.33E+01	0.00E+00	6.19E+01	3.87E+01	1.69E+01	6.74E+00
62-75-9	2.38E-02	2.75E-02	0.00E+00	6.55E-03	9.33E+00	4.08E+00	4.64E-02
64-18-6	5.78E-08	6.67E-08	0.00E+00	1.60E-08	1.84E-05	8.07E-06	1.86E-07
67-56-1	8.55E-08	9.87E-08	0.00E+00	2.36E-08	3.16E-05	8.65E-06	7.43E-07
67-64-1	4.86E-08	5.59E-08	0.00E+00	1.36E-08	1.04E-05	2.75E-06	4.13E-07
67-66-3	4.40E-05	4.74E-05	0.00E+00	1.52E-05	4.32E-04	4.72E-04	7.70E-05

Table D16b. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
67-72-1	5.88E-02	6.04E-02	0.00E+00	2.53E-02	4.63E-02	2.03E-02	3.61E-02
71-36-3	2.77E-06	3.17E-06	0.00E+00	7.95E-07	1.94E-04	8.49E-05	3.71E-06
71-43-2	1.69E-04	1.82E-04	0.00E+00	5.82E-05	1.54E-03	3.48E-04	2.56E-04
71-55-6	4.09E-06	4.32E-06	0.00E+00	1.49E-06	1.33E-05	3.23E-06	6.92E-06
72-20-8	7.32E+00	7.49E+00	0.00E+00	7.00E+00	7.07E+00	7.73E+01	7.88E-01
74-83-9	7.98E-05	8.81E-05	0.00E+00	2.56E-05	2.64E-03	7.21E-04	1.38E-04
74-87-3	na	na	na	na	na	na	na
75-00-3	3.82E-07	4.17E-07	0.00E+00	1.27E-07	8.16E-06	2.23E-06	7.39E-07
75-01-4	7.06E-05	7.66E-05	0.00E+00	2.39E-05	1.10E-03	2.40E-04	1.38E-04
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	2.18E-06	2.41E-06	0.00E+00	6.99E-07	6.91E-05	1.59E-05	3.58E-06
75-15-0	3.68E-06	3.94E-06	0.00E+00	1.29E-06	3.03E-05	2.63E-04	7.30E-06
75-21-8	na	na	na	na	na	na	na
75-34-3	3.18E-06	3.45E-06	0.00E+00	1.08E-06	4.25E-05	9.29E-06	5.60E-06
75-35-4	1.10E-05	1.17E-05	0.00E+00	3.90E-06	6.84E-05	1.50E-05	2.05E-05
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	4.04E-06	4.25E-06	0.00E+00	1.48E-06	1.08E-05	1.03E-05	6.93E-06
75-71-8	2.86E-06	3.04E-06	0.00E+00	1.02E-06	1.60E-05	1.53E-05	5.39E-06
76-13-1	1.56E-07	1.63E-07	0.00E+00	5.87E-08	1.16E-07	3.17E-08	2.12E-07
76-44-8	2.16E+01	2.14E+01	0.00E+00	2.19E+01	2.40E+00	7.28E-01	2.33E+00
78-83-1	7.52E-07	8.60E-07	0.00E+00	2.15E-07	5.93E-05	1.62E-05	1.24E-06
78-87-5	na	na	na	na	na	na	na
78-93-3	1.49E-07	1.71E-07	0.00E+00	4.21E-08	1.86E-05	5.09E-06	6.19E-07
79-00-5	1.49E-04	1.64E-04	0.00E+00	4.82E-05	2.56E-03	6.92E-04	1.67E-04
79-01-6	3.43E-03	3.63E-03	0.00E+00	1.23E-03	1.42E-02	2.06E-02	5.70E-03
79-10-7	3.95E-07	4.55E-07	0.00E+00	1.11E-07	4.95E-05	2.17E-05	7.43E-07
79-34-5	3.14E-05	3.44E-05	0.00E+00	1.05E-05	3.31E-04	1.03E-04	2.70E-05
79-46-9	na	na	na	na	na	na	na
82-68-8	1.19E-01	1.23E-01	0.00E+00	8.11E-02	1.70E-01	4.65E-02	2.92E-02
83-32-9	1.23E-03	1.31E-03	0.00E+00	6.24E-04	4.54E-03	3.21E-03	4.07E-04
84-66-2	1.09E-05	1.23E-05	0.00E+00	3.58E-06	2.82E-04	6.86E-05	2.14E-06
84-74-2	3.25E-03	3.41E-03	0.00E+00	2.22E-03	6.87E-03	1.50E-03	6.83E-04
85-68-7	4.79E-03	5.02E-03	0.00E+00	3.99E-03	1.15E-02	4.14E-03	5.14E-04
87-68-3	6.38E-01	6.53E-01	0.00E+00	2.56E-01	4.29E-02	1.88E-02	3.74E-01
87-86-5	5.04E-02	5.16E-02	0.00E+00	4.51E-02	4.63E-02	1.01E-02	2.72E-03
88-06-2	8.75E-01	9.58E-01	0.00E+00	4.39E-01	6.59E+00	2.88E+00	6.47E-02
88-85-7	1.17E-01	1.30E-01	0.00E+00	5.75E-02	1.35E+00	5.91E-01	1.29E-02
91-20-3	7.81E-04	8.41E-04	0.00E+00	3.06E-04	4.09E-03	1.12E-03	4.07E-04
92-52-4	1.47E-03	1.55E-03	0.00E+00	7.37E-04	4.34E-03	1.90E-03	5.44E-04
95-47-6	2.55E-05	2.69E-05	0.00E+00	9.51E-06	4.89E-05	1.34E-05	2.96E-05
95-48-7	1.42E-04	1.63E-04	0.00E+00	4.35E-05	7.09E-03	3.10E-03	1.49E-05
95-50-1	1.24E-04	1.29E-04	0.00E+00	4.72E-05	1.99E-04	5.45E-05	1.14E-04
95-57-8	1.26E-03	1.43E-03	0.00E+00	3.95E-04	4.43E-02	1.94E-02	2.12E-04
95-63-6	3.11E-04	3.23E-04	0.00E+00	1.20E-04	2.64E-04	7.22E-05	2.92E-04

Table D16b. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
95-95-4	9.34E-04	1.02E-03	0.00E+00	4.75E-04	6.82E-03	2.98E-03	6.83E-05
98-86-2	1.52E-05	1.74E-05	0.00E+00	4.49E-06	6.66E-04	1.82E-04	5.58E-07
98-95-3	5.04E-03	5.73E-03	0.00E+00	1.52E-03	1.83E-01	4.13E-02	1.25E-03
100-25-4	3.64E-02	4.18E-02	0.00E+00	1.06E-02	2.81E+00	1.23E+00	3.12E-03
100-41-4	5.36E-05	5.63E-05	0.00E+00	2.00E-05	9.25E-05	2.09E-05	6.24E-05
100-42-5	2.15E-05	2.29E-05	0.00E+00	7.81E-06	7.99E-05	2.18E-05	2.19E-05
100-51-6	2.95E-06	3.38E-06	0.00E+00	8.42E-07	2.08E-04	6.90E-05	1.23E-07
106-42-3	2.66E-05	2.79E-05	0.00E+00	9.93E-06	4.48E-05	1.22E-05	3.12E-05
106-44-5	1.35E-03	1.55E-03	0.00E+00	4.14E-04	6.73E-02	2.27E-02	1.46E-04
106-46-7	3.66E-04	3.83E-04	0.00E+00	1.40E-04	5.28E-04	1.28E-04	3.48E-04
106-93-4	na	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na	na
107-02-8	8.17E-05	9.37E-05	0.00E+00	2.31E-05	1.36E-02	3.71E-03	7.43E-04
107-05-1	7.72E-06	8.30E-06	0.00E+00	2.68E-06	7.37E-05	2.02E-05	1.44E-05
107-06-2	8.04E-06	8.91E-06	0.00E+00	2.56E-06	2.13E-04	4.66E-05	1.08E-05
107-13-1	6.30E-05	7.21E-05	0.00E+00	1.79E-05	8.02E-03	2.19E-03	3.71E-04
108-10-1	3.54E-06	3.98E-06	0.00E+00	1.07E-06	1.38E-04	3.77E-05	2.99E-06
108-38-3	2.96E-05	3.11E-05	0.00E+00	1.11E-05	4.60E-05	1.26E-05	3.41E-05
108-39-4	1.40E-04	1.60E-04	0.00E+00	4.29E-05	6.84E-03	2.99E-03	1.51E-05
108-67-8	1.95E-04	2.03E-04	0.00E+00	7.40E-05	2.27E-04	6.20E-05	2.01E-04
108-87-2	na	na	na	na	na	na	na
108-88-3	1.08E-05	1.14E-05	0.00E+00	3.92E-06	3.48E-05	9.52E-06	1.48E-05
108-90-7	1.52E-04	1.61E-04	0.00E+00	5.51E-05	5.36E-04	3.78E-04	1.80E-04
108-94-1	8.84E-08	1.01E-07	0.00E+00	2.50E-08	7.41E-06	2.03E-06	7.43E-08
108-95-2	1.24E-05	1.42E-05	0.00E+00	3.61E-06	9.68E-04	2.35E-04	1.04E-06
109-99-9	4.53E-07	5.18E-07	0.00E+00	1.29E-07	4.67E-05	2.04E-05	1.77E-06
110-00-9	1.65E-04	1.83E-04	0.00E+00	5.28E-05	4.87E-03	1.33E-03	2.52E-04
110-54-3	4.03E-04	4.17E-04	0.00E+00	1.54E-04	5.11E-05	1.40E-05	3.93E-04
110-80-5	2.50E-07	2.88E-07	0.00E+00	6.92E-08	6.11E-05	2.67E-05	9.28E-07
110-82-7	na	na	na	na	na	na	na
110-86-1	4.59E-04	5.28E-04	0.00E+00	1.29E-04	4.82E-02	2.11E-02	3.71E-04
111-76-2	6.31E-07	7.23E-07	0.00E+00	1.80E-07	4.79E-05	2.10E-05	7.43E-07
111-90-0	1.47E-06	1.69E-06	0.00E+00	4.05E-07	4.50E-04	1.97E-04	6.19E-06
117-81-7	3.19E+01	3.13E+01	0.00E+00	4.20E+01	2.98E-01	3.43E-01	1.81E-03
117-84-0	4.98E+01	4.88E+01	0.00E+00	6.59E+01	1.47E-01	3.58E-02	1.86E-04
118-74-1	2.40E+00	2.38E+00	0.00E+00	1.17E+00	7.40E-02	3.24E-02	7.56E-01
120-82-1	4.46E-03	4.59E-03	0.00E+00	1.87E-03	4.00E-03	9.03E-04	2.92E-03
121-14-2	3.98E-03	4.55E-03	0.00E+00	1.22E-03	1.97E-01	5.06E-02	3.92E-04
121-44-8	na	na	na	na	na	na	na
122-39-4	2.74E-03	3.03E-03	0.00E+00	1.28E-03	2.72E-02	1.19E-02	4.64E-04
123-91-1	na	na	na	na	na	na	na
126-73-8	9.28E-04	1.01E-03	0.00E+00	5.45E-04	5.26E-03	2.30E-03	2.34E-05
126-98-7	1.07E-03	1.22E-03	0.00E+00	3.12E-04	8.51E-02	2.33E-02	3.71E-03
127-18-4	8.07E-04	8.39E-04	0.00E+00	3.06E-04	4.21E-04	9.21E-05	9.72E-04
129-00-0	4.86E-02	5.06E-02	0.00E+00	4.36E-02	1.04E-01	7.37E-02	4.47E-03
141-78-6	1.36E-07	1.54E-07	0.00E+00	3.94E-08	1.03E-05	2.81E-06	4.13E-07

Table D16b. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
156-59-2	3.79E-05	4.10E-05	0.00E+00	1.28E-05	4.80E-04	1.05E-04	6.34E-05
206-44-0	6.34E-02	6.52E-02	0.00E+00	6.23E-02	8.38E-02	5.91E-02	5.51E-03
309-00-2	1.39E+03	1.37E+03	0.00E+00	1.66E+03	1.08E+02	4.72E+01	7.90E+01
319-84-6	2.56E-01	2.79E-01	0.00E+00	1.37E-01	1.86E+00	4.20E-01	3.95E-02
319-85-7	7.56E-01	8.29E-01	0.00E+00	4.07E-01	6.30E+00	1.52E+00	9.53E-02
541-73-1	1.48E-02	1.54E-02	0.00E+00	5.68E-03	1.84E-02	5.02E-03	1.36E-02
542-75-6	1.92E-05	2.08E-05	0.00E+00	6.53E-06	2.13E-04	8.46E-05	2.86E-05
621-64-7	na	na	na	na	na	na	na
1314-62-1	2.06E-01	5.13E-03	1.47E-01	2.73E-01	9.28E-01	1.02E-01	2.61E-03
1330-20-7	2.54E-05	2.67E-05	0.00E+00	9.46E-06	4.78E-05	1.14E-05	2.96E-05
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	3.61E+02	5.59E+01	2.47E+01	3.05E+01	1.05E+02	4.59E+01	1.47E+01
7429-90-5	1.08E-03	4.49E-04	1.98E-03	2.44E-03	8.39E-03	1.84E-03	5.87E-05
7439-89-6	5.00E-02	2.34E-04	2.22E-02	1.03E-02	2.81E-02	4.10E-03	7.83E-05
7439-93-2	3.74E-01	2.34E+00	3.29E-03	9.13E-01	4.05E-01	1.11E-02	5.87E-06
7439-96-5	1.04E-02	2.20E-03	3.82E-03	2.12E-03	1.80E-01	9.86E-02	3.35E-04
7439-97-6	na	na	na	na	na	na	na
7439-98-7	8.34E-01	5.09E+00	2.15E+00	8.94E-01	4.84E-01	2.79E-02	2.35E-04
7440-02-0	3.00E-01	3.19E+00	3.75E-04	1.73E-02	4.21E-01	3.41E-02	5.87E-04
7440-22-4	4.17E-01	2.16E-02	2.51E+00	2.91E-01	1.46E+00	1.77E-01	1.17E-04
7440-24-6	7.27E-02	9.13E-02	2.03E-03	2.35E-03	1.31E-02	1.43E-03	1.17E-05
7440-28-0	4.37E+02	6.78E+01	3.00E+01	3.70E+01	1.27E+02	1.85E+01	1.78E+01
7440-31-5	1.03E-01	4.05E-03	2.23E-03	4.12E-03	1.39E-02	3.04E-03	5.87E-04
7440-36-0	8.72E-02	1.74E-01	1.03E-01	5.58E-01	2.11E+01	2.31E+01	2.94E-02
7440-38-2	5.10E+00	4.80E-01	1.82E+01	8.10E+00	2.64E+01	1.41E+00	9.55E-02
7440-39-3	2.68E-03	2.10E-02	8.49E-04	3.93E-02	9.72E-02	3.04E-02	6.71E-06
7440-41-7	3.61E-01	1.01E-03	1.30E+00	3.01E-02	4.00E+00	8.75E+00	5.87E-03
7440-42-8	5.44E-02	3.70E-01	2.92E-02	5.41E-02	1.20E-02	2.92E-04	6.52E-06
7440-43-9	7.85E-01	6.80E+00	6.86E+00	3.97E-01	1.42E+01	6.20E+01	2.35E-02
7440-45-1	na	na	na	na	na	na	na
7440-48-4	5.49E-01	5.46E-02	6.90E-01	1.60E-02	3.40E-01	9.31E-03	1.76E-03
7440-50-8	1.41E+00	8.48E-01	2.03E-01	9.39E-02	1.48E-01	1.08E-02	5.87E-04
7440-62-2	2.65E-01	6.60E-03	1.89E-01	3.50E-01	1.19E+00	2.61E+00	3.35E-03
7440-66-6	5.97E+01	2.18E+01	7.87E+00	1.56E+00	2.64E-02	2.88E-03	9.86E-05
7487-94-7	1.45E+03	9.49E+00	6.63E-01	2.05E+00	1.02E+01	3.19E+00	3.91E-01
7664-41-7	na	na	na	na	na	na	na
7723-14-0	4.53E+04	5.28E+04	3.50E+02	8.53E+03	1.41E+02	1.55E+01	8.81E+00
7782-41-4	1.92E+00	4.02E-02	1.09E-03	1.01E-01	1.29E-01	2.91E-03	1.96E-05
7782-49-2	9.72E-01	8.24E-01	3.52E+00	1.63E+00	1.48E-01	7.34E-03	3.99E-03
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	2.56E+03	2.51E+03	0.00E+00	2.72E+03	6.25E+01	9.12E+01	8.26E+02
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na

Table D16b. Columbia River Population Hazard Index by Pathway, per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
12674-11-2	4.39E+01	4.38E+01	0.00E+00	3.87E+01	1.07E+01	1.57E+01	2.97E+01
14797-55-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-04	7.90E-06	2.32E-07
14797-65-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.89E-03	1.26E-04	3.71E-06
16065-83-1	4.10E-03	1.41E-05	8.23E-04	1.52E-03	4.64E-03	2.03E-02	1.57E-05
16984-48-8	1.92E+00	4.02E-02	1.09E-03	1.01E-01	1.29E-01	2.91E-03	1.96E-05
18540-29-9	5.76E-01	1.98E-03	6.73E-02	1.25E-01	9.63E-02	1.05E-01	7.83E-03
53469-21-9	na	na	na	na	na	na	na
Uranium	2.48E-01	1.04E+00	6.43E+00	2.97E+00	3.85E+00	9.91E-02	1.96E-03
Cr Mixture	8.58E-02	2.95E-04	1.03E-02	1.91E-02	1.77E-02	3.24E-02	1.13E-03

Zero values for poultry indicate the poultry uptake factors were not available.

Table D17a. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
50-32-8	1.56E-01	9.11E-03	4.33E-05	1.10E+00	2.94E-05	9.25E-03	1.04E-01
53-70-3	1.56E-01	2.45E-03	4.63E-05	1.49E+00	3.15E-05	9.90E-03	7.63E-02
56-23-5	2.77E-03	8.24E-03	1.38E-09	1.69E-04	4.72E-10	3.11E-07	1.02E-03
57-12-5	na	na	na	na	na	na	na
57-14-7	6.40E-02	7.74E-03	8.08E-06	2.65E-05	2.51E-07	1.27E-04	1.66E+01
57-55-6	na	na	na	na	na	na	na
58-89-9	2.77E-02	na	na	1.41E-03	5.57E-07	5.47E-04	8.80E-02
60-29-7	na	na	na	na	na	na	na
60-34-4	6.40E-02	3.52E-03	7.13E-06	4.06E-05	2.21E-07	1.12E-04	1.24E+01
60-57-1	3.41E-01	1.04E+00	1.13E-04	5.38E-02	2.01E-05	1.02E-02	2.61E-01
62-75-9	1.09E+00	6.01E-01	2.59E-05	1.02E-03	4.61E-06	2.34E-03	1.33E+02
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	4.91E-06	1.28E-02	2.60E-09	3.88E-07	3.31E-12	6.70E-10	2.92E-06
67-72-1	2.99E-04	2.22E-03	4.59E-09	6.30E-05	8.17E-10	4.14E-07	1.34E-04
71-36-3	na	na	na	na	na	na	na
71-43-2	1.17E-03	4.32E-03	1.26E-09	4.43E-05	2.32E-10	2.28E-07	7.52E-04
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	2.77E-04	9.98E-04	1.60E-10	2.55E-06	3.66E-11	2.97E-08	3.52E-04
75-00-3	6.19E-05	na	na	1.09E-06	7.88E-12	6.40E-09	4.72E-05
75-01-4	2.99E-02	4.88E-03	7.59E-10	5.98E-04	3.07E-09	3.11E-06	1.97E-02
75-05-8	na	na	na	na	na	na	na
75-07-0	na	1.22E-03	4.18E-10	na	na	na	na
75-09-2	1.60E-04	2.61E-04	5.13E-11	1.33E-06	2.18E-11	2.10E-08	1.68E-04
75-15-0	na	na	na	na	na	na	na
75-21-8	2.18E-02	5.54E-02	1.51E-08	3.02E-05	4.88E-09	3.96E-06	1.89E-01
75-34-3	na	na	na	na	na	na	na

Table D17a. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	9.60E-02	7.13E-01	2.25E-05	5.10E-02	2.78E-06	2.03E-03	4.15E-02
78-83-1	na	na	na	na	na	na	na
78-87-5	1.45E-03	na	na	3.44E-05	3.66E-10	2.75E-07	1.03E-03
78-93-3	na	na	na	na	na	na	na
79-00-5	1.22E-03	9.03E-03	4.32E-09	1.71E-05	4.74E-10	3.90E-07	1.33E-03
79-01-6	8.53E-03	6.34E-02	1.27E-08	1.58E-03	7.54E-09	1.15E-06	3.88E-03
79-10-7	na	na	na	na	na	na	na
79-34-5	4.27E-03	3.17E-02	2.90E-08	9.68E-05	3.68E-09	2.61E-06	4.59E-03
79-46-9	na	1.49E+00	1.04E-06	na	na	na	na
82-68-8	5.55E-03	na	na	7.28E-04	7.26E-08	5.89E-05	4.25E-03
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	1.66E-03	1.24E-02	7.39E-09	7.13E-04	1.31E-09	6.66E-07	5.19E-04
87-86-5	2.56E-03	na	na	8.84E-04	5.98E-08	6.07E-05	2.14E-03
88-06-2	2.35E-04	1.85E-04	3.44E-08	4.12E-05	6.11E-09	3.10E-06	5.49E-04
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	6.10E-04	2.64E-10	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	5.12E-04	3.48E-03	2.56E-09	6.74E-05	2.75E-10	2.51E-07	2.29E-04
106-93-4	1.81E+00	1.22E-01	9.67E-08	1.34E-02	1.19E-06	9.62E-04	2.72E+00
106-99-0	na	1.66E-02	2.46E-09	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na

Table D17a. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
107-06-2	1.94E-03	1.44E-02	4.34E-09	1.84E-05	3.86E-10	3.91E-07	2.24E-03
107-13-1	1.15E-02	3.77E-02	1.42E-08	3.47E-05	3.58E-09	2.90E-06	6.79E-02
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	1.62E-04	1.08E-03	4.95E-10	8.44E-07	9.83E-11	4.98E-08	8.86E-04
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	2.99E-04	na	na	5.48E-03	8.80E-08	1.70E-05	1.12E-04
117-84-0	na	na	na	na	na	na	na
118-74-1	3.41E-02	2.53E-01	6.55E-07	4.93E-02	1.16E-07	5.90E-05	1.07E-02
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	2.35E-04	na	na	1.85E-07	1.33E-10	1.08E-07	4.85E-03
126-73-8	1.15E-04	na	na	1.28E-05	4.37E-09	2.21E-06	2.57E-04
126-98-7	na	na	na	na	na	na	na
127-18-4	1.11E-03	3.22E-04	6.40E-11	9.45E-05	1.46E-10	1.48E-07	3.71E-04
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	3.63E-01	2.69E+00	1.66E-04	6.00E-01	2.95E-05	1.49E-02	1.67E-01
319-84-6	1.34E-01	4.98E-01	2.60E-05	6.85E-03	2.38E-06	2.34E-03	3.48E-01
319-85-7	3.84E-02	5.13E-03	9.39E-06	2.08E-03	9.17E-07	8.46E-04	1.25E-01
541-73-1	na	na	na	na	na	na	na
542-75-6	2.13E-03	2.22E-03	6.66E-10	7.62E-05	7.69E-10	4.29E-07	1.50E-03
621-64-7	1.49E-01	na	na	2.99E-03	3.92E-06	9.94E-04	3.70E+00
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	6.40E-03	4.75E-02	7.49E-06	1.16E-02	2.22E-06	3.38E-04	8.04E-03
1336-36-3	8.53E-04	4.75E-02	7.49E-06	1.55E-03	2.22E-06	3.38E-04	8.04E-03
6533-73-9	na	na	na	na	na	na	na

Table D17a. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion	Garden Vegetables
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	3.20E-02	7.56E-06	2.32E-04	2.67E-04	5.00E-07	2.08E-03	1.90E-02
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	2.44E-07	1.30E-04	na	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	1.83E-07	9.29E-05	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	2.85E-07	1.42E-04	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	2.35E-02	4.27E-02	1.33E-05	6.02E-03	2.36E-06	1.20E-03	1.84E-02
11096-82-5	6.40E-03	4.75E-02	1.42E-05	6.90E-02	4.22E-06	6.42E-04	6.85E-03
11097-69-1	6.40E-03	4.75E-02	1.03E-05	1.62E-02	3.06E-06	4.65E-04	7.64E-03
11104-28-2	6.40E-03	4.75E-02	3.23E-06	2.80E-03	9.56E-07	1.45E-04	1.40E-02
11141-16-5	6.40E-03	4.75E-02	3.23E-06	2.80E-03	9.56E-07	1.45E-04	1.40E-02
12672-29-6	6.40E-03	4.75E-02	5.32E-06	1.25E-02	1.58E-06	2.40E-04	7.46E-03
12674-11-2	8.53E-04	6.34E-02	6.91E-06	8.39E-04	2.05E-06	3.12E-04	1.01E-02
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	1.22E-06	7.45E-05	na	na	na	na
53469-21-9	6.40E-03	4.75E-02	6.95E-06	1.16E-02	2.06E-06	3.13E-04	7.91E-03
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	1.75E-07	1.06E-05	na	na	na	na

The scenario totals are shown in Table 21.
"na" means that one or more of the cancer induction slope factors was not available.

Table D17b. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	1.80E-01	1.80E-01	0.00E+00	2.21E-01	4.79E-02	3.09E-04	8.98E-03
53-70-3	7.47E-01	7.38E-01	0.00E+00	9.71E-01	5.56E-02	3.59E-04	2.69E-02
56-23-5	3.00E-07	3.14E-07	0.00E+00	1.11E-07	4.60E-07	1.42E-09	4.60E-07
57-12-5	na	na	na	na	na	na	na
57-14-7	2.92E-07	3.37E-07	0.00E+00	8.02E-08	2.02E-04	8.09E-07	1.11E-06
57-55-6	na	na	na	na	na	na	na
58-89-9	1.65E-04	1.81E-04	0.00E+00	8.58E-05	1.42E-03	2.93E-06	2.23E-05
60-29-7	na	na	na	na	na	na	na
60-34-4	3.01E-07	3.47E-07	0.00E+00	8.27E-08	1.76E-04	7.03E-07	1.11E-06
60-57-1	5.00E-02	5.07E-02	0.00E+00	4.95E-02	3.10E-02	1.24E-04	5.39E-03
62-75-9	9.70E-06	1.12E-05	0.00E+00	2.67E-06	3.81E-03	1.52E-05	1.89E-05
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	1.01E-10	1.09E-10	0.00E+00	3.50E-11	9.93E-10	9.93E-12	1.77E-10
67-72-1	8.24E-07	8.45E-07	0.00E+00	3.55E-07	6.48E-07	2.59E-09	5.05E-07
71-36-3	na	na	na	na	na	na	na
71-43-2	3.71E-08	4.01E-08	0.00E+00	1.28E-08	3.39E-07	6.99E-10	5.63E-08
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	9.11E-10	1.01E-09	0.00E+00	2.85E-10	4.39E-08	1.10E-10	4.83E-09
75-00-3	4.43E-10	4.84E-10	0.00E+00	1.47E-10	9.47E-09	2.37E-11	8.57E-10
75-01-4	2.97E-07	3.22E-07	0.00E+00	1.01E-07	4.60E-06	9.20E-09	5.80E-07
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	9.83E-10	1.09E-09	0.00E+00	3.14E-10	3.11E-08	6.54E-11	1.61E-09
75-15-0	na	na	na	na	na	na	na
75-21-8	2.63E-08	3.02E-08	0.00E+00	7.41E-09	5.87E-06	1.47E-08	3.79E-07
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	4.86E-02	4.81E-02	0.00E+00	4.93E-02	5.39E-03	1.50E-05	5.25E-03
78-83-1	na	na	na	na	na	na	na
78-87-5	3.50E-08	3.80E-08	0.00E+00	1.19E-08	4.08E-07	1.10E-09	5.33E-08
78-93-3	na	na	na	na	na	na	na
79-00-5	3.39E-08	3.74E-08	0.00E+00	1.10E-08	5.84E-07	1.44E-09	3.81E-08
79-01-6	4.11E-07	4.36E-07	0.00E+00	1.48E-07	1.70E-06	2.27E-08	6.84E-07
79-10-7	na	na	na	na	na	na	na
79-34-5	3.76E-07	4.12E-07	0.00E+00	1.26E-07	3.97E-06	1.13E-08	3.24E-07
79-46-9	na	na	na	na	na	na	na

Table D17b. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
82-68-8	9.31E-05	9.62E-05	0.00E+00	6.32E-05	1.33E-04	3.32E-07	2.28E-05
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	1.49E-05	1.53E-05	0.00E+00	5.99E-06	1.00E-06	4.02E-09	8.76E-06
87-86-5	1.81E-04	1.86E-04	0.00E+00	1.62E-04	1.67E-04	3.33E-07	9.80E-06
88-06-2	9.63E-07	1.05E-06	0.00E+00	4.83E-07	7.25E-06	2.90E-08	7.12E-08
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	2.63E-07	2.76E-07	0.00E+00	1.00E-07	3.80E-07	8.46E-10	2.50E-07
106-93-4	7.83E-05	8.71E-05	0.00E+00	2.49E-05	1.46E-03	3.64E-06	6.43E-05
106-99-0	na	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	2.20E-08	2.43E-08	0.00E+00	6.99E-09	5.82E-07	1.16E-09	2.94E-08
107-13-1	3.40E-08	3.90E-08	0.00E+00	9.69E-09	4.33E-06	1.08E-08	2.01E-07
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	7.23E-10	8.27E-10	0.00E+00	2.07E-10	7.45E-08	2.98E-10	2.82E-09
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na

Table D17b. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	8.94E-03	8.77E-03	0.00E+00	1.18E-02	8.35E-05	8.79E-07	5.06E-07
117-84-0	na	na	na	na	na	na	na
118-74-1	3.07E-03	3.05E-03	0.00E+00	1.50E-03	9.48E-05	3.79E-07	9.68E-04
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	7.15E-10	8.24E-10	0.00E+00	1.99E-10	1.61E-07	4.02E-10	4.08E-09
126-73-8	1.00E-06	1.09E-06	0.00E+00	5.89E-07	5.68E-06	2.27E-08	2.52E-08
126-98-7	na	na	na	na	na	na	na
127-18-4	4.20E-07	4.36E-07	0.00E+00	1.59E-07	2.19E-07	4.38E-10	5.06E-07
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	7.07E-01	6.98E-01	0.00E+00	8.48E-01	5.50E-02	2.20E-04	4.03E-02
319-84-6	8.05E-04	8.80E-04	0.00E+00	4.31E-04	5.87E-03	1.21E-05	1.24E-04
319-85-7	2.72E-04	2.99E-04	0.00E+00	1.47E-04	2.27E-03	4.99E-06	3.43E-05
541-73-1	na	na	na	na	na	na	na
542-75-6	5.76E-08	6.25E-08	0.00E+00	1.96E-08	6.38E-07	2.32E-09	8.57E-08
621-64-7	2.34E-05	2.70E-05	0.00E+00	6.78E-06	2.04E-03	1.63E-05	1.83E-06
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	1.38E-02	1.36E-02	0.00E+00	1.32E-02	8.30E-04	1.11E-05	6.81E-03
1336-36-3	1.38E-02	1.36E-02	0.00E+00	1.32E-02	8.30E-04	1.11E-05	6.81E-03
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	2.29E-03	2.16E-04	8.18E-03	3.65E-03	1.19E-02	5.79E-06	4.30E-05
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	na	na	na	na	na	na

Table D17b. Columbia River Population Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Beef	Milk	Poultry	Egg	Sediment Ingestion	Sediment Dermal	Fish
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	1.14E-02	1.14E-02	0.00E+00	1.31E-02	5.28E-03	2.11E-05	7.27E-04
11096-82-5	1.84E+00	1.80E+00	0.00E+00	2.17E+00	1.96E-03	2.61E-05	5.75E-04
11097-69-1	5.12E-02	5.02E-02	0.00E+00	5.45E-02	1.25E-03	1.67E-05	1.65E-02
11104-28-2	2.28E-04	2.35E-04	0.00E+00	1.38E-04	3.02E-04	4.02E-06	7.21E-05
11141-16-5	2.28E-04	2.35E-04	0.00E+00	1.38E-04	3.02E-04	4.02E-06	7.21E-05
12672-29-6	1.30E-02	1.27E-02	0.00E+00	1.12E-02	5.48E-04	7.30E-06	7.44E-03
12674-11-2	3.07E-03	3.07E-03	0.00E+00	2.71E-03	7.52E-04	1.00E-05	2.08E-03
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na	na
53469-21-9	1.33E-02	1.31E-02	0.00E+00	1.24E-02	7.57E-04	1.01E-05	6.81E-03
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na	na

Zero values for poultry indicate the poultry uptake factors were not available.

Table D18. HSRAM Industrial Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
H-3	1.88E-05	1.60E-05	2.78E-06	0.00E+00	0.00E+00	3.62E-11
Be-10	1.17E-03	1.17E-03	1.80E-07	3.30E-06	4.20E-06	1.27E-06
C-14	5.23E-04	5.23E-04	1.06E-09	1.60E-08	4.40E-08	4.68E-07
Na-22	1.70E-02	2.88E-03	3.89E-09	2.16E-08	1.42E-02	9.45E-07
Al-26	6.13E-02	3.64E-03	7.41E-09	1.36E-07	5.76E-02	3.99E-06
Si-32+D	2.80E-03	2.75E-03	5.23E-07	9.10E-06	4.24E-05	2.84E-06
Cl-36	7.61E-04	7.58E-04	1.11E-08	7.78E-08	3.46E-06	3.14E-07
K-40	7.61E-03	4.65E-03	6.30E-09	1.01E-07	2.96E-03	4.41E-06
Ca-41	3.19E-04	3.18E-04	6.47E-10	1.02E-08	0.00E+00	2.98E-07
Ti-44+D	4.90E-02	6.15E-03	2.30E-07	3.84E-06	4.29E-02	6.10E-06
V-49	1.54E-05	1.54E-05	1.75E-10	3.98E-10	0.00E+00	2.07E-09
Mn-54	2.74E-03	6.93E-04	3.40E-09	7.18E-09	2.04E-03	8.67E-08
Fe-55	1.52E-04	1.52E-04	6.81E-10	3.94E-09	0.00E+00	5.21E-08
Fe-60+D	6.55E-02	3.81E-02	1.37E-07	2.68E-06	2.73E-02	4.54E-05
Co-60	3.28E-02	6.73E-03	1.68E-08	1.49E-07	2.60E-02	3.54E-06
Ni-59	5.26E-05	5.25E-05	4.66E-10	8.60E-09	0.00E+00	5.74E-08
Ni-63	1.44E-04	1.44E-04	1.17E-09	2.06E-08	0.00E+00	1.51E-07
Se-79	2.18E-03	2.18E-03	3.33E-09	3.40E-08	4.11E-08	1.32E-06
Rb-87	1.23E-03	1.23E-03	1.64E-09	2.95E-08	5.47E-07	1.31E-06
Sr-90+D	3.84E-02	3.83E-02	1.25E-07	1.96E-06	7.80E-05	3.54E-05
Zr-93	4.16E-04	4.15E-04	4.23E-08	7.86E-07	9.76E-08	4.87E-07
Nb-91	1.75E-04	1.31E-04	1.63E-09	2.96E-08	4.45E-05	1.41E-07
Nb-93m	1.31E-04	1.31E-04	1.63E-09	2.28E-08	3.15E-07	1.08E-07
Nb-94	3.53E-02	1.79E-03	1.83E-08	3.35E-07	3.35E-02	1.94E-06
Mo-93	3.40E-04	3.38E-04	1.44E-08	2.26E-07	2.03E-06	3.34E-07
Tc-99	3.66E-04	3.65E-04	4.23E-09	4.32E-08	2.77E-07	2.21E-07
Ru-106+D	7.47E-03	6.85E-03	5.99E-08	1.49E-07	6.17E-04	1.01E-06
Pd-107	3.74E-05	3.73E-05	6.50E-09	1.17E-07	0.00E+00	3.97E-08
Ag-108m+D	3.46E-02	1.91E-03	1.29E-08	2.25E-07	3.27E-02	1.98E-06
Cd-109	3.29E-03	3.28E-03	5.79E-08	1.75E-07	9.62E-06	5.86E-07
Cd-113m	4.03E-02	4.03E-02	7.77E-07	1.04E-05	1.85E-06	3.19E-05
In-115	3.96E-02	3.95E-02	1.90E-06	3.50E-05	1.58E-06	4.32E-05
Sn-121m+D	5.71E-04	5.63E-04	6.05E-09	1.02E-07	7.74E-06	5.66E-07
Sn-126+D	4.74E-02	5.25E-03	5.13E-08	9.45E-07	4.22E-02	5.74E-06
Sb-125	3.48E-03	7.03E-04	6.20E-09	4.07E-08	2.77E-03	3.13E-07
Te-125m	9.19E-04	9.18E-04	3.70E-09	1.52E-09	1.35E-06	2.24E-08
I-129	6.91E-02	6.90E-02	8.84E-08	1.48E-06	4.70E-05	6.86E-05
Cs-134	2.67E-02	1.83E-02	2.35E-08	1.09E-07	8.37E-03	5.03E-06
Cs-135	1.77E-03	1.77E-03	2.31E-09	4.26E-08	1.53E-07	1.93E-06
Cs-137+D	2.29E-02	1.25E-02	1.62E-08	2.57E-07	1.04E-02	1.18E-05
Ba-133	5.70E-03	8.50E-04	3.97E-09	4.82E-08	4.85E-03	6.13E-07
Pm-147	2.63E-04	2.63E-04	1.99E-08	1.12E-07	6.06E-08	8.74E-08
Sm-147	4.70E-02	4.63E-02	3.79E-05	6.96E-04	0.00E+00	5.03E-05
Sm-151	9.76E-05	9.73E-05	1.52E-08	2.65E-07	3.71E-09	1.01E-07
Eu-150	2.90E-02	1.59E-03	1.36E-07	2.21E-06	2.74E-02	1.53E-06

Table D18. HSRAM Industrial Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
Eu-152	1.90E-02	1.62E-03	1.12E-07	1.50E-06	1.74E-02	1.28E-06
Eu-154	1.87E-02	2.39E-03	1.45E-07	1.66E-06	1.63E-02	1.62E-06
Eu-155	7.14E-04	3.83E-04	2.10E-08	1.77E-07	3.31E-04	1.91E-07
Gd-152	4.27E-02	4.03E-02	1.23E-04	2.27E-03	0.00E+00	4.40E-05
Ho-166m	3.82E-02	2.02E-03	3.93E-07	7.17E-06	3.62E-02	2.19E-06
Re-187	2.38E-06	2.38E-06	2.76E-11	5.00E-10	0.00E+00	2.55E-09
Tl-204	8.47E-04	8.40E-04	1.22E-09	8.97E-09	6.38E-06	3.65E-07
Pb-205	4.08E-04	4.08E-04	1.99E-09	3.67E-08	2.82E-08	4.46E-07
Pb-210+D	1.34E+00	1.34E+00	6.91E-06	1.67E-04	1.95E-05	1.61E-03
Bi-207	2.95E-02	1.37E-03	1.02E-08	1.63E-07	2.81E-02	1.30E-06
Po-209	5.93E-01	5.93E-01	5.44E-06	9.57E-05	6.73E-05	6.19E-04
Po-210	4.75E-01	4.75E-01	4.36E-06	4.22E-06	9.59E-09	2.73E-05
Ra-226+D	3.71E-01	3.33E-01	4.37E-06	1.16E-04	3.74E-02	7.12E-04
Ra-228+D	3.86E-01	3.60E-01	2.47E-06	1.35E-03	2.43E-02	2.94E-04
Ac-227+D	3.72E+00	3.70E+00	8.84E-04	1.33E-02	6.17E-03	3.30E-03
Th-228+D	2.12E-01	2.03E-01	1.74E-04	7.55E-04	7.79E-03	5.23E-05
Th-229+D	1.03E+00	1.01E+00	8.84E-04	1.63E-02	5.87E-03	1.10E-03
Th-230	1.40E-01	1.37E-01	1.33E-04	2.46E-03	1.14E-04	1.52E-04
Th-232	7.18E-01	6.83E-01	5.84E-04	1.19E-02	2.16E-02	1.02E-03
Pa-231	2.67E+00	2.65E+00	6.50E-04	1.50E-02	2.11E-03	3.64E-03
U-232	3.50E-01	3.28E-01	7.57E-06	2.05E-03	2.00E-02	4.11E-04
U-233	7.24E-02	7.23E-02	4.06E-06	7.03E-05	7.64E-06	6.54E-05
U-234	7.09E-02	7.08E-02	4.00E-06	6.06E-05	1.31E-06	6.34E-05
U-235+D	6.93E-02	6.68E-02	3.70E-06	5.77E-05	2.41E-03	6.03E-05
U-236	6.74E-02	6.73E-02	3.78E-06	5.71E-05	6.97E-07	6.03E-05
U-238+D	6.75E-02	6.70E-02	3.59E-06	5.42E-05	3.79E-04	6.01E-05
Np-237+D	1.12E+00	1.11E+00	2.74E-04	4.77E-03	3.92E-03	1.15E-03
Pu-236	2.94E-01	2.93E-01	7.37E-05	5.03E-04	5.51E-04	1.17E-04
Pu-238	8.05E-01	8.00E-01	1.99E-04	3.48E-03	5.72E-07	8.31E-04
Pu-239	8.90E-01	8.85E-01	2.18E-04	4.02E-03	1.13E-06	9.68E-04
Pu-240	8.90E-01	8.85E-01	2.18E-04	4.02E-03	5.85E-07	9.68E-04
Pu-241+D	1.72E-02	1.71E-02	4.19E-06	9.27E-05	1.55E-06	2.24E-05
Pu-242	8.45E-01	8.40E-01	2.09E-04	3.85E-03	5.11E-07	9.19E-04
Pu-244+D	8.42E-01	8.30E-01	2.05E-04	3.78E-03	7.12E-03	9.09E-04
Am-241	9.15E-01	9.10E-01	2.26E-04	4.11E-03	1.73E-04	9.85E-04
Am-242m+D	8.86E-01	8.80E-01	2.16E-04	4.12E-03	2.50E-04	9.88E-04
Am-243+D	9.16E-01	9.08E-01	2.24E-04	4.12E-03	3.48E-03	9.92E-04
Cm-242	2.88E-02	2.88E-02	8.79E-06	2.66E-05	4.44E-08	5.91E-06
Cm-243	6.33E-01	6.28E-01	1.56E-04	2.46E-03	1.92E-03	5.86E-04
Cm-244	5.07E-01	5.05E-01	1.26E-04	1.82E-03	3.95E-07	4.34E-04
Cm-245	9.42E-01	9.35E-01	2.31E-04	4.29E-03	1.35E-03	1.03E-03
Cm-246	9.30E-01	9.25E-01	2.29E-04	4.22E-03	4.63E-07	1.01E-03
Cm-247+D	8.67E-01	8.55E-01	2.10E-04	3.88E-03	6.88E-03	9.36E-04
Cm-248	3.42E+00	3.40E+00	8.38E-04	1.54E-02	3.50E-07	3.72E-03
Cm-250+D	1.95E+01	1.94E+01	4.78E-03	8.81E-02	6.73E-03	2.13E-02
Bk-247	1.18E+00	1.18E+00	2.92E-04	5.36E-03	1.68E-03	1.28E-03
Cf-248	8.37E-02	8.35E-02	2.26E-05	1.32E-04	7.83E-08	3.06E-05

Table D18. HSRAM Industrial Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
Cf-249	1.20E+00	1.19E+00	2.93E-04	5.32E-03	6.75E-03	1.28E-03
Cf-250	5.35E-01	5.33E-01	1.33E-04	1.77E-03	3.41E-07	4.20E-04
Cf-251	1.22E+00	1.21E+00	2.99E-04	5.47E-03	2.05E-03	1.32E-03
Cf-252	2.71E-01	2.70E-01	6.96E-05	3.93E-04	2.15E-07	9.04E-05
The averaging period is 20 years, with no prior irrigation.						

Table D19. HSRAM Industrial Scenario Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
H-3	6.75E-10	5.60E-10	1.15E-10	0.00E+00	0.00E+00	2.49E-15
Be-10	3.53E-08	3.52E-08	9.55E-13	1.75E-11	5.90E-11	1.10E-10
C-14	7.76E-09	7.75E-09	7.18E-14	1.08E-12	5.12E-13	1.25E-11
Na-22	2.96E-07	4.81E-08	3.95E-14	2.19E-13	2.47E-07	3.24E-11
Al-26	1.15E-06	8.65E-08	7.03E-13	1.30E-11	1.06E-06	2.57E-10
Si-32+D	6.29E-08	6.20E-08	3.10E-12	5.39E-11	7.11E-10	1.65E-10
Cl-36	1.66E-08	1.65E-08	2.54E-13	1.78E-12	5.27E-11	1.59E-11
K-40	1.79E-07	1.24E-07	1.05E-13	1.67E-12	5.52E-08	2.93E-10
Ca-41	1.77E-09	1.77E-09	2.12E-15	3.35E-14	0.00E+00	2.68E-12
Ti-44+D	8.76E-07	1.36E-07	2.05E-12	3.43E-11	7.39E-07	3.55E-10
V-49	6.10E-10	6.10E-10	1.49E-15	3.39E-15	0.00E+00	2.38E-13
Mn-54	4.70E-08	1.14E-08	5.97E-14	1.26E-13	3.56E-08	3.22E-12
Fe-55	4.31E-09	4.31E-09	8.12E-15	4.70E-14	0.00E+00	3.59E-12
Fe-60+D	1.40E-06	9.00E-07	1.87E-12	3.79E-11	5.01E-07	2.04E-09
Co-60	5.55E-07	7.85E-08	3.64E-13	3.23E-12	4.77E-07	1.06E-10
Ni-59	1.37E-09	1.37E-09	4.73E-15	8.73E-14	0.00E+00	4.01E-12
Ni-63	3.36E-09	3.35E-09	1.67E-14	2.93E-13	0.00E+00	9.35E-12
Se-79	3.65E-08	3.65E-08	3.38E-14	3.45E-13	4.86E-13	4.84E-11
Rb-87	2.62E-08	2.61E-08	2.17E-14	3.90E-13	7.09E-12	6.66E-11
Sr-90+D	3.72E-07	3.70E-07	1.15E-12	1.79E-11	1.33E-09	6.67E-10
Zr-93	5.57E-09	5.55E-09	7.41E-14	1.45E-12	7.18E-13	1.45E-11
Nb-91	4.43E-09	4.02E-09	1.93E-14	3.50E-13	3.99E-10	1.24E-11
Nb-93m	4.03E-09	4.02E-09	1.93E-14	2.70E-13	2.32E-12	9.58E-12
Nb-94	6.16E-07	3.89E-08	3.83E-13	7.00E-12	5.77E-07	1.11E-10
Mo-93	1.68E-08	1.68E-08	1.29E-14	2.69E-13	1.50E-11	2.65E-11
Tc-99	1.38E-08	1.38E-08	1.43E-13	1.46E-12	3.60E-12	2.32E-11
Ru-106+D	2.21E-07	2.11E-07	1.04E-12	2.57E-12	1.04E-08	8.75E-11
Pd-107	1.25E-09	1.25E-09	1.72E-14	3.08E-13	0.00E+00	3.86E-12
Ag-108m+D	5.86E-07	4.07E-08	2.71E-13	4.75E-12	5.45E-07	9.97E-11
Cd-109	2.51E-08	2.50E-08	1.50E-13	4.53E-13	1.14E-10	1.02E-11
Cd-113m	1.44E-07	1.44E-07	1.32E-12	1.77E-11	2.58E-11	2.03E-10
In-115	1.69E-07	1.69E-07	4.09E-12	7.55E-11	2.16E-11	3.20E-10
Sn-121m+D	1.76E-08	1.75E-08	1.65E-13	2.79E-12	7.24E-11	5.03E-11
Sn-126+D	8.41E-07	1.36E-07	1.03E-12	1.89E-11	7.05E-07	4.10E-10
Sb-125	6.73E-08	2.19E-08	1.69E-13	1.13E-12	4.54E-08	2.27E-11
Te-125m	1.67E-08	1.67E-08	1.19E-13	4.89E-14	1.24E-11	1.09E-12

Table D19. HSRAM Industrial Scenario Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
I-129	7.42E-07	7.40E-07	6.17E-13	1.03E-11	4.43E-10	1.35E-09
Cs-134	3.53E-07	2.11E-07	1.68E-13	7.75E-13	1.42E-07	7.97E-11
Cs-135	2.37E-08	2.37E-08	1.89E-14	3.48E-13	1.89E-12	3.93E-11
Cs-137+D	3.27E-07	1.52E-07	1.21E-13	1.92E-12	1.75E-07	2.04E-10
Ba-133	1.10E-07	3.41E-08	1.18E-13	1.43E-12	7.58E-08	5.01E-11
Pm-147	8.46E-09	8.45E-09	1.64E-13	9.17E-13	7.80E-13	8.12E-12
Sm-147	1.89E-07	1.87E-07	6.99E-11	1.28E-09	0.00E+00	4.13E-10
Sm-151	2.78E-09	2.78E-09	4.96E-14	8.64E-13	2.72E-14	8.22E-12
Eu-150	4.78E-07	2.17E-08	1.14E-12	1.85E-11	4.56E-07	5.20E-11
Eu-152	3.37E-07	3.04E-08	9.25E-13	1.23E-11	3.07E-07	6.42E-11
Eu-154	3.41E-07	5.15E-08	1.17E-12	1.34E-11	2.89E-07	9.67E-11
Eu-155	1.40E-08	9.50E-09	1.50E-13	1.26E-12	4.51E-09	1.34E-11
Gd-152	1.51E-07	1.49E-07	9.25E-11	1.70E-09	0.00E+00	3.43E-10
Ho-166m	6.49E-07	4.02E-08	3.14E-12	5.73E-11	6.09E-07	1.14E-10
Re-187	8.98E-11	8.95E-11	2.55E-16	4.62E-15	0.00E+00	2.58E-13
Tl-204	2.94E-08	2.93E-08	2.49E-14	1.82E-13	8.76E-11	3.35E-11
Pb-205	3.17E-09	3.17E-09	6.54E-15	1.21E-13	2.80E-13	6.90E-12
Pb-210+D	4.46E-06	4.45E-06	3.14E-11	2.05E-09	2.76E-10	1.18E-08
Bi-207	5.20E-07	2.83E-08	2.13E-13	3.42E-12	4.91E-07	7.08E-11
Po-209	2.36E-06	2.35E-06	1.37E-10	2.42E-09	1.01E-09	5.19E-09
Po-210	1.89E-06	1.89E-06	1.10E-10	1.06E-10	1.66E-13	2.29E-10
Ra-226+D	2.61E-06	1.93E-06	1.18E-10	2.60E-09	6.75E-07	6.54E-09
Ra-228+D	5.66E-06	5.20E-06	5.29E-11	1.16E-08	4.45E-07	8.26E-09
Ac-227+D	2.56E-06	2.44E-06	1.42E-09	2.14E-08	9.58E-08	5.17E-09
Th-228+D	1.66E-06	1.51E-06	1.45E-09	6.31E-09	1.47E-07	1.05E-09
Th-229+D	2.78E-06	2.64E-06	2.25E-09	4.14E-08	9.27E-08	7.06E-09
Th-230	4.64E-07	4.55E-07	2.90E-10	5.35E-09	2.04E-09	1.12E-09
Th-232	9.26E-07	5.05E-07	4.40E-10	1.79E-08	3.94E-07	8.91E-09
Pa-231	9.14E-07	8.65E-07	4.14E-10	1.25E-08	3.27E-08	3.21E-09
U-232	1.86E-06	1.46E-06	1.98E-10	1.90E-08	3.78E-07	5.11E-09
U-233	3.62E-07	3.59E-07	1.18E-10	1.80E-09	1.15E-10	7.21E-10
U-234	3.56E-07	3.54E-07	1.16E-10	1.75E-09	1.66E-11	7.08E-10
U-235+D	3.97E-07	3.59E-07	1.03E-10	1.55E-09	3.56E-08	7.31E-10
U-236	3.37E-07	3.35E-07	1.07E-10	1.61E-09	8.18E-12	6.68E-10
U-238+D	4.44E-07	4.36E-07	9.50E-11	1.44E-09	6.31E-09	9.41E-10
Np-237+D	4.01E-07	3.37E-07	1.80E-10	3.13E-09	6.01E-08	8.36E-10
Pu-236	3.87E-07	3.74E-07	2.32E-10	1.93E-09	1.04E-08	4.57E-10
Pu-238	6.63E-07	6.55E-07	3.41E-10	5.97E-09	5.47E-12	1.41E-09
Pu-239	6.83E-07	6.75E-07	3.38E-10	6.24E-09	1.60E-11	1.51E-09
Pu-240	6.83E-07	6.75E-07	3.38E-10	6.24E-09	5.57E-12	1.51E-09
Pu-241+D	8.94E-09	8.80E-09	3.39E-12	9.13E-11	1.96E-11	2.35E-11
Pu-242	6.48E-07	6.40E-07	3.18E-10	5.87E-09	5.00E-12	1.44E-09
Pu-244+D	8.49E-07	7.20E-07	2.98E-10	5.50E-09	1.21E-07	1.72E-09
Am-241	5.29E-07	5.20E-07	2.85E-10	5.21E-09	2.18E-09	1.17E-09
Am-242m+D	3.73E-07	3.63E-07	1.60E-10	5.20E-09	3.68E-09	1.19E-09
Am-243+D	5.97E-07	5.40E-07	2.74E-10	5.05E-09	5.08E-08	1.27E-09

Table D19. HSRAM Industrial Scenario Incremental Cancer Risks from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Total	Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion
Cm-242	1.93E-07	1.93E-07	1.53E-10	2.03E-10	4.06E-13	4.21E-11
Cm-243	5.08E-07	4.74E-07	2.73E-10	4.30E-09	2.86E-08	9.58E-10
Cm-244	4.23E-07	4.18E-07	2.57E-10	3.72E-09	3.04E-12	7.78E-10
Cm-245	5.46E-07	5.20E-07	2.81E-10	5.21E-09	1.90E-08	1.20E-09
Cm-246	5.17E-07	5.10E-07	2.81E-10	5.18E-09	3.65E-12	1.16E-09
Cm-247+D	6.16E-07	5.00E-07	2.54E-10	4.68E-09	1.09E-07	1.16E-09
Cm-248	1.89E-06	1.87E-06	1.00E-09	1.85E-08	2.73E-12	4.25E-09
Cm-250+D	1.09E-05	1.07E-05	5.63E-09	1.04E-07	1.14E-07	2.44E-08
Bk-247	6.52E-07	6.20E-07	3.31E-10	6.09E-09	2.46E-08	1.36E-09
Cf-248	2.23E-07	2.22E-07	1.84E-10	5.79E-10	5.96E-13	1.13E-10
Cf-249	7.51E-07	6.35E-07	3.45E-10	6.27E-09	1.08E-07	1.37E-09
Cf-250	4.36E-07	4.31E-07	2.70E-10	3.59E-09	2.58E-12	7.29E-10
Cf-251	6.98E-07	6.60E-07	3.45E-10	6.32E-09	2.98E-08	1.45E-09
Cf-252	2.44E-07	2.43E-07	1.58E-10	8.94E-10	2.12E-12	1.74E-10

The total risk from 20 years of intakes is shown.

Table D20. HSRAM Industrial Scenario Hazard Index by Pathway, per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	1.56E+01	1.40E+01	na	na	1.61E+00	2.69E-04	8.73E-04
57-12-5	4.98E-01	4.89E-01	na	na	8.32E-03	3.38E-04	2.88E-04
57-14-7	na	na	na	na	na	na	na
57-55-6	2.04E-02	1.96E-02	6.17E-04	1.75E-04	1.90E-05	3.51E-06	8.78E-06
58-89-9	3.60E+01	3.26E+01	na	na	3.13E+00	4.71E-02	2.28E-01
60-29-7	4.95E-02	4.89E-02	na	na	5.89E-04	8.89E-07	3.56E-06
60-34-4	na	na	na	na	na	na	na
60-57-1	2.56E+02	1.96E+02	na	na	5.82E+01	6.60E-01	1.65E+00
62-75-9	1.23E+03	1.22E+03	na	na	2.17E+00	5.76E-01	1.44E+00
64-18-6	4.91E-03	4.89E-03	na	na	1.35E-05	1.29E-06	3.23E-06
67-56-1	1.96E-02	1.96E-02	na	na	2.82E-05	1.35E-06	5.41E-06
67-64-1	1.09E-02	1.09E-02	na	na	2.49E-05	4.30E-07	1.78E-06
67-66-3	1.16E+02	9.78E-01	1.15E+02	2.97E-05	1.46E-01	7.45E-05	7.45E-05
67-72-1	1.37E+01	9.78E+00	na	na	3.90E+00	3.00E-03	7.50E-03
71-36-3	1.38E+01	9.78E-02	1.37E+01	4.37E-05	1.86E-03	1.33E-05	3.32E-05
71-43-2	1.42E+01	2.45E+00	1.15E+01	4.24E-06	1.74E-01	5.47E-05	2.65E-04
71-55-6	1.94E-01	3.49E-02	1.57E-01	3.50E-08	2.22E-03	5.10E-07	2.29E-06
72-20-8	2.78E+02	3.26E+01	na	na	2.42E+02	2.82E+00	2.82E-01
74-83-9	7.62E+01	6.99E+00	6.91E+01	1.53E-05	1.02E-01	1.14E-04	4.56E-04
74-87-3	3.84E+00	na	3.84E+00	7.78E-07	na	na	na
75-00-3	5.98E-02	2.45E-02	3.45E-02	6.75E-09	8.15E-04	3.52E-07	1.41E-06
75-01-4	6.84E+00	3.26E+00	3.45E+00	6.80E-07	1.23E-01	3.78E-05	1.89E-04
75-05-8	5.78E+00	na	5.78E+00	3.99E-06	na	na	na

Table D20. HSRAM Industrial Scenario Hazard Index by Pathway, per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
75-07-0	3.84E+01	na	3.84E+01	1.67E-05	na	na	na
75-09-2	2.81E-01	1.63E-01	1.15E-01	2.86E-08	2.56E-03	2.51E-06	1.19E-05
75-15-0	6.00E-01	9.78E-02	4.94E-01	8.96E-08	8.09E-03	4.16E-05	5.24E-06
75-21-8	na	na	na	na	na	na	na
75-34-3	7.92E-01	9.78E-02	6.91E-01	1.76E-07	2.90E-03	1.47E-06	7.33E-06
75-35-4	1.94E+00	1.96E-01	1.73E+00	3.54E-07	1.04E-02	2.36E-06	1.18E-05
75-45-6	6.91E-03	na	6.91E-03	1.38E-09	na	na	na
75-68-3	6.91E-03	na	6.91E-03	1.38E-09	na	na	na
75-69-4	5.35E-01	3.26E-02	4.94E-01	9.61E-08	8.19E-03	1.63E-06	1.87E-06
75-71-8	1.79E+00	4.89E-02	1.73E+00	3.32E-07	8.45E-03	2.41E-06	2.77E-06
76-13-1	1.19E-02	3.26E-04	1.15E-02	2.40E-09	3.27E-05	5.01E-09	2.00E-08
76-44-8	3.94E+01	1.96E+01	na	na	1.96E+01	3.93E-02	1.42E-01
78-83-1	3.29E-02	3.26E-02	na	na	3.17E-04	2.53E-06	1.01E-05
78-87-5	8.67E+01	na	8.67E+01	3.10E-05	na	na	na
78-93-3	8.55E-02	1.63E-02	6.91E-02	4.56E-08	7.56E-05	7.94E-07	3.17E-06
79-00-5	2.51E+00	2.45E+00	na	na	6.49E-02	1.08E-04	4.37E-04
79-01-6	5.27E+01	3.26E+01	8.67E+00	2.20E-06	1.14E+01	3.26E-03	2.44E-03
79-10-7	5.25E+00	1.96E-02	5.22E+00	5.13E-04	1.61E-04	3.43E-06	8.57E-06
79-34-5	1.70E-01	1.63E-01	na	na	6.98E-03	1.59E-05	5.56E-05
79-46-9	1.73E+01	na	1.73E+01	1.53E-05	na	na	na
82-68-8	4.09E+00	3.26E+00	na	na	8.07E-01	3.91E-03	1.57E-02
83-32-9	3.98E-01	1.63E-01	na	na	2.34E-01	3.33E-04	5.16E-04
84-66-2	1.25E-02	1.22E-02	na	na	1.99E-04	7.63E-06	3.43E-05
84-74-2	1.18E-01	9.78E-02	na	na	1.95E-02	1.11E-04	5.55E-04
85-68-7	6.40E-02	4.89E-02	na	na	1.45E-02	1.41E-04	4.32E-04
87-68-3	5.90E+01	3.26E+01	na	na	2.64E+01	2.91E-03	7.27E-03
87-86-5	5.42E-01	3.26E-01	na	na	2.12E-01	4.98E-04	2.49E-03
88-06-2	1.31E+02	9.78E+01	na	na	3.24E+01	2.18E-01	5.44E-01
88-85-7	1.13E+01	9.78E+00	na	na	1.44E+00	2.96E-02	7.41E-02
91-20-3	1.16E+02	4.89E-01	1.15E+02	4.90E-04	1.42E-01	1.53E-04	6.13E-04
92-52-4	3.87E-01	1.96E-01	na	na	1.91E-01	2.10E-04	5.25E-04
95-47-6	3.52E+00	4.89E-02	3.45E+00	2.00E-06	1.44E-02	2.09E-06	8.34E-06
95-48-7	2.10E-01	1.96E-01	na	na	1.32E-02	3.00E-04	7.49E-04
95-50-1	1.87E+00	1.09E-01	1.73E+00	1.81E-06	2.99E-02	8.39E-06	3.35E-05
95-57-8	2.10E+00	1.96E+00	na	na	1.37E-01	2.14E-03	5.35E-03
95-63-6	5.81E+01	1.96E-01	5.78E+01	4.48E-05	1.09E-01	1.12E-05	4.47E-05
95-95-4	1.33E-01	9.78E-02	na	na	3.41E-02	2.22E-04	5.54E-04
98-86-2	9.99E-02	9.78E-02	na	na	1.91E-03	2.60E-05	1.04E-04
98-95-3	1.90E+02	1.96E+01	1.70E+02	8.09E-04	4.69E-01	5.56E-03	2.70E-02
100-25-4	9.96E+01	9.78E+01	na	na	1.27E+00	1.28E-01	3.20E-01
100-41-4	4.68E-01	9.78E-02	3.45E-01	1.89E-07	2.49E-02	3.26E-06	1.58E-05
100-42-5	4.06E-01	4.89E-02	3.45E-01	3.23E-07	1.12E-02	3.37E-06	1.35E-05
100-51-6	3.31E-02	3.26E-02	na	na	4.16E-04	1.01E-05	3.34E-05
106-42-3	3.52E+00	4.89E-02	3.45E+00	1.83E-06	1.51E-02	1.91E-06	7.65E-06
106-44-5	2.07E+00	1.96E+00	na	na	1.00E-01	2.22E-03	7.23E-03
106-46-7	8.39E-01	3.26E-01	4.31E-01	4.00E-07	8.10E-02	1.98E-05	8.92E-05

Table D20. HSRAM Industrial Scenario Hazard Index by Pathway, per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
106-93-4	1.73E+03	na	1.73E+03	1.73E-03	na	na	na
106-99-0	1.73E+02	na	1.73E+02	3.24E-05	na	na	na
107-02-8	1.73E+04	1.96E+01	1.73E+04	6.99E-03	6.97E-02	5.83E-04	2.33E-03
107-05-1	3.46E+02	1.96E-01	3.45E+02	7.62E-05	1.25E-02	3.18E-06	1.27E-05
107-06-2	7.09E+01	3.26E-01	7.06E+01	2.69E-05	5.82E-03	7.33E-06	3.66E-05
107-13-1	1.83E+02	9.78E+00	1.73E+02	8.25E-05	5.56E-02	3.44E-04	1.37E-03
108-10-1	2.40E-01	1.22E-01	1.15E-01	7.51E-08	2.03E-03	5.87E-06	2.35E-05
108-38-3	3.52E+00	4.89E-02	3.45E+00	1.88E-06	1.64E-02	1.96E-06	7.85E-06
108-39-4	2.10E-01	1.96E-01	na	na	1.35E-02	2.92E-04	7.31E-04
108-67-8	5.81E+01	1.96E-01	5.78E+01	3.86E-05	7.71E-02	9.64E-06	3.86E-05
108-87-2	1.15E-01	na	1.15E-01	2.25E-08	na	na	na
108-88-3	9.25E-01	4.89E-02	8.67E-01	3.59E-07	9.25E-03	1.49E-06	5.98E-06
108-90-7	6.52E+00	4.89E-01	5.81E+00	3.67E-06	2.15E-01	5.88E-05	9.12E-05
108-94-1	1.97E-03	1.96E-03	na	na	1.47E-05	3.10E-07	1.24E-06
108-95-2	3.34E-02	3.26E-02	na	na	6.69E-04	2.42E-05	1.09E-04
109-99-9	1.20E+00	4.66E-02	1.15E+00	6.70E-07	4.58E-04	3.19E-06	7.98E-06
110-00-9	1.01E+01	9.78E+00	na	na	2.68E-01	2.10E-04	8.39E-04
110-54-3	2.12E+00	1.63E-01	1.73E+00	3.17E-07	2.27E-01	2.21E-06	8.82E-06
110-80-5	5.78E-02	2.45E-02	3.32E-02	2.54E-06	5.20E-05	4.23E-06	1.06E-05
110-82-7	5.78E-02	na	5.78E-02	1.17E-08	na	na	na
110-86-1	9.91E+00	9.78E+00	na	na	1.19E-01	3.14E-03	7.85E-03
111-76-2	2.15E-02	1.96E-02	1.74E-03	3.82E-08	1.84E-04	3.31E-06	8.29E-06
111-90-0	1.64E-01	1.63E-01	1.05E-04	1.87E-04	1.31E-04	3.13E-05	7.82E-05
117-81-7	1.74E+01	4.89E-01	na	na	1.69E+01	5.39E-03	5.12E-03
117-84-0	4.29E+00	2.45E-01	na	na	4.04E+00	5.68E-04	2.56E-03
118-74-1	4.56E+01	1.22E+01	na	na	3.33E+01	4.66E-03	1.16E-02
120-82-1	8.80E+01	9.78E-01	8.67E+01	1.97E-04	3.61E-01	1.35E-04	6.56E-04
121-14-2	4.99E+00	4.89E+00	na	na	7.23E-02	4.74E-03	2.01E-02
121-44-8	4.94E+01	na	4.94E+01	7.92E-05	na	na	na
122-39-4	5.36E-01	3.91E-01	na	na	1.41E-01	8.83E-04	2.21E-03
123-91-1	na	na	na	na	na	na	na
126-73-8	5.96E-02	4.89E-02	na	na	1.02E-02	1.35E-04	3.38E-04
126-98-7	5.93E+02	9.78E+01	4.94E+02	2.49E-04	9.23E-01	3.64E-03	1.46E-02
127-18-4	1.72E+00	9.78E-01	5.81E-01	1.46E-07	1.57E-01	1.45E-05	7.27E-05
129-00-0	1.47E+00	3.26E-01	na	na	1.14E+00	1.98E-03	3.07E-03
141-78-6	1.10E-02	1.09E-02	na	na	8.26E-05	4.39E-07	1.76E-06
156-59-2	1.03E+00	9.78E-01	na	na	4.87E-02	1.65E-05	8.27E-05
206-44-0	1.60E+00	2.45E-01	na	na	1.35E+00	1.51E-03	2.33E-03
309-00-2	1.35E+03	3.26E+02	na	na	1.02E+03	1.24E+00	3.09E+00
319-84-6	2.16E+01	1.96E+01	na	na	1.88E+00	2.64E-02	1.28E-01
319-85-7	5.44E+01	4.89E+01	na	na	5.01E+00	7.94E-02	3.61E-01
541-73-1	1.44E+01	1.09E+01	na	na	3.52E+00	7.74E-04	3.10E-03
542-75-6	1.77E+01	3.26E-01	1.73E+01	6.58E-06	2.20E-02	1.33E-05	3.66E-05
621-64-7	na	na	na	na	na	na	na
1314-62-1	1.45E+00	1.09E+00	na	na	3.47E-01	1.19E-03	1.19E-02
1330-20-7	3.52E+00	4.89E-02	3.45E+00	1.95E-06	1.25E-02	1.77E-06	8.15E-06

Table D20. HSRAM Industrial Scenario Hazard Index by Pathway, per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	1.24E+02	1.22E+02	na	na	5.26E-04	5.35E-01	1.34E+00
7429-90-5	1.32E-02	9.78E-03	1.39E-05	2.56E-03	6.99E-04	2.14E-05	1.07E-04
7439-89-6	3.32E-02	3.26E-02	na	na	1.79E-04	4.76E-05	3.57E-04
7439-93-2	4.96E-01	4.89E-01	na	na	1.00E-03	1.33E-04	5.33E-03
7439-96-5	4.93E-01	2.10E-01	1.39E-03	2.56E-01	2.24E-02	1.15E-03	2.29E-03
7439-97-6	1.67E-02	na	2.32E-04	1.64E-02	na	na	na
7439-98-7	1.99E+00	1.96E+00	na	na	1.24E-02	9.46E-04	1.80E-02
7440-02-0	4.97E-01	4.89E-01	na	na	1.99E-03	3.97E-04	5.35E-03
7440-22-4	2.00E+00	1.96E+00	na	na	2.21E-02	2.34E-03	2.11E-02
7440-24-6	1.67E-02	1.63E-02	na	na	2.20E-04	1.77E-05	1.77E-04
7440-28-0	1.51E+02	1.48E+02	na	na	5.18E-01	2.16E-01	1.62E+00
7440-31-5	1.81E-02	1.63E-02	na	na	1.57E-03	3.57E-05	1.78E-04
7440-36-0	2.95E+01	2.45E+01	na	na	4.45E+00	2.68E-01	2.68E-01
7440-38-2	3.35E+01	3.26E+01	na	na	5.13E-01	1.73E-02	3.55E-01
7440-39-3	1.70E-01	1.40E-01	1.39E-04	2.51E-02	2.69E-03	4.27E-04	1.50E-03
7440-41-7	6.77E+00	4.89E+00	3.48E-03	6.39E-01	1.08E+00	1.07E-01	5.33E-02
7440-42-8	1.11E-01	1.09E-01	3.48E-06	4.33E-04	9.20E-04	1.78E-05	8.03E-04
7440-43-9	2.11E+01	1.96E+01	na	na	4.58E-01	8.41E-01	2.10E-01
7440-45-1	6.45E-02	na	3.48E-04	6.42E-02	na	na	na
7440-48-4	1.13E+00	4.89E-01	3.48E-03	6.28E-01	2.47E-03	1.31E-04	5.23E-03
7440-50-8	2.48E-01	2.45E-01	na	na	8.36E-04	1.72E-04	2.57E-03
7440-62-2	2.07E+00	1.40E+00	na	na	6.30E-01	3.06E-02	1.53E-02
7440-66-6	3.32E-02	3.26E-02	na	na	1.86E-04	3.55E-05	3.55E-04
7487-94-7	3.31E+01	3.26E+01	na	na	4.58E-02	8.93E-02	3.13E-01
7664-41-7	4.87E-01	na	4.87E-01	6.37E-06	na	na	na
7723-14-0	5.01E+02	4.89E+02	na	na	6.20E+00	4.63E-01	4.63E+00
7782-41-4	1.66E-01	1.63E-01	na	na	9.04E-04	3.65E-05	1.77E-03
7782-49-2	1.98E+00	1.96E+00	na	na	1.34E-02	5.64E-04	1.24E-02
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	2.84E+03	4.89E+02	na	na	2.34E+03	4.80E+00	3.60E+00
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	4.01E+02	1.40E+02	na	na	2.59E+02	1.10E+00	8.28E-01
14797-55-8	6.18E-03	6.12E-03	na	na	4.58E-05	8.97E-07	2.24E-05
14797-65-0	9.89E-02	9.78E-02	na	na	7.06E-04	1.44E-05	3.59E-04
16065-83-1	1.12E-02	6.52E-03	na	na	4.36E-03	2.80E-04	7.00E-05
16984-48-8	1.66E-01	1.63E-01	na	na	9.04E-04	3.65E-05	1.77E-03
18540-29-9	3.88E+00	3.26E+00	8.67E-03	4.30E-02	5.45E-01	1.20E-02	1.20E-02
53469-21-9	na	na	na	na	na	na	na
Uranium	1.65E+01	1.63E+01	na	na	6.41E-02	3.49E-03	1.48E-01
Cr Mixture	5.64E-01	4.72E-01	1.24E-03	6.14E-03	8.15E-02	1.95E-03	1.77E-03

"na" means that one or more of the cancer induction slope factors was not available.

Table D21. HSRAM Industrial Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
50-32-8	2.95E-01	2.04E-02	1.62E-03	3.13E-06	2.73E-01	1.40E-04	2.16E-04
53-70-3	3.91E-01	2.04E-02	4.37E-04	3.19E-06	3.69E-01	1.42E-04	2.21E-04
56-23-5	1.87E-03	3.63E-04	1.47E-03	3.11E-10	4.18E-05	6.99E-09	2.27E-08
57-12-5	na	na	na	na	na	na	na
57-14-7	9.79E-03	8.39E-03	1.38E-03	1.80E-06	6.55E-06	3.66E-06	9.14E-06
57-55-6	na	na	na	na	na	na	na
58-89-9	4.01E-03	3.63E-03	na	na	3.49E-04	5.24E-06	2.54E-05
60-29-7	na	na	na	na	na	na	na
60-34-4	9.04E-03	8.39E-03	6.27E-04	1.59E-06	1.00E-05	3.24E-06	8.09E-06
60-57-1	2.43E-01	4.47E-02	1.85E-01	1.29E-05	1.33E-02	1.51E-04	3.77E-04
62-75-9	2.50E-01	1.43E-01	1.07E-01	5.75E-06	2.52E-04	6.71E-05	1.68E-04
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	2.27E-03	6.43E-07	2.27E-03	5.87E-10	9.58E-08	4.90E-11	4.90E-11
67-72-1	4.50E-04	3.91E-05	3.95E-04	1.03E-09	1.56E-05	1.20E-08	3.00E-08
71-36-3	na	na	na	na	na	na	na
71-43-2	9.35E-04	1.54E-04	7.71E-04	2.83E-10	1.10E-05	3.44E-09	1.67E-08
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	2.15E-04	3.63E-05	1.78E-04	3.60E-11	6.30E-07	5.42E-10	2.17E-09
75-00-3	8.38E-06	8.11E-06	na	na	2.70E-07	1.17E-10	4.67E-10
75-01-4	2.52E-03	2.01E-03	4.35E-04	8.55E-11	7.60E-05	2.34E-08	1.17E-07
75-05-8	na	na	na	na	na	na	na
75-07-0	2.17E-04	na	2.17E-04	9.43E-11	na	na	na
75-09-2	6.79E-05	2.10E-05	4.66E-05	1.16E-11	3.29E-07	3.23E-10	1.53E-09
75-15-0	na	na	na	na	na	na	na
75-21-8	1.27E-02	2.85E-03	9.88E-03	3.40E-09	7.48E-06	7.23E-08	2.89E-07
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	1.52E-01	1.26E-02	1.27E-01	3.12E-06	1.26E-02	2.53E-05	9.11E-05
78-83-1	na	na	na	na	na	na	na
78-87-5	1.99E-04	1.90E-04	na	na	8.51E-06	5.42E-09	2.01E-08
78-93-3	na	na	na	na	na	na	na
79-00-5	1.77E-03	1.59E-04	1.61E-03	9.74E-10	4.23E-06	7.02E-09	2.84E-08
79-01-6	1.28E-02	1.12E-03	1.13E-02	2.87E-09	3.91E-04	1.12E-07	8.38E-08
79-10-7	na	na	na	na	na	na	na

Table D21. HSRAM Industrial Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
79-34-5	6.23E-03	5.59E-04	5.65E-03	6.53E-09	2.39E-05	5.44E-08	1.91E-07
79-46-9	2.65E-01	na	2.65E-01	2.35E-07	na	na	na
82-68-8	9.11E-04	7.27E-04	na	na	1.80E-04	8.72E-07	3.49E-06
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	2.60E-03	2.18E-04	2.20E-03	1.66E-09	1.76E-04	1.94E-08	4.86E-08
87-86-5	5.57E-04	3.35E-04	na	na	2.18E-04	5.13E-07	2.56E-06
88-06-2	7.42E-05	3.08E-05	3.30E-05	5.85E-09	1.02E-05	6.84E-08	1.71E-07
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	1.09E-04	na	1.09E-04	5.95E-11	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	7.05E-04	6.71E-05	6.21E-04	5.76E-10	1.67E-05	4.08E-09	1.83E-08
106-93-4	2.63E-01	2.38E-01	2.17E-02	2.18E-08	3.32E-03	1.75E-05	7.02E-05
106-99-0	2.96E-03	na	2.96E-03	5.55E-10	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	2.83E-03	2.54E-04	2.57E-03	9.79E-10	4.54E-06	5.72E-09	2.86E-08
107-13-1	8.24E-03	1.51E-03	6.72E-03	3.20E-09	8.57E-06	5.30E-08	2.12E-07
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	2.13E-04	2.12E-05	1.92E-04	1.11E-10	2.09E-07	1.46E-09	3.64E-09
110-00-9	na	na	na	na	na	na	na

Table D21. HSRAM Industrial Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	1.40E-03	3.91E-05	na	na	1.36E-03	4.31E-07	4.10E-07
117-84-0	na	na	na	na	na	na	na
118-74-1	6.18E-02	4.47E-03	4.52E-02	1.46E-07	1.22E-02	1.70E-06	4.26E-06
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	3.08E-05	3.08E-05	na	na	4.57E-08	1.96E-09	7.85E-09
126-73-8	1.84E-05	1.51E-05	na	na	3.16E-06	4.17E-08	1.04E-07
126-98-7	na	na	na	na	na	na	na
127-18-4	2.26E-04	1.45E-04	5.73E-05	1.44E-11	2.34E-05	2.16E-09	1.08E-08
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	6.76E-01	4.75E-02	4.80E-01	1.54E-05	1.48E-01	1.80E-04	4.50E-04
319-84-6	1.08E-01	1.76E-02	8.87E-02	3.95E-06	1.69E-03	2.38E-05	1.15E-04
319-85-7	6.51E-03	5.03E-03	9.14E-04	1.27E-06	5.15E-04	8.17E-06	3.72E-05
541-73-1	na	na	na	na	na	na	na
542-75-6	6.94E-04	2.80E-04	3.95E-04	1.50E-10	1.88E-05	1.14E-08	3.13E-08
621-64-7	2.04E-02	1.96E-02	na	na	7.40E-04	5.22E-05	6.53E-05
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	1.63E-02	1.12E-03	1.13E-02	1.19E-06	3.83E-03	4.63E-05	3.47E-05
1336-36-3	1.22E-02	1.96E-04	1.13E-02	1.19E-06	6.70E-04	4.63E-05	3.47E-05
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	4.32E-03	4.19E-03	1.35E-06	1.57E-05	6.59E-05	2.22E-06	4.56E-05

Table D21. HSRAM Industrial Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Dermal	Soil Dermal	Soil Ingestion
7440-39-3	na	na	na	na	na	na	na
7440-41-7	8.80E-06	na	4.77E-08	8.75E-06	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	6.52E-06	na	3.57E-08	6.48E-06	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	1.01E-05	na	5.56E-08	1.00E-05	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	1.22E-02	3.08E-03	7.62E-03	1.07E-06	1.49E-03	1.25E-05	3.12E-05
11096-82-5	3.53E-02	1.12E-03	1.13E-02	1.62E-06	2.27E-02	6.30E-05	4.73E-05
11097-69-1	1.79E-02	1.12E-03	1.13E-02	1.41E-06	5.35E-03	5.48E-05	4.11E-05
11104-28-2	1.34E-02	1.12E-03	1.13E-02	6.51E-07	9.21E-04	2.53E-05	1.90E-05
11141-16-5	1.34E-02	1.12E-03	1.13E-02	6.51E-07	9.21E-04	2.53E-05	1.90E-05
12672-29-6	1.66E-02	1.12E-03	1.13E-02	9.57E-07	4.12E-03	3.73E-05	2.79E-05
12674-11-2	1.19E-02	1.96E-04	1.13E-02	1.13E-06	3.63E-04	4.41E-05	3.31E-05
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	1.50E-05	na	2.38E-07	1.47E-05	na	na	na
53469-21-9	1.63E-02	1.12E-03	1.13E-02	1.14E-06	3.83E-03	4.43E-05	3.32E-05
Uranium	na	na	na	na	na	na	na
Cr Mixture	2.14E-06	na	3.40E-08	2.11E-06	na	na	na

"na" means that one or more of the cancer induction slope factors was not available.

Table D22a. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
H-3	9.01E-07	1.65E-06	8.96E-07	4.84E-09	0.00E+00
Be-10	6.59E-05	4.70E-03	6.52E-05	4.40E-09	1.37E-07
C-14	2.93E-05	1.03E+00	2.93E-05	2.60E-11	6.10E-10
Na-22	8.90E-04	8.00E-03	1.61E-04	9.51E-11	6.46E-10
Al-26	4.33E-03	1.47E-01	2.04E-04	1.81E-10	5.68E-09
Si-32+D	1.58E-04	2.40E-03	1.54E-04	1.28E-08	3.69E-07
Cl-36	4.26E-05	1.55E-03	4.24E-05	2.72E-10	2.40E-09
K-40	4.59E-04	1.87E-01	2.60E-04	1.54E-10	3.93E-09
Ca-41	1.79E-05	5.24E-04	1.78E-05	1.58E-11	3.95E-10
Ti-44+D	3.28E-03	2.92E-01	3.44E-04	5.61E-09	1.53E-07
V-49	8.60E-07	1.22E-04	8.60E-07	4.28E-12	1.14E-11
Mn-54	1.39E-04	1.19E-02	3.88E-05	8.32E-11	2.05E-10
Fe-55	8.50E-06	1.21E-03	8.50E-06	1.66E-11	1.18E-10
Fe-60+D	4.51E-03	3.57E-01	2.13E-03	3.35E-09	1.13E-07
Co-60	1.82E-03	9.53E-02	3.77E-04	4.11E-10	4.80E-09
Ni-59	2.95E-06	2.12E-04	2.94E-06	1.14E-11	3.58E-10
Ni-63	8.10E-06	5.81E-04	8.08E-06	2.86E-11	8.38E-10
Se-79	1.22E-04	1.48E-02	1.22E-04	8.14E-11	1.13E-09
Rb-87	6.91E-05	9.75E-02	6.89E-05	4.01E-11	1.21E-09
Sr-90+D	2.15E-03	9.35E-02	2.14E-03	3.07E-09	7.55E-08
Zr-93	2.34E-05	4.96E-03	2.32E-05	1.03E-09	3.28E-08
Nb-91	1.05E-05	1.61E-03	7.31E-06	3.99E-11	1.22E-09
Nb-93m	7.34E-06	1.56E-03	7.31E-06	3.99E-11	8.40E-10
Nb-94	2.49E-03	6.34E-02	1.00E-04	4.48E-10	1.39E-08
Mo-93	1.91E-05	1.56E-04	1.89E-05	3.53E-10	8.72E-09
Tc-99	2.05E-05	3.10E-04	2.04E-05	1.03E-10	1.44E-09
Ru-106+D	4.14E-04	3.45E-03	3.84E-04	1.47E-09	4.25E-09
Pd-107	2.10E-06	1.73E-05	2.09E-06	1.59E-10	4.80E-09
Ag-108m+D	2.39E-03	3.81E-02	1.07E-04	3.14E-10	9.13E-09
Cd-109	1.84E-04	2.61E-02	1.83E-04	1.42E-09	5.03E-09
Cd-113m	2.26E-03	3.21E-01	2.25E-03	1.90E-08	3.76E-07
In-115	2.22E-03	1.56E+02	2.21E-03	4.65E-08	1.46E-06
Sn-121m+D	3.21E-05	6.69E-02	3.15E-05	1.48E-10	4.10E-09
Sn-126+D	3.31E-03	6.79E-01	2.94E-04	1.25E-09	3.93E-08
Sb-125	1.83E-04	4.19E-03	3.93E-05	1.52E-10	1.23E-09
Te-125m	5.14E-05	1.46E-02	5.14E-05	9.05E-11	4.27E-11
I-129	3.88E-03	1.14E-01	3.86E-03	2.16E-09	5.89E-08
Cs-134	1.45E-03	1.46E+00	1.03E-03	5.75E-10	3.21E-09
Cs-135	9.93E-05	1.40E-01	9.90E-05	5.65E-11	1.77E-09
Cs-137+D	1.39E-03	1.00E+00	7.00E-04	3.96E-10	9.99E-09
Ba-133	3.40E-04	3.70E-03	4.76E-05	9.70E-11	1.69E-09
Pm-147	1.47E-05	3.27E-04	1.47E-05	4.87E-10	3.35E-09
Sm-147	2.63E-03	4.90E-02	2.59E-03	9.28E-07	2.89E-05
Sm-151	5.47E-06	1.03E-04	5.45E-06	3.73E-10	1.08E-08
Eu-150	1.94E-03	3.24E-02	8.90E-05	3.33E-09	8.66E-08

Table D22a. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
Eu-152	1.17E-03	1.77E-02	9.07E-05	2.74E-09	5.43E-08
Eu-154	1.10E-03	1.64E-02	1.34E-04	3.55E-09	5.72E-08
Eu-155	3.96E-05	9.69E-04	2.14E-05	5.14E-10	5.61E-09
Gd-152	2.36E-03	4.27E-02	2.25E-03	3.02E-06	9.46E-05
Ho-166m	2.69E-03	4.79E-02	1.13E-04	9.60E-09	2.97E-07
Re-187	1.34E-07	1.15E-05	1.33E-07	6.76E-13	2.07E-11
Tl-204	4.74E-05	3.33E-01	4.70E-05	2.99E-11	2.78E-10
Pb-205	2.29E-05	4.87E-03	2.28E-05	4.87E-11	1.53E-09
Pb-210+D	7.54E-02	1.60E+01	7.52E-02	1.69E-07	6.40E-06
Bi-207	1.96E-03	3.00E-02	7.67E-05	2.48E-10	6.34E-09
Po-209	3.33E-02	1.21E+00	3.32E-02	1.33E-07	3.90E-06
Po-210	2.66E-02	9.68E-01	2.66E-02	1.07E-07	1.19E-07
Ra-226+D	2.14E-02	7.38E-01	1.86E-02	1.07E-07	5.45E-06
Ra-228+D	2.17E-02	7.51E-01	2.02E-02	6.04E-08	4.79E-05
Ac-227+D	2.09E-01	3.90E+00	2.07E-01	2.16E-05	5.04E-04
Th-228+D	1.18E-02	8.18E-01	1.14E-02	4.25E-06	2.21E-05
Th-229+D	5.77E-02	4.07E+00	5.64E-02	2.16E-05	6.79E-04
Th-230	7.81E-03	5.52E-01	7.67E-03	3.25E-06	1.02E-04
Th-232	4.09E-02	2.80E+00	3.82E-02	1.43E-05	5.14E-04
Pa-231	1.50E-01	1.26E+00	1.48E-01	1.59E-05	6.73E-04
U-232	1.99E-02	1.66E-01	1.83E-02	1.85E-07	8.27E-05
U-233	4.06E-03	3.31E-02	4.05E-03	9.92E-08	2.85E-06
U-234	3.97E-03	3.24E-02	3.96E-03	9.79E-08	2.31E-06
U-235+D	3.91E-03	3.22E-02	3.74E-03	9.05E-08	2.24E-06
U-236	3.78E-03	3.08E-02	3.77E-03	9.24E-08	2.17E-06
U-238+D	3.79E-03	3.09E-02	3.75E-03	8.77E-08	2.06E-06
Np-237+D	6.28E-02	1.00E+00	6.22E-02	6.71E-06	1.93E-04
Pu-236	1.65E-02	2.61E-01	1.64E-02	1.80E-06	1.61E-05
Pu-238	4.51E-02	7.19E-01	4.48E-02	4.87E-06	1.41E-04
Pu-239	4.99E-02	7.97E-01	4.96E-02	5.33E-06	1.67E-04
Pu-240	4.99E-02	7.97E-01	4.96E-02	5.33E-06	1.67E-04
Pu-241+D	9.67E-04	1.55E-02	9.59E-04	1.02E-07	4.08E-06
Pu-242	4.73E-02	7.56E-01	4.70E-02	5.10E-06	1.60E-04
Pu-244+D	4.73E-02	7.57E-01	4.65E-02	5.01E-06	1.57E-04
Am-241	5.13E-02	8.19E-01	5.10E-02	5.51E-06	1.70E-04
Am-242m+D	4.96E-02	7.93E-01	4.93E-02	5.29E-06	1.72E-04
Am-243+D	5.14E-02	8.22E-01	5.08E-02	5.46E-06	1.71E-04
Cm-242	1.61E-03	2.56E-02	1.61E-03	2.15E-07	9.72E-07
Cm-243	3.54E-02	5.64E-01	3.51E-02	3.81E-06	9.51E-05
Cm-244	2.84E-02	4.52E-01	2.83E-02	3.08E-06	6.82E-05
Cm-245	5.28E-02	8.44E-01	5.24E-02	5.65E-06	1.79E-04
Cm-246	5.21E-02	8.33E-01	5.18E-02	5.60E-06	1.76E-04
Cm-247+D	4.87E-02	7.79E-01	4.79E-02	5.14E-06	1.62E-04
Cm-248	1.92E-01	3.06E+00	1.90E-01	2.05E-05	6.43E-04
Cm-250+D	1.10E+00	1.75E+01	1.09E+00	1.17E-04	3.67E-03
Bk-247	6.63E-02	1.25E+00	6.58E-02	7.13E-06	2.23E-04

Table D22a. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
Cf-248	4.69E-03	8.77E-02	4.68E-03	5.51E-07	4.64E-06
Cf-249	6.73E-02	1.26E+00	6.64E-02	7.17E-06	2.20E-04
Cf-250	2.99E-02	5.61E-01	2.98E-02	3.25E-06	6.40E-05
Cf-251	6.85E-02	1.29E+00	6.79E-02	7.30E-06	2.27E-04
Cf-252	1.51E-02	2.83E-01	1.51E-02	1.70E-06	1.18E-05
The averaging period is 30 years, with no prior irrigation.					

Table D22b. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
H-3	0.00E+00	4.17E-12	1.19E-07	7.17E-12	0.00E+00	6.34E-07
Be-10	3.00E-07	1.88E-07	2.94E-07	1.41E-05	5.06E-06	4.61E-03
C-14	2.88E-09	6.42E-08	6.44E-06	2.69E-06	2.65E-08	1.03E+00
Na-22	7.29E-04	1.09E-07	5.55E-05	4.01E-06	6.14E-03	9.11E-04
Al-26	4.13E-03	5.93E-07	1.38E-06	4.52E-05	7.09E-02	7.22E-02
Si-32+D	2.95E-06	4.12E-07	2.77E-08	2.64E-05	4.23E-05	2.18E-03
Cl-36	1.84E-07	3.67E-08	3.82E-06	7.30E-07	8.23E-07	1.50E-03
K-40	1.98E-04	6.19E-07	2.34E-05	2.99E-05	2.11E-03	1.84E-01
Ca-41	0.00E+00	4.15E-08	1.60E-07	1.93E-06	0.00E+00	5.04E-04
Ti-44+D	2.93E-03	8.71E-07	4.64E-05	5.95E-05	4.48E-02	2.44E-01
V-49	0.00E+00	2.37E-10	8.57E-09	7.74E-09	0.00E+00	1.22E-04
Mn-54	1.00E-04	9.92E-09	7.66E-08	3.22E-07	7.79E-04	1.10E-02
Fe-55	0.00E+00	6.00E-09	7.34E-07	2.25E-07	0.00E+00	1.20E-03
Fe-60+D	2.37E-03	6.85E-06	1.92E-04	5.36E-04	5.04E-02	3.02E-01
Co-60	1.44E-03	4.25E-07	1.66E-05	1.79E-05	1.36E-02	7.99E-02
Ni-59	0.00E+00	8.54E-09	6.61E-08	6.52E-07	0.00E+00	2.08E-04
Ni-63	0.00E+00	2.20E-08	1.82E-07	1.59E-06	0.00E+00	5.71E-04
Se-79	2.36E-09	1.62E-07	8.22E-06	3.93E-06	1.26E-08	1.46E-02
Rb-87	3.87E-08	1.93E-07	3.10E-06	1.33E-05	6.01E-07	9.74E-02
Sr-90+D	5.18E-06	4.92E-06	7.68E-05	3.09E-04	7.23E-05	9.09E-02
Zr-93	9.50E-09	7.39E-08	1.05E-10	5.86E-06	2.44E-07	4.93E-03
Nb-91	3.16E-06	2.08E-08	9.86E-12	1.52E-06	5.22E-05	1.55E-03
Nb-93m	2.00E-08	1.45E-08	9.80E-12	8.19E-07	2.51E-07	1.55E-03
Nb-94	2.39E-03	2.87E-07	1.35E-10	2.12E-05	3.97E-02	2.12E-02
Mo-93	1.36E-07	4.73E-08	8.50E-08	2.19E-06	1.33E-06	1.34E-04
Tc-99	1.58E-08	2.72E-08	9.20E-09	6.60E-07	8.46E-08	2.89E-04
Ru-106+D	3.04E-05	1.15E-07	7.73E-05	3.79E-06	2.38E-04	2.71E-03
Pd-107	0.00E+00	5.83E-09	3.75E-08	4.04E-07	0.00E+00	1.48E-05
Ag-108m+D	2.28E-03	2.88E-07	1.44E-06	1.99E-05	3.54E-02	3.77E-04
Cd-109	4.76E-07	6.69E-08	3.02E-07	2.24E-06	3.76E-06	2.59E-02
Cd-113m	1.15E-07	4.20E-06	4.02E-06	2.25E-04	1.37E-06	3.19E-01
In-115	1.13E-07	6.42E-06	7.96E-05	4.90E-04	1.95E-06	1.56E+02
Sn-121m+D	5.33E-07	8.11E-08	1.13E-05	5.62E-06	8.27E-06	6.68E-02
Sn-126+D	3.02E-03	8.53E-07	1.06E-04	6.49E-05	5.17E-02	6.24E-01
Sb-125	1.43E-04	3.60E-08	1.76E-07	1.36E-06	1.23E-03	2.78E-03

Table D22b. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
Te-125m	6.50E-08	2.58E-09	8.59E-07	7.94E-08	4.89E-07	1.45E-02
I-129	3.22E-06	9.79E-06	6.96E-04	5.39E-04	3.93E-05	1.09E-01
Cs-134	4.25E-04	5.75E-07	2.19E-04	2.06E-05	3.51E-03	1.45E+00
Cs-135	1.09E-08	2.88E-07	2.23E-05	2.20E-05	1.88E-07	1.40E-01
Cs-137+D	6.93E-04	1.64E-06	1.57E-04	1.07E-04	1.00E-02	9.90E-01
Ba-133	2.93E-04	7.84E-08	4.24E-08	3.90E-06	3.22E-03	1.35E-04
Pm-147	3.12E-09	1.00E-08	3.17E-07	3.74E-07	2.66E-08	3.12E-04
Sm-147	0.00E+00	7.46E-06	5.83E-05	5.58E-04	0.00E+00	4.58E-02
Sm-151	2.59E-10	1.46E-08	1.22E-07	1.03E-06	4.10E-09	9.63E-05
Eu-150	1.85E-03	2.16E-07	2.00E-06	1.42E-05	2.73E-02	3.15E-03
Eu-152	1.08E-03	1.69E-07	2.02E-06	9.34E-06	1.33E-02	3.21E-03
Eu-154	9.65E-04	2.04E-07	2.97E-06	1.01E-05	1.06E-02	4.73E-03
Eu-155	1.81E-05	2.27E-08	4.70E-07	9.57E-07	1.71E-04	7.57E-04
Gd-152	0.00E+00	6.53E-06	3.55E-05	4.96E-04	0.00E+00	3.98E-02
Ho-166m	2.58E-03	3.24E-07	2.29E-06	2.41E-05	4.32E-02	2.00E-03
Re-187	0.00E+00	3.77E-10	4.79E-09	2.69E-08	0.00E+00	1.13E-05
Tl-204	3.41E-07	4.27E-08	8.22E-06	1.72E-06	3.08E-06	3.33E-01
Pb-205	2.02E-09	6.64E-08	4.11E-08	5.08E-06	3.49E-08	4.84E-03
Pb-210+D	1.28E-06	2.22E-04	2.83E-04	1.38E-02	1.76E-05	1.59E+01
Bi-207	1.89E-03	1.83E-07	1.38E-07	1.19E-05	2.75E-02	5.43E-04
Po-209	4.72E-06	9.02E-05	7.46E-04	6.52E-03	7.65E-05	1.17E+00
Po-210	4.65E-10	3.13E-06	4.50E-04	9.81E-05	3.53E-09	9.41E-01
Ra-226+D	2.68E-03	1.24E-04	7.66E-05	1.26E-02	4.54E-02	6.58E-01
Ra-228+D	1.43E-03	3.61E-05	8.01E-05	1.69E-03	1.51E-02	7.13E-01
Ac-227+D	4.03E-04	4.52E-04	2.32E-05	2.78E-02	5.51E-03	3.66E+00
Th-228+D	3.93E-04	5.97E-06	2.89E-07	2.11E-04	3.23E-03	8.03E-01
Th-229+D	4.20E-04	1.64E-04	1.52E-06	1.25E-02	7.24E-03	3.99E+00
Th-230	1.21E-05	2.28E-05	2.13E-07	1.79E-03	3.74E-04	5.43E-01
Th-232	2.02E-03	1.60E-04	2.63E-06	1.36E-02	4.77E-02	2.70E+00
Pa-231	1.90E-04	5.81E-04	6.80E-06	5.11E-02	4.69E-03	1.05E+00
U-232	1.40E-03	5.64E-05	2.47E-05	2.43E-03	1.42E-02	1.30E-01
U-233	6.11E-07	9.01E-06	5.46E-06	3.84E-04	9.27E-06	2.86E-02
U-234	8.64E-08	8.71E-06	5.35E-06	3.65E-04	8.15E-07	2.80E-02
U-235+D	1.58E-04	8.31E-06	5.05E-06	3.54E-04	1.45E-03	2.64E-02
U-236	4.56E-08	8.27E-06	5.08E-06	3.47E-04	4.20E-07	2.66E-02
U-238+D	2.48E-05	8.24E-06	5.07E-06	3.46E-04	2.28E-04	2.65E-02
Np-237+D	2.73E-04	1.66E-04	2.80E-04	1.03E-02	3.78E-03	9.23E-01
Pu-236	4.48E-05	1.39E-05	7.48E-07	5.56E-04	5.57E-04	2.43E-01
Pu-238	3.99E-08	1.21E-04	2.01E-06	8.69E-03	6.45E-07	6.65E-01
Pu-239	8.13E-08	1.44E-04	2.23E-06	1.10E-02	1.40E-06	7.36E-01
Pu-240	4.19E-08	1.44E-04	2.23E-06	1.10E-02	7.21E-07	7.36E-01
Pu-241+D	1.47E-07	3.49E-06	4.52E-08	2.92E-04	3.72E-06	1.42E-02
Pu-242	3.66E-08	1.37E-04	2.12E-06	1.05E-02	6.31E-07	6.99E-01
Pu-244+D	5.10E-04	1.35E-04	2.09E-06	1.04E-02	8.79E-03	6.90E-01
Am-241	1.23E-05	1.46E-04	9.17E-06	1.10E-02	2.09E-04	7.57E-01
Am-242m+D	1.77E-05	1.47E-04	8.87E-06	1.12E-02	2.91E-04	7.32E-01
Am-243+D	2.49E-04	1.47E-04	9.15E-06	1.12E-02	4.27E-03	7.55E-01

Table D22b. HSRAM Recreational Scenario Doses by Pathway, mrem/y per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
Cm-242	2.21E-09	8.08E-07	2.21E-08	5.04E-05	1.86E-08	2.39E-02
Cm-243	1.28E-04	8.17E-05	5.51E-07	5.25E-03	1.84E-03	5.22E-01
Cm-244	2.54E-08	5.87E-05	4.43E-07	3.49E-03	3.36E-07	4.20E-01
Cm-245	9.64E-05	1.53E-04	8.25E-07	1.18E-02	1.66E-03	7.78E-01
Cm-246	3.32E-08	1.50E-04	8.16E-07	1.14E-02	5.69E-07	7.69E-01
Cm-247+D	4.93E-04	1.39E-04	7.54E-07	1.06E-02	8.47E-03	7.11E-01
Cm-248	2.51E-08	5.53E-04	3.00E-06	4.22E-02	4.31E-07	2.83E+00
Cm-250+D	4.82E-04	3.16E-03	1.79E-05	2.41E-01	8.27E-03	1.62E+01
Bk-247	1.20E-04	1.90E-04	1.18E-05	1.45E-02	2.06E-03	1.16E+00
Cf-248	4.16E-09	3.98E-06	9.31E-05	2.13E-04	3.97E-08	8.27E-02
Cf-249	4.80E-04	1.89E-04	1.49E-03	1.41E-02	8.05E-03	1.17E+00
Cf-250	2.12E-08	5.52E-05	6.65E-04	3.05E-03	2.59E-07	5.27E-01
Cf-251	1.46E-04	1.95E-04	1.53E-03	1.47E-02	2.48E-03	1.20E+00
Cf-252	1.11E-08	1.04E-05	3.26E-04	3.88E-04	9.42E-08	2.67E-01

Table D23a. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
H-3	4.73E-11	9.81E-11	4.70E-11	3.01E-13	0.00E+00
Be-10	2.98E-09	3.08E-07	2.95E-09	3.50E-14	1.09E-12
C-14	6.54E-10	2.97E-05	6.51E-10	2.63E-15	6.19E-14
Na-22	2.32E-08	2.16E-07	4.04E-09	1.45E-15	9.84E-15
Al-26	1.21E-07	5.78E-06	7.27E-09	2.58E-14	8.09E-13
Si-32+D	5.32E-09	1.11E-07	5.21E-09	1.14E-13	3.28E-12
Cl-36	1.39E-09	6.76E-08	1.39E-09	9.32E-15	8.21E-14
K-40	1.60E-08	1.03E-05	1.04E-08	3.84E-15	9.79E-14
Ca-41	1.49E-10	5.37E-09	1.48E-10	7.79E-17	1.94E-15
Ti-44+D	8.74E-08	1.27E-05	1.14E-08	7.53E-14	2.05E-12
V-49	5.13E-11	1.07E-08	5.12E-11	5.48E-17	1.45E-16
Mn-54	3.57E-09	3.93E-07	9.58E-10	2.19E-15	5.38E-15
Fe-55	3.63E-10	6.93E-08	3.62E-10	2.98E-16	2.12E-15
Fe-60+D	1.41E-07	1.58E-05	7.56E-08	6.86E-14	2.41E-12
Co-60	4.62E-08	2.41E-06	6.59E-09	1.33E-14	1.56E-13
Ni-59	1.16E-10	1.17E-08	1.15E-10	1.74E-16	5.45E-15
Ni-63	2.83E-10	2.87E-08	2.81E-10	6.11E-16	1.79E-14
Se-79	3.07E-09	4.93E-07	3.06E-09	1.24E-15	1.72E-14
Rb-87	2.21E-09	4.20E-06	2.19E-09	7.97E-16	2.41E-14
Sr-90+D	3.14E-08	1.74E-06	3.11E-08	4.21E-14	1.04E-12
Zr-93	4.70E-10	1.29E-07	4.66E-10	2.72E-15	9.22E-14
Nb-91	3.83E-10	1.06E-07	3.37E-10	7.08E-16	2.17E-14
Nb-93m	3.39E-10	1.05E-07	3.37E-10	7.08E-16	1.49E-14
Nb-94	6.51E-08	2.08E-06	3.26E-09	1.40E-14	4.35E-13
Mo-93	1.41E-09	1.41E-08	1.41E-09	4.73E-16	1.70E-14
Tc-99	1.16E-09	2.50E-08	1.16E-09	5.25E-15	7.30E-14
Ru-106+D	1.85E-08	2.12E-07	1.77E-08	3.80E-14	1.10E-13

Table D23a. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
Pd-107	1.06E-10	1.26E-09	1.05E-10	6.30E-16	1.90E-14
Ag-108m+D	6.06E-08	9.64E-07	3.42E-09	9.95E-15	2.89E-13
Cd-109	2.11E-09	4.00E-07	2.10E-09	5.51E-15	1.96E-14
Cd-113m	1.21E-08	2.18E-06	1.21E-08	4.84E-14	9.59E-13
In-115	1.43E-08	1.29E-03	1.42E-08	1.50E-13	4.71E-12
Sn-121m+D	1.49E-09	4.57E-06	1.47E-09	6.04E-15	1.67E-13
Sn-126+D	8.72E-08	3.63E-05	1.14E-08	3.76E-14	1.18E-12
Sb-125	5.37E-09	2.18E-07	1.84E-09	6.19E-15	5.11E-14
Te-125m	1.40E-09	5.60E-07	1.40E-09	4.36E-15	2.06E-15
I-129	6.25E-08	2.39E-06	6.22E-08	2.26E-14	6.16E-13
Cs-134	2.86E-08	3.07E-05	1.77E-08	6.15E-15	3.43E-14
Cs-135	2.00E-09	3.50E-06	1.99E-09	6.93E-16	2.18E-14
Cs-137+D	3.03E-08	2.25E-05	1.28E-08	4.43E-15	1.12E-13
Ba-133	9.72E-09	9.69E-08	2.86E-09	4.32E-15	7.52E-14
Pm-147	7.11E-10	2.29E-08	7.10E-10	6.00E-15	4.12E-14
Sm-147	1.59E-08	3.77E-07	1.57E-08	2.56E-12	7.98E-11
Sm-151	2.35E-10	6.36E-09	2.33E-10	1.82E-15	5.25E-14
Eu-150	4.80E-08	8.20E-07	1.82E-09	4.17E-14	1.09E-12
Eu-152	3.12E-08	5.13E-07	2.55E-09	3.39E-14	6.71E-13
Eu-154	3.00E-08	5.34E-07	4.33E-09	4.28E-14	6.89E-13
Eu-155	1.17E-09	4.59E-08	7.98E-10	5.51E-15	6.02E-14
Gd-152	1.27E-08	3.05E-07	1.25E-08	3.39E-12	1.06E-10
Ho-166m	6.85E-08	1.25E-06	3.37E-09	1.15E-13	3.57E-12
Re-187	7.58E-12	9.24E-10	7.52E-12	9.35E-18	2.86E-16
Tl-204	2.47E-09	2.45E-05	2.46E-09	9.13E-16	8.48E-15
Pb-205	2.67E-10	7.39E-08	2.66E-10	2.40E-16	7.54E-15
Pb-210+D	3.76E-07	1.07E-04	3.74E-07	1.15E-12	1.19E-10
Bi-207	5.18E-08	7.97E-07	2.38E-09	7.82E-15	2.00E-13
Po-209	1.99E-07	4.20E-05	1.97E-07	5.03E-12	1.48E-10
Po-210	1.58E-07	3.36E-05	1.58E-07	4.02E-12	4.49E-12
Ra-226+D	2.36E-07	9.27E-06	1.62E-07	4.32E-12	1.74E-10
Ra-228+D	4.78E-07	2.22E-05	4.37E-07	1.94E-12	6.16E-10
Ac-227+D	2.16E-07	5.27E-06	2.05E-07	5.22E-11	1.22E-09
Th-228+D	1.38E-07	1.28E-05	1.26E-07	5.33E-11	2.78E-10
Th-229+D	2.36E-07	2.18E-05	2.22E-07	8.23E-11	2.59E-09
Th-230	3.91E-08	3.60E-06	3.82E-08	1.06E-11	3.34E-10
Th-232	1.02E-07	5.60E-06	4.24E-08	1.61E-11	1.35E-09
Pa-231	7.88E-08	9.37E-07	7.27E-08	1.52E-11	8.96E-10
U-232	1.64E-07	1.76E-06	1.23E-07	7.27E-12	1.14E-09
U-233	3.04E-08	3.25E-07	3.02E-08	4.32E-12	1.04E-10
U-234	2.99E-08	3.20E-07	2.97E-08	4.25E-12	9.99E-11
U-235+D	3.39E-08	3.62E-07	3.02E-08	3.76E-12	8.86E-11
U-236	2.84E-08	3.02E-07	2.81E-08	3.91E-12	9.20E-11
U-238+D	3.75E-08	4.11E-07	3.66E-08	3.48E-12	8.19E-11
Np-237+D	3.50E-08	7.01E-07	2.83E-08	6.60E-12	1.90E-10
Pu-236	3.28E-08	6.71E-07	3.14E-08	8.50E-12	1.00E-10

Table D23a. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	Well Total	River Total	Drinking Water	Water Inhaled	Soil Inhaled
Pu-238	5.57E-08	1.13E-06	5.50E-08	1.25E-11	3.64E-10
Pu-239	5.74E-08	1.17E-06	5.67E-08	1.24E-11	3.90E-10
Pu-240	5.74E-08	1.17E-06	5.67E-08	1.24E-11	3.89E-10
Pu-241+D	7.54E-10	1.55E-08	7.39E-10	1.24E-13	6.31E-12
Pu-242	5.45E-08	1.11E-06	5.38E-08	1.17E-11	3.66E-10
Pu-244+D	7.43E-08	1.51E-06	6.05E-08	1.09E-11	3.43E-10
Am-241	4.45E-08	9.04E-07	4.37E-08	1.05E-11	3.23E-10
Am-242m+D	3.14E-08	6.22E-07	3.05E-08	5.85E-12	3.30E-10
Am-243+D	5.14E-08	1.05E-06	4.54E-08	1.01E-11	3.16E-10
Cm-242	1.62E-08	3.58E-07	1.62E-08	5.63E-12	9.14E-12
Cm-243	4.31E-08	8.64E-07	3.98E-08	1.00E-11	2.50E-10
Cm-244	3.55E-08	7.18E-07	3.51E-08	9.43E-12	2.09E-10
Cm-245	4.63E-08	9.44E-07	4.37E-08	1.03E-11	3.27E-10
Cm-246	4.34E-08	8.80E-07	4.28E-08	1.03E-11	3.24E-10
Cm-247+D	5.43E-08	1.09E-06	4.20E-08	9.32E-12	2.93E-10
Cm-248	1.59E-07	3.23E-06	1.57E-07	3.69E-11	1.16E-09
Cm-250+D	9.23E-07	1.87E-05	8.99E-07	2.06E-10	6.49E-09
Bk-247	5.54E-08	1.31E-06	5.21E-08	1.21E-11	3.80E-10
Cf-248	1.87E-08	4.82E-07	1.86E-08	6.74E-12	2.74E-11
Cf-249	6.55E-08	1.49E-06	5.33E-08	1.27E-11	3.89E-10
Cf-250	3.66E-08	8.77E-07	3.62E-08	9.91E-12	1.95E-10
Cf-251	5.94E-08	1.40E-06	5.54E-08	1.27E-11	3.93E-10
Cf-252	2.04E-08	4.90E-07	2.04E-08	5.81E-12	4.02E-11

The total risk from 30 years of intakes is shown.

Table D23b. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
H-3	0.00E+00	4.30E-16	8.04E-12	7.39E-16	0.00E+00	4.28E-11
Be-10	6.33E-12	2.44E-11	1.93E-11	1.83E-09	1.06E-10	3.03E-07
C-14	5.03E-14	2.57E-12	1.85E-10	1.08E-10	4.62E-13	2.97E-05
Na-22	1.91E-08	5.59E-12	1.82E-09	2.06E-10	1.61E-07	2.99E-08
Al-26	1.14E-07	5.73E-11	7.06E-11	4.37E-09	1.96E-06	3.70E-06
Si-32+D	7.43E-11	3.58E-11	1.31E-12	2.30E-09	1.07E-09	1.03E-07
Cl-36	4.19E-12	2.78E-12	1.68E-10	5.53E-11	1.88E-11	6.59E-08
K-40	5.56E-09	6.17E-11	1.30E-09	2.98E-09	5.92E-08	1.02E-05
Ca-41	0.00E+00	5.61E-13	1.65E-12	2.61E-11	0.00E+00	5.19E-09
Ti-44+D	7.59E-08	7.59E-11	2.19E-09	5.19E-09	1.16E-06	1.15E-05
V-49	0.00E+00	4.08E-14	7.50E-13	1.33E-12	0.00E+00	1.06E-08
Mn-54	2.61E-09	5.52E-13	2.58E-12	1.80E-11	2.03E-08	3.69E-07
Fe-55	0.00E+00	6.20E-13	4.21E-11	2.33E-11	0.00E+00	6.89E-08
Fe-60+D	6.51E-08	4.60E-10	9.04E-09	3.57E-08	1.38E-06	1.42E-05
Co-60	3.96E-08	1.91E-11	4.12E-10	8.06E-10	3.73E-07	1.99E-06
Ni-59	0.00E+00	8.94E-13	3.68E-12	6.83E-11	0.00E+00	1.16E-08

Table D23b. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
Ni-63	0.00E+00	2.04E-12	8.98E-12	1.48E-10	0.00E+00	2.82E-08
Se-79	4.18E-14	8.93E-12	2.75E-10	2.17E-10	2.23E-13	4.89E-07
Rb-87	7.52E-13	1.47E-11	1.34E-10	1.02E-09	1.17E-11	4.20E-06
Sr-90+D	1.32E-10	1.39E-10	1.44E-09	8.72E-09	1.84E-09	1.70E-06
Zr-93	1.05E-13	3.45E-12	2.73E-15	2.95E-10	2.70E-12	1.28E-07
Nb-91	4.25E-11	2.76E-12	6.63E-16	2.02E-10	7.01E-10	1.04E-07
Nb-93m	2.21E-13	1.92E-12	6.59E-16	1.09E-10	2.77E-12	1.04E-07
Nb-94	6.18E-08	2.47E-11	6.29E-15	1.82E-09	1.03E-06	9.89E-07
Mo-93	1.50E-12	5.64E-12	7.90E-12	2.64E-10	1.47E-11	1.24E-08
Tc-99	3.09E-13	4.28E-12	7.56E-13	1.04E-10	1.65E-12	2.38E-08
Ru-106+D	7.66E-10	1.50E-11	5.17E-09	4.94E-10	6.00E-09	1.81E-07
Pd-107	0.00E+00	8.52E-13	2.77E-12	5.90E-11	0.00E+00	1.09E-09
Ag-108m+D	5.71E-08	2.17E-11	6.34E-11	1.50E-09	8.85E-07	1.66E-08
Cd-109	8.47E-12	1.75E-12	4.64E-12	5.84E-11	6.68E-11	3.98E-07
Cd-113m	2.41E-12	4.00E-11	2.73E-11	2.15E-09	2.86E-11	2.16E-06
In-115	2.32E-12	7.13E-11	6.55E-10	5.44E-09	3.98E-11	1.29E-03
Sn-121m+D	7.48E-12	1.08E-11	7.73E-10	7.49E-10	1.16E-10	4.56E-06
Sn-126+D	7.57E-08	9.14E-11	5.93E-09	6.95E-09	1.30E-06	3.49E-05
Sb-125	3.53E-09	3.92E-12	6.95E-12	1.48E-10	3.02E-08	1.82E-07
Te-125m	8.96E-13	1.88E-13	3.30E-11	5.79E-12	6.74E-12	5.58E-07
I-129	4.55E-11	2.88E-10	1.46E-08	1.59E-08	5.55E-10	2.29E-06
Cs-134	1.08E-08	1.37E-11	4.60E-09	4.89E-10	8.94E-08	3.05E-05
Cs-135	2.03E-13	8.76E-12	5.56E-10	6.69E-10	3.48E-12	3.49E-06
Cs-137+D	1.75E-08	4.27E-11	3.52E-09	2.77E-09	2.53E-07	2.22E-05
Ba-133	6.85E-09	9.62E-12	3.53E-12	4.79E-10	7.55E-08	1.12E-08
Pm-147	6.03E-14	1.40E-12	2.24E-11	5.21E-11	5.13E-13	2.21E-08
Sm-147	0.00E+00	9.19E-11	4.51E-10	6.87E-09	0.00E+00	3.54E-07
Sm-151	2.84E-15	1.79E-12	7.62E-12	1.26E-10	4.50E-14	5.99E-09
Eu-150	4.62E-08	1.10E-11	5.72E-11	7.26E-10	6.81E-07	9.01E-08
Eu-152	2.87E-08	1.27E-11	8.15E-11	7.01E-10	3.51E-07	1.29E-07
Eu-154	2.57E-08	1.83E-11	1.39E-10	9.06E-10	2.81E-07	2.21E-07
Eu-155	3.70E-10	2.40E-12	2.55E-11	1.01E-10	3.49E-09	4.11E-08
Gd-152	0.00E+00	7.66E-11	2.55E-10	5.81E-09	0.00E+00	2.86E-07
Ho-166m	6.51E-08	2.53E-11	9.69E-11	1.88E-09	1.09E-06	8.46E-08
Re-187	0.00E+00	5.72E-14	3.87E-13	4.08E-12	0.00E+00	9.12E-10
Tl-204	7.01E-12	5.88E-12	6.05E-10	2.36E-10	6.34E-11	2.45E-05
Pb-205	3.01E-14	1.54E-12	6.24E-13	1.18E-10	5.19E-13	7.35E-08
Pb-210+D	2.71E-11	2.43E-09	6.16E-09	1.52E-07	3.73E-10	1.06E-04
Bi-207	4.94E-08	1.49E-11	6.13E-12	9.72E-10	7.20E-07	2.42E-08
Po-209	1.06E-10	1.13E-09	2.65E-08	8.20E-08	1.72E-09	4.17E-05
Po-210	1.20E-14	3.94E-11	1.60E-08	1.23E-09	9.14E-14	3.34E-05
Ra-226+D	7.23E-08	1.66E-09	8.99E-10	1.61E-07	1.23E-06	7.65E-06
Ra-228+D	3.93E-08	1.52E-09	2.39E-09	6.99E-08	4.17E-07	2.12E-05
Ac-227+D	9.38E-09	1.06E-09	3.07E-11	6.54E-08	1.28E-07	4.86E-06
Th-228+D	1.11E-08	1.79E-10	4.53E-12	6.35E-09	9.13E-08	1.26E-05
Th-229+D	9.96E-09	1.57E-09	8.12E-12	1.20E-07	1.72E-07	2.13E-05

Table D23b. HSRAM Recreational Scenario Incremental Cancer Risk from Radionuclides by Pathway, lifetime risk per pCi/L

Nuclide	External	Soil Ingestion	Game	Sediment Ingestion	Sediment External	Fish
Th-230	3.24E-10	2.53E-10	1.41E-12	2.00E-08	1.01E-08	3.53E-06
Th-232	5.54E-08	2.37E-09	4.91E-11	2.34E-07	1.31E-06	3.95E-06
Pa-231	4.43E-09	8.08E-10	4.43E-12	7.75E-08	1.09E-07	6.71E-07
U-232	3.95E-08	1.07E-09	2.18E-10	4.74E-08	4.03E-07	1.14E-06
U-233	1.39E-11	1.49E-10	5.49E-11	6.30E-09	2.15E-10	2.88E-07
U-234	1.64E-12	1.46E-10	5.41E-11	6.12E-09	1.56E-11	2.84E-07
U-235+D	3.49E-09	1.51E-10	5.53E-11	6.33E-09	3.21E-08	2.90E-07
U-236	8.04E-13	1.37E-10	5.12E-11	5.77E-09	7.39E-12	2.68E-07
U-238+D	6.20E-10	1.94E-10	6.86E-11	8.13E-09	5.70E-09	3.59E-07
Np-237+D	6.28E-09	1.82E-10	1.72E-10	1.13E-08	8.69E-08	5.68E-07
Pu-236	1.27E-09	8.79E-11	2.15E-12	3.90E-09	1.58E-08	6.19E-07
Pu-238	5.74E-13	3.08E-10	3.19E-12	2.22E-08	9.27E-12	1.05E-06
Pu-239	1.72E-12	3.37E-10	3.29E-12	2.58E-08	2.96E-11	1.09E-06
Pu-240	5.99E-13	3.38E-10	3.29E-12	2.58E-08	1.03E-11	1.09E-06
Pu-241+D	2.79E-12	5.60E-12	4.54E-14	4.85E-10	7.05E-11	1.42E-08
Pu-242	5.37E-13	3.21E-10	3.12E-12	2.46E-08	9.25E-12	1.03E-06
Pu-244+D	1.31E-08	3.84E-10	3.59E-12	2.94E-08	2.25E-07	1.19E-06
Am-241	2.33E-10	2.61E-10	1.01E-11	1.96E-08	3.95E-09	8.36E-07
Am-242m+D	3.89E-10	2.70E-10	6.89E-12	2.11E-08	6.41E-09	5.63E-07
Am-243+D	5.45E-09	2.83E-10	1.07E-11	2.16E-08	9.36E-08	8.86E-07
Cm-242	3.05E-14	7.58E-12	2.87E-13	3.02E-10	2.57E-13	3.42E-07
Cm-243	2.86E-09	2.00E-10	8.10E-13	1.29E-08	4.09E-08	7.67E-07
Cm-244	2.94E-13	1.58E-10	7.10E-13	9.38E-09	3.88E-12	6.74E-07
Cm-245	2.04E-09	2.68E-10	8.93E-13	2.06E-08	3.51E-08	8.42E-07
Cm-246	3.92E-13	2.58E-10	8.67E-13	1.97E-08	6.72E-12	8.17E-07
Cm-247+D	1.18E-08	2.59E-10	8.67E-13	1.98E-08	2.02E-07	8.17E-07
Cm-248	2.94E-13	9.48E-10	3.18E-12	7.23E-08	5.04E-12	2.99E-06
Cm-250+D	1.23E-08	5.44E-09	1.95E-11	4.15E-07	2.11E-07	1.72E-05
Bk-247	2.64E-09	3.02E-10	1.21E-11	2.30E-08	4.53E-08	1.19E-06
Cf-248	4.76E-14	2.07E-11	5.20E-10	9.02E-10	4.55E-13	4.62E-07
Cf-249	1.15E-08	3.03E-10	1.54E-09	2.26E-08	1.93E-07	1.21E-06
Cf-250	2.41E-13	1.44E-10	1.05E-09	7.92E-09	2.94E-12	8.32E-07
Cf-251	3.19E-09	3.22E-10	1.61E-09	2.43E-08	5.41E-08	1.26E-06
Cf-252	1.64E-13	3.00E-11	5.70E-10	1.12E-09	1.39E-12	4.68E-07

Table D24a. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	1.76E+00	1.91E+01	1.71E+00	na	na	4.50E-02	7.46E-01
57-12-5	6.04E-02	1.28E-01	5.99E-02	na	na	2.33E-04	3.86E-03
57-14-7	na	na	na	na	na	na	na
57-55-6	2.42E-03	4.93E-03	2.40E-03	1.38E-06	1.02E-05	5.31E-07	8.79E-06

Table D24a. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
58-89-9	4.17E+00	1.98E+02	4.00E+00	na	na	8.77E-02	1.45E+00
60-29-7	6.01E-03	1.24E-02	5.99E-03	na	na	1.65E-05	2.73E-04
60-34-4	na	na	na	na	na	na	na
60-57-1	2.62E+01	2.23E+04	2.40E+01	na	na	1.63E+00	2.70E+01
62-75-9	1.51E+02	3.16E+02	1.50E+02	na	na	6.06E-02	1.00E+00
64-18-6	6.02E-04	1.24E-03	5.99E-04	na	na	3.78E-07	6.26E-06
67-56-1	2.40E-03	4.90E-03	2.40E-03	na	na	7.89E-07	1.31E-05
67-64-1	1.33E-03	2.72E-03	1.33E-03	na	na	6.97E-07	1.15E-05
67-66-3	1.93E-01	5.11E-01	1.20E-01	6.86E-02	1.73E-06	4.08E-03	6.76E-02
67-72-1	1.31E+00	1.22E+02	1.20E+00	na	na	1.09E-01	1.81E+00
71-36-3	2.02E-02	3.35E-02	1.20E-02	8.18E-03	2.54E-06	5.20E-05	8.61E-04
71-43-2	3.12E-01	1.23E+00	3.00E-01	6.89E-03	2.48E-07	4.88E-03	8.09E-02
71-55-6	4.44E-03	2.82E-02	4.28E-03	9.39E-05	2.04E-09	6.21E-05	1.03E-03
72-20-8	1.11E+01	2.74E+03	4.00E+00	na	na	6.79E+00	1.12E+02
74-83-9	9.01E-01	1.40E+00	8.56E-01	4.13E-02	8.93E-07	2.87E-03	4.75E-02
74-87-3	2.30E-03	2.30E-03	na	2.30E-03	4.55E-08	na	na
75-00-3	3.04E-03	5.84E-03	3.00E-03	2.06E-05	3.95E-10	2.28E-05	3.78E-04
75-01-4	4.05E-01	9.16E-01	4.00E-01	2.06E-03	3.97E-08	3.45E-03	5.71E-02
75-05-8	3.45E-03	3.45E-03	na	3.45E-03	2.33E-07	na	na
75-07-0	2.30E-02	2.30E-02	na	2.30E-02	9.74E-07	na	na
75-09-2	2.01E-02	3.31E-02	2.00E-02	6.89E-05	1.67E-09	7.16E-05	1.19E-03
75-15-0	1.25E-02	4.02E-02	1.20E-02	2.95E-04	5.24E-09	2.27E-04	3.75E-03
75-21-8	na	na	na	na	na	na	na
75-34-3	1.25E-02	3.23E-02	1.20E-02	4.13E-04	1.03E-08	8.11E-05	1.34E-03
75-35-4	2.53E-02	9.74E-02	2.40E-02	1.03E-03	2.07E-08	2.91E-04	4.82E-03
75-45-6	4.13E-06	4.13E-06	na	4.13E-06	8.08E-11	na	na
75-68-3	4.13E-06	4.13E-06	na	4.13E-06	8.08E-11	na	na
75-69-4	4.52E-03	3.10E-02	4.00E-03	2.95E-04	5.61E-09	2.29E-04	3.80E-03
75-71-8	7.27E-03	2.88E-02	5.99E-03	1.03E-03	1.94E-08	2.37E-04	3.92E-03
76-13-1	4.78E-05	7.61E-04	4.00E-05	6.89E-06	1.40E-10	9.15E-07	1.52E-05
76-44-8	3.00E+00	7.71E+03	2.40E+00	na	na	5.49E-01	9.10E+00
78-83-1	4.01E-03	8.30E-03	4.00E-03	na	na	8.88E-06	1.47E-04
78-87-5	5.18E-02	5.18E-02	na	5.18E-02	1.81E-06	na	na
78-93-3	2.04E-03	4.14E-03	2.00E-03	4.13E-05	2.66E-09	2.12E-06	3.51E-05
79-00-5	3.02E-01	8.84E-01	3.00E-01	na	na	1.82E-03	3.01E-02
79-01-6	4.32E+00	2.81E+01	4.00E+00	5.18E-03	1.29E-07	3.19E-01	5.29E+00
79-10-7	5.56E-03	8.14E-03	2.40E-03	3.12E-03	2.98E-05	4.50E-06	7.46E-05
79-34-5	2.02E-02	1.13E-01	2.00E-02	na	na	1.95E-04	3.24E-03
79-46-9	1.03E-02	1.03E-02	na	1.03E-02	8.92E-07	na	na
82-68-8	4.30E-01	9.73E+01	4.00E-01	na	na	2.26E-02	3.75E-01
83-32-9	2.68E-02	1.48E+00	2.00E-02	na	na	6.54E-03	1.08E-01
84-66-2	1.53E-03	8.98E-03	1.50E-03	na	na	5.58E-06	9.24E-05
84-74-2	1.28E-02	2.28E+00	1.20E-02	na	na	5.47E-04	9.07E-03
85-68-7	6.54E-03	1.72E+00	5.99E-03	na	na	4.06E-04	6.72E-03
87-68-3	4.74E+00	1.25E+03	4.00E+00	na	na	7.38E-01	1.22E+01
87-86-5	4.68E-02	9.17E+00	4.00E-02	na	na	5.95E-03	9.86E-02

Table D24a. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
88-06-2	1.31E+01	2.48E+02	1.20E+01	na	na	9.08E-01	1.50E+01
88-85-7	1.27E+00	4.59E+01	1.20E+00	na	na	4.03E-02	6.67E-01
91-20-3	1.33E-01	1.54E+00	5.99E-02	6.89E-02	2.67E-05	3.97E-03	6.58E-02
92-52-4	2.97E-02	1.91E+00	2.40E-02	na	na	5.34E-03	8.85E-02
95-47-6	8.47E-03	1.12E-01	5.99E-03	2.06E-03	1.17E-07	4.03E-04	6.67E-03
95-48-7	2.48E-02	8.76E-02	2.40E-02	na	na	3.70E-04	6.13E-03
95-50-1	1.52E-02	4.04E-01	1.33E-02	1.03E-03	1.05E-07	8.38E-04	1.39E-02
95-57-8	2.47E-01	1.06E+00	2.40E-01	na	na	3.84E-03	6.37E-02
95-63-6	6.16E-02	1.07E+00	2.40E-02	3.45E-02	2.61E-06	3.04E-03	5.04E-02
95-95-4	1.32E-02	2.61E-01	1.20E-02	na	na	9.54E-04	1.58E-02
98-86-2	1.21E-02	1.55E-02	1.20E-02	na	na	5.34E-05	8.85E-04
98-95-3	2.53E+00	7.05E+00	2.40E+00	1.01E-01	4.35E-05	1.31E-02	2.18E-01
100-25-4	1.22E+01	2.63E+01	1.20E+01	na	na	3.57E-02	5.91E-01
100-41-4	1.29E-02	2.30E-01	1.20E-02	2.06E-04	1.11E-08	6.97E-04	1.16E-02
100-42-5	6.52E-03	8.37E-02	5.99E-03	2.06E-04	1.88E-08	3.13E-04	5.19E-03
100-51-6	4.03E-03	4.85E-03	4.00E-03	na	na	1.16E-05	1.93E-04
106-42-3	8.49E-03	1.18E-01	5.99E-03	2.06E-03	1.07E-07	4.23E-04	7.00E-03
106-44-5	2.47E-01	8.47E-01	2.40E-01	na	na	2.80E-03	4.64E-02
106-46-7	4.26E-02	1.23E+00	4.00E-02	2.58E-04	2.33E-08	2.27E-03	3.76E-02
106-93-4	1.03E+00	1.03E+00	na	1.03E+00	1.01E-04	na	na
106-99-0	1.03E-01	1.03E-01	na	1.03E-01	1.89E-06	na	na
107-02-8	1.27E+01	1.52E+01	2.40E+00	1.03E+01	4.09E-04	1.95E-03	3.23E-02
107-05-1	2.31E-01	2.84E-01	2.40E-02	2.06E-01	4.45E-06	3.50E-04	5.80E-03
107-06-2	8.23E-02	1.21E-01	4.00E-02	4.22E-02	1.57E-06	1.63E-04	2.70E-03
107-13-1	1.30E+00	2.56E+00	1.20E+00	1.03E-01	4.82E-06	1.56E-03	2.58E-02
108-10-1	1.51E-02	2.60E-02	1.50E-02	6.89E-05	4.38E-09	5.68E-05	9.40E-04
108-38-3	8.52E-03	1.28E-01	5.99E-03	2.06E-03	1.10E-07	4.59E-04	7.60E-03
108-39-4	2.48E-02	8.83E-02	2.40E-02	na	na	3.77E-04	6.25E-03
108-67-8	6.07E-02	7.59E-01	2.40E-02	3.45E-02	2.25E-06	2.16E-03	3.58E-02
108-87-2	6.89E-05	6.89E-05	na	6.89E-05	1.32E-09	na	na
108-88-3	6.77E-03	5.97E-02	5.99E-03	5.18E-04	2.10E-08	2.59E-04	4.29E-03
108-90-7	6.95E-02	7.58E-01	5.99E-02	3.47E-03	2.14E-07	6.01E-03	9.95E-02
108-94-1	2.41E-04	5.01E-04	2.40E-04	na	na	4.12E-07	6.82E-06
108-95-2	4.08E-03	8.86E-03	4.00E-03	na	na	1.87E-05	3.11E-04
109-99-9	6.42E-03	1.25E-02	5.71E-03	6.89E-04	3.91E-08	1.28E-05	2.12E-04
110-00-9	1.21E+00	2.16E+00	1.20E+00	na	na	7.49E-03	1.24E-01
110-54-3	2.74E-02	1.42E+00	2.00E-02	1.03E-03	1.86E-08	6.37E-03	1.05E-01
110-80-5	3.03E-03	6.18E-03	3.00E-03	1.99E-05	1.47E-07	1.45E-06	2.41E-05
110-82-7	3.45E-05	3.45E-05	na	3.45E-05	6.81E-10	na	na
110-86-1	1.21E+00	2.54E+00	1.20E+00	na	na	3.33E-03	5.52E-02
111-76-2	2.41E-03	5.00E-03	2.40E-03	1.04E-06	2.22E-09	5.16E-06	8.55E-05
111-90-0	2.01E-02	4.10E-02	2.00E-02	1.37E-06	1.08E-05	3.66E-06	6.06E-05
117-81-7	5.36E-01	1.41E+01	5.99E-02	na	na	4.74E-01	7.86E+00
117-84-0	1.44E-01	2.61E+00	3.00E-02	na	na	1.13E-01	1.87E+00
118-74-1	2.44E+00	2.51E+03	1.50E+00	na	na	9.33E-01	1.55E+01
120-82-1	1.82E-01	9.97E+00	1.20E-01	5.18E-02	1.13E-05	1.01E-02	1.67E-01

Table D24a. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
121-14-2	6.12E-01	2.15E+00	5.99E-01	na	na	2.02E-03	3.35E-02
121-44-8	2.95E-02	2.95E-02	na	2.95E-02	4.58E-06	na	na
122-39-4	5.29E-02	1.68E+00	4.79E-02	na	na	3.95E-03	6.55E-02
123-91-1	na	na	na	na	na	na	na
126-73-8	6.41E-03	9.38E-02	5.99E-03	na	na	2.86E-04	4.75E-03
126-98-7	1.23E+01	2.51E+01	1.20E+01	2.95E-01	1.46E-05	2.59E-02	4.28E-01
127-18-4	1.25E-01	3.40E+00	1.20E-01	3.47E-04	8.55E-09	4.40E-03	7.29E-02
129-00-0	7.29E-02	1.54E+01	4.00E-02	na	na	3.19E-02	5.28E-01
141-78-6	1.34E-03	2.74E-03	1.33E-03	na	na	2.31E-06	3.83E-05
156-59-2	1.21E-01	3.52E-01	1.20E-01	na	na	1.36E-03	2.26E-02
206-44-0	6.86E-02	1.89E+01	3.00E-02	na	na	3.79E-02	6.27E-01
309-00-2	6.94E+01	2.61E+05	4.00E+01	na	na	2.85E+01	4.72E+02
319-84-6	2.50E+00	1.36E+02	2.40E+00	na	na	5.26E-02	8.72E-01
319-85-7	6.27E+00	3.30E+02	5.99E+00	na	na	1.40E-01	2.32E+00
541-73-1	1.43E+00	4.79E+01	1.33E+00	na	na	9.85E-02	1.63E+00
542-75-6	5.09E-02	1.55E-01	4.00E-02	1.03E-02	3.84E-07	6.16E-04	1.02E-02
621-64-7	na	na	na	na	na	na	na
1314-62-1	1.46E-01	9.33E+00	1.33E-01	na	na	9.71E-03	1.61E-01
1330-20-7	8.41E-03	1.12E-01	5.99E-03	2.06E-03	1.14E-07	3.50E-04	5.80E-03
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	1.54E+01	4.85E+04	1.50E+01	na	na	1.47E-05	2.44E-04
7429-90-5	1.30E-03	1.99E-01	1.20E-03	8.26E-07	4.98E-05	1.96E-05	3.24E-04
7439-89-6	4.10E-03	2.75E-01	4.00E-03	na	na	5.02E-06	8.32E-05
7439-93-2	6.14E-02	2.66E-01	5.99E-02	na	na	2.80E-05	4.64E-04
7439-96-5	3.21E-02	1.24E+00	2.57E-02	8.26E-05	4.98E-03	6.27E-04	1.04E-02
7439-97-6	6.13E-04	6.13E-04	na	1.38E-05	6.00E-04	na	na
7439-98-7	2.46E-01	1.44E+00	2.40E-01	na	na	3.47E-04	5.75E-03
7440-02-0	6.14E-02	2.19E+00	5.99E-02	na	na	5.58E-05	9.24E-04
7440-22-4	2.46E-01	1.37E+00	2.40E-01	na	na	6.19E-04	1.03E-02
7440-24-6	2.05E-03	4.71E-02	2.00E-03	na	na	6.17E-06	1.02E-04
7440-28-0	1.86E+01	5.88E+04	1.82E+01	na	na	1.45E-02	2.40E-01
7440-31-5	2.09E-03	1.95E+00	2.00E-03	na	na	4.39E-05	7.28E-04
7440-36-0	3.21E+00	1.14E+02	3.00E+00	na	na	1.25E-01	2.07E+00
7440-38-2	4.11E+00	3.32E+02	4.00E+00	na	na	1.44E-02	2.38E-01
7440-39-3	1.81E-02	9.46E-02	1.71E-02	8.26E-06	4.95E-04	7.53E-05	1.25E-03
7440-41-7	6.64E-01	2.35E+01	5.99E-01	2.07E-04	1.25E-02	3.02E-02	5.00E-01
7440-42-8	1.36E-02	4.78E-02	1.33E-02	2.07E-07	1.11E-05	2.58E-05	4.27E-04
7440-43-9	2.53E+00	9.59E+01	2.40E+00	na	na	1.28E-02	2.12E-01
7440-45-1	1.27E-03	1.27E-03	na	2.07E-05	1.25E-03	na	na
7440-48-4	7.40E-02	6.06E+00	5.99E-02	2.07E-04	1.24E-02	6.92E-05	1.15E-03
7440-50-8	3.07E-02	2.05E+00	3.00E-02	na	na	2.34E-05	3.88E-04
7440-62-2	1.95E-01	1.24E+01	1.71E-01	na	na	1.76E-02	2.92E-01
7440-66-6	4.10E-03	3.42E-01	4.00E-03	na	na	5.22E-06	8.64E-05
7487-94-7	4.09E+00	1.30E+03	4.00E+00	na	na	1.28E-03	2.12E-02
7664-41-7	2.91E-04	2.91E-04	na	2.91E-04	3.67E-07	na	na

Table D24a. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
7723-14-0	6.15E+01	2.92E+04	5.99E+01	na	na	1.74E-01	2.88E+00
7782-41-4	2.05E-02	1.46E-01	2.00E-02	na	na	2.53E-05	4.19E-04
7782-49-2	2.45E-01	1.36E+01	2.40E-01	na	na	3.76E-04	6.22E-03
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	1.27E+02	2.73E+06	5.99E+01	na	na	6.56E+01	1.09E+03
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	2.48E+01	9.80E+04	1.71E+01	na	na	7.26E+00	1.20E+02
14797-55-8	7.62E-04	1.74E-03	7.49E-04	na	na	1.28E-06	2.12E-05
14797-65-0	1.22E-02	2.78E-02	1.20E-02	na	na	1.98E-05	3.27E-04
16065-83-1	9.61E-04	5.97E-02	7.99E-04	na	na	1.22E-04	2.02E-03
16984-48-8	2.05E-02	1.46E-01	2.00E-02	na	na	2.53E-05	4.19E-04
18540-29-9	4.24E-01	2.66E+01	4.00E-01	5.16E-04	1.67E-03	1.53E-02	2.53E-01
53469-21-9	na	na	na	na	na	na	na
Uranium	2.04E+00	1.18E+01	2.00E+00	na	na	1.79E-03	2.97E-02
Cr Mixture	6.14E-02	3.85E+00	5.78E-02	7.37E-05	2.39E-04	2.28E-03	3.78E-02

"na" means that one or more of the reference doses was not available.

Table D24b. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na
56-23-5	1.59E-05	6.99E-04	1.19E-06	5.31E-03	3.40E-04	1.67E+01
57-12-5	2.00E-05	2.27E-04	3.47E-11	1.83E-03	4.47E-04	6.13E-02
57-14-7	na	na	na	na	na	na
57-55-6	2.07E-07	6.98E-06	2.96E-13	5.31E-05	4.42E-06	2.45E-03
58-89-9	3.00E-03	8.33E-02	2.16E-05	3.69E+00	1.63E-01	1.89E+02
60-29-7	5.26E-08	2.85E-06	4.79E-11	2.16E-05	1.12E-06	6.13E-03
60-34-4	na	na	na	na	na	na
60-57-1	4.45E-02	5.30E-01	6.19E-03	3.50E+01	3.25E+00	2.22E+04
62-75-9	3.39E-02	1.08E+00	4.15E-08	9.80E+00	8.15E-01	1.53E+02
64-18-6	7.62E-08	2.53E-06	1.78E-13	1.94E-05	1.61E-06	6.13E-04
67-56-1	8.00E-08	4.33E-06	4.19E-13	3.32E-05	1.73E-06	2.45E-03
67-64-1	2.54E-08	1.43E-06	7.88E-13	1.09E-05	5.48E-07	1.36E-03
67-66-3	4.40E-06	5.96E-05	1.15E-08	4.53E-04	9.42E-05	2.54E-01
67-72-1	1.77E-04	5.85E-03	1.70E-05	4.86E-02	4.04E-03	1.19E+02
71-36-3	7.84E-07	2.65E-05	9.35E-11	2.04E-04	1.69E-05	1.23E-02
71-43-2	3.23E-06	2.12E-04	4.16E-08	1.62E-03	6.94E-05	8.44E-01
71-55-6	3.01E-08	1.84E-06	1.36E-09	1.39E-05	6.44E-07	2.28E-02
72-20-8	1.91E-01	8.89E-02	6.51E-04	6.21E+00	1.47E+01	2.60E+03
74-83-9	6.74E-06	3.65E-04	1.36E-08	2.77E-03	1.44E-04	4.55E-01
74-87-3	na	na	na	na	na	na

Table D24b. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
75-00-3	2.08E-08	1.13E-06	8.30E-11	8.57E-06	4.45E-07	2.44E-03
75-01-4	2.24E-06	1.51E-04	1.71E-08	1.15E-03	4.78E-05	4.56E-01
75-05-8	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na
75-09-2	1.48E-07	9.55E-06	3.65E-10	7.25E-05	3.17E-06	1.18E-02
75-15-0	2.46E-06	4.19E-06	1.07E-09	3.18E-05	5.25E-05	2.41E-02
75-21-8	na	na	na	na	na	na
75-34-3	8.67E-08	5.87E-06	7.60E-10	4.46E-05	1.85E-06	1.85E-02
75-35-4	1.40E-07	9.45E-06	3.33E-09	7.18E-05	2.99E-06	6.75E-02
75-45-6	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na
75-69-4	9.61E-08	1.50E-06	1.39E-09	1.14E-05	2.06E-06	2.29E-02
75-71-8	1.42E-07	2.22E-06	8.91E-10	1.68E-05	3.04E-06	1.78E-02
76-13-1	2.96E-10	1.60E-08	5.94E-11	1.22E-07	6.33E-09	6.99E-04
76-44-8	2.53E-03	5.06E-02	3.10E-03	2.40E+00	1.44E-01	7.70E+03
78-83-1	1.50E-07	8.09E-06	2.36E-11	6.23E-05	3.24E-06	4.08E-03
78-87-5	na	na	na	na	na	na
78-93-3	4.69E-08	2.54E-06	4.01E-12	1.95E-05	1.01E-06	2.04E-03
79-00-5	6.37E-06	3.49E-04	2.39E-08	2.69E-03	1.38E-04	5.51E-01
79-01-6	1.93E-04	1.96E-03	1.08E-06	1.49E-02	4.12E-03	1.88E+01
79-10-7	2.02E-07	6.81E-06	5.52E-12	5.20E-05	4.32E-06	2.45E-03
79-34-5	9.39E-07	4.43E-05	5.04E-09	3.47E-04	2.06E-05	8.92E-02
79-46-9	na	na	na	na	na	na
82-68-8	2.33E-04	7.26E-03	1.79E-05	1.78E-01	9.28E-03	9.64E+01
83-32-9	1.94E-05	2.98E-04	1.71E-07	4.77E-03	6.40E-04	1.34E+00
84-66-2	4.45E-07	2.08E-05	4.05E-10	2.96E-04	1.37E-05	7.06E-03
84-74-2	6.77E-06	2.32E-04	3.90E-07	7.17E-03	3.00E-04	2.26E+00
85-68-7	9.68E-06	1.34E-04	3.31E-07	9.86E-03	7.78E-04	1.70E+00
87-68-3	1.72E-04	5.81E-03	2.48E-04	4.51E-02	3.75E-03	1.24E+03
87-86-5	3.25E-05	8.57E-04	5.42E-06	4.53E-02	1.99E-03	8.99E+00
88-06-2	1.32E-02	2.31E-01	6.04E-05	6.89E+00	5.75E-01	2.14E+02
88-85-7	1.93E-03	2.56E-02	4.48E-06	1.33E+00	1.17E-01	4.26E+01
91-20-3	9.01E-06	4.58E-04	1.23E-07	4.30E-03	2.23E-04	1.34E+00
92-52-4	1.23E-05	3.25E-04	2.35E-07	4.56E-03	3.79E-04	1.79E+00
95-47-6	1.23E-07	6.67E-06	8.13E-09	5.14E-05	2.67E-06	9.76E-02
95-48-7	1.76E-05	3.94E-04	2.20E-09	7.44E-03	6.19E-04	4.91E-02
95-50-1	4.96E-07	2.68E-05	3.69E-08	2.09E-04	1.09E-05	3.76E-01
95-57-8	1.25E-04	3.29E-03	3.48E-08	4.66E-02	3.87E-03	6.99E-01
95-63-6	6.61E-07	3.58E-05	1.05E-07	2.77E-04	1.44E-05	9.65E-01
95-95-4	1.35E-05	2.32E-04	6.47E-08	7.12E-03	5.95E-04	2.25E-01
98-86-2	1.53E-06	7.92E-05	4.69E-10	6.99E-04	3.63E-05	1.84E-03
98-95-3	3.27E-04	1.99E-02	1.75E-07	1.92E-01	8.25E-03	4.11E+00
100-25-4	7.49E-03	1.82E-01	3.56E-07	2.95E+00	2.46E-01	1.03E+01
100-41-4	1.93E-07	1.26E-05	1.74E-08	9.72E-05	4.16E-06	2.06E-01
100-42-5	1.99E-07	1.08E-05	5.49E-09	8.39E-05	4.36E-06	7.22E-02
100-51-6	5.96E-07	2.55E-05	5.17E-11	2.19E-04	1.38E-05	4.06E-04

Table D24b. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
106-42-3	1.13E-07	6.12E-06	8.71E-09	4.70E-05	2.44E-06	1.03E-01
106-44-5	1.30E-04	3.87E-03	2.15E-08	7.07E-02	4.52E-03	4.82E-01
106-46-7	1.17E-06	7.12E-05	1.13E-07	5.55E-04	2.56E-05	1.15E+00
106-93-4	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na
107-02-8	3.45E-05	1.87E-03	2.41E-09	1.42E-02	7.40E-04	2.45E+00
107-05-1	1.88E-07	1.02E-05	2.10E-09	7.74E-05	4.02E-06	4.74E-02
107-06-2	4.33E-07	2.93E-05	1.24E-09	2.24E-04	9.30E-06	3.55E-02
107-13-1	2.03E-05	1.10E-03	2.19E-09	8.42E-03	4.37E-04	1.23E+00
108-10-1	3.47E-07	1.88E-05	3.15E-10	1.45E-04	7.52E-06	9.86E-03
108-38-3	1.16E-07	6.28E-06	9.77E-09	4.83E-05	2.51E-06	1.13E-01
108-39-4	1.71E-05	3.89E-04	2.25E-09	7.18E-03	5.97E-04	4.99E-02
108-67-8	5.70E-07	3.08E-05	6.49E-08	2.38E-04	1.24E-05	6.65E-01
108-87-2	na	na	na	na	na	na
108-88-3	8.83E-08	4.78E-06	3.31E-09	3.66E-05	1.90E-06	4.89E-02
108-90-7	3.48E-06	7.29E-05	4.26E-08	5.62E-04	7.54E-05	5.94E-01
108-94-1	1.83E-08	9.74E-07	1.59E-12	7.78E-06	4.04E-07	2.45E-04
108-95-2	1.42E-06	6.13E-05	1.19E-10	1.02E-03	4.69E-05	3.43E-03
109-99-9	1.89E-07	6.38E-06	1.69E-11	4.90E-05	4.07E-06	5.83E-03
110-00-9	1.24E-05	6.72E-04	2.70E-08	5.11E-03	2.66E-04	8.32E-01
110-54-3	1.30E-07	7.06E-06	1.63E-07	5.37E-05	2.79E-06	1.30E+00
110-80-5	2.50E-07	8.42E-06	1.48E-12	6.42E-05	5.33E-06	3.06E-03
110-82-7	na	na	na	na	na	na
110-86-1	1.85E-04	6.11E-03	5.51E-09	5.06E-02	4.21E-03	1.23E+00
111-76-2	1.96E-07	6.59E-06	1.67E-11	5.03E-05	4.18E-06	2.45E-03
111-90-0	1.85E-06	6.21E-05	5.93E-12	4.72E-04	3.93E-05	2.04E-02
117-81-7	3.96E-04	1.41E-03	2.45E-03	1.62E-01	5.13E-02	5.96E+00
117-84-0	4.17E-05	7.04E-04	3.88E-03	8.06E-02	5.37E-03	6.15E-01
118-74-1	2.75E-04	8.95E-03	8.28E-04	7.78E-02	6.46E-03	2.50E+03
120-82-1	7.98E-06	5.14E-04	1.29E-06	4.20E-03	1.80E-04	9.63E+00
121-14-2	2.79E-04	1.02E-02	5.89E-08	2.07E-01	1.01E-02	1.29E+00
121-44-8	na	na	na	na	na	na
122-39-4	5.38E-05	9.28E-04	1.56E-07	2.84E-02	2.37E-03	1.53E+00
123-91-1	na	na	na	na	na	na
126-73-8	8.58E-06	1.24E-04	6.16E-08	5.35E-03	4.57E-04	7.71E-02
126-98-7	2.15E-04	1.17E-02	5.90E-08	8.93E-02	4.64E-03	1.23E+01
127-18-4	8.59E-07	5.82E-05	3.10E-07	4.42E-04	1.84E-05	3.21E+00
129-00-0	1.39E-04	9.12E-04	3.12E-06	7.90E-02	1.31E-02	1.47E+01
141-78-6	2.60E-08	1.41E-06	7.36E-12	1.08E-05	5.60E-07	1.36E-03
156-59-2	9.78E-07	6.62E-05	8.93E-09	5.03E-04	2.09E-05	2.09E-01
206-44-0	1.06E-04	6.86E-04	4.46E-06	6.15E-02	1.04E-02	1.82E+01
309-00-2	8.70E-02	9.13E-01	1.30E-01	8.05E+01	8.36E+00	2.61E+05
319-84-6	1.66E-03	4.89E-02	1.56E-05	1.92E+00	8.36E-02	1.30E+02
319-85-7	5.13E-03	1.27E-01	3.71E-05	6.27E+00	3.00E-01	3.15E+02
541-73-1	4.58E-05	2.47E-03	4.64E-06	1.93E-02	1.00E-03	4.49E+01
542-75-6	7.86E-07	2.93E-05	4.40E-09	2.23E-04	1.69E-05	9.42E-02

Table D24b. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
621-64-7	na	na	na	na	na	na
1314-62-1	8.90E-05	3.17E-03	1.37E-05	4.11E-01	1.34E-02	8.61E+00
1330-20-7	1.05E-07	6.52E-06	8.13E-09	5.02E-05	2.27E-06	9.76E-02
1336-36-3	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na
6533-73-9	4.01E-02	3.56E-01	2.47E-02	4.63E+01	6.05E+00	4.84E+04
7429-90-5	1.60E-06	2.85E-05	7.40E-08	3.71E-03	2.42E-04	1.94E-01
7439-89-6	3.57E-06	9.50E-05	3.29E-06	1.24E-02	5.40E-04	2.58E-01
7439-93-2	9.97E-06	1.42E-03	2.47E-05	1.83E-01	1.48E-03	1.94E-02
7439-96-5	8.59E-05	6.10E-04	1.76E-07	7.95E-02	1.30E-02	1.11E+00
7439-97-6	na	na	na	na	na	na
7439-98-7	6.57E-05	5.42E-03	9.86E-06	4.06E-01	5.20E-03	7.75E-01
7440-02-0	2.97E-05	1.42E-03	1.23E-05	1.86E-01	4.49E-03	1.94E+00
7440-22-4	1.74E-04	5.68E-03	2.96E-05	7.03E-01	2.47E-02	3.87E-01
7440-24-6	1.32E-06	4.74E-05	6.58E-07	6.03E-03	1.94E-04	3.87E-02
7440-28-0	1.62E-02	4.32E-01	2.99E-02	5.62E+01	2.44E+00	5.87E+04
7440-31-5	2.67E-06	4.75E-05	6.58E-06	6.16E-03	4.02E-04	1.94E+00
7440-36-0	2.01E-02	7.12E-02	4.93E-06	9.29E+00	3.04E+00	9.69E+01
7440-38-2	1.29E-03	9.48E-02	3.29E-04	1.21E+01	1.90E-01	3.15E+02
7440-39-3	3.17E-05	4.05E-04	1.41E-07	4.88E-02	4.33E-03	2.21E-02
7440-41-7	7.96E-03	1.42E-02	2.47E-05	1.82E+00	1.18E+00	1.94E+01
7440-42-8	1.15E-06	2.82E-04	4.38E-07	1.22E-02	5.79E-05	2.15E-02
7440-43-9	6.25E-02	5.67E-02	1.97E-05	6.95E+00	8.71E+00	7.75E+01
7440-45-1	na	na	na	na	na	na
7440-48-4	9.70E-06	1.42E-03	2.47E-05	1.71E-01	1.33E-03	5.81E+00
7440-50-8	1.26E-05	7.05E-04	1.11E-05	8.06E-02	1.61E-03	1.94E+00
7440-62-2	2.29E-03	4.07E-03	1.76E-05	5.29E-01	3.45E-01	1.11E+01
7440-66-6	2.65E-06	9.48E-05	1.64E-05	1.21E-02	3.89E-04	3.25E-01
7487-94-7	6.32E-03	9.15E-02	4.11E-02	7.80E+00	5.71E-01	1.29E+03
7664-41-7	na	na	na	na	na	na
7723-14-0	3.25E-02	1.37E+00	1.23E-01	1.12E+02	2.81E+00	2.91E+04
7782-41-4	2.72E-06	4.74E-04	1.23E-04	5.99E-02	3.96E-04	6.46E-02
7782-49-2	3.51E-05	4.82E-03	1.48E-04	1.54E-01	1.46E-03	1.32E+01
8001-35-2	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na
11097-69-1	3.09E-01	1.27E+00	3.80E-01	6.22E+01	1.80E+01	2.73E+06
11104-28-2	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na
12674-11-2	6.78E-02	3.37E-01	7.34E-03	1.12E+01	3.12E+00	9.78E+04
14797-55-8	5.26E-08	1.20E-05	0.00E+00	1.90E-04	1.58E-06	7.66E-04
14797-65-0	8.41E-07	1.91E-04	0.00E+00	3.03E-03	2.52E-05	1.23E-02
16065-83-1	2.08E-05	1.89E-05	2.96E-07	2.30E-03	2.87E-03	5.17E-02
16984-48-8	2.72E-06	4.74E-04	1.23E-04	5.99E-02	3.96E-04	6.46E-02
18540-29-9	7.01E-04	6.38E-03	1.48E-04	1.01E-01	2.10E-02	2.58E+01
53469-21-9	na	na	na	na	na	na

Table D24b. HSRAM Recreational Hazard Index by Pathway, per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
Uranium	2.42E-04	4.51E-02	2.47E-05	3.29E+00	1.86E-02	6.46E+00
Cr Mixture	1.18E-04	9.28E-04	2.14E-05	1.64E-02	5.46E-03	3.73E+00

The game, sediment, and fish pathways are only used when the contaminated water source is the Columbia River.

Table D25a. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
50-32-8	1.32E-02	1.29E+01	1.71E-03	6.65E-07	1.92E-07	1.15E-02	1.90E-01
53-70-3	1.73E-02	3.84E+01	1.71E-03	1.79E-07	1.98E-07	1.55E-02	2.57E-01
56-23-5	3.29E-05	7.11E-04	3.05E-05	6.01E-07	1.31E-11	1.76E-06	2.91E-05
57-12-5	na	na	na	na	na	na	na
57-14-7	7.09E-04	2.35E-03	7.05E-04	5.65E-07	7.64E-08	2.75E-07	4.56E-06
57-55-6	na	na	na	na	na	na	na
58-89-9	3.27E-04	3.25E-02	3.05E-04	na	na	1.47E-05	2.43E-04
60-29-7	na	na	na	na	na	na	na
60-34-4	7.08E-04	2.34E-03	7.05E-04	2.57E-07	6.75E-08	4.21E-07	6.98E-06
60-57-1	4.51E-03	7.65E+00	3.76E-03	7.56E-05	7.13E-07	5.58E-04	9.25E-03
62-75-9	1.21E-02	4.02E-02	1.20E-02	4.39E-05	2.45E-07	1.06E-05	1.76E-04
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	9.89E-07	1.30E-06	5.40E-08	9.31E-07	2.48E-11	4.02E-09	6.67E-08
67-72-1	4.12E-06	7.29E-04	3.29E-06	1.62E-07	4.36E-11	6.54E-07	1.08E-05
71-36-3	na	na	na	na	na	na	na
71-43-2	1.37E-05	1.01E-04	1.29E-05	3.16E-07	1.20E-11	4.60E-07	7.63E-06
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	3.15E-06	1.04E-05	3.05E-06	7.29E-08	1.52E-12	2.64E-08	4.38E-07
75-00-3	6.93E-07	2.08E-06	6.81E-07	na	na	1.13E-08	1.88E-07
75-01-4	3.35E-04	1.25E-03	3.29E-04	3.56E-07	7.23E-12	6.20E-06	1.03E-04
75-05-8	na	na	na	na	na	na	na
75-07-0	8.91E-08	8.91E-08	na	8.91E-08	3.99E-12	na	na
75-09-2	1.79E-06	4.30E-06	1.76E-06	1.91E-08	4.88E-13	1.38E-08	2.29E-07
75-15-0	na	na	na	na	na	na	na
75-21-8	2.44E-04	7.86E-04	2.40E-04	4.05E-06	1.44E-10	3.14E-07	5.20E-06
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na

Table D25a. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
76-44-8	1.67E-03	7.43E+00	1.06E-03	5.20E-05	1.62E-07	5.29E-04	8.77E-03
78-83-1	na	na	na	na	na	na	na
78-87-5	1.63E-05	9.74E-05	1.60E-05	na	na	3.57E-07	5.92E-06
78-93-3	na	na	na	na	na	na	na
79-00-5	1.42E-05	7.10E-05	1.34E-05	6.59E-07	4.12E-11	1.77E-07	2.94E-06
79-01-6	1.15E-04	1.34E-03	9.39E-05	4.63E-06	1.21E-10	1.64E-05	2.72E-04
79-10-7	na	na	na	na	na	na	na
79-34-5	5.04E-05	5.26E-04	4.70E-05	2.31E-06	2.76E-10	1.01E-06	1.67E-05
79-46-9	1.09E-04	1.09E-04	na	1.09E-04	9.92E-09	na	na
82-68-8	6.97E-05	3.24E-02	6.11E-05	na	na	7.56E-06	1.25E-04
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	2.66E-05	1.25E-02	1.83E-05	9.02E-07	7.04E-11	7.40E-06	1.23E-04
87-86-5	3.81E-05	1.41E-02	2.82E-05	na	na	9.18E-06	1.52E-04
88-06-2	3.08E-06	1.13E-04	2.58E-06	1.35E-08	2.82E-10	4.28E-07	7.09E-06
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	4.45E-08	4.45E-08	na	4.45E-08	2.52E-12	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	6.60E-06	3.72E-04	5.64E-06	2.54E-07	2.44E-11	7.00E-07	1.16E-05
106-93-4	2.01E-02	1.14E-01	2.00E-02	8.91E-06	9.21E-10	1.40E-04	2.31E-03
106-99-0	1.21E-06	1.21E-06	na	1.21E-06	2.34E-11	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	2.26E-05	6.73E-05	2.14E-05	1.05E-06	4.14E-11	1.91E-07	3.16E-06
107-13-1	1.30E-04	4.20E-04	1.27E-04	2.75E-06	1.35E-10	3.60E-07	5.97E-06
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na

Table D25a. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	1.87E-06	6.02E-06	1.78E-06	7.86E-08	4.71E-12	8.76E-09	1.45E-07
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	6.04E-05	1.68E-03	3.29E-06	na	na	5.69E-05	9.43E-04
117-84-0	na	na	na	na	na	na	na
118-74-1	9.08E-04	1.38E+00	3.76E-04	1.85E-05	6.20E-09	5.12E-04	8.48E-03
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	2.59E-06	8.44E-06	2.58E-06	na	na	1.92E-09	3.18E-08
126-73-8	1.43E-06	4.08E-05	1.27E-06	na	na	1.33E-07	2.20E-06
126-98-7	na	na	na	na	na	na	na
127-18-4	1.32E-05	7.43E-04	1.22E-05	2.35E-08	6.10E-13	9.81E-07	1.63E-05
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	1.06E-02	5.71E+01	3.99E-03	1.97E-04	8.96E-07	6.23E-03	1.03E-01
319-84-6	1.62E-03	1.80E-01	1.48E-03	3.63E-05	1.99E-07	7.11E-05	1.18E-03
319-85-7	4.56E-04	4.99E-02	4.23E-04	3.74E-07	6.67E-08	2.16E-05	3.59E-04
541-73-1	na	na	na	na	na	na	na
542-75-6	2.44E-05	1.58E-04	2.35E-05	1.62E-07	6.35E-12	7.91E-07	1.31E-05
621-64-7	1.70E-03	5.44E-03	1.64E-03	na	na	3.11E-05	5.15E-04
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	2.73E-04	1.93E+01	9.39E-05	4.63E-06	5.90E-08	1.61E-04	2.66E-03
1336-36-3	6.31E-05	1.93E+01	1.64E-05	4.63E-06	5.90E-08	2.81E-05	4.66E-04
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na

Table D25a. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Well Total	River Total	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin	
						Well	River
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	3.69E-04	6.31E-02	3.52E-04	3.49E-09	9.79E-07	2.77E-06	4.59E-05
7440-39-3	na	na	na	na	na	na	na
7440-41-7	5.47E-07	5.47E-07	na	1.94E-09	5.45E-07	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	4.02E-07	4.02E-07	na	1.46E-09	4.01E-07	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	6.22E-07	6.22E-07	na	2.27E-09	6.20E-07	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	3.34E-04	1.03E+00	2.58E-04	3.12E-06	6.42E-08	6.25E-05	1.03E-03
11096-82-5	1.07E-03	1.64E+00	9.39E-05	4.63E-06	8.94E-08	9.55E-04	1.58E-02
11097-69-1	3.40E-04	4.67E+01	9.39E-05	4.63E-06	7.37E-08	2.25E-04	3.73E-03
11104-28-2	1.45E-04	2.05E-01	9.39E-05	4.63E-06	2.90E-08	3.87E-05	6.41E-04
11141-16-5	1.45E-04	2.05E-01	9.39E-05	4.63E-06	2.90E-08	3.87E-05	6.41E-04
12672-29-6	2.83E-04	2.10E+01	9.39E-05	4.63E-06	4.51E-08	1.73E-04	2.86E-03
12674-11-2	4.96E-05	5.87E+00	1.64E-05	4.63E-06	5.55E-08	1.53E-05	2.53E-04
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	6.73E-07	6.73E-07	na	9.72E-09	6.64E-07	na	na
53469-21-9	2.73E-04	1.93E+01	9.39E-05	4.63E-06	5.57E-08	1.61E-04	2.66E-03
Uranium	na	na	na	na	na	na	na
Cr Mixture	9.62E-08	9.62E-08	na	1.39E-09	9.48E-08	na	na

"na" means that one or more of the cancer induction slope factors was not available.

Table D25b. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	1.55E-05	6.12E-05	5.20E-06	8.07E-03	2.09E-03	1.27E+01
53-70-3	1.59E-05	6.26E-05	2.17E-05	8.81E-03	2.30E-03	3.81E+01

Table D25b. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
56-23-5	6.20E-10	8.12E-09	4.64E-11	1.17E-07	1.32E-08	6.51E-04
57-12-5	na	na	na	na	na	na
57-14-7	3.23E-07	3.18E-06	1.02E-13	5.15E-05	7.57E-06	1.58E-03
57-55-6	na	na	na	na	na	na
58-89-9	5.01E-07	6.95E-06	3.60E-09	3.57E-04	2.72E-05	3.15E-02
60-29-7	na	na	na	na	na	na
60-34-4	2.86E-07	2.83E-06	1.41E-13	4.47E-05	6.58E-06	1.58E-03
60-57-1	1.52E-05	1.03E-04	2.12E-06	7.38E-03	1.12E-03	7.63E+00
62-75-9	5.93E-06	5.80E-05	7.25E-12	9.69E-04	1.42E-04	2.68E-02
64-18-6	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na
67-66-3	4.34E-12	1.75E-11	1.13E-14	2.53E-10	9.29E-11	2.51E-07
67-72-1	1.06E-09	1.06E-08	1.02E-10	1.65E-07	2.43E-08	7.15E-04
71-36-3	na	na	na	na	na	na
71-43-2	3.05E-10	5.96E-09	3.92E-12	8.63E-08	6.54E-09	7.96E-05
71-55-6	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na
74-87-3	4.81E-11	7.75E-10	5.58E-14	1.12E-08	1.03E-09	6.83E-06
75-00-3	1.04E-11	1.67E-10	4.12E-14	2.41E-09	2.21E-10	1.21E-06
75-01-4	4.03E-09	8.12E-08	3.08E-11	1.17E-06	8.61E-08	8.20E-04
75-05-8	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na
75-09-2	2.86E-11	5.48E-10	7.05E-14	7.91E-09	6.12E-10	2.28E-06
75-15-0	na	na	na	na	na	na
75-21-8	6.41E-09	1.03E-07	2.70E-13	1.49E-06	1.37E-07	5.36E-04
75-34-3	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na
76-44-8	2.44E-06	2.49E-05	2.99E-06	1.35E-03	1.39E-04	7.42E+00
78-83-1	na	na	na	na	na	na
78-87-5	4.81E-10	7.17E-09	3.43E-12	1.04E-07	1.03E-08	7.54E-05
78-93-3	na	na	na	na	na	na
79-00-5	6.23E-10	1.02E-08	2.34E-12	1.49E-07	1.35E-08	5.39E-05
79-01-6	9.91E-09	3.00E-08	5.56E-11	4.33E-07	2.12E-07	9.68E-04
79-10-7	na	na	na	na	na	na
79-34-5	4.83E-09	6.80E-08	2.59E-11	1.01E-06	1.06E-07	4.59E-04
79-46-9	na	na	na	na	na	na
82-68-8	7.80E-08	9.88E-07	6.00E-09	3.38E-05	3.10E-06	3.22E-02
83-32-9	na	na	na	na	na	na

Table D25b. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
84-66-2	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na
87-68-3	1.72E-09	1.74E-08	2.48E-09	2.56E-07	3.76E-08	1.24E-02
87-86-5	5.02E-08	7.00E-07	8.36E-09	4.12E-05	3.08E-06	1.39E-02
88-06-2	6.23E-09	4.75E-08	2.85E-11	1.84E-06	2.71E-07	1.01E-04
88-85-7	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na
106-46-7	3.61E-10	6.55E-09	3.49E-11	9.69E-08	7.91E-09	3.54E-04
106-93-4	1.56E-06	2.50E-05	4.10E-09	3.71E-04	3.40E-05	9.10E-02
106-99-0	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na
107-06-2	5.07E-10	1.02E-08	1.45E-12	1.48E-07	1.09E-08	4.16E-05
107-13-1	4.70E-09	7.58E-08	5.07E-13	1.10E-06	1.01E-07	2.84E-04
108-10-1	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na
109-99-9	1.29E-10	1.30E-09	1.16E-14	1.90E-08	2.79E-09	3.99E-06
110-00-9	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na

Table D25b. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
111-76-2	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na
117-81-7	4.75E-08	1.16E-07	2.94E-07	1.46E-05	6.15E-06	7.15E-04
117-84-0	na	na	na	na	na	na
118-74-1	1.51E-07	1.49E-06	4.54E-07	2.41E-05	3.55E-06	1.37E+00
120-82-1	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na
123-91-1	1.74E-10	2.80E-09	3.12E-15	4.09E-08	3.76E-09	5.78E-06
126-73-8	3.97E-09	2.85E-08	2.85E-11	1.43E-06	2.12E-07	3.57E-05
126-98-7	na	na	na	na	na	na
127-18-4	1.91E-10	3.86E-09	6.90E-11	5.57E-08	4.09E-09	7.15E-04
129-00-0	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na
309-00-2	1.90E-05	1.25E-04	2.84E-05	1.18E-02	1.83E-03	5.70E+01
319-84-6	2.24E-06	3.16E-05	2.10E-08	1.48E-03	1.13E-04	1.76E-01
319-85-7	7.92E-07	1.01E-05	5.73E-09	5.66E-04	4.62E-05	4.85E-02
541-73-1	na	na	na	na	na	na
542-75-6	1.01E-09	1.12E-08	5.66E-12	1.62E-07	2.17E-08	1.21E-04
621-64-7	4.58E-06	1.97E-05	8.47E-11	5.19E-04	1.52E-04	2.59E-03
1314-62-1	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na
1336-36-3	4.30E-06	9.54E-06	2.06E-06	4.21E-04	2.07E-04	1.93E+01
1336-36-3	4.30E-06	9.54E-06	2.06E-06	4.21E-04	2.07E-04	1.93E+01
6533-73-9	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na
7440-38-2	2.49E-07	1.30E-05	6.34E-08	1.85E-03	3.66E-05	6.08E-02
7440-39-3	na	na	na	na	na	na
7440-41-7	na	na	na	na	na	na
7440-42-8	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na

Table D25b. HSRAM Recreational Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Soil Dermal	Soil Ingestion	Game	Sediment Ingestion	Sediment Dermal	Fish
7440-45-1	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na
8001-35-2	1.35E-06	8.75E-06	3.50E-07	1.00E-03	1.58E-04	1.03E+00
11096-82-5	6.37E-06	1.30E-05	1.97E-04	9.31E-04	4.70E-04	1.63E+00
11097-69-1	5.30E-06	1.12E-05	6.52E-06	6.23E-04	3.09E-04	4.67E+01
11104-28-2	2.22E-06	5.72E-06	3.58E-08	1.54E-04	7.52E-05	2.04E-01
11141-16-5	2.22E-06	5.72E-06	3.58E-08	1.54E-04	7.52E-05	2.04E-01
12672-29-6	3.35E-06	7.87E-06	2.31E-06	2.79E-04	1.37E-04	2.10E+01
12674-11-2	4.07E-06	9.14E-06	4.41E-07	3.82E-04	1.87E-04	5.87E+00
14797-55-8	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na
53469-21-9	4.08E-06	9.16E-06	2.06E-06	3.84E-04	1.89E-04	1.93E+01
Uranium	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na

The game, sediment, and fish pathways are only used when the contaminated water source is the Columbia River.

Table 26a. HSRAM Residential and Agricultural Scenario Average Doses, mrem/y per pCi/L

Nuclide	Residential		Agricultural	
	Well Total	River Total	Well Total	River Total
H-3	5.23E-05	5.29E-05	5.97E-05	6.04E-05
Be-10	3.89E-03	9.24E-03	3.98E-03	9.33E-03
C-14	2.30E-03	1.04E+00	8.66E-03	1.04E+00
Na-22	1.23E-01	1.31E-01	1.62E-01	1.69E-01
Al-26	6.55E-01	8.01E-01	6.56E-01	8.01E-01
Si-32+D	9.96E-03	1.36E-02	1.00E-02	1.36E-02
Cl-36	3.59E-02	3.74E-02	1.53E-01	1.55E-01
K-40	5.07E-02	2.39E-01	8.80E-02	2.76E-01
Ca-41	1.31E-03	1.92E-03	2.87E-03	3.47E-03
Ti-44+D	4.77E-01	7.68E-01	5.21E-01	8.13E-01
V-49	5.01E-05	1.72E-04	5.25E-05	1.75E-04
Mn-54	1.79E-02	2.97E-02	1.79E-02	2.97E-02
Fe-55	4.97E-04	1.71E-03	7.05E-04	1.92E-03
Fe-60+D	4.95E-01	8.76E-01	5.55E-01	9.35E-01
Co-60	2.47E-01	3.41E-01	2.53E-01	3.47E-01
Ni-59	1.79E-04	4.21E-04	6.33E-04	8.75E-04
Ni-63	4.91E-04	1.15E-03	1.73E-03	2.38E-03
Se-79	7.19E-03	2.20E-02	1.38E-02	2.87E-02
Rb-87	6.28E-03	1.04E-01	1.96E-02	1.18E-01
Sr-90+D	1.64E-01	2.71E-01	3.69E-01	4.76E-01
Zr-93	1.37E-03	6.61E-03	1.37E-03	6.61E-03
Nb-91	9.27E-04	2.61E-03	9.27E-04	2.61E-03
Nb-93m	4.35E-04	2.03E-03	4.35E-04	2.03E-03
Nb-94	3.78E-01	4.40E-01	3.78E-01	4.40E-01
Mo-93	1.57E-03	1.81E-03	2.01E-03	2.26E-03
Tc-99	4.42E-03	4.74E-03	6.08E-03	6.40E-03
Ru-106+D	2.72E-02	3.03E-02	4.82E-02	5.14E-02
Pd-107	1.26E-04	1.62E-04	3.41E-04	3.77E-04
Ag-108m+D	3.62E-01	3.98E-01	3.62E-01	3.99E-01
Cd-109	1.09E-02	3.70E-02	1.25E-02	3.85E-02
Cd-113m	1.41E-01	4.72E-01	1.67E-01	4.98E-01
In-115	1.30E-01	1.57E+02	1.56E-01	1.57E+02
Sn-121m+D	1.94E-03	6.91E-02	5.66E-03	7.28E-02
Sn-126+D	4.88E-01	1.17E+00	5.23E-01	1.20E+00
Sb-125	2.47E-02	2.87E-02	2.48E-02	2.88E-02
Te-125m	2.96E-03	1.75E-02	3.25E-03	1.78E-02
I-129	2.30E-01	3.68E-01	7.66E-01	9.04E-01
Cs-134	1.27E-01	1.58E+00	2.61E-01	1.72E+00
Cs-135	6.45E-03	1.48E-01	2.46E-02	1.66E-01
Cs-137+D	1.53E-01	1.16E+00	2.73E-01	1.28E+00
Ba-133	4.84E-02	5.20E-02	4.86E-02	5.22E-02
Pm-147	8.61E-04	1.19E-03	9.52E-04	1.28E-03
Sm-147	1.54E-01	2.29E-01	1.72E-01	2.47E-01
Sm-151	3.21E-04	4.71E-04	3.59E-04	5.09E-04
Eu-150	2.94E-01	3.25E-01	2.94E-01	3.25E-01

Table 26a. HSRAM Residential and Agricultural Scenario Average Doses, mrem/y per pCi/L

Nuclide	Residential		Agricultural	
	Well Total	River Total	Well Total	River Total
Eu-152	1.74E-01	1.91E-01	1.75E-01	1.92E-01
Eu-154	1.58E-01	1.74E-01	1.59E-01	1.75E-01
Eu-155	4.08E-03	5.06E-03	4.22E-03	5.20E-03
Gd-152	1.38E-01	2.04E-01	1.49E-01	2.15E-01
Ho-166m	4.09E-01	4.55E-01	4.09E-01	4.56E-01
Re-187	9.78E-06	2.25E-05	1.64E-05	2.91E-05
Tl-204	2.81E-03	3.36E-01	5.91E-03	3.39E-01
Pb-205	1.35E-03	6.45E-03	1.41E-03	6.52E-03
Pb-210+D	4.45E+00	2.11E+01	4.75E+00	2.14E+01
Bi-207	2.98E-01	3.27E-01	2.99E-01	3.27E-01
Po-209	1.95E+00	3.47E+00	2.28E+00	3.79E+00
Po-210	1.54E+00	2.49E+00	1.71E+00	2.65E+00
Ra-226+D	1.53E+00	2.89E+00	1.78E+00	3.14E+00
Ra-228+D	1.41E+00	2.23E+00	1.66E+00	2.47E+00
Ac-227+D	1.23E+01	1.74E+01	1.23E+01	1.74E+01
Th-228+D	7.26E-01	1.54E+00	7.27E-01	1.54E+00
Th-229+D	3.42E+00	8.07E+00	3.42E+00	8.07E+00
Th-230	4.58E-01	1.09E+00	4.59E-01	1.09E+00
Th-232	2.59E+00	6.05E+00	2.62E+00	6.07E+00
Pa-231	8.80E+00	1.25E+01	8.81E+00	1.25E+01
U-232	1.31E+00	1.58E+00	1.38E+00	1.65E+00
U-233	2.39E-01	2.87E-01	2.55E-01	3.03E-01
U-234	2.34E-01	2.81E-01	2.49E-01	2.96E-01
U-235+D	2.45E-01	2.91E-01	2.60E-01	3.06E-01
U-236	2.22E-01	2.67E-01	2.37E-01	2.82E-01
U-238+D	2.25E-01	2.70E-01	2.40E-01	2.85E-01
Np-237+D	3.73E+00	5.20E+00	3.82E+00	5.29E+00
Pu-236	9.67E-01	1.24E+00	9.67E-01	1.24E+00
Pu-238	2.64E+00	3.76E+00	2.64E+00	3.76E+00
Pu-239	2.92E+00	4.23E+00	2.92E+00	4.23E+00
Pu-240	2.92E+00	4.23E+00	2.92E+00	4.23E+00
Pu-241+D	5.66E-02	8.61E-02	5.67E-02	8.61E-02
Pu-242	2.77E+00	4.02E+00	2.77E+00	4.02E+00
Pu-244+D	2.82E+00	4.06E+00	2.82E+00	4.06E+00
Am-241	3.00E+00	4.33E+00	3.01E+00	4.34E+00
Am-242m+D	2.91E+00	4.23E+00	2.91E+00	4.23E+00
Am-243+D	3.03E+00	4.38E+00	3.04E+00	4.38E+00
Cm-242	9.37E-02	1.20E-01	9.39E-02	1.20E-01
Cm-243	2.09E+00	2.89E+00	2.09E+00	2.89E+00
Cm-244	1.66E+00	2.27E+00	1.67E+00	2.27E+00
Cm-245	3.10E+00	4.50E+00	3.11E+00	4.51E+00
Cm-246	3.05E+00	4.42E+00	3.06E+00	4.43E+00
Cm-247+D	2.90E+00	4.17E+00	2.91E+00	4.18E+00
Cm-248	1.12E+01	1.62E+01	1.13E+01	1.63E+01
Cm-250+D	6.42E+01	9.29E+01	6.44E+01	9.31E+01
Bk-247	3.90E+00	5.82E+00	3.90E+00	5.82E+00

Table 26a. HSRAM Residential and Agricultural Scenario Average Doses, mrem/y per pCi/L

Nuclide	Residential		Agricultural	
	Well Total	River Total	Well Total	River Total
Cf-248	2.74E-01	3.67E-01	2.98E-01	3.92E-01
Cf-249	4.01E+00	5.92E+00	4.46E+00	6.38E+00
Cf-250	1.76E+00	2.45E+00	1.96E+00	2.64E+00
Cf-251	4.05E+00	6.02E+00	4.51E+00	6.48E+00
Cf-252	8.87E-01	1.17E+00	9.78E-01	1.27E+00
The averaging period is 30 years, with no prior irrigation.				

Table D26b. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	4.67E-05	3.17E-06	0.00E+00	0.00E+00	2.17E-10	2.36E-06
Be-10	3.40E-03	2.60E-07	7.14E-06	4.68E-05	9.80E-06	4.25E-04
C-14	1.53E-03	1.54E-09	3.18E-08	4.48E-07	3.35E-06	7.67E-04
Na-22	8.40E-03	5.63E-09	3.37E-08	1.14E-01	5.67E-06	1.44E-03
Al-26	1.06E-02	1.07E-08	2.96E-07	6.43E-01	3.09E-05	1.32E-03
Si-32+D	8.03E-03	7.57E-07	1.92E-05	4.60E-04	2.15E-05	1.43E-03
Cl-36	2.21E-03	1.61E-08	1.25E-07	2.86E-05	1.91E-06	3.36E-02
K-40	1.36E-02	9.11E-09	2.05E-07	3.09E-02	3.23E-05	6.23E-03
Ca-41	9.29E-04	9.36E-10	2.06E-08	0.00E+00	2.16E-06	3.80E-04
Ti-44+D	1.80E-02	3.32E-07	7.96E-06	4.57E-01	4.54E-05	2.25E-03
V-49	4.48E-05	2.54E-10	5.92E-10	0.00E+00	1.23E-08	5.30E-06
Mn-54	2.02E-03	4.92E-09	1.07E-08	1.56E-02	5.17E-07	2.74E-04
Fe-55	4.43E-04	9.85E-10	6.18E-09	0.00E+00	3.13E-07	5.40E-05
Fe-60+D	1.11E-01	1.98E-07	5.90E-06	3.69E-01	3.57E-04	1.46E-02
Co-60	1.96E-02	2.43E-08	2.50E-07	2.24E-01	2.21E-05	2.71E-03
Ni-59	1.53E-04	6.75E-10	1.87E-08	0.00E+00	4.45E-07	2.55E-05
Ni-63	4.21E-04	1.69E-09	4.37E-08	0.00E+00	1.15E-06	6.90E-05
Se-79	6.35E-03	4.81E-09	5.89E-08	3.67E-07	8.44E-06	8.34E-04
Rb-87	3.59E-03	2.37E-09	6.32E-08	6.02E-06	1.00E-05	2.68E-03
Sr-90+D	1.12E-01	1.82E-07	3.94E-06	8.06E-04	2.57E-04	5.17E-02
Zr-93	1.21E-03	6.12E-08	1.71E-06	1.48E-06	3.85E-06	1.52E-04
Nb-91	3.81E-04	2.36E-09	6.38E-08	4.93E-04	1.08E-06	5.16E-05
Nb-93m	3.81E-04	2.36E-09	4.38E-08	3.11E-06	7.53E-07	5.00E-05
Nb-94	5.21E-03	2.65E-08	7.25E-07	3.72E-01	1.49E-05	7.07E-04
Mo-93	9.86E-04	2.09E-08	4.55E-07	2.11E-05	2.47E-06	5.56E-04
Tc-99	1.07E-03	6.12E-09	7.49E-08	2.47E-06	1.42E-06	3.35E-03
Ru-106+D	2.00E-02	8.67E-08	2.22E-07	4.73E-03	6.01E-06	2.44E-03
Pd-107	1.09E-04	9.41E-09	2.50E-07	0.00E+00	3.04E-07	1.68E-05
Ag-108m+D	5.56E-03	1.86E-08	4.76E-07	3.55E-01	1.50E-05	6.91E-04
Cd-109	9.56E-03	8.38E-08	2.62E-07	7.42E-05	3.49E-06	1.29E-03
Cd-113m	1.18E-01	1.12E-06	1.96E-05	1.80E-05	2.19E-04	2.35E-02
In-115	1.15E-01	2.75E-06	7.60E-05	1.77E-05	3.35E-04	1.43E-02
Sn-121m+D	1.64E-03	8.75E-09	2.14E-07	8.30E-05	4.23E-06	2.10E-04
Sn-126+D	1.53E-02	7.42E-08	2.05E-06	4.70E-01	4.45E-05	1.97E-03

Table D26b. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Sb-125	2.05E-03	8.97E-09	6.39E-08	2.23E-02	1.88E-06	2.68E-04
Te-125m	2.68E-03	5.36E-09	2.23E-09	1.01E-05	1.34E-07	2.74E-04
I-129	2.01E-01	1.28E-07	3.07E-06	5.01E-04	5.10E-04	2.76E-02
Cs-134	5.35E-02	3.40E-08	1.67E-07	6.61E-02	3.00E-05	7.73E-03
Cs-135	5.16E-03	3.34E-09	9.25E-08	1.70E-06	1.50E-05	1.28E-03
Cs-137+D	3.65E-02	2.34E-08	5.21E-07	1.08E-01	8.58E-05	8.14E-03
Ba-133	2.48E-03	5.74E-09	8.81E-08	4.56E-02	4.09E-06	3.40E-04
Pm-147	7.67E-04	2.88E-08	1.75E-07	4.87E-07	5.24E-07	9.34E-05
Sm-147	1.35E-01	5.49E-05	1.51E-03	0.00E+00	3.89E-04	1.71E-02
Sm-151	2.84E-04	2.21E-08	5.61E-07	4.03E-08	7.61E-07	3.59E-05
Eu-150	4.64E-03	1.97E-07	4.52E-06	2.88E-01	1.12E-05	5.84E-04
Eu-152	4.73E-03	1.62E-07	2.83E-06	1.69E-01	8.81E-06	5.91E-04
Eu-154	6.97E-03	2.10E-07	2.98E-06	1.50E-01	1.07E-05	8.66E-04
Eu-155	1.12E-03	3.04E-08	2.93E-07	2.82E-03	1.18E-06	1.37E-04
Gd-152	1.18E-01	1.79E-04	4.93E-03	0.00E+00	3.41E-04	1.49E-02
Ho-166m	5.89E-03	5.68E-07	1.55E-05	4.02E-01	1.69E-05	7.46E-04
Re-187	6.94E-06	4.00E-11	1.08E-09	0.00E+00	1.97E-08	2.82E-06
Tl-204	2.45E-03	1.77E-09	1.45E-08	5.30E-05	2.23E-06	2.99E-04
Pb-205	1.19E-03	2.88E-09	7.98E-08	3.15E-07	3.46E-06	1.53E-04
Pb-210+D	3.92E+00	1.00E-05	3.34E-04	1.99E-04	1.16E-02	5.17E-01
Bi-207	4.00E-03	1.47E-08	3.31E-07	2.94E-01	9.52E-06	5.08E-04
Po-209	1.73E+00	7.86E-06	2.03E-04	7.34E-04	4.70E-03	2.19E-01
Po-210	1.39E+00	6.31E-06	6.19E-06	7.24E-08	1.63E-04	1.56E-01
Ra-226+D	9.71E-01	6.32E-06	2.84E-04	4.17E-01	6.49E-03	1.32E-01
Ra-228+D	1.05E+00	3.57E-06	2.50E-03	2.23E-01	1.88E-03	1.32E-01
Ac-227+D	1.08E+01	1.28E-03	2.63E-02	6.28E-02	2.36E-02	1.33E+00
Th-228+D	5.92E-01	2.51E-04	1.15E-03	6.13E-02	3.11E-04	7.13E-02
Th-229+D	2.94E+00	1.28E-03	3.54E-02	6.55E-02	8.55E-03	3.64E-01
Th-230	4.00E-01	1.93E-04	5.33E-03	1.88E-03	1.19E-03	4.96E-02
Th-232	1.99E+00	8.45E-04	2.68E-02	3.15E-01	8.37E-03	2.51E-01
Pa-231	7.74E+00	9.41E-04	3.51E-02	2.97E-02	3.03E-02	9.64E-01
U-232	9.56E-01	1.10E-05	4.31E-03	2.18E-01	2.94E-03	1.24E-01
U-233	2.11E-01	5.87E-06	1.49E-04	9.51E-05	4.70E-04	2.71E-02
U-234	2.07E-01	5.79E-06	1.20E-04	1.35E-05	4.54E-04	2.65E-02
U-235+D	1.95E-01	5.36E-06	1.17E-04	2.46E-02	4.33E-04	2.50E-02
U-236	1.96E-01	5.47E-06	1.13E-04	7.10E-06	4.31E-04	2.52E-02
U-238+D	1.96E-01	5.19E-06	1.07E-04	3.86E-03	4.30E-04	2.51E-02
Np-237+D	3.24E+00	3.97E-04	1.01E-02	4.26E-02	8.66E-03	4.30E-01
Pu-236	8.54E-01	1.07E-04	8.42E-04	6.97E-03	7.26E-04	1.04E-01
Pu-238	2.34E+00	2.88E-04	7.38E-03	6.22E-06	6.30E-03	2.89E-01
Pu-239	2.58E+00	3.15E-04	8.73E-03	1.27E-05	7.51E-03	3.20E-01
Pu-240	2.58E+00	3.15E-04	8.72E-03	6.52E-06	7.50E-03	3.20E-01
Pu-241+D	5.00E-02	6.06E-06	2.13E-04	2.29E-05	1.82E-04	6.22E-03
Pu-242	2.45E+00	3.02E-04	8.36E-03	5.71E-06	7.13E-03	3.04E-01
Pu-244+D	2.42E+00	2.96E-04	8.21E-03	7.95E-02	7.05E-03	3.00E-01
Am-241	2.66E+00	3.26E-04	8.88E-03	1.92E-03	7.60E-03	3.29E-01

Table D26b. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Am-242m+D	2.57E+00	3.13E-04	8.96E-03	2.75E-03	7.67E-03	3.20E-01
Am-243+D	2.65E+00	3.23E-04	8.94E-03	3.88E-02	7.69E-03	3.28E-01
Cm-242	8.40E-02	1.27E-05	5.07E-05	3.45E-07	4.21E-05	9.66E-03
Cm-243	1.83E+00	2.26E-04	4.96E-03	1.99E-02	4.26E-03	2.26E-01
Cm-244	1.47E+00	1.82E-04	3.56E-03	3.96E-06	3.06E-03	1.82E-01
Cm-245	2.73E+00	3.34E-04	9.34E-03	1.50E-02	8.00E-03	3.38E-01
Cm-246	2.70E+00	3.31E-04	9.15E-03	5.16E-06	7.83E-03	3.34E-01
Cm-247+D	2.50E+00	3.04E-04	8.42E-03	7.68E-02	7.26E-03	3.09E-01
Cm-248	9.93E+00	1.21E-03	3.35E-02	3.91E-06	2.88E-02	1.23E+00
Cm-250+D	5.67E+01	6.91E-03	1.91E-01	7.50E-02	1.65E-01	7.02E+00
Bk-247	3.43E+00	4.22E-04	1.16E-02	1.87E-02	9.92E-03	4.25E-01
Cf-248	2.44E-01	3.26E-05	2.42E-04	6.48E-07	2.07E-04	2.94E-02
Cf-249	3.46E+00	4.24E-04	1.15E-02	7.48E-02	9.84E-03	4.52E-01
Cf-250	1.55E+00	1.93E-04	3.34E-03	3.30E-06	2.88E-03	1.98E-01
Cf-251	3.54E+00	4.32E-04	1.18E-02	2.28E-02	1.02E-02	4.63E-01
Cf-252	7.88E-01	1.01E-04	6.14E-04	1.73E-06	5.42E-04	9.69E-02

The averaging period is 30 years, with no prior irrigation.

Table D26c. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
H-3	1.48E-06	5.94E-06	1.19E-07	3.74E-10	0.00E+00	6.34E-07
Be-10	8.87E-05	5.22E-07	2.94E-07	7.33E-04	5.06E-06	4.61E-03
C-14	2.66E-03	3.70E-03	6.44E-06	1.40E-04	2.65E-08	1.03E+00
Na-22	1.64E-02	2.19E-02	5.55E-05	2.09E-04	6.14E-03	9.11E-04
Al-26	4.15E-04	3.61E-04	1.38E-06	2.36E-03	7.09E-02	7.22E-02
Si-32+D	1.03E-05	3.33E-05	2.77E-08	1.38E-03	4.23E-05	2.18E-03
Cl-36	1.90E-02	9.85E-02	3.82E-06	3.81E-05	8.23E-07	1.50E-03
K-40	1.12E-02	2.60E-02	2.34E-05	1.56E-03	2.11E-03	1.84E-01
Ca-41	1.48E-04	1.41E-03	1.60E-07	1.00E-04	0.00E+00	5.04E-04
Ti-44+D	1.38E-02	3.02E-02	4.64E-05	3.10E-03	4.48E-02	2.44E-01
V-49	2.27E-06	1.26E-07	8.57E-09	4.03E-07	0.00E+00	1.22E-04
Mn-54	2.12E-05	8.84E-06	7.66E-08	1.68E-05	7.79E-04	1.10E-02
Fe-55	2.06E-04	2.07E-06	7.34E-07	1.18E-05	0.00E+00	1.20E-03
Fe-60+D	5.86E-02	7.15E-04	1.92E-04	2.80E-02	5.04E-02	3.02E-01
Co-60	5.06E-03	1.00E-03	1.66E-05	9.36E-04	1.36E-02	7.99E-02
Ni-59	2.07E-05	4.33E-04	6.61E-08	3.40E-05	0.00E+00	2.08E-04
Ni-63	5.65E-05	1.18E-03	1.82E-07	8.29E-05	0.00E+00	5.71E-04
Se-79	2.41E-03	4.23E-03	8.22E-06	2.05E-04	1.26E-08	1.46E-02
Rb-87	1.53E-03	1.18E-02	3.10E-06	6.96E-04	6.01E-07	9.74E-02
Sr-90+D	6.32E-02	1.41E-01	7.68E-05	1.61E-02	7.23E-05	9.09E-02
Zr-93	3.15E-08	1.14E-07	1.05E-10	3.05E-04	2.44E-07	4.93E-03
Nb-91	2.99E-09	2.67E-08	9.86E-12	7.94E-05	5.22E-05	1.55E-03
Nb-93m	2.90E-09	2.61E-08	9.80E-12	4.27E-05	2.51E-07	1.55E-03

Table D26c. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
Nb-94	4.10E-08	3.66E-07	1.35E-10	1.10E-03	3.97E-02	2.12E-02
Mo-93	3.68E-05	4.04E-04	8.50E-08	1.14E-04	1.33E-06	1.34E-04
Tc-99	1.72E-04	1.49E-03	9.20E-09	3.44E-05	8.46E-08	2.89E-04
Ru-106+D	2.10E-02	9.56E-06	7.73E-05	1.98E-04	2.38E-04	2.71E-03
Pd-107	1.24E-05	2.03E-04	3.75E-08	2.11E-05	0.00E+00	1.48E-05
Ag-108m+D	4.30E-04	4.69E-05	1.44E-06	1.04E-03	3.54E-02	3.77E-04
Cd-109	8.64E-05	1.47E-03	3.02E-07	1.17E-04	3.76E-06	2.59E-02
Cd-113m	1.49E-03	2.43E-02	4.02E-06	1.18E-02	1.37E-06	3.19E-01
In-115	2.40E-02	1.96E-03	7.96E-05	2.55E-02	1.95E-06	1.56E+02
Sn-121m+D	3.44E-03	2.81E-04	1.13E-05	2.93E-04	8.27E-06	6.68E-02
Sn-126+D	3.25E-02	2.65E-03	1.06E-04	3.38E-03	5.17E-02	6.24E-01
Sb-125	6.62E-05	2.73E-05	1.76E-07	7.08E-05	1.23E-03	2.78E-03
Te-125m	1.74E-04	1.10E-04	8.59E-07	4.14E-06	4.89E-07	1.45E-02
I-129	2.14E-01	3.22E-01	6.96E-04	2.81E-02	3.93E-05	1.09E-01
Cs-134	6.49E-02	6.87E-02	2.19E-04	1.07E-03	3.51E-03	1.45E+00
Cs-135	8.96E-03	9.17E-03	2.23E-05	1.14E-03	1.88E-07	1.40E-01
Cs-137+D	5.94E-02	6.10E-02	1.57E-04	5.56E-03	1.00E-02	9.90E-01
Ba-133	1.31E-05	2.07E-04	4.24E-08	2.04E-04	3.22E-03	1.35E-04
Pm-147	8.87E-05	2.38E-06	3.17E-07	1.95E-05	2.66E-08	3.12E-04
Sm-147	1.76E-02	4.60E-04	5.83E-05	2.91E-02	0.00E+00	4.58E-02
Sm-151	3.68E-05	9.63E-07	1.22E-07	5.37E-05	4.10E-09	9.63E-05
Eu-150	5.96E-04	1.56E-05	2.00E-06	7.43E-04	2.73E-02	3.15E-03
Eu-152	5.95E-04	1.57E-05	2.02E-06	4.87E-04	1.33E-02	3.21E-03
Eu-154	8.64E-04	2.28E-05	2.97E-06	5.28E-04	1.06E-02	4.73E-03
Eu-155	1.34E-04	3.57E-06	4.70E-07	4.99E-05	1.71E-04	7.57E-04
Gd-152	1.07E-02	4.01E-04	3.55E-05	2.59E-02	0.00E+00	3.98E-02
Ho-166m	6.91E-04	2.01E-05	2.29E-06	1.26E-03	4.32E-02	2.00E-03
Re-187	2.99E-06	3.60E-06	4.79E-09	1.40E-06	0.00E+00	1.13E-05
Tl-204	2.33E-03	7.76E-04	8.22E-06	8.95E-05	3.08E-06	3.33E-01
Pb-205	1.24E-05	5.07E-05	4.11E-08	2.65E-04	3.49E-08	4.84E-03
Pb-210+D	1.09E-01	1.87E-01	2.83E-04	7.21E-01	1.76E-05	1.59E+01
Bi-207	4.17E-05	3.41E-04	1.38E-07	6.21E-04	2.75E-02	5.43E-04
Po-209	2.23E-01	9.93E-02	7.46E-04	3.40E-01	7.65E-05	1.17E+00
Po-210	1.08E-01	5.59E-02	4.50E-04	5.11E-03	3.53E-09	9.41E-01
Ra-226+D	2.71E-02	2.25E-01	7.66E-05	6.59E-01	4.54E-02	6.58E-01
Ra-228+D	2.33E-02	2.23E-01	8.01E-05	8.80E-02	1.51E-02	7.13E-01
Ac-227+D	6.85E-03	3.60E-02	2.32E-05	1.45E+00	5.51E-03	3.66E+00
Th-228+D	7.98E-05	4.49E-04	2.89E-07	1.10E-02	3.23E-03	8.03E-01
Th-229+D	4.58E-04	2.49E-03	1.52E-06	6.54E-01	7.24E-03	3.99E+00
Th-230	8.11E-05	4.42E-04	2.13E-07	9.33E-02	3.74E-04	5.43E-01
Th-232	2.38E-03	1.82E-02	2.63E-06	7.09E-01	4.77E-02	2.70E+00
Pa-231	2.17E-03	7.24E-03	6.80E-06	2.66E+00	4.69E-03	1.05E+00
U-232	7.33E-03	6.40E-02	2.47E-05	1.27E-01	1.42E-02	1.30E-01
U-233	1.62E-03	1.42E-02	5.46E-06	2.00E-02	9.27E-06	2.86E-02
U-234	1.59E-03	1.39E-02	5.35E-06	1.91E-02	8.15E-07	2.80E-02
U-235+D	1.50E-03	1.31E-02	5.05E-06	1.85E-02	1.45E-03	2.64E-02

Table D26c. HSRAM Residential and Agricultural Scenario Average Doses by Pathway, mrem/y per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
U-236	1.51E-03	1.32E-02	5.08E-06	1.81E-02	4.20E-07	2.66E-02
U-238+D	1.51E-03	1.32E-02	5.07E-06	1.80E-02	2.28E-04	2.65E-02
Np-237+D	8.57E-02	2.80E-03	2.80E-04	5.38E-01	3.78E-03	9.23E-01
Pu-236	2.27E-04	3.42E-04	7.48E-07	2.90E-02	5.57E-04	2.43E-01
Pu-238	6.01E-04	4.33E-04	2.01E-06	4.53E-01	6.45E-07	6.65E-01
Pu-239	6.69E-04	4.81E-04	2.23E-06	5.74E-01	1.40E-06	7.36E-01
Pu-240	6.69E-04	4.81E-04	2.23E-06	5.73E-01	7.21E-07	7.36E-01
Pu-241+D	1.54E-05	9.64E-06	4.52E-08	1.52E-02	3.72E-06	1.42E-02
Pu-242	6.35E-04	4.57E-04	2.12E-06	5.45E-01	6.31E-07	6.99E-01
Pu-244+D	6.28E-04	4.51E-04	2.09E-06	5.40E-01	8.79E-03	6.90E-01
Am-241	2.75E-03	6.74E-04	9.17E-06	5.72E-01	2.09E-04	7.57E-01
Am-242m+D	2.73E-03	1.17E-03	8.87E-06	5.86E-01	2.91E-04	7.32E-01
Am-243+D	2.75E-03	6.73E-04	9.15E-06	5.86E-01	4.27E-03	7.55E-01
Cm-242	5.96E-06	2.08E-04	2.21E-08	2.63E-03	1.86E-08	2.39E-02
Cm-243	1.63E-04	6.12E-03	5.51E-07	2.74E-01	1.84E-03	5.22E-01
Cm-244	1.30E-04	4.89E-03	4.43E-07	1.82E-01	3.36E-07	4.20E-01
Cm-245	2.49E-04	9.25E-03	8.25E-07	6.16E-01	1.66E-03	7.78E-01
Cm-246	2.45E-04	9.15E-03	8.16E-07	5.97E-01	5.69E-07	7.69E-01
Cm-247+D	2.27E-04	8.46E-03	7.54E-07	5.54E-01	8.47E-03	7.11E-01
Cm-248	9.00E-04	3.36E-02	3.00E-06	2.20E+00	4.31E-07	2.83E+00
Cm-250+D	6.17E-03	1.92E-01	1.79E-05	1.26E+01	8.27E-03	1.62E+01
Bk-247	3.55E-03	8.71E-04	1.18E-05	7.54E-01	2.06E-03	1.16E+00
Cf-248	2.46E-02	6.53E-05	9.31E-05	1.11E-02	3.97E-08	8.27E-02
Cf-249	4.50E-01	4.42E-04	1.49E-03	7.34E-01	8.05E-03	1.17E+00
Cf-250	1.95E-01	1.94E-04	6.65E-04	1.59E-01	2.59E-07	5.27E-01
Cf-251	4.61E-01	4.53E-04	1.53E-03	7.66E-01	2.48E-03	1.20E+00
Cf-252	9.13E-02	9.19E-05	3.26E-04	2.02E-02	9.42E-08	2.67E-01

Table D27a. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
H-3	2.45E-09	1.97E-10	0.00E+00	0.00E+00	2.24E-14	1.60E-10
Be-10	1.54E-07	2.07E-12	5.69E-11	9.85E-10	1.27E-09	2.79E-08
C-14	3.39E-08	1.56E-13	3.23E-12	7.83E-12	1.34E-10	2.20E-08
Na-22	2.11E-07	8.58E-14	5.13E-13	2.98E-06	2.91E-10	4.72E-08
Al-26	3.79E-07	1.53E-12	4.22E-11	1.78E-05	2.99E-09	6.77E-08
Si-32+D	2.72E-07	6.73E-12	1.71E-10	1.16E-08	1.87E-09	6.76E-08
Cl-36	7.23E-08	5.51E-13	4.28E-12	6.53E-10	1.45E-10	1.48E-06
K-40	5.41E-07	2.27E-13	5.10E-12	8.65E-07	3.22E-09	3.44E-07
Ca-41	7.73E-09	4.61E-15	1.01E-13	0.00E+00	2.93E-11	3.92E-09
Ti-44+D	5.96E-07	4.45E-12	1.07E-10	1.18E-05	3.96E-09	1.06E-07
V-49	2.67E-09	3.24E-15	7.57E-15	0.00E+00	2.13E-12	4.64E-10
Mn-54	4.99E-08	1.30E-13	2.81E-13	4.07E-07	2.88E-11	9.23E-09
Fe-55	1.89E-08	1.76E-14	1.11E-13	0.00E+00	3.23E-11	3.10E-09

Table D27a. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Fe-60+D	3.94E-06	4.06E-12	1.26E-10	1.01E-05	2.40E-08	6.74E-07
Co-60	3.44E-07	7.89E-13	8.12E-12	6.17E-06	9.95E-10	6.73E-08
Ni-59	6.00E-09	1.03E-14	2.84E-13	0.00E+00	4.66E-11	1.42E-09
Ni-63	1.47E-08	3.62E-14	9.34E-13	0.00E+00	1.07E-10	3.41E-09
Se-79	1.60E-07	7.34E-14	8.99E-13	6.51E-12	4.66E-10	2.79E-08
Rb-87	1.14E-07	4.72E-14	1.26E-12	1.17E-10	7.66E-10	1.15E-07
Sr-90+D	1.62E-06	2.49E-12	5.41E-11	2.06E-08	7.24E-09	9.66E-07
Zr-93	2.43E-08	1.61E-13	4.81E-12	1.63E-11	1.80E-10	4.03E-09
Nb-91	1.76E-08	4.19E-14	1.13E-12	6.63E-09	1.44E-10	3.47E-09
Nb-93m	1.76E-08	4.19E-14	7.78E-13	3.44E-11	1.00E-10	3.36E-09
Nb-94	1.70E-07	8.31E-13	2.27E-11	9.62E-06	1.29E-09	3.30E-08
Mo-93	7.34E-08	2.80E-14	8.84E-13	2.33E-10	2.94E-10	5.16E-08
Tc-99	6.02E-08	3.11E-13	3.81E-12	4.81E-11	2.23E-10	2.75E-07
Ru-106+D	9.24E-07	2.25E-12	5.75E-12	1.19E-07	7.83E-10	1.63E-07
Pd-107	5.48E-09	3.73E-14	9.91E-13	0.00E+00	4.44E-11	1.24E-09
Ag-108m+D	1.78E-07	5.89E-13	1.51E-11	8.90E-06	1.13E-09	3.05E-08
Cd-109	1.10E-07	3.26E-13	1.02E-12	1.32E-09	9.10E-11	1.98E-08
Cd-113m	6.29E-07	2.87E-12	5.00E-11	3.75E-10	2.09E-09	1.60E-07
In-115	7.40E-07	8.89E-12	2.46E-10	3.61E-10	3.72E-09	1.18E-07
Sn-121m+D	7.67E-08	3.57E-13	8.73E-12	1.16E-09	5.64E-10	1.43E-08
Sn-126+D	5.96E-07	2.23E-12	6.15E-11	1.18E-05	4.76E-09	1.10E-07
Sb-125	9.57E-08	3.66E-13	2.67E-12	5.49E-07	2.05E-10	1.72E-08
Te-125m	7.29E-08	2.58E-13	1.07E-13	1.40E-10	9.79E-12	1.05E-08
I-129	3.24E-06	1.34E-12	3.21E-11	7.08E-09	1.50E-08	5.78E-07
Cs-134	9.24E-07	3.64E-13	1.79E-12	1.69E-06	7.13E-10	1.63E-07
Cs-135	1.04E-07	4.10E-14	1.13E-12	3.16E-11	4.57E-10	3.18E-08
Cs-137+D	6.66E-07	2.62E-13	5.83E-12	2.73E-06	2.23E-09	1.83E-07
Ba-133	1.49E-07	2.56E-13	3.92E-12	1.07E-06	5.02E-10	2.84E-08
Pm-147	3.70E-08	3.55E-13	2.15E-12	9.40E-12	7.30E-11	6.62E-09
Sm-147	8.19E-07	1.52E-10	4.16E-09	0.00E+00	4.79E-09	1.32E-07
Sm-151	1.22E-08	1.08E-13	2.74E-12	4.43E-13	9.33E-11	2.23E-09
Eu-150	9.48E-08	2.47E-12	5.66E-11	7.19E-06	5.73E-10	1.67E-08
Eu-152	1.33E-07	2.01E-12	3.50E-11	4.46E-06	6.60E-10	2.38E-08
Eu-154	2.26E-07	2.54E-12	3.60E-11	3.99E-06	9.54E-10	4.05E-08
Eu-155	4.16E-08	3.26E-13	3.14E-12	5.77E-08	1.25E-10	7.47E-09
Gd-152	6.50E-07	2.01E-10	5.54E-09	0.00E+00	3.99E-09	1.07E-07
Ho-166m	1.76E-07	6.81E-12	1.86E-10	1.01E-05	1.32E-09	3.16E-08
Re-187	3.92E-10	5.53E-16	1.49E-14	0.00E+00	2.98E-12	2.28E-10
Tl-204	1.28E-07	5.40E-14	4.42E-13	1.09E-09	3.06E-10	2.20E-08
Pb-205	1.39E-08	1.42E-14	3.93E-13	4.69E-12	8.02E-11	2.33E-09
Pb-210+D	1.95E-05	6.81E-11	6.20E-09	4.22E-09	1.27E-07	3.98E-06
Bi-207	1.24E-07	4.63E-13	1.04E-11	7.70E-06	7.76E-10	2.26E-08
Po-209	1.03E-05	2.98E-10	7.69E-09	1.65E-08	5.91E-08	7.79E-06
Po-210	8.26E-06	2.38E-10	2.34E-10	1.88E-12	2.05E-09	5.54E-06
Ra-226+D	8.45E-06	2.56E-10	9.06E-09	1.13E-05	8.66E-08	1.54E-06
Ra-228+D	2.28E-05	1.15E-10	3.21E-08	6.12E-06	7.91E-08	3.91E-06

Table D27a. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Drinking Water	Water Inhalation	Soil Inhalation	External	Soil Ingestion	Garden Vegetables
Ac-227+D	1.07E-05	3.09E-09	6.35E-08	1.46E-06	5.54E-08	1.77E-06
Th-228+D	6.59E-06	3.15E-09	1.45E-08	1.73E-06	9.35E-09	1.12E-06
Th-229+D	1.16E-05	4.87E-09	1.35E-07	1.55E-06	8.21E-08	1.94E-06
Th-230	1.99E-06	6.28E-10	1.74E-08	5.04E-08	1.32E-08	3.23E-07
Th-232	2.21E-06	9.55E-10	7.02E-08	8.63E-06	1.23E-07	4.84E-07
Pa-231	3.79E-06	8.97E-10	4.67E-08	6.90E-07	4.21E-08	6.21E-07
U-232	6.39E-06	4.30E-10	5.96E-08	6.16E-06	5.56E-08	1.11E-06
U-233	1.57E-06	2.56E-10	5.40E-09	2.17E-09	7.76E-09	2.73E-07
U-234	1.55E-06	2.51E-10	5.21E-09	2.55E-10	7.60E-09	2.69E-07
U-235+D	1.57E-06	2.23E-10	4.62E-09	5.44E-07	7.85E-09	2.75E-07
U-236	1.47E-06	2.32E-10	4.80E-09	1.25E-10	7.17E-09	2.54E-07
U-238+D	1.91E-06	2.06E-10	4.27E-09	9.65E-08	1.01E-08	3.40E-07
Np-237+D	1.48E-06	3.90E-10	9.91E-09	9.78E-07	9.48E-09	2.64E-07
Pu-236	1.64E-06	5.03E-10	5.23E-09	1.97E-07	4.58E-09	2.66E-07
Pu-238	2.87E-06	7.41E-10	1.90E-08	8.94E-11	1.61E-08	4.58E-07
Pu-239	2.96E-06	7.34E-10	2.03E-08	2.68E-10	1.76E-08	4.72E-07
Pu-240	2.96E-06	7.34E-10	2.03E-08	9.33E-11	1.76E-08	4.72E-07
Pu-241+D	3.85E-08	7.36E-12	3.29E-10	4.35E-10	2.92E-10	6.22E-09
Pu-242	2.80E-06	6.90E-10	1.91E-08	8.36E-11	1.67E-08	4.48E-07
Pu-244+D	3.15E-06	6.46E-10	1.79E-08	2.03E-06	2.00E-08	5.15E-07
Am-241	2.28E-06	6.20E-10	1.69E-08	3.63E-08	1.36E-08	3.63E-07
Am-242m+D	1.59E-06	3.46E-10	1.72E-08	6.05E-08	1.41E-08	2.56E-07
Am-243+D	2.37E-06	5.95E-10	1.65E-08	8.49E-07	1.47E-08	3.85E-07
Cm-242	8.43E-07	3.33E-10	4.77E-10	4.74E-12	3.95E-10	1.37E-07
Cm-243	2.07E-06	5.93E-10	1.30E-08	4.45E-07	1.04E-08	3.32E-07
Cm-244	1.83E-06	5.58E-10	1.09E-08	4.57E-11	8.22E-09	2.91E-07
Cm-245	2.28E-06	6.11E-10	1.70E-08	3.18E-07	1.40E-08	3.66E-07
Cm-246	2.23E-06	6.11E-10	1.69E-08	6.10E-11	1.35E-08	3.55E-07
Cm-247+D	2.19E-06	5.51E-10	1.53E-08	1.83E-06	1.35E-08	3.55E-07
Cm-248	8.19E-06	2.18E-09	6.03E-08	4.57E-11	4.94E-08	1.30E-06
Cm-250+D	4.69E-05	1.22E-08	3.39E-07	1.91E-06	2.83E-07	7.46E-06
Bk-247	2.72E-06	7.19E-10	1.98E-08	4.12E-07	1.58E-08	4.34E-07
Cf-248	9.72E-07	3.99E-10	1.43E-09	7.41E-12	1.08E-09	1.62E-07
Cf-249	2.78E-06	7.50E-10	2.03E-08	1.79E-06	1.58E-08	4.66E-07
Cf-250	1.89E-06	5.87E-10	1.02E-08	3.75E-11	7.50E-09	3.13E-07
Cf-251	2.89E-06	7.50E-10	2.05E-08	4.97E-07	1.68E-08	4.86E-07
Cf-252	1.06E-06	3.44E-10	2.10E-09	2.55E-11	1.57E-09	1.69E-07
The averaging period is 30 years, with no prior irrigation.						

Table D27b. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
H-3	9.97E-11	4.01E-10	8.04E-12	3.85E-14	0.00E+00	4.28E-11
Be-10	5.82E-09	3.43E-11	1.93E-11	9.53E-08	1.06E-10	3.03E-07

Table D27b. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
C-14	7.65E-08	1.06E-07	1.85E-10	5.63E-09	4.62E-13	2.97E-05
Na-22	5.38E-07	7.19E-07	1.82E-09	1.07E-08	1.61E-07	2.99E-08
Al-26	2.12E-08	1.85E-08	7.06E-11	2.28E-07	1.96E-06	3.70E-06
Si-32+D	4.84E-10	1.57E-09	1.31E-12	1.20E-07	1.07E-09	1.03E-07
Cl-36	8.35E-07	4.33E-06	1.68E-10	2.89E-09	1.88E-11	6.59E-08
K-40	6.21E-07	1.44E-06	1.30E-09	1.55E-07	5.92E-08	1.02E-05
Ca-41	1.52E-09	1.45E-08	1.65E-12	1.36E-09	0.00E+00	5.19E-09
Ti-44+D	6.53E-07	1.43E-06	2.19E-09	2.71E-07	1.16E-06	1.15E-05
V-49	1.98E-10	1.10E-11	7.50E-13	6.96E-11	0.00E+00	1.06E-08
Mn-54	7.15E-10	2.98E-10	2.58E-12	9.36E-10	2.03E-08	3.69E-07
Fe-55	1.18E-08	1.18E-10	4.21E-11	1.21E-09	0.00E+00	6.89E-08
Fe-60+D	2.74E-06	3.04E-08	9.04E-09	1.86E-06	1.38E-06	1.42E-05
Co-60	1.26E-07	2.49E-08	4.12E-10	4.20E-08	3.73E-07	1.99E-06
Ni-59	1.15E-09	2.41E-08	3.68E-12	3.56E-09	0.00E+00	1.16E-08
Ni-63	2.79E-09	5.84E-08	8.98E-12	7.72E-09	0.00E+00	2.82E-08
Se-79	8.07E-08	1.41E-07	2.75E-10	1.13E-08	2.23E-13	4.89E-07
Rb-87	6.57E-08	5.09E-07	1.34E-10	5.30E-08	1.17E-11	4.20E-06
Sr-90+D	1.18E-06	2.64E-06	1.44E-09	4.54E-07	1.84E-09	1.70E-06
Zr-93	8.24E-13	2.99E-12	2.73E-15	1.54E-08	2.70E-12	1.28E-07
Nb-91	2.01E-13	1.80E-12	6.63E-16	1.05E-08	7.01E-10	1.04E-07
Nb-93m	1.95E-13	1.75E-12	6.59E-16	5.67E-09	2.77E-12	1.04E-07
Nb-94	1.91E-12	1.71E-11	6.29E-15	9.51E-08	1.03E-06	9.89E-07
Mo-93	3.42E-09	3.75E-08	7.90E-12	1.37E-08	1.47E-11	1.24E-08
Tc-99	1.41E-08	1.22E-07	7.56E-13	5.41E-09	1.65E-12	2.38E-08
Ru-106+D	1.40E-06	6.39E-10	5.17E-09	2.58E-08	6.00E-09	1.81E-07
Pd-107	9.20E-10	1.50E-08	2.77E-12	3.08E-09	0.00E+00	1.09E-09
Ag-108m+D	1.90E-08	2.07E-09	6.34E-11	7.84E-08	8.85E-07	1.66E-08
Cd-109	1.33E-09	2.26E-08	4.64E-12	3.04E-09	6.68E-11	3.98E-07
Cd-113m	1.01E-08	1.65E-07	2.73E-11	1.12E-07	2.86E-11	2.16E-06
In-115	1.97E-07	1.61E-08	6.55E-10	2.84E-07	3.98E-11	1.29E-03
Sn-121m+D	2.35E-07	1.92E-08	7.73E-10	3.91E-08	1.16E-10	4.56E-06
Sn-126+D	1.82E-06	1.48E-07	5.93E-09	3.62E-07	1.30E-06	3.49E-05
Sb-125	2.60E-09	1.27E-09	6.95E-12	7.70E-09	3.02E-08	1.82E-07
Te-125m	6.68E-09	4.23E-09	3.30E-11	3.02E-10	6.74E-12	5.58E-07
I-129	4.49E-06	1.13E-05	1.46E-08	8.28E-07	5.55E-10	2.29E-06
Cs-134	1.37E-06	1.44E-06	4.60E-09	2.55E-08	8.94E-08	3.05E-05
Cs-135	2.24E-07	2.29E-07	5.56E-10	3.49E-08	3.48E-12	3.49E-06
Cs-137+D	1.33E-06	1.37E-06	3.52E-09	1.44E-07	2.53E-07	2.22E-05
Ba-133	1.09E-09	1.72E-08	3.53E-12	2.50E-08	7.55E-08	1.12E-08
Pm-147	6.29E-09	1.69E-10	2.24E-11	2.72E-09	5.13E-13	2.21E-08
Sm-147	1.36E-07	3.56E-09	4.51E-10	3.58E-07	0.00E+00	3.54E-07
Sm-151	2.29E-09	5.99E-11	7.62E-12	6.58E-09	4.50E-14	5.99E-09
Eu-150	1.71E-08	4.48E-10	5.72E-11	3.78E-08	6.81E-07	9.01E-08
Eu-152	2.40E-08	6.31E-10	8.15E-11	3.65E-08	3.51E-07	1.29E-07
Eu-154	4.04E-08	1.07E-09	1.39E-10	4.72E-08	2.81E-07	2.21E-07
Eu-155	7.30E-09	1.94E-10	2.55E-11	5.28E-09	3.49E-09	4.11E-08

Table D27b. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
Gd-152	7.70E-08	2.88E-09	2.55E-10	3.03E-07	0.00E+00	2.86E-07
Ho-166m	2.93E-08	8.51E-10	9.69E-11	9.81E-08	1.09E-06	8.46E-08
Re-187	2.42E-10	2.91E-10	3.87E-13	2.13E-10	0.00E+00	9.12E-10
Tl-204	1.72E-07	5.72E-08	6.05E-10	1.23E-08	6.34E-11	2.45E-05
Pb-205	1.89E-10	7.70E-10	6.24E-13	6.14E-09	5.19E-13	7.35E-08
Pb-210+D	2.73E-06	1.91E-06	6.16E-09	7.92E-06	3.73E-10	1.06E-04
Bi-207	1.86E-09	1.52E-08	6.13E-12	5.07E-08	7.20E-07	2.42E-08
Po-209	7.93E-06	3.53E-06	2.65E-08	4.28E-06	1.72E-09	4.17E-05
Po-210	3.82E-06	1.99E-06	1.60E-08	6.43E-08	9.14E-14	3.34E-05
Ra-226+D	3.76E-07	2.63E-06	8.99E-10	8.40E-06	1.23E-06	7.65E-06
Ra-228+D	6.95E-07	6.64E-06	2.39E-09	3.65E-06	4.17E-07	2.12E-05
Ac-227+D	9.09E-09	4.77E-08	3.07E-11	3.41E-06	1.28E-07	4.86E-06
Th-228+D	1.25E-09	7.05E-09	4.53E-12	3.31E-07	9.13E-08	1.26E-05
Th-229+D	2.44E-09	1.33E-08	8.12E-12	6.28E-06	1.72E-07	2.13E-05
Th-230	7.41E-10	3.42E-09	1.41E-12	1.04E-06	1.01E-08	3.53E-06
Th-232	6.21E-08	4.94E-07	4.91E-11	1.22E-05	1.31E-06	3.95E-06
Pa-231	1.50E-09	5.10E-09	4.43E-12	4.04E-06	1.09E-07	6.71E-07
U-232	6.47E-08	5.65E-07	2.18E-10	2.47E-06	4.03E-07	1.14E-06
U-233	1.63E-08	1.43E-07	5.49E-11	3.29E-07	2.15E-10	2.88E-07
U-234	1.61E-08	1.41E-07	5.41E-11	3.19E-07	1.56E-11	2.84E-07
U-235+D	1.65E-08	1.44E-07	5.53E-11	3.30E-07	3.21E-08	2.90E-07
U-236	1.52E-08	1.33E-07	5.12E-11	3.01E-07	7.39E-12	2.68E-07
U-238+D	2.04E-08	1.78E-07	6.86E-11	4.24E-07	5.70E-09	3.59E-07
Np-237+D	5.27E-08	1.72E-09	1.72E-10	5.89E-07	8.69E-08	5.68E-07
Pu-236	7.58E-10	2.10E-09	2.15E-12	2.04E-07	1.58E-08	6.19E-07
Pu-238	9.53E-10	6.86E-10	3.19E-12	1.16E-06	9.27E-12	1.05E-06
Pu-239	9.87E-10	7.10E-10	3.29E-12	1.34E-06	2.96E-11	1.09E-06
Pu-240	9.87E-10	7.10E-10	3.29E-12	1.35E-06	1.03E-11	1.09E-06
Pu-241+D	1.57E-11	9.69E-12	4.54E-14	2.53E-08	7.05E-11	1.42E-08
Pu-242	9.36E-10	6.73E-10	3.12E-12	1.28E-06	9.25E-12	1.03E-06
Pu-244+D	1.08E-09	7.75E-10	3.59E-12	1.53E-06	2.25E-07	1.19E-06
Am-241	3.04E-09	7.45E-10	1.01E-11	1.02E-06	3.95E-09	8.36E-07
Am-242m+D	2.24E-09	1.36E-09	6.89E-12	1.10E-06	6.41E-09	5.63E-07
Am-243+D	3.22E-09	7.90E-10	1.07E-11	1.12E-06	9.36E-08	8.86E-07
Cm-242	7.13E-11	2.96E-09	2.87E-13	1.58E-08	2.57E-13	3.42E-07
Cm-243	2.40E-10	9.00E-09	8.10E-13	6.71E-07	4.09E-08	7.67E-07
Cm-244	2.09E-10	7.84E-09	7.10E-13	4.89E-07	3.88E-12	6.74E-07
Cm-245	2.69E-10	1.00E-08	8.93E-13	1.08E-06	3.51E-08	8.42E-07
Cm-246	2.60E-10	9.72E-09	8.67E-13	1.03E-06	6.72E-12	8.17E-07
Cm-247+D	2.60E-10	9.72E-09	8.67E-13	1.03E-06	2.02E-07	8.17E-07
Cm-248	9.53E-10	3.56E-08	3.18E-12	3.77E-06	5.04E-12	2.99E-06
Cm-250+D	7.09E-09	2.04E-07	1.95E-11	2.16E-05	2.11E-07	1.72E-05
Bk-247	3.63E-09	8.90E-10	1.21E-11	1.20E-06	4.53E-08	1.19E-06
Cf-248	1.37E-07	2.07E-10	5.20E-10	4.70E-08	4.55E-13	4.62E-07
Cf-249	4.65E-07	4.56E-10	1.54E-09	1.18E-06	1.93E-07	1.21E-06
Cf-250	3.08E-07	3.05E-10	1.05E-09	4.13E-07	2.94E-12	8.32E-07

Table D27b. HSRAM Residential and Agricultural Scenario Incremental Cancer Risk by Pathway, lifetime risk per pCi/L

Nuclide	Beef	Milk	Game	Sediment Ingestion	Sediment External	Fish
Cf-251	4.85E-07	4.76E-10	1.61E-09	1.26E-06	5.41E-08	1.26E-06
Cf-252	1.60E-07	1.61E-10	5.70E-10	5.84E-08	1.39E-12	4.68E-07

Table D28a. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	8.93E+01	na	na	2.35E+00	3.05E+00	4.08E-04	3.65E-02
57-12-5	3.13E+00	na	na	1.22E-02	1.58E-02	5.14E-04	1.18E-02
57-14-7	na	na	na	na	na	na	na
57-55-6	1.25E-01	6.78E-04	5.31E-04	2.77E-05	3.59E-05	5.33E-06	3.64E-04
58-89-9	2.08E+02	na	na	4.57E+00	5.94E+00	7.71E-02	4.35E+00
60-29-7	3.13E-01	na	na	8.60E-04	1.12E-03	1.35E-06	1.48E-04
60-34-4	na	na	na	na	na	na	na
60-57-1	1.25E+03	na	na	8.49E+01	1.10E+02	1.14E+00	2.76E+01
62-75-9	7.81E+03	na	na	3.16E+00	4.10E+00	8.71E-01	5.65E+01
64-18-6	3.13E-02	na	na	1.97E-05	2.56E-05	1.96E-06	1.32E-04
67-56-1	1.25E-01	na	na	4.12E-05	5.34E-05	2.06E-06	2.26E-04
67-64-1	6.94E-02	na	na	3.63E-05	4.72E-05	6.54E-07	7.45E-05
67-66-3	6.25E+00	1.26E+02	9.04E-05	2.13E-01	2.76E-01	1.13E-04	3.11E-03
67-72-1	6.25E+01	na	na	5.69E+00	7.39E+00	4.55E-03	3.05E-01
71-36-3	6.25E-01	1.50E+01	1.33E-04	2.71E-03	3.52E-03	2.02E-05	1.38E-03
71-43-2	1.56E+01	1.27E+01	1.29E-05	2.55E-01	3.31E-01	8.31E-05	1.11E-02
71-55-6	2.23E-01	1.73E-01	1.07E-07	3.24E-03	4.20E-03	7.75E-07	9.57E-05
72-20-8	2.08E+02	na	na	3.54E+02	4.60E+02	4.92E+00	4.64E+00
74-83-9	4.46E+01	7.59E+01	4.66E-05	1.50E-01	1.94E-01	1.73E-04	1.90E-02
74-87-3	na	4.22E+00	2.37E-06	na	na	na	na
75-00-3	1.56E-01	3.80E-02	2.06E-08	1.19E-03	1.55E-03	5.36E-07	5.88E-05
75-01-4	2.08E+01	3.80E+00	2.07E-06	1.80E-01	2.33E-01	5.75E-05	7.90E-03
75-05-8	na	6.35E+00	1.21E-05	na	na	na	na
75-07-0	na	4.22E+01	5.08E-05	na	na	na	na
75-09-2	1.04E+00	1.27E-01	8.71E-08	3.73E-03	4.85E-03	3.82E-06	4.98E-04
75-15-0	6.25E-01	5.43E-01	2.73E-07	1.18E-02	1.53E-02	6.32E-05	2.19E-04
75-21-8	na	na	na	na	na	na	na
75-34-3	6.25E-01	7.59E-01	5.35E-07	4.23E-03	5.49E-03	2.23E-06	3.06E-04
75-35-4	1.25E+00	1.90E+00	1.08E-06	1.52E-02	1.97E-02	3.59E-06	4.93E-04
75-45-6	na	7.59E-03	4.21E-09	na	na	na	na
75-68-3	na	7.59E-03	4.22E-09	na	na	na	na
75-69-4	2.08E-01	5.43E-01	2.93E-07	1.20E-02	1.55E-02	2.47E-06	7.81E-05
75-71-8	3.13E-01	1.90E+00	1.01E-06	1.23E-02	1.60E-02	3.66E-06	1.16E-04
76-13-1	2.08E-03	1.27E-02	7.32E-09	4.77E-05	6.20E-05	7.62E-09	8.36E-07
76-44-8	1.25E+02	na	na	2.86E+01	3.72E+01	6.50E-02	2.64E+00
78-83-1	2.08E-01	na	na	4.63E-04	6.02E-04	3.85E-06	4.22E-04

Table D28a. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
78-87-5	na	9.52E+01	9.45E-05	na	na	na	na
78-93-3	1.04E-01	7.59E-02	1.39E-07	1.10E-04	1.43E-04	1.21E-06	1.32E-04
79-00-5	1.56E+01	na	na	9.47E-02	1.23E-01	1.64E-04	1.82E-02
79-01-6	2.08E+02	9.52E+00	6.71E-06	1.66E+01	2.16E+01	4.95E-03	1.02E-01
79-10-7	1.25E-01	5.74E+00	1.55E-03	2.35E-04	3.05E-04	5.21E-06	3.55E-04
79-34-5	1.04E+00	na	na	1.02E-02	1.32E-02	2.41E-05	2.31E-03
79-46-9	na	1.90E+01	4.65E-05	na	na	na	na
82-68-8	2.08E+01	na	na	1.18E+00	1.53E+00	6.00E-03	3.79E-01
83-32-9	1.04E+00	na	na	3.41E-01	4.43E-01	5.00E-04	1.55E-02
84-66-2	7.81E-02	na	na	2.91E-04	3.78E-04	1.14E-05	1.09E-03
84-74-2	6.25E-01	na	na	2.85E-02	3.71E-02	1.74E-04	1.21E-02
85-68-7	3.13E-01	na	na	2.12E-02	2.75E-02	2.49E-04	7.00E-03
87-68-3	2.08E+02	na	na	3.85E+01	5.00E+01	4.42E-03	3.03E-01
87-86-5	2.08E+00	na	na	3.10E-01	4.03E-01	8.36E-04	4.47E-02
88-06-2	6.25E+02	na	na	4.73E+01	6.15E+01	3.40E-01	1.20E+01
88-85-7	6.25E+01	na	na	2.10E+00	2.73E+00	4.96E-02	1.34E+00
91-20-3	3.13E+00	1.27E+02	1.39E-03	2.07E-01	2.69E-01	2.32E-04	2.39E-02
92-52-4	1.25E+00	na	na	2.79E-01	3.62E-01	3.15E-04	1.69E-02
95-47-6	3.13E-01	3.80E+00	6.08E-06	2.10E-02	2.73E-02	3.17E-06	3.48E-04
95-48-7	1.25E+00	na	na	1.93E-02	2.50E-02	4.52E-04	2.05E-02
95-50-1	6.94E-01	1.90E+00	5.50E-06	4.37E-02	5.67E-02	1.27E-05	1.40E-03
95-57-8	1.25E+01	na	na	2.00E-01	2.60E-01	3.21E-03	1.71E-01
95-63-6	1.25E+00	6.35E+01	1.36E-04	1.59E-01	2.06E-01	1.70E-05	1.86E-03
95-95-4	6.25E-01	na	na	4.97E-02	6.46E-02	3.47E-04	1.21E-02
98-86-2	6.25E-01	na	na	2.79E-03	3.62E-03	3.94E-05	4.13E-03
98-95-3	1.25E+02	1.86E+02	2.27E-03	6.85E-01	8.89E-01	8.40E-03	1.04E+00
100-25-4	6.25E+02	na	na	1.86E+00	2.42E+00	1.93E-01	9.48E+00
100-41-4	6.25E-01	3.80E-01	5.76E-07	3.64E-02	4.72E-02	4.95E-06	6.59E-04
100-42-5	3.13E-01	3.80E-01	9.81E-07	1.63E-02	2.12E-02	5.12E-06	5.61E-04
100-51-6	2.08E-01	na	na	6.07E-04	7.89E-04	1.53E-05	1.33E-03
106-42-3	3.13E-01	3.80E+00	5.58E-06	2.20E-02	2.86E-02	2.91E-06	3.19E-04
106-44-5	1.25E+01	na	na	1.46E-01	1.90E-01	3.35E-03	2.02E-01
106-46-7	2.08E+00	4.74E-01	1.22E-06	1.18E-01	1.54E-01	3.01E-05	3.71E-03
106-93-4	na	1.90E+03	5.27E-03	na	na	na	na
106-99-0	na	1.90E+02	9.87E-05	na	na	na	na
107-02-8	1.25E+02	1.90E+04	2.13E-02	1.02E-01	1.32E-01	8.86E-04	9.73E-02
107-05-1	1.25E+00	3.80E+02	2.32E-04	1.83E-02	2.37E-02	4.84E-06	5.31E-04
107-06-2	2.08E+00	7.75E+01	8.19E-05	8.49E-03	1.10E-02	1.11E-05	1.53E-03
107-13-1	6.25E+01	1.90E+02	2.51E-04	8.11E-02	1.05E-01	5.23E-04	5.74E-02
108-10-1	7.81E-01	1.27E-01	2.29E-07	2.96E-03	3.84E-03	8.92E-06	9.79E-04
108-38-3	3.13E-01	3.80E+00	5.73E-06	2.39E-02	3.11E-02	2.98E-06	3.28E-04
108-39-4	1.25E+00	na	na	1.97E-02	2.55E-02	4.41E-04	2.03E-02
108-67-8	1.25E+00	6.35E+01	1.18E-04	1.13E-01	1.46E-01	1.47E-05	1.61E-03
108-87-2	na	1.27E-01	6.86E-08	na	na	na	na
108-88-3	3.13E-01	9.52E-01	1.09E-06	1.35E-02	1.75E-02	2.27E-06	2.49E-04
108-90-7	3.13E+00	6.39E+00	1.12E-05	3.13E-01	4.07E-01	8.94E-05	3.80E-03

Table D28a. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
108-94-1	1.25E-02	na	na	2.15E-05	2.79E-05	4.70E-07	5.08E-05
108-95-2	2.08E-01	na	na	9.77E-04	1.27E-03	3.64E-05	3.20E-03
109-99-9	2.98E-01	1.27E+00	2.04E-06	6.68E-04	8.67E-04	4.85E-06	3.33E-04
110-00-9	6.25E+01	na	na	3.91E-01	5.07E-01	3.19E-04	3.50E-02
110-54-3	1.04E+00	1.90E+00	9.68E-07	3.32E-01	4.31E-01	3.35E-06	3.68E-04
110-80-5	1.56E-01	3.65E-02	7.69E-06	7.59E-05	9.85E-05	6.43E-06	4.39E-04
110-82-7	na	6.35E-02	3.55E-08	na	na	na	na
110-86-1	6.25E+01	na	na	1.74E-01	2.26E-01	4.77E-03	3.18E-01
111-76-2	1.25E-01	1.91E-03	1.16E-07	2.69E-04	3.49E-04	5.04E-06	3.44E-04
111-90-0	1.04E+00	1.15E-04	5.65E-04	1.91E-04	2.48E-04	4.75E-05	3.24E-03
117-81-7	3.13E+00	na	na	2.47E+01	3.21E+01	1.02E-02	7.34E-02
117-84-0	1.56E+00	na	na	5.90E+00	7.66E+00	1.07E-03	3.67E-02
118-74-1	7.81E+01	na	na	4.87E+01	6.32E+01	7.06E-03	4.67E-01
120-82-1	6.25E+00	9.52E+01	5.88E-04	5.26E-01	6.83E-01	2.05E-04	2.68E-02
121-14-2	3.13E+01	na	na	1.06E-01	1.37E-01	7.17E-03	5.31E-01
121-44-8	na	5.43E+01	2.39E-04	na	na	na	na
122-39-4	2.50E+00	na	na	2.06E-01	2.68E-01	1.38E-03	4.84E-02
123-91-1	na	na	na	na	na	na	na
126-73-8	3.13E-01	na	na	1.49E-02	1.94E-02	2.21E-04	6.49E-03
126-98-7	6.25E+02	5.43E+02	7.60E-04	1.35E+00	1.75E+00	5.54E-03	6.08E-01
127-18-4	6.25E+00	6.39E-01	4.46E-07	2.30E-01	2.98E-01	2.21E-05	3.03E-03
129-00-0	2.08E+00	na	na	1.66E+00	2.16E+00	3.58E-03	4.75E-02
141-78-6	6.94E-02	na	na	1.21E-04	1.57E-04	6.68E-07	7.33E-05
156-59-2	6.25E+00	na	na	7.11E-02	9.23E-02	2.52E-05	3.45E-03
206-44-0	1.56E+00	na	na	1.97E+00	2.56E+00	2.73E-03	3.58E-02
309-00-2	2.08E+03	na	na	1.49E+03	1.93E+03	2.24E+00	4.76E+01
319-84-6	1.25E+02	na	na	2.74E+00	3.56E+00	4.26E-02	2.55E+00
319-85-7	3.13E+02	na	na	7.31E+00	9.50E+00	1.32E-01	6.63E+00
541-73-1	6.94E+01	na	na	5.14E+00	6.67E+00	1.18E-03	1.29E-01
542-75-6	2.08E+00	1.90E+01	2.00E-05	3.21E-02	4.17E-02	2.02E-05	1.53E-03
621-64-7	na	na	na	na	na	na	na
1314-62-1	6.94E+00	na	na	5.06E-01	6.57E-01	2.29E-03	1.65E-01
1330-20-7	3.13E-01	3.80E+00	5.95E-06	1.83E-02	2.37E-02	2.69E-06	3.40E-04
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	7.81E+02	na	na	7.68E-04	9.98E-04	1.03E+00	1.86E+01
7429-90-5	6.25E-02	2.01E-05	2.60E-03	1.02E-03	1.33E-03	4.12E-05	1.49E-03
7439-89-6	2.08E-01	na	na	2.62E-04	3.40E-04	9.17E-05	4.95E-03
7439-93-2	3.13E+00	na	na	1.46E-03	1.90E-03	2.56E-04	7.42E-02
7439-96-5	1.34E+00	2.01E-03	2.60E-01	3.27E-02	4.25E-02	2.21E-03	3.18E-02
7439-97-6	na	3.36E-04	3.13E-02	na	na	na	na
7439-98-7	1.25E+01	na	na	1.81E-02	2.35E-02	1.69E-03	2.83E-01
7440-02-0	3.13E+00	na	na	2.91E-03	3.78E-03	7.64E-04	7.43E-02
7440-22-4	1.25E+01	na	na	3.23E-02	4.19E-02	4.48E-03	2.96E-01
7440-24-6	1.04E-01	na	na	3.22E-04	4.18E-04	3.40E-05	2.47E-03
7440-28-0	9.47E+02	na	na	7.57E-01	9.83E-01	4.16E-01	2.25E+01

Table D28a. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
7440-31-5	1.04E-01	na	na	2.29E-03	2.97E-03	6.87E-05	2.48E-03
7440-36-0	1.56E+02	na	na	6.50E+00	8.44E+00	5.16E-01	3.71E+00
7440-38-2	2.08E+02	na	na	7.49E-01	9.72E-01	3.32E-02	4.94E+00
7440-39-3	8.93E-01	2.01E-04	2.58E-02	3.92E-03	5.10E-03	8.15E-04	2.11E-02
7440-41-7	3.13E+01	5.04E-03	6.50E-01	1.57E+00	2.04E+00	2.05E-01	7.42E-01
7440-42-8	6.94E-01	5.04E-06	5.79E-04	1.34E-03	1.74E-03	2.97E-05	1.47E-02
7440-43-9	1.25E+02	na	na	6.68E-01	8.67E-01	1.61E+00	2.96E+00
7440-45-1	na	5.04E-04	6.50E-02	na	na	na	na
7440-48-4	3.13E+00	5.04E-03	6.47E-01	3.61E-03	4.69E-03	2.49E-04	7.38E-02
7440-50-8	1.56E+00	na	na	1.22E-03	1.59E-03	3.25E-04	3.68E-02
7440-62-2	8.93E+00	na	na	9.20E-01	1.19E+00	5.89E-02	2.12E-01
7440-66-6	2.08E-01	na	na	2.72E-04	3.53E-04	6.81E-05	4.94E-03
7487-94-7	2.08E+02	na	na	6.68E-02	8.67E-02	1.62E-01	4.77E+00
7664-41-7	na	5.35E-01	1.92E-05	na	na	na	na
7723-14-0	3.13E+03	na	na	9.05E+00	1.18E+01	8.37E-01	7.13E+01
7782-41-4	1.04E+00	na	na	1.32E-03	1.71E-03	7.00E-05	2.47E-02
7782-49-2	1.25E+01	na	na	1.96E-02	2.54E-02	9.03E-04	2.51E-01
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	3.13E+03	na	na	3.42E+03	4.44E+03	7.96E+00	6.62E+01
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	8.93E+02	na	na	3.79E+02	4.92E+02	1.74E+00	1.76E+01
14797-55-8	3.91E-02	na	na	6.68E-05	8.67E-05	1.35E-06	6.24E-04
14797-65-0	6.25E-01	na	na	1.03E-03	1.34E-03	2.16E-05	9.99E-03
16065-83-1	4.17E-02	na	na	6.36E-03	8.26E-03	5.34E-04	9.85E-04
16984-48-8	1.04E+00	na	na	1.32E-03	1.71E-03	7.00E-05	2.47E-02
18540-29-9	2.08E+01	1.26E-02	8.73E-02	7.95E-01	1.03E+00	1.80E-02	3.33E-01
53469-21-9	na	na	na	na	na	na	na
Uranium	1.04E+02	na	na	9.36E-02	1.21E-01	6.22E-03	2.35E+00
Cr Mixture	3.01E+00	1.80E-03	1.25E-02	1.19E-01	1.55E-01	3.03E-03	4.84E-02

The totals for the HSRAM Residential scenario are shown in Table 27. The totals for the HSRAM Agricultural scenario are shown in Table 29.
"na" means that one or more of the reference doses were not available.

Table D28b. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	na	na	na	na	na	na	na
53-70-3	na	na	na	na	na	na	na
56-23-5	6.82E+00	4.26E-03	7.88E-03	1.19E-06	5.31E-03	3.40E-04	1.67E+01
57-12-5	2.83E+01	1.01E-05	2.03E-05	3.47E-11	1.83E-03	4.47E-04	6.13E-02
57-14-7	na	na	na	na	na	na	na
57-55-6	2.11E+00	1.60E-07	3.22E-07	2.96E-13	5.31E-05	4.42E-06	2.45E-03

Table D28b. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
58-89-9	1.09E+02	4.70E-01	9.00E-01	2.16E-05	3.69E+00	1.63E-01	1.89E+02
60-29-7	9.74E-02	5.32E-07	1.04E-06	4.79E-11	2.16E-05	1.12E-06	6.13E-03
60-34-4	na	na	na	na	na	na	na
60-57-1	1.56E+02	6.33E+01	1.12E+02	6.19E-03	3.50E+01	3.25E+00	2.22E+04
62-75-9	1.94E+05	3.30E-02	6.64E-02	4.15E-08	9.80E+00	8.15E-01	1.53E+02
64-18-6	4.42E-01	8.07E-08	1.62E-07	1.78E-13	1.94E-05	1.61E-06	6.13E-04
67-56-1	1.11E+00	1.19E-07	2.40E-07	4.19E-13	3.32E-05	1.73E-06	2.45E-03
67-64-1	1.84E-01	6.78E-08	1.36E-07	7.88E-13	1.09E-05	5.48E-07	1.36E-03
67-66-3	7.66E-01	5.82E-05	1.10E-04	1.15E-08	4.53E-04	9.42E-05	2.54E-01
67-72-1	5.79E+00	7.73E-02	1.40E-01	1.70E-05	4.86E-02	4.04E-03	1.19E+02
71-36-3	7.78E-01	3.85E-06	7.67E-06	9.35E-11	2.04E-04	1.69E-05	1.23E-02
71-43-2	2.06E+00	2.24E-04	4.26E-04	4.16E-08	1.62E-03	6.94E-05	8.44E-01
71-55-6	1.94E-02	5.33E-06	9.94E-06	1.36E-09	1.39E-05	6.44E-07	2.28E-02
72-20-8	3.06E+01	7.21E+00	1.29E+01	6.51E-04	6.21E+00	1.47E+01	2.60E+03
74-83-9	9.43E+00	1.08E-04	2.09E-04	1.36E-08	2.77E-03	1.44E-04	4.55E-01
74-87-3	na	na	na	na	na	na	na
75-00-3	2.46E-02	5.11E-07	9.80E-07	8.30E-11	8.57E-06	4.45E-07	2.44E-03
75-01-4	2.83E+00	9.38E-05	1.79E-04	1.71E-08	1.15E-03	4.78E-05	4.56E-01
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	2.26E-01	2.95E-06	5.72E-06	3.65E-10	7.25E-05	3.17E-06	1.18E-02
75-15-0	6.61E-02	4.84E-06	9.13E-06	1.07E-09	3.18E-05	5.25E-05	2.41E-02
75-21-8	na	na	na	na	na	na	na
75-34-3	8.64E-02	4.23E-06	8.06E-06	7.60E-10	4.46E-05	1.85E-06	1.85E-02
75-35-4	1.25E-01	1.44E-05	2.71E-05	3.33E-09	7.18E-05	2.99E-06	6.75E-02
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	1.72E-02	5.24E-06	9.75E-06	1.39E-09	1.14E-05	2.06E-06	2.29E-02
75-71-8	3.00E-02	3.74E-06	7.03E-06	8.91E-10	1.68E-05	3.04E-06	1.78E-02
76-13-1	1.47E-04	2.01E-07	3.70E-07	5.94E-11	1.22E-07	6.33E-09	6.99E-04
76-44-8	1.03E+01	2.46E+01	4.27E+01	3.10E-03	2.40E+00	1.44E-01	7.70E+03
78-83-1	2.79E-01	1.04E-06	2.08E-06	2.36E-11	6.23E-05	3.24E-06	4.08E-03
78-87-5	na	na	na	na	na	na	na
78-93-3	1.64E-01	2.07E-07	4.14E-07	4.01E-12	1.95E-05	1.01E-06	2.04E-03
79-00-5	3.51E+00	2.01E-04	3.89E-04	2.39E-08	2.69E-03	1.38E-04	5.51E-01
79-01-6	1.96E+01	4.48E-03	8.38E-03	1.08E-06	1.49E-02	4.12E-03	1.88E+01
79-10-7	3.85E-01	5.51E-07	1.10E-06	5.52E-12	5.20E-05	4.32E-06	2.45E-03
79-34-5	2.30E-01	4.24E-05	8.14E-05	5.04E-09	3.47E-04	2.06E-05	8.92E-02
79-46-9	na	na	na	na	na	na	na
82-68-8	3.09E+00	1.51E-01	2.73E-01	1.79E-05	1.78E-01	9.28E-03	9.64E+01
83-32-9	2.19E-01	1.62E-03	3.02E-03	1.71E-07	4.77E-03	6.40E-04	1.34E+00
84-66-2	8.15E-02	1.46E-05	2.88E-05	4.05E-10	2.96E-04	1.37E-05	7.06E-03
84-74-2	1.18E-01	3.99E-03	7.29E-03	3.90E-07	7.17E-03	3.00E-04	2.26E+00
85-68-7	7.02E-02	4.54E-03	8.29E-03	3.31E-07	9.86E-03	7.78E-04	1.70E+00
87-68-3	1.35E+01	8.20E-01	1.48E+00	2.48E-04	4.51E-02	3.75E-03	1.24E+03
87-86-5	2.96E-01	5.48E-02	9.80E-02	5.42E-06	4.53E-02	1.99E-03	8.99E+00

Table D28b. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
88-06-2	2.66E+02	1.07E+00	2.04E+00	6.04E-05	6.89E+00	5.75E-01	2.14E+02
88-85-7	4.32E+01	1.24E-01	2.39E-01	4.48E-06	1.33E+00	1.17E-01	4.26E+01
91-20-3	6.56E-01	1.05E-03	1.98E-03	1.23E-07	4.30E-03	2.23E-04	1.34E+00
92-52-4	2.23E-01	1.94E-03	3.59E-03	2.35E-07	4.56E-03	3.79E-04	1.79E+00
95-47-6	2.83E-02	3.34E-05	6.19E-05	8.13E-09	5.14E-05	2.67E-06	9.76E-02
95-48-7	3.19E+00	1.86E-04	3.71E-04	2.20E-09	7.44E-03	6.19E-04	4.91E-02
95-50-1	6.72E-02	1.62E-04	2.99E-04	3.69E-08	2.09E-04	1.09E-05	3.76E-01
95-57-8	1.80E+01	1.69E-03	3.36E-03	3.48E-08	4.66E-02	3.87E-03	6.99E-01
95-63-6	1.01E-01	4.04E-04	7.41E-04	1.05E-07	2.77E-04	1.44E-05	9.65E-01
95-95-4	2.61E-01	1.14E-03	2.17E-03	6.47E-08	7.12E-03	5.95E-04	2.25E-01
98-86-2	8.44E-01	2.11E-05	4.19E-05	4.69E-10	6.99E-04	3.63E-05	1.84E-03
98-95-3	1.48E+02	6.94E-03	1.38E-02	1.75E-07	1.92E-01	8.25E-03	4.11E+00
100-25-4	2.60E+03	4.84E-02	9.68E-02	3.56E-07	2.95E+00	2.46E-01	1.03E+01
100-41-4	5.49E-02	6.99E-05	1.29E-04	1.74E-08	9.72E-05	4.16E-06	2.06E-01
100-42-5	3.82E-02	2.85E-05	5.35E-05	5.49E-09	8.39E-05	4.36E-06	7.22E-02
100-51-6	5.03E-01	4.08E-06	8.16E-06	5.17E-11	2.19E-04	1.38E-05	4.06E-04
106-42-3	2.72E-02	3.47E-05	6.42E-05	8.71E-09	4.70E-05	2.44E-06	1.03E-01
106-44-5	3.12E+01	1.78E-03	3.55E-03	2.15E-08	7.07E-02	4.52E-03	4.82E-01
106-46-7	1.92E-01	4.79E-04	8.83E-04	1.13E-07	5.55E-04	2.56E-05	1.15E+00
106-93-4	na	na	na	na	na	na	na
106-99-0	na	na	na	na	na	na	na
107-02-8	1.80E+02	1.14E-04	2.27E-04	2.41E-09	1.42E-02	7.40E-04	2.45E+00
107-05-1	1.45E-01	1.02E-05	1.93E-05	2.10E-09	7.74E-05	4.02E-06	4.74E-02
107-06-2	4.95E-01	1.09E-05	2.12E-05	1.24E-09	2.24E-04	9.30E-06	3.55E-02
107-13-1	7.57E+01	8.75E-05	1.75E-04	2.19E-09	8.42E-03	4.37E-04	1.23E+00
108-10-1	3.47E-01	4.86E-06	9.56E-06	3.15E-10	1.45E-04	7.52E-06	9.86E-03
108-38-3	2.69E-02	3.86E-05	7.14E-05	9.77E-09	4.83E-05	2.51E-06	1.13E-01
108-39-4	3.07E+00	1.84E-04	3.66E-04	2.25E-09	7.18E-03	5.97E-04	4.99E-02
108-67-8	1.05E-01	2.54E-04	4.67E-04	6.49E-08	2.38E-04	1.24E-05	6.65E-01
108-87-2	na	na	na	na	na	na	na
108-88-3	3.02E-02	1.41E-05	2.64E-05	3.31E-09	3.66E-05	1.90E-06	4.89E-02
108-90-7	3.39E-01	2.00E-04	3.75E-04	4.26E-08	5.62E-04	7.54E-05	5.94E-01
108-94-1	2.96E-02	1.23E-07	2.46E-07	1.59E-12	7.78E-06	4.04E-07	2.45E-04
108-95-2	8.85E-01	1.64E-05	3.29E-05	1.19E-10	1.02E-03	4.69E-05	3.43E-03
109-99-9	3.34E-01	6.29E-07	1.25E-06	1.69E-11	4.90E-05	4.07E-06	5.83E-03
110-00-9	1.39E+01	2.24E-04	4.34E-04	2.70E-08	5.11E-03	2.66E-04	8.32E-01
110-54-3	6.62E-02	5.16E-04	9.45E-04	1.63E-07	5.37E-05	2.79E-06	1.30E+00
110-80-5	1.15E+00	3.49E-07	7.01E-07	1.48E-12	6.42E-05	5.33E-06	3.06E-03
110-82-7	na	na	na	na	na	na	na
110-86-1	2.23E+02	6.38E-04	1.28E-03	5.51E-09	5.06E-02	4.21E-03	1.23E+00
111-76-2	2.00E-01	8.77E-07	1.75E-06	1.67E-11	5.03E-05	4.18E-06	2.45E-03
111-90-0	1.12E+01	2.05E-06	4.12E-06	5.93E-12	4.72E-04	3.93E-05	2.04E-02
117-81-7	2.14E-01	2.50E+01	4.31E+01	2.45E-03	1.62E-01	5.13E-02	5.96E+00
117-84-0	1.04E-01	3.93E+01	6.75E+01	3.88E-03	8.06E-02	5.37E-03	6.15E-01
118-74-1	5.09E+00	3.11E+00	5.44E+00	8.28E-04	7.78E-02	6.46E-03	2.50E+03
120-82-1	5.88E-01	5.86E-03	1.06E-02	1.29E-06	4.20E-03	1.80E-04	9.63E+00

Table D28b. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
121-14-2	8.23E+01	5.15E-03	1.03E-02	5.89E-08	2.07E-01	1.01E-02	1.29E+00
121-44-8	na	na	na	na	na	na	na
122-39-4	1.35E+00	3.34E-03	6.42E-03	1.56E-07	2.84E-02	2.37E-03	1.53E+00
123-91-1	na	na	na	na	na	na	na
126-73-8	1.17E-01	1.05E-03	1.98E-03	6.16E-08	5.35E-03	4.57E-04	7.71E-02
126-98-7	4.67E+02	1.48E-03	2.94E-03	5.90E-08	8.93E-02	4.64E-03	1.23E+01
127-18-4	4.33E-01	1.04E-03	1.91E-03	3.10E-07	4.42E-04	1.84E-05	3.21E+00
129-00-0	4.34E-01	4.27E-02	7.76E-02	3.12E-06	7.90E-02	1.31E-02	1.47E+01
141-78-6	5.27E-02	1.87E-07	3.72E-07	7.36E-12	1.08E-05	5.60E-07	1.36E-03
156-59-2	8.77E-01	5.04E-05	9.60E-05	8.93E-09	5.03E-04	2.09E-05	2.09E-01
206-44-0	2.58E-01	5.54E-02	9.93E-02	4.46E-06	6.15E-02	1.04E-02	1.82E+01
309-00-2	1.67E+02	1.26E+03	2.17E+03	1.30E-01	8.05E+01	8.36E+00	2.61E+05
319-84-6	5.54E+01	2.95E-01	5.62E-01	1.56E-05	1.92E+00	8.36E-02	1.30E+02
319-85-7	1.62E+02	8.15E-01	1.56E+00	3.71E-05	6.27E+00	3.00E-01	3.15E+02
541-73-1	6.24E+00	1.93E-02	3.55E-02	4.64E-06	1.93E-02	1.00E-03	4.49E+01
542-75-6	3.03E-01	2.56E-05	4.88E-05	4.40E-09	2.23E-04	1.69E-05	9.42E-02
621-64-7	na	na	na	na	na	na	na
1314-62-1	5.15E-01	1.49E-01	6.49E-03	1.37E-05	4.11E-01	1.34E-02	8.61E+00
1330-20-7	2.81E-02	3.32E-05	6.15E-05	8.13E-09	5.02E-05	2.27E-06	9.76E-02
1336-36-3	na	na	na	na	na	na	na
1336-36-3	na	na	na	na	na	na	na
6533-73-9	5.16E+01	2.61E+02	7.10E+01	2.47E-02	4.63E+01	6.05E+00	4.84E+04
7429-90-5	4.18E-03	7.85E-04	5.70E-04	7.40E-08	3.71E-03	2.42E-04	1.94E-01
7439-89-6	1.60E-02	3.60E-02	2.95E-04	3.29E-06	1.24E-02	5.40E-04	2.58E-01
7439-93-2	2.50E-01	2.71E-01	2.97E+00	2.47E-05	1.83E-01	1.48E-03	1.94E-02
7439-96-5	4.14E-01	6.72E-03	2.46E-03	1.76E-07	7.95E-02	1.30E-02	1.11E+00
7439-97-6	na	na	na	na	na	na	na
7439-98-7	2.54E+01	7.08E-01	7.52E+00	9.86E-06	4.06E-01	5.20E-03	7.75E-01
7440-02-0	7.93E-01	2.05E-01	3.78E+00	1.23E-05	1.86E-01	4.49E-03	1.94E+00
7440-22-4	8.45E-01	3.10E-01	2.81E-02	2.96E-05	7.03E-01	2.47E-02	3.87E-01
7440-24-6	2.03E-01	4.66E-02	1.02E-01	6.58E-07	6.03E-03	1.94E-04	3.87E-02
7440-28-0	6.26E+01	3.16E+02	8.61E+01	2.99E-02	5.62E+01	2.44E+00	5.87E+04
7440-31-5	9.05E-03	7.40E-02	5.08E-03	6.58E-06	6.16E-03	4.02E-04	1.94E+00
7440-36-0	1.94E+01	6.14E-02	2.14E-01	4.93E-06	9.29E+00	3.04E+00	9.69E+01
7440-38-2	1.84E+01	3.69E+00	6.09E-01	3.29E-04	1.21E+01	1.90E-01	3.15E+02
7440-39-3	1.55E-01	1.94E-03	2.64E-02	1.41E-07	4.88E-02	4.33E-03	2.21E-02
7440-41-7	2.20E+00	2.63E-01	1.29E-03	2.47E-05	1.82E+00	1.18E+00	1.94E+01
7440-42-8	2.72E+00	5.73E-02	6.78E-01	4.38E-07	1.22E-02	5.79E-05	2.15E-02
7440-43-9	3.66E+01	5.33E-01	8.00E+00	1.97E-05	6.95E+00	8.71E+00	7.75E+01
7440-45-1	na	na	na	na	na	na	na
7440-48-4	7.47E-01	3.92E-01	6.77E-02	2.47E-05	1.71E-01	1.33E-03	5.81E+00
7440-50-8	3.83E+00	9.60E-01	1.00E+00	1.11E-05	8.06E-02	1.61E-03	1.94E+00
7440-62-2	6.62E-01	1.91E-01	8.34E-03	1.76E-05	5.29E-01	3.45E-01	1.11E+01
7440-66-6	1.48E+01	3.74E+01	2.38E+01	1.64E-05	1.21E-02	3.89E-04	3.25E-01
7487-94-7	1.41E+02	1.18E+03	1.35E+01	4.11E-02	7.80E+00	5.71E-01	1.29E+03
7664-41-7	na	na	na	na	na	na	na

Table D28b. HSRAM Residential and Agricultural, Hazard Index by Pathway, per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
7723-14-0	2.82E+04	3.65E+04	7.40E+04	1.23E-01	1.12E+02	2.81E+00	2.91E+04
7782-41-4	9.49E-02	1.39E+00	5.11E-02	1.23E-04	5.99E-02	3.96E-04	6.46E-02
7782-49-2	1.25E+00	1.16E+00	1.72E+00	1.48E-04	1.54E-01	1.46E-03	1.32E+01
8001-35-2	na	na	na	na	na	na	na
11096-82-5	na	na	na	na	na	na	na
11097-69-1	2.21E+02	2.90E+03	4.99E+03	3.80E-01	6.22E+01	1.80E+01	2.73E+06
11104-28-2	na	na	na	na	na	na	na
11141-16-5	na	na	na	na	na	na	na
12672-29-6	na	na	na	na	na	na	na
12674-11-2	8.19E+01	5.36E+01	9.38E+01	7.34E-03	1.12E+01	3.12E+00	9.78E+04
14797-55-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-04	1.58E-06	7.66E-04
14797-65-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-03	2.52E-05	1.23E-02
16065-83-1	2.80E-03	3.08E-03	1.86E-05	2.96E-07	2.30E-03	2.87E-03	5.17E-02
16984-48-8	9.49E-02	1.39E+00	5.11E-02	1.23E-04	5.99E-02	3.96E-04	6.46E-02
18540-29-9	1.29E+00	7.44E-01	4.49E-03	1.48E-04	1.01E-01	2.10E-02	2.58E+01
53469-21-9	na	na	na	na	na	na	na
Uranium	8.98E+00	2.35E-01	1.72E+00	2.47E-05	3.29E+00	1.86E-02	6.46E+00
Cr Mixture	1.87E-01	1.09E-01	6.57E-04	2.14E-05	1.64E-02	5.46E-03	3.73E+00
The game, sediment, and fish pathways are only used when water comes from the Columbia River.							

Table D29a. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
50-32-8	8.94E-02	2.68E-03	1.00E-05	5.97E-01	7.75E-01	3.98E-04	3.19E-03
53-70-3	8.94E-02	7.20E-04	1.03E-05	8.09E-01	1.05E+00	4.09E-04	3.26E-03
56-23-5	1.59E-03	2.42E-03	6.86E-10	9.16E-05	1.19E-04	1.59E-08	4.23E-07
57-12-5	na	na	na	na	na	na	na
57-14-7	3.67E-02	2.27E-03	3.99E-06	1.44E-05	1.86E-05	8.31E-06	1.66E-04
57-55-6	na	na	na	na	na	na	na
58-89-9	1.59E-02	na	na	7.65E-04	9.93E-04	1.29E-05	3.62E-04
60-29-7	na	na	na	na	na	na	na
60-34-4	3.67E-02	1.03E-03	3.52E-06	2.20E-05	2.85E-05	7.36E-06	1.47E-04
60-57-1	1.96E-01	3.04E-01	3.72E-05	2.91E-02	3.78E-02	3.92E-04	5.40E-03
62-75-9	6.24E-01	1.76E-01	1.28E-05	5.53E-04	7.18E-04	1.52E-04	3.03E-03
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	2.82E-06	3.74E-03	1.29E-09	2.10E-07	2.72E-07	1.12E-10	9.13E-10
67-72-1	1.71E-04	6.51E-04	2.27E-09	3.41E-05	4.43E-05	2.73E-08	5.51E-07
71-36-3	na	na	na	na	na	na	na
71-43-2	6.73E-04	1.27E-03	6.24E-10	2.40E-05	3.12E-05	7.84E-09	3.11E-07
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na

Table D29a. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
74-87-3	1.59E-04	2.93E-04	7.93E-11	1.38E-06	1.79E-06	1.24E-09	4.04E-08
75-00-3	3.55E-05	na	na	5.92E-07	7.68E-07	2.66E-10	8.71E-09
75-01-4	1.71E-02	1.43E-03	3.77E-10	3.24E-04	4.20E-04	1.04E-07	4.23E-06
75-05-8	na	na	na	na	na	na	na
75-07-0	na	3.58E-04	2.08E-10	na	na	na	na
75-09-2	9.18E-05	7.68E-05	2.55E-11	7.20E-07	9.35E-07	7.36E-10	2.86E-08
75-15-0	na	na	na	na	na	na	na
75-21-8	1.25E-02	1.63E-02	7.49E-09	1.64E-05	2.13E-05	1.65E-07	5.39E-06
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	5.51E-02	2.09E-01	8.46E-06	2.76E-02	3.58E-02	6.27E-05	1.30E-03
78-83-1	na	na	na	na	na	na	na
78-87-5	8.33E-04	na	na	1.86E-05	2.42E-05	1.24E-08	3.74E-07
78-93-3	na	na	na	na	na	na	na
79-00-5	6.98E-04	2.65E-03	2.15E-09	9.25E-06	1.20E-05	1.60E-08	5.30E-07
79-01-6	4.90E-03	1.86E-02	6.33E-09	8.56E-04	1.11E-03	2.55E-07	1.56E-06
79-10-7	na	na	na	na	na	na	na
79-34-5	2.45E-03	9.30E-03	1.44E-08	5.24E-05	6.81E-05	1.24E-07	3.54E-06
79-46-9	na	4.37E-01	5.17E-07	na	na	na	na
82-68-8	3.18E-03	na	na	3.94E-04	5.12E-04	2.01E-06	5.15E-05
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	9.55E-04	3.63E-03	3.67E-09	3.86E-04	5.01E-04	4.43E-08	9.05E-07
87-86-5	1.47E-03	na	na	4.79E-04	6.21E-04	1.29E-06	3.65E-05
88-06-2	1.35E-04	5.44E-05	1.47E-08	2.23E-05	2.90E-05	1.60E-07	2.48E-06
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	1.79E-04	1.31E-10	na	na	na	na

Table D29a. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	2.94E-04	1.02E-03	1.27E-09	3.65E-05	4.74E-05	9.29E-09	3.41E-07
106-93-4	1.04E+00	3.58E-02	4.80E-08	7.28E-03	9.45E-03	4.00E-05	1.31E-03
106-99-0	na	4.88E-03	1.22E-09	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	1.11E-03	4.23E-03	2.16E-09	9.94E-06	1.29E-05	1.30E-08	5.33E-07
107-13-1	6.61E-03	1.11E-02	7.06E-09	1.88E-05	2.44E-05	1.21E-07	3.95E-06
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	9.31E-05	3.16E-04	2.46E-10	4.57E-07	5.93E-07	3.32E-09	6.78E-08
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	1.71E-04	na	na	2.97E-03	3.85E-03	1.22E-06	6.03E-06
117-84-0	na	na	na	na	na	na	na
118-74-1	1.96E-02	7.44E-02	3.23E-07	2.67E-02	3.47E-02	3.87E-06	7.77E-05
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	1.35E-04	na	na	1.00E-07	1.30E-07	4.47E-09	1.46E-07
126-73-8	6.61E-05	na	na	6.91E-06	8.98E-06	1.02E-07	1.49E-06
126-98-7	na	na	na	na	na	na	na
127-18-4	6.37E-04	9.44E-05	3.18E-11	5.11E-05	6.64E-05	4.92E-09	2.01E-07
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	2.08E-01	7.91E-01	4.67E-05	3.25E-01	4.22E-01	4.89E-04	6.52E-03
319-84-6	7.71E-02	1.46E-01	1.04E-05	3.71E-03	4.81E-03	5.75E-05	1.65E-03

Table D29a. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
319-85-7	2.20E-02	1.51E-03	3.48E-06	1.13E-03	1.47E-03	2.04E-05	5.29E-04
541-73-1	na	na	na	na	na	na	na
542-75-6	1.22E-03	6.51E-04	3.31E-10	4.13E-05	5.36E-05	2.60E-08	5.84E-07
621-64-7	8.57E-02	na	na	1.62E-03	2.10E-03	1.18E-04	1.03E-03
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	4.90E-03	1.86E-02	3.07E-06	8.38E-03	1.09E-02	1.11E-04	4.98E-04
1336-36-3	8.57E-04	1.86E-02	3.07E-06	1.47E-03	1.90E-03	1.11E-04	4.98E-04
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	1.84E-02	2.22E-06	5.10E-05	1.44E-04	1.88E-04	6.41E-06	6.76E-04
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	1.04E-07	2.84E-05	na	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	7.77E-08	2.09E-05	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	1.21E-07	3.23E-05	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	1.35E-02	1.25E-02	3.35E-06	3.26E-03	4.23E-03	3.48E-05	4.56E-04
11096-82-5	4.90E-03	1.86E-02	4.66E-06	4.98E-02	6.47E-02	1.64E-04	6.76E-04
11097-69-1	4.90E-03	1.86E-02	3.84E-06	1.17E-02	1.52E-02	1.36E-04	5.85E-04
11104-28-2	4.90E-03	1.86E-02	1.51E-06	2.02E-03	2.62E-03	5.72E-05	2.98E-04
11141-16-5	4.90E-03	1.86E-02	1.51E-06	2.02E-03	2.62E-03	5.72E-05	2.98E-04
12672-29-6	4.90E-03	1.86E-02	2.35E-06	9.02E-03	1.17E-02	8.61E-05	4.10E-04
12674-11-2	8.57E-04	1.86E-02	2.89E-06	7.95E-04	1.03E-03	1.05E-04	4.76E-04
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na

Table D29a. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Drinking Water	Water Inhalation	Soil Inhalation	Water Absorbed by Skin		Soil Dermal	Soil Ingestion
				Well	River		
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	5.18E-07	3.46E-05	na	na	na	na
53469-21-9	4.90E-03	1.86E-02	2.91E-06	8.38E-03	1.09E-02	1.05E-04	4.78E-04
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	7.40E-08	4.94E-06	na	na	na	na

The totals for the HSRAM Residential scenario are shown in Table 27. The totals for the HSRAM Agricultural scenario are shown in Table 29.
"na" means that one or more of the reference doses were not available.

Table D29b. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
50-32-8	1.89E-02	5.84E-02	1.02E-01	5.20E-06	8.07E-03	2.09E-03	1.27E+01
53-70-3	1.54E-02	2.36E-01	4.08E-01	2.17E-05	8.81E-03	2.30E-03	3.81E+01
56-23-5	2.66E-04	1.66E-07	3.07E-07	4.64E-11	1.17E-07	1.32E-08	6.51E-04
57-12-5	na	na	na	na	na	na	na
57-14-7	4.26E+00	1.74E-07	3.49E-07	1.02E-13	5.15E-05	7.57E-06	1.58E-03
57-55-6	na	na	na	na	na	na	na
58-89-9	1.82E-02	7.86E-05	1.50E-04	3.60E-09	3.57E-04	2.72E-05	3.15E-02
60-29-7	na	na	na	na	na	na	na
60-34-4	3.18E+00	1.79E-07	3.61E-07	1.41E-13	4.47E-05	6.58E-06	1.58E-03
60-57-1	5.36E-02	2.17E-02	3.84E-02	2.12E-06	7.38E-03	1.12E-03	7.63E+00
62-75-9	3.39E+01	5.77E-06	1.16E-05	7.25E-12	9.69E-04	1.42E-04	2.68E-02
64-18-6	na	na	na	na	na	na	na
67-56-1	na	na	na	na	na	na	na
67-64-1	na	na	na	na	na	na	na
67-66-3	7.55E-07	5.74E-11	1.09E-10	1.13E-14	2.53E-10	9.29E-11	2.51E-07
67-72-1	3.47E-05	4.64E-07	8.37E-07	1.02E-10	1.65E-07	2.43E-08	7.15E-04
71-36-3	na	na	na	na	na	na	na
71-43-2	1.95E-04	2.11E-08	4.01E-08	3.92E-12	8.63E-08	6.54E-09	7.96E-05
71-55-6	na	na	na	na	na	na	na
72-20-8	na	na	na	na	na	na	na
74-83-9	na	na	na	na	na	na	na
74-87-3	9.10E-05	5.30E-10	1.03E-09	5.58E-14	1.12E-08	1.03E-09	6.83E-06
75-00-3	1.22E-05	2.54E-10	4.87E-10	4.12E-14	2.41E-09	2.21E-10	1.21E-06
75-01-4	5.10E-03	1.69E-07	3.22E-07	3.08E-11	1.17E-06	8.61E-08	8.20E-04
75-05-8	na	na	na	na	na	na	na
75-07-0	na	na	na	na	na	na	na
75-09-2	4.35E-05	5.69E-10	1.10E-09	7.05E-14	7.91E-09	6.12E-10	2.28E-06
75-15-0	na	na	na	na	na	na	na
75-21-8	4.87E-02	1.57E-08	3.14E-08	2.70E-13	1.49E-06	1.37E-07	5.36E-04
75-34-3	na	na	na	na	na	na	na
75-35-4	na	na	na	na	na	na	na

Table D29b. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
75-45-6	na	na	na	na	na	na	na
75-68-3	na	na	na	na	na	na	na
75-69-4	na	na	na	na	na	na	na
75-71-8	na	na	na	na	na	na	na
76-13-1	na	na	na	na	na	na	na
76-44-8	9.94E-03	2.37E-02	4.11E-02	2.99E-06	1.35E-03	1.39E-04	7.42E+00
78-83-1	na	na	na	na	na	na	na
78-87-5	2.65E-04	2.00E-08	3.81E-08	3.43E-12	1.04E-07	1.03E-08	7.54E-05
78-93-3	na	na	na	na	na	na	na
79-00-5	3.43E-04	1.97E-08	3.80E-08	2.34E-12	1.49E-07	1.35E-08	5.39E-05
79-01-6	1.01E-03	2.30E-07	4.31E-07	5.56E-11	4.33E-07	2.12E-07	9.68E-04
79-10-7	na	na	na	na	na	na	na
79-34-5	1.18E-03	2.18E-07	4.19E-07	2.59E-11	1.01E-06	1.06E-07	4.59E-04
79-46-9	na	na	na	na	na	na	na
82-68-8	1.03E-03	5.05E-05	9.14E-05	6.00E-09	3.38E-05	3.10E-06	3.22E-02
83-32-9	na	na	na	na	na	na	na
84-66-2	na	na	na	na	na	na	na
84-74-2	na	na	na	na	na	na	na
85-68-7	na	na	na	na	na	na	na
87-68-3	1.35E-04	8.22E-06	1.49E-05	2.48E-09	2.56E-07	3.76E-08	1.24E-02
87-86-5	4.56E-04	8.46E-05	1.51E-04	8.36E-09	4.12E-05	3.08E-06	1.39E-02
88-06-2	1.25E-04	5.05E-07	9.63E-07	2.85E-11	1.84E-06	2.71E-07	1.01E-04
88-85-7	na	na	na	na	na	na	na
91-20-3	na	na	na	na	na	na	na
92-52-4	na	na	na	na	na	na	na
95-47-6	na	na	na	na	na	na	na
95-48-7	na	na	na	na	na	na	na
95-50-1	na	na	na	na	na	na	na
95-57-8	na	na	na	na	na	na	na
95-63-6	na	na	na	na	na	na	na
95-95-4	na	na	na	na	na	na	na
98-86-2	na	na	na	na	na	na	na
98-95-3	na	na	na	na	na	na	na
100-25-4	na	na	na	na	na	na	na
100-41-4	na	na	na	na	na	na	na
100-42-5	na	na	na	na	na	na	na
100-51-6	na	na	na	na	na	na	na
106-42-3	na	na	na	na	na	na	na
106-44-5	na	na	na	na	na	na	na
106-46-7	5.93E-05	1.48E-07	2.72E-07	3.49E-11	9.69E-08	7.91E-09	3.54E-04
106-93-4	7.03E-01	4.58E-05	8.91E-05	4.10E-09	3.71E-04	3.40E-05	9.10E-02
106-99-0	na	na	na	na	na	na	na
107-02-8	na	na	na	na	na	na	na
107-05-1	na	na	na	na	na	na	na
107-06-2	5.80E-04	1.27E-08	2.47E-08	1.45E-12	1.48E-07	1.09E-08	4.16E-05

Table D29b. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
107-13-1	1.75E-02	2.03E-08	4.04E-08	5.07E-13	1.10E-06	1.01E-07	2.84E-04
108-10-1	na	na	na	na	na	na	na
108-38-3	na	na	na	na	na	na	na
108-39-4	na	na	na	na	na	na	na
108-67-8	na	na	na	na	na	na	na
108-87-2	na	na	na	na	na	na	na
108-88-3	na	na	na	na	na	na	na
108-90-7	na	na	na	na	na	na	na
108-94-1	na	na	na	na	na	na	na
108-95-2	na	na	na	na	na	na	na
109-99-9	2.29E-04	4.30E-10	8.57E-10	1.16E-14	1.90E-08	2.79E-09	3.99E-06
110-00-9	na	na	na	na	na	na	na
110-54-3	na	na	na	na	na	na	na
110-80-5	na	na	na	na	na	na	na
110-82-7	na	na	na	na	na	na	na
110-86-1	na	na	na	na	na	na	na
111-76-2	na	na	na	na	na	na	na
111-90-0	na	na	na	na	na	na	na
117-81-7	2.57E-05	3.01E-03	5.17E-03	2.94E-07	1.46E-05	6.15E-06	7.15E-04
117-84-0	na	na	na	na	na	na	na
118-74-1	2.79E-03	1.71E-03	2.99E-03	4.54E-07	2.41E-05	3.55E-06	1.37E+00
120-82-1	na	na	na	na	na	na	na
121-14-2	na	na	na	na	na	na	na
121-44-8	na	na	na	na	na	na	na
122-39-4	na	na	na	na	na	na	na
123-91-1	1.25E-03	4.28E-10	8.58E-10	3.12E-15	4.09E-08	3.76E-09	5.78E-06
126-73-8	5.40E-05	4.85E-07	9.14E-07	2.85E-11	1.43E-06	2.12E-07	3.57E-05
126-98-7	na	na	na	na	na	na	na
127-18-4	9.64E-05	2.31E-07	4.26E-07	6.90E-11	5.57E-08	4.09E-09	7.15E-04
129-00-0	na	na	na	na	na	na	na
141-78-6	na	na	na	na	na	na	na
156-59-2	na	na	na	na	na	na	na
206-44-0	na	na	na	na	na	na	na
309-00-2	3.66E-02	2.75E-01	4.75E-01	2.84E-05	1.18E-02	1.83E-03	5.70E+01
319-84-6	7.47E-02	3.98E-04	7.58E-04	2.10E-08	1.48E-03	1.13E-04	1.76E-01
319-85-7	2.49E-02	1.26E-04	2.40E-04	5.73E-09	5.66E-04	4.62E-05	4.85E-02
541-73-1	na	na	na	na	na	na	na
542-75-6	3.89E-04	3.29E-08	6.28E-08	5.66E-12	1.62E-07	2.17E-08	1.21E-04
621-64-7	9.07E-01	1.34E-05	2.67E-05	8.47E-11	5.19E-04	1.52E-04	2.59E-03
1314-62-1	na	na	na	na	na	na	na
1330-20-7	na	na	na	na	na	na	na
1336-36-3	4.02E-03	1.43E-02	2.48E-02	2.06E-06	4.21E-04	2.07E-04	1.93E+01
1336-36-3	4.02E-03	1.43E-02	2.48E-02	2.06E-06	4.21E-04	2.07E-04	1.93E+01
6533-73-9	na	na	na	na	na	na	na
7429-90-5	na	na	na	na	na	na	na

Table D29b. HSRAM Residential and Agricultural, Incremental Cancer Risk from Chemicals by Pathway, lifetime risk per mg/L

CASRN	Garden Vegetables	Beef	Milk	Game	Sediment Ingestion	Sediment Dermal	Fish
7439-89-6	na	na	na	na	na	na	na
7439-93-2	na	na	na	na	na	na	na
7439-96-5	na	na	na	na	na	na	na
7439-97-6	na	na	na	na	na	na	na
7439-98-7	na	na	na	na	na	na	na
7440-02-0	na	na	na	na	na	na	na
7440-22-4	na	na	na	na	na	na	na
7440-24-6	na	na	na	na	na	na	na
7440-28-0	na	na	na	na	na	na	na
7440-31-5	na	na	na	na	na	na	na
7440-36-0	na	na	na	na	na	na	na
7440-38-2	3.54E-03	7.12E-04	1.17E-04	6.34E-08	1.85E-03	3.66E-05	6.08E-02
7440-39-3	na	na	na	na	na	na	na
7440-41-7	na	na	na	na	na	na	na
7440-42-8	na	na	na	na	na	na	na
7440-43-9	na	na	na	na	na	na	na
7440-45-1	na	na	na	na	na	na	na
7440-48-4	na	na	na	na	na	na	na
7440-50-8	na	na	na	na	na	na	na
7440-62-2	na	na	na	na	na	na	na
7440-66-6	na	na	na	na	na	na	na
7487-94-7	na	na	na	na	na	na	na
7664-41-7	na	na	na	na	na	na	na
7723-14-0	na	na	na	na	na	na	na
7782-41-4	na	na	na	na	na	na	na
7782-49-2	na	na	na	na	na	na	na
8001-35-2	3.31E-03	3.96E-03	6.95E-03	3.50E-07	1.00E-03	1.58E-04	1.03E+00
11096-82-5	3.45E-03	1.63E+00	2.79E+00	1.97E-04	9.31E-04	4.70E-04	1.63E+00
11097-69-1	3.79E-03	4.97E-02	8.55E-02	6.52E-06	6.23E-04	3.09E-04	4.67E+01
11104-28-2	7.06E-03	2.55E-04	4.61E-04	3.58E-08	1.54E-04	7.52E-05	2.04E-01
11141-16-5	7.06E-03	2.55E-04	4.61E-04	3.58E-08	1.54E-04	7.52E-05	2.04E-01
12672-29-6	3.81E-03	1.40E-02	2.42E-02	2.31E-06	2.79E-04	1.37E-04	2.10E+01
12674-11-2	4.91E-03	3.22E-03	5.63E-03	4.41E-07	3.82E-04	1.87E-04	5.87E+00
14797-55-8	na	na	na	na	na	na	na
14797-65-0	na	na	na	na	na	na	na
16065-83-1	na	na	na	na	na	na	na
16984-48-8	na	na	na	na	na	na	na
18540-29-9	na	na	na	na	na	na	na
53469-21-9	3.98E-03	1.39E-02	2.40E-02	2.06E-06	3.84E-04	1.89E-04	1.93E+01
Uranium	na	na	na	na	na	na	na
Cr Mixture	na	na	na	na	na	na	na

The game, sediment, and fish pathways are only used when water comes from the Columbia River.

APPENDIX E

EMANATION OF GASEOUS RADIONUCLIDES FROM THE SOIL SURFACE

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EMANATION OF GASEOUS RADIONUCLIDES FROM THE SOIL SURFACE

This section describes the migration of gaseous radionuclides from the buried waste, through the facility cover to the ground surface, and into the atmosphere. Then the consequences of the air emission are estimated. The gaseous radionuclides are tritium (as water vapor), ^{14}C (as carbon dioxide), and ^{222}Rn (an inert gas).

E.1. DIFFUSION FLUX AT THE GROUND SURFACE

For the discussion in this section, the waste is separated into solids and a gas-filled pore space. The solids contain the radioactive inventory, while the pore space collects any gaseous nuclides that may be released from the solids. Vitrified waste is expected to release gases very slowly, while low-level waste could release the gaseous radionuclides rapidly. The quantity of gaseous radionuclides in the waste solids decreases with time by radioactive decay, and by release from the waste solids into the waste pore space. It will be assumed that over the course of one year both the inventory in the waste solids and the fractional release rate are relatively constant. The rate at which the gaseous nuclides are released from the waste solids is calculated using the formula below.

$$\text{Gas Release Rate} = \lambda_C Q_S$$

where

Q_S = quantity of a gaseous radionuclide in the waste solids at some time after closure, in Ci

λ_C = fraction of the total released from the waste solids into the waste pore space per year. This fraction may vary slowly from year to year.

The gaseous radionuclides released from the solids then diffuse from the waste into the soil surrounding the disposal site. If this diffusion is slow, then the gaseous nuclides accumulate in the pore space until the diffusion rate away from the waste matches the release rate from the solids. If this diffusion is rapid, then the concentration in the waste pore space will be very small, but will be proportional to the concentration in the waste solids.

The diffusion of radioactive gases can be represented using Fick's law of diffusion with a loss term for radioactive decay (Jury 1991 Chapter 6). The ^{222}Rn will be discussed separately from the ^{3}H and ^{14}C because it is produced by a decay chain that includes ^{238}U, ^{234}U, ^{230}Th, and ^{226}Ra. For calculating diffusion in the presence of radioactive decay the source concentration is assumed to be constant because it changes very slowly with time compared to the movement of the diffusing gases. It will further be assumed that the diffusion characteristics of the waste cover are uniform with depth, so that a single diffusion coefficient (D) represents an average for the various soil layers.

$$\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial z^2} - \lambda_R C$$

$$\text{if } \frac{\partial C}{\partial t} = 0 \quad \text{then} \quad D\frac{\partial^2 C}{\partial z^2} = \lambda_R C$$

The source region is assumed to be a homogenous layer of soil with the same diffusion coefficient as the soil cover. In steady-state, the waste region has a constant gas concentration (C_0) in the pore space. Because this concentration is proportional to the release rate from the waste solids, it will change slowly with time, as discussed above.

The solution to the differential equation has an exponential dependence in elevation as shown below. The boundary conditions that the soil concentration is C_0 at the top of the waste ($z=0$) and zero at the ground surface ($z=z_0$) have been included. The solution is only valid from $z=0$ to $z=z_0$.

$$C(z) = C_0\left[\frac{e^{-z\mu} - e^{-(2z_0 - z)\mu}}{1 - e^{-2z_0\mu}}\right] \qquad \text{and} \qquad \mu = \sqrt{\frac{\lambda_R}{D}}$$

$$J(z) = -D\frac{\partial C}{\partial z} \qquad \text{thus} \quad J(z) = C_0\mu D\frac{e^{-z\mu} + e^{-(2z_0 - z)\mu}}{1 - e^{-2z_0\mu}}$$

$$J(0) = C_0\mu D\frac{1 + e^{-2z_0\mu}}{1 - e^{-2z_0\mu}} \qquad \text{and} \quad J(z_0) = \frac{2C_0\mu D e^{-z_0\mu}}{1 - e^{-2z_0\mu}}$$

where

- $C(z)$ = concentration of a gaseous radionuclide in the soil at elevation z in the soil above the waste, in Ci per m^3 of soil. At the bottom of the soil cover, the soil concentration matches the gas concentration in the waste, i.e., $C=C_0$. At the top of the cover the gas concentration is zero.
- C_0 = average gaseous radionuclide concentration in the waste pore space available for diffusion, in Ci per m^3 of waste. Note that this is the total gaseous activity in the waste pore space divided by the total volume of the waste.
- D = diffusion coefficient for low atomic number gases moving through waste and soil, 0.01 $cm^2/s = 31.56\ m^2/y$
- $J(z)$ = upward diffusion flux at elevation z above the waste, in Ci/m^2 per y
- z = vertical position in the soil, in m. The bottom of the soil column is $z=0$, while the ground surface is $z=z_0=5$ m.
- λ_R = radioactive decay constant for the nuclide, per y.
- μ = inverse length parameter characteristic of gaseous radionuclide with a particular half life diffusing in a particular medium, in m^{-1}

Earlier performance assessment calculations did not use the boundary condition that the surface concentration is zero. In effect, an infinite medium was assumed. This underestimates the surface diffusion flux (J) by at least a factor of two. Longer half-life nuclides show a larger difference. The 2001 ILAW PA included this boundary condition.

Only ^{222}Rn is an inert gas that will faithfully follow the diffusion model. The ^{3}H and ^{14}C will undergo chemical reactions and be part of compounds that are likely to exist in the soil or the waste corrosion products. For ^{3}H these compounds include water and hydroxides. For ^{14}C these compounds include carbonates and carbides. The effect of these chemical reactions is to slow the migration to the surface and the resulting release rate from the ground surface. This effect has not been included in the diffusion calculations to maximize estimated consequences.

If the decay half life is very long, the above equations simplify to the equations shown below. In steady-state, the diffusion flux is constant with elevation. These equations represent the diffusion of ^{3}H and ^{14}C very well due to the long half lives.

$$C(z) = C_0\left(1 - \frac{z}{z_0}\right) \quad \text{and} \quad J(z) = \frac{C_0 D}{z_0}$$

The calculation of gaseous radionuclide flux at the ground surface requires a value for the steady state concentration in the waste matrix (C_0). Since the concentration available for diffusion (C_0) varies slowly with time, the rate of addition of gas to the pore space equals the rate of removal. This can be stated mathematically as shown below. The first equation defines "steady state". The second equation says that the rate at which gaseous radionuclides are entering the waste pore space is equal to the rate at which they decay and diffuse. In this simple one-dimensional model the diffusion is either up or down. Hence, the total loss is double the diffusion flux in one direction. In the final equation for steady state concentration the numerator is the rate of addition of gaseous nuclides to the waste pore space.

$$\text{rate of addition} = \text{rate of removal}$$

$$\lambda_C Q_S = \lambda_R Q_0 + 2 A J(0) \quad \text{and} \quad J(0) = \frac{Q_0 \mu D}{A z_W}\Omega$$

$$\lambda_C Q_S = \lambda_R Q_0 + \frac{2 Q_0 \mu D}{z_W}\Omega \quad \text{where} \quad \Omega = \frac{1 + e^{-2 z_0 \mu}}{1 - e^{-2 z_0 \mu}}$$

$$\text{finally,} \quad C_0 = \frac{\lambda_C Q_S}{\lambda_R V + 2 A \mu D \Omega}$$

where

- A = surface area footprint of the waste disposal site, in m^2
- C_0 = average gaseous radionuclide concentration in the waste pore space available for diffusion, in Ci per m^3 of waste. Note that this is the total gaseous activity in the waste pore space (Q_0) divided by the total volume of the waste (V).
- D = diffusion coefficient for low atomic number gases moving through waste and soil, 0.01 cm^2/s = 31.56 m^2/y
- $J(z)$ = upward diffusion flux at elevation z above the waste, in Ci/m^2 per y
- Q_0 = quantity of a gaseous radionuclide located in the waste pore space, in Ci
- Q_S = quantity of a gaseous radionuclide embedded in the waste solids, in Ci
- V = total volume of the waste, in m^3

z_0 = thickness of the soil above the waste, 5 m
z_W = thickness of the waste, in m. The volume of the waste is the product of the footprint area and the thickness: $V = A\, z_W$.
λ_C = fraction of the total released from the waste solids into the waste pore space per year.
λ_R = radioactive decay constant for the nuclide, per y
μ = inverse length parameter characteristic of gaseous radionuclide with a particular half life diffusing in a particular medium, in m^{-1}

It should be noted that the above equation for gaseous radionuclide concentration in the pore space reduces to the expected form when the radioactive decay constant becomes very small. One way to derive the expected form is to write the no-decay flux in terms of both the source release rate and the surface release rate. By conservation of matter in a simple one-dimensional model, this condition is shown in the equation below. The factor of two in the first equation stems from the assumption that only half the released activity diffuses upward. The other half diffuses downward. This formula can be used to calculate the initial concentration in the waste. The final equation for diffusion flux at the ground surface when radioactive decay is not important is shown below also.

$$J = \frac{D\,C_0}{z_0} = \frac{\lambda_C\, Q_S}{2\,A} \qquad \text{thus} \qquad C_0 = \frac{\lambda_C\, Q_S\, z_0}{2\,A\,D}$$

Determining the initial concentration of ^{222}Rn is complicated by two sources of the gas. One is the release from the waste solids. The other is the decay of ^{226}Ra that has already been released from the waste solids. The ^{226}Ra produces ^{222}Rn by radioactive decay. The total amount of ^{226}Ra slowly increases for two reasons. First, an increasing fraction of the waste matrix has decomposed. Second, ^{226}Ra is being produced by the radioactive decay of ^{238}U and ^{234}U that have been released. The peak ^{222}Rn flux occurs after all the waste has decomposed, and the ^{226}Ra has reached radioactive equilibrium with the ^{238}U. This equilibrium occurs after times greater than 1×10^6 years after closure. Note that the uranium decay chain is assumed to remain in the waste disposal facility indefinitely. This ignores the mobility of uranium in the soil, but is conservative. For ^{222}Rn, the steady state concentration in the waste pore space is calculated as shown in the equation below. In the final equation for steady state concentration the numerator is the rate of addition of ^{222}Rn to the waste pore space.

$$\text{rate of addition} = \text{rate of removal}$$

$$\lambda_C\, Q_{S,Rn\text{-}222} + \lambda_{Rn\text{-}222}\, Q_{0,Ra\text{-}226} = \lambda_{Rn\text{-}222} Q_{0,Rn\text{-}222} + 2\,A\,J_{Rn\text{-}222}(0)$$

$$\text{finally,} \quad C_{0,Rn\text{-}222} = \frac{\lambda_C\, Q_{S,Rn\text{-}222} + \lambda_{Rn\text{-}222}\, Q_{0,Ra\text{-}226}}{\lambda_{Rn\text{-}222} V + 2\,A\,\mu\,D\,\Omega}$$

If the initial inventory per unit area of ^{238}U in the disposal facility is 1 Ci/m^2 (i.e., 1 Ci ^{238}U per m^2 of facility footprint), then after a few million years, the waste solids have decomposed (i.e. Q_S=0) and the ^{234}U, ^{230}Th, ^{226}Ra, and ^{222}Rn are all in radioactive equilibrium with the ^{238}U. Thus the ^{226}Ra inventory in the trench is 1 Ci/m^2. It is assumed that no migration of the uranium out of the trench has taken place during this time. If the waste thickness (z_W=V/A) is 1 m, the resulting concentration of ^{222}Rn is 0.420 Ci/m^3. The calculation of the diffusion flux for ^{222}Rn is

carried out using the formula given previously for $J(z_0)$. The ^{222}Rn flux at the ground surface through 5 m of cover with a diffusion coefficient of 0.01 cm^2/s is 0.0275 Ci/m^2 per year, or 671 pCi/m^2 per second. Note that the performance objective for radon emanation is 20 pCi/m^2 per second.

E.2. MECHANISMS AFFECTING THE DIFFUSION FLUX

There are four environmental factors that can affect the rate of gas transport through the soil. These are barometric pressure, temperature, wind, and rain (Jury 1991). Each of these will be discussed in terms of its effect on the gaseous diffusion rate from the ground surface calculated above.

E.2.1. Atmospheric Pressure

An increase in atmospheric pressure will compress the air above the soil and drive air into the soil. The motion of air into the soil is impeded by the tortuosity of the flow channels and the small diameter of the surface openings between soil grains. When the atmospheric pressure decreases gases in the soil expand and the gas near the surface is released into the atmosphere. The effect on gases diffusing from underground is to slow the release rate while the atmospheric pressure increases, and increase the release rate when the atmospheric pressure decreases.

However, atmospheric pressure variation represents a very small change in the average pressure. The annual standard deviation of barometric pressure variations was at most 0.72% during the years 1988 through 1991 (WHC-EP-0651). The annual extremes for these years were at most 3.1% from the average. Such small variation suggests the influence of atmospheric pressure changes is small. This suspicion is born out in literature cited in *Soil Physics* (Jury 1991). A soil permeable column 3 m deep was affected by typical barometric pressure variations to a depth of at most 0.56 cm. Thus, barometric pressure changes will have little influence on the average diffusion flux from the surface.

E.2.2. Atmospheric Temperature

The air temperature at the ground surface varies sinusoidally during the day as well as during the year. The daily variation does not penetrate as deeply as the seasonal variation. The seasonal temperature change at a depth of 5 m in sandy soil is about 10% of the seasonal temperature change at the surface (Jury 1991). The variation in temperature decreases exponentially with distance below the surface. In addition, there is a phase shift that increases with depth. The cyclic variation in soil temperature will cause air movement due to the expansion and contraction of the air as the temperature increases and decreases. This air movement can be expected to increase the average diffusion flux at the surface.

However, the influx of air is limited to a shallow layer near the surface, just as with barometric pressure changes. The monthly average air temperature at Hanford typically ranges from -12 C to 30 C with an average around 12 C (PNL-9809). Thus the near-surface soil layer experiences a seasonal temperature variation no more than 10% on the absolute temperature scale. While this variation is an order of magnitude greater than the barometric pressure change, it is confined to a relatively shallow layer near the surface. Thus, temperature changes will have

little effect on the average diffusion flux from the surface. If the 10% variation is assumed to accelerate gas transport in the top 10% of the soil cover, then the soil cover thickness is effectively reduced by 0.5 m. With a cover thickness of 4.5 m, the ^{222}Rn diffusion flux increases from 0.96 pCi/m^2 per second to 1.98 pCi/m^2 per second.

E.2.3. Wind

The motion of air over the ground surface will create areas with higher pressure and areas with lower pressure. This varying surface pressure is similar in effect to the barometric pressure variation, but on a much shorter time scale. Experience with temperature changes suggests that the rapid variation will not penetrate as deeply into the soil. Thus the enhanced gaseous release rate will affect gas migration to a depth less than the 0.5 cm predicted for barometric pressure variation. It is concluded that wind effects will have little effect on the average diffusion flux from the surface.

C.2.4. Rainfall

As the water infiltrates the soil, it displaces some air from the soil pore space. As the water moves deeper, the pore space is refilled with air from the nearby pore space. This air motion will increase the mixing between adjacent layers and should increase the average diffusion flux as well.

However, as the water moves deeper in the soil, the water and air coexist in the pore space so that the motion of water has no effect on the diffusion of gases. Thus the rainfall effect is limited to a shallow surface layer. The overall effect on the average diffusion flux is very small. The largest recorded 24-h rainfall at the Hanford Meteorological Station is 4.85 cm (1.91 in), which occurred on October 1 and 2, 1957. Using a soil porosity of 35% means the water would saturate the soil to a depth of 14.0 cm (5.5 in). Thus the normal rainfall at Hanford affects gas motion in the soil to a depth considerably less than the normal temperature variation.

E.3. DOSE CONSEQUENCES FROM AIR EMISSIONS

Two cases are described in the "No Infiltration Scenarios" of Table 2 (of the main text). The first is the "Offsite Farmer" who is downwind of the disposal site. The second is the "Onsite Resident" who lives in a dwelling affected by the gaseous emission. These scenarios are presented in more detail below. In addition, the two are compared to show that the offsite dose is always lower than the onsite dose.

The H-3 is normally found as water and would be released as water vapor. The C-14 is assumed bound in an organic compound. Presumably the organic compound could be volatile as well. The most likely carbon compound to be emitted is carbon dioxide. However, the inhalation dose factor for carbon dioxide is about 90 times smaller than for organically bound C-14, which has been used in this report. Finally, the inhalation dose from radon compounds depends on the ease with which the particulate progeny of the inert gas become attached to dust particles in the air, as well as the relative amounts of the short half life progeny. For this reason, the radon emission is limited to 20 pCi m^{-2} s^{-1} (RPP-13263 and RPP-14283).

The air pathway dose downwind was estimated using the formula shown below.

$$\text{Air Pathway Dose} = J\ A\ T\ DF$$

where

J = flux of the radionuclide from the soil surface, Ci/m^2 per y
A = cross-sectional area of the disposal facility trenches when viewed from above
T = duration of the release, 1 y
DF = air pathway dose factor from CAP88-PC for an annual release, mrem

The air transport factor and air pathway dose factors presented below originally appeared in Section 3.2.1 of *Exposure Scenarios and Unit Dose Factors for the Hanford Immobilized Low-Activity Tank Waste Performance Assessment* (HNF-SD-WM-TI-707 Revision 1). The air transport factor is a bounding value that applies to annual emission near the border of a large area source. The dose factors were obtained using the CAP88-PC software from EPA (EPA 402-B-92-001).

E.3.1. Offsite Farmer

Radioactivity released into the air is carried by the wind to locations some distance from the emission source. As the airborne material travels it is diluted, so that the potential doses are lessened. However, the radioactive material may settle on crops and pastures, leading to ingestion pathway doses as well as the initial inhalation dose as the plume passes the receptor location. The inhalation dose to an individual downwind is calculated using the formula shown below.

$$H_{bt} = Q_{emit}\ X/Q'\ BR\ DF_{inh}$$

where,

H_{bt} = inhalation dose at a downwind location, mrem
Q_{emit} = activity released into the air as a gas or respirable particles, Ci
X/Q' = air transport factor, 1.0E-4 s/m^3
BR = breathing rate, 2.64E-4 m^3/s
DF_{inh} = inhalation dose factor for a nuclide emanating from the ground surface, in mrem per pCi inhaled. Values are given in Table A22.

Because the emission from the ground surface is assumed to take place over the course of a year, the parameters in the above are chosen to represent the annual average. Thus the annual average breathing rate is 0.95 m^3/h, or 2.64E-4 m^3/s. In addition, the activity released into the air is the total released over the course of one year. Finally, the air transport factor (1.0E-4 s/m^3) is a bounding value for an annual emission (WHC-SD-WM-TI-616). It includes the normal variation in wind direction, wind speed, and atmospheric stability.

Inserting values for inhalation dose factor, and assuming a 1 Ci emission over the course of a year, leads to unit dose factors of 0.0025 mrem per Ci H-3, and 0.055 mrem per Ci C-14.

An additional method for estimating the offsite dose that takes into account the ingestion pathways is the CAP88-PC software from EPA (EPA 402-B-92-001). **The software predicts that the total doses are 0.0237 mrem per Ci H-3, and 1.32 mrem per Ci C-14.** The program output is listed in the attachment to this appendix. Note that the air transport factor used by CAP88-PC is 7.98E-6 s/m^3 because a distance of 1000 m was input. The doses reported by CAP88-PC were then adjusted upward by the ratio of air transport factors, namely, (1.0E-4)/(7.98E-6)=12.5 to give the values reported above. An additional difference with the simple inhalation dose method is the assumed chemical form of the carbon. In CAP88-PC the carbon is in the form of carbon dioxide, while in the simple inhalation calculation, the organic form is used. Although the organic form of carbon leads to larger inhalation doses, the ingestion pathways in CAP88-PC give most of the dose. It should be noted that the various consumption parameters in CAP88-PC are larger. For example the fraction of contaminated vegetables is 100% in CAP88-PC. The value of CAP88-PC is that is can be used to demonstrate compliance with the 10 mrem/y performance objective for airborne emissions.

The CAP88-PC output (see attachment) was interpreted according to the following procedure. From the SYNOPSIS report, the worst-case wind direction was east southeast (ESE). From the CHI/Q TABLE report, the air transport factor for this direction is 7.980E-6 s/m^3. From the SUMMARY report, the effective dose equivalent for H-3 is 0.00189 mrem, and for C-14 0.105 mrem.

At a location where the air transport factor is 1.0E-4 s/m^3, the CAP88-PC dose is computed as shown below. These values are listed in Table C1.

H-3: (0.00189 mrem)(1.0E-4 s/m^3)/(7.98E-6 s/m^3) = 0.0237 mrem

C-14: (0.105 mrem)(1.0E-4 s/m^3)/(7.98E-6 s/m^3) = 1.32 mrem

The EPA default parameter file was used as input to the CAP88-PC calculations rather than the Hanford-specific parameter file.

E.3.2. Onsite Resident

For modeling the effect of contaminants emanating from the soil into a ventilated building, the equilibrium air concentration is the product of the emanation rate (activity per unit area per unit time) and the floor area divided by the building ventilation rate (volume per unit time). The ratio of ventilation rate to floor area is characteristic of classes of building construction. Typical ratios are less than 0.003 m/s. The individual exposed to gaseous emanations from the disposal site is located in a ventilated dwelling. For a constant emanation rate with a constant ventilation rate, the concentration starts at zero and rises according to the formula shown below.

$$C = (C_{eq}) \cong \{1 - \mathrm{Exp}[-(F)(t)/(V)]\}$$

$$C_{eq} = (E)/(F/A)$$

Where,

C = time-dependent air concentration inside the building, Ci/m^3

C_{eq} = steady-state (or equilibrium) air concentration, Ci/m^3

E = contaminant emanation rate, Ci m^{-2} s^{-1}

A = building floor area, m^2

F = building ventilation rate, m^3/s

V = building volume, m^3

The ratio F/A is characteristic of certain dwellings. Two examples are listed below. Typical values will need to be established for dose calculation purposes. For radon, the DOE uses an emanation limit. For gases such as tritium (as water vapor) and carbon-14, a dose calculation can be performed.

house: F/A = (10 cfm)/(100 ft^2) = 1/600 ft/s = 5.08E-4 m/s

office: F/A = (100 cfm)/(200 ft^2) = 1/120 ft/s = 2.54E-3 m/s

Using the smaller value to maximize the equilibrium air concentration, and assuming a unit emanation rate (1 pCi m^{-2} s^{-1}) leads to an equilibrium air concentration of 2000 pCi/m^3, or 2 pCi/L in the dirt-floor house.

The inhalation dose received by exposure to radionuclides emanating from the soil into a dwelling is the product of the steady-state air concentration, the volume of air inhaled during the year, and the inhalation dose factor as shown in the equation below. Any decay factor is expected to be nearly one, since the nuclides that contribute to this pathway (tritium, C-14, Rn-220 and Rn-222) are expected to see very little change in the emanation rate due to radioactive decay.

$$H_{be} = Q_{ab}\, C_{eq}\, D_{inh}\, T_{inh}$$

Where

H_{be} = inhalation dose from the emanation of gaseous nuclides during one year, in mrem.

Q_{ab} = quantity of air inhaled by the person while in the dwelling, in m^3/y. The value used is 8,040 m^3/y based on the sleeping and indoor data for the rural pasture scenario in Table A9.

C_{eq} = steady-state concentration of gaseous nuclides in the dwelling, in pCi/L.

D_{inh} = inhalation dose factor for a nuclide, in mrem per pCi inhaled. Values are given in Table A22.

T_{inh} = inhalation exposure time of the individual, 1 y.

For H-3 and C-14, the inhalation doses inside a house are calculated as shown below. They are based on a unit emanation rate, 1 pCi m^{-2} s^{-1}.

H-3: (8,040 m^3/y)(2000 pCi/m^3)(9.60E-8 mrem/pCi)(1 y) = 1.54 mrem

C-14: (8,040 m^3/y)(2000 pCi/m^3)(2.09E-6 mrem/pCi)(1 y) = 33.6 mrem

E.3.3. Comparison of the Offsite and Onsite Individuals

A basic difference between the two dose calculations is the input radioactivity. For the offsite dose calculation, the total released into the air during one year must be estimated. For the onsite dose calculation, the rate at which activity enters the air per unit area of floor space is needed. To put the two on a comparable level, assume the ground surface directly above the waste site has a surface area of 31,690 m^2. A uniform emanation rate of 1 pCi m^{-2} s^{-1} for one year will release 1 Ci of activity into the air.

$$(1 \text{ pCi m}^{-2} \text{ s}^{-1})(31{,}690 \text{ m}^2)(3.156\text{x}10^7 \text{ s/y})(1 \text{ y}) = 1 \text{ Ci}$$

Because the offsite dose is smaller than the onsite dose for unit emission rates (Table E1), the waste site area needs to be increased to raise the offsite dose, which depends on the total emitted during the year. Table E1 shows the calculated doses and required disposal site area for the two doses to be equal. Because the disposal site surface area will be significantly less than a square kilometer (1.0E+6 m^2), the onsite dose will always be greater than the offsite dose.

Table E1. Comparison of Onsite and Offsite Doses.

Volatile Nuclide	Onsite Resident (per pCi m^{-2} s^{-1})	Offsite Farmer (per Ci released)	Disposal Facility Surface Area
H-3	1.54 mrem	0.0237 mrem	2.06E+6 m^2
C-14	33.6 mrem	1.32 mrem	8.07E+5 m^2

Disposal Site Area is calculated as the Onsite dose multiplied by 31,690 m^2 and divided by the Offsite dose.

E.4. REFERENCES

ENDF/B-VI, Evaluated Nuclear Data File, Release VI. This nuclear data library is maintained by the Cross Section Evaluation Working Group. Data and documentation are available from the National Nuclear Data Center, Brookhaven National Laboratory, Upton, New York. (also provided on www.nndc.bnl.gov).

EPA 402-B-92-001, 1992, Parks, B. S., *User's Guide for CAP88-PC Version 1.0*, U.S. Environmental Protection Agency, Washington, D.C.

HNF-SD-WM-TI-707, Revision 1, 1999, Rittmann, P. D., *Exposure Scenarios and Unit Dose Factors for the Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, Fluor Federal Services, Inc., Richland, Washington.

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WHC-EP-0651, Revision 0, 1993, Crippen, M. D., *Barometric Pressure Variations*, Westinghouse Hanford Company, Richland, Washington.

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C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Nov 30, 1999 7:45 am

Facility: Various Cases
Address:
City: Richland
State: WA Zip: 99352

Effective Dose Equivalent (mrem/year)
1.07E-01

At This Location: 1000 Meters East Southeast
Source Category:
Source Type: Stack
Emission Year: 1996

Comments:

Dataset Name: ILAW PA
Dataset Date: Nov 30, 1999 7:45 am
Wind File: WNDFILES\HB-200E.WND

Nov 30, 1999 7:45 am

SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1000 Meters East Southeast
Lifetime Fatal Cancer Risk: 2.61E-06

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	4.68E-02
BREAST	1.19E-01
R MAR	2.08E-01
LUNGS	5.64E-02
THYROID	5.61E-02
ENDOST	4.32E-01
RMNDR	1.02E-01
EFFEC	1.07E-01

Nov 30, 1999 7:45 am

SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 1996

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
H-3	*	0.00	1.0E+00	1.0E+00
C-14	*	0.00	1.0E+00	1.0E+00

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 17 cm/y
Mixing Height: 1000 m

Nov 30, 1999 7:45 am

SYNOPSIS
Page 3

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 1.00
Diameter (m): 0.10

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1000

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Nov 30, 1999 7:45 am

Facility: Various Cases
Address:
City: Richland
State: WA Zip: 99352

Source Category:
Source Type: Stack
Emission Year: 1996

Comments:

Dataset Name: ILAW PA
Dataset Date: Nov 30, 1999 7:45 am
Wind File: WNDFILES\HB-200E.WND

Nov 30, 1999 7:45 am

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	4.68E-02
BREAST	1.19E-01
R MAR	2.08E-01
LUNGS	5.64E-02
THYROID	5.61E-02
ENDOST	4.32E-01
RMNDR	1.02E-01
EFFEC	1.07E-01

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.06E-01
INHALATION	2.82E-04
AIR IMMERSION	0.00E+00
GROUND SURFACE	0.00E+00
INTERNAL	1.07E-01
EXTERNAL	0.00E+00
TOTAL	1.07E-01

Nov 30, 1999 7:45 am

SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
H-3	1.89E-03
C-14	1.05E-01
TOTAL	1.07E-01

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	6.60E-07
BONE	7.65E-08
THYROID	2.55E-08
BREAST	4.67E-07
LUNG	2.80E-07
STOMACH	2.48E-07
BOWEL	1.26E-07
LIVER	2.70E-07
PANCREAS	1.67E-07
URINARY	8.36E-08
OTHER	2.04E-07
TOTAL	2.61E-06

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.60E-06
INHALATION	7.62E-09
AIR IMMERSION	0.00E+00
GROUND SURFACE	0.00E+00
INTERNAL	2.61E-06
EXTERNAL	0.00E+00
TOTAL	2.61E-06

Nov 30, 1999 7:45 am

SUMMARY
Page 4

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
H-3	5.12E-08
C-14	2.56E-06
TOTAL	2.61E-06

Nov 30, 1999 7:45 am

SUMMARY
Page 5

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)
Direction	1000
N	3.2E-02
NNW	4.3E-02
NW	4.2E-02
WNW	3.4E-02
W	2.7E-02
WSW	2.0E-02
SW	2.1E-02
SSW	1.9E-02
S	2.4E-02
SSE	3.1E-02
SE	6.2E-02
ESE	1.1E-01
E	7.5E-02
ENE	4.3E-02
NE	3.1E-02
NNE	2.6E-02

Nov 30, 1999 7:45 am

SUMMARY
Page 6

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)
Direction	1000
N	7.9E-07
NNW	1.0E-06
NW	1.0E-06
WNW	8.2E-07
W	6.6E-07
WSW	5.0E-07
SW	5.2E-07
SSW	4.8E-07
S	5.8E-07
SSE	7.6E-07
SE	1.5E-06
ESE	2.6E-06
E	1.8E-06
ENE	1.1E-06
NE	7.6E-07
NNE	6.4E-07

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Nov 30, 1999 7:45 am

Facility: Various Cases
Address:
City: Richland
State: WA Zip: 99352

Source Category:
Source Type: Stack
Emission Year: 1996

Comments:

Dataset Name: ILAW PA
Dataset Date: Nov 30, 1999 7:45 am
Wind File: WNDFILES\HB-200E.WND

Nov 30, 1999 7:45 am

CHIQ
Page 1

GROUND-LEVEL CHI/Q VALUES FOR H-3
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)
Dir	1000
N	2.429E-06
NNW	3.192E-06
NW	3.166E-06
WNW	2.521E-06
W	2.025E-06
WSW	1.524E-06
SW	1.595E-06
SSW	1.455E-06
S	1.784E-06
SSE	2.326E-06
SE	4.672E-06
ESE	7.980E-06
E	5.598E-06
ENE	3.251E-06
NE	2.330E-06
NNE	1.946E-06

Nov 30, 1999 7:45 am CHIQ
Page 2

GROUND-LEVEL CHI/Q VALUES FOR C-14
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)
Dir	1000
N	2.429E-06
NNW	3.192E-06
NW	3.166E-06
WNW	2.521E-06
W	2.025E-06
WSW	1.524E-06
SW	1.595E-06
SSW	1.455E-06
S	1.784E-06
SSE	2.326E-06
SE	4.672E-06
ESE	7.980E-06
E	5.598E-06
ENE	3.251E-06
NE	2.330E-06
NNE	1.946E-06

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APPENDIX F

QUALITY ASSURANCE CONSIDERATIONS

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Desk Instruction 2.0, Rev. 1

CHECKLIST FOR TECHNICAL PEER REVIEW

Document Reviewed - _____

Title: HNF-SD-WM-TI-707, Revision 2, *Exposure Scenarios and Unit Dose Factors for Hanford Tank Waste Performance Assessments*, April 2003
Author: Paul D. Rittmann

Yes	No*	NA		
⋈	[ ]	[ ]		Referenced analyses appropriate.
⋈	[ ]	[ ]		Problem completely defined and all potential configurations considered.
⋈	[ ]	[ ]		Accident scenarios developed in a clear and logical manner.
⋈	[ ]	[ ]		Necessary assumptions explicitly stated and supported.
[ ]	[ ]	⋈		Computer codes and data files documented.
⋈	[ ]	[ ]		Data used in calculations explicitly stated in document.
⋈	[ ]	[ ]		Data checked for consistency with original source information as applicable. (Spot check)
⋈	[ ]	[ ]		Mathematical derivations checked including dimensional consistency of results (checked all non-decay equations, spot checked decay equations)
⋈	[ ]	[ ]		Models appropriate and used within range of validity, or use outside range of established validity justified.
⋈	[ ]	[ ]		Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations. (Spot check)
[ ]	[ ]	⋈		Software input correct and consistent with document reviewed.
[ ]	[ ]	⋈		Software output consistent with input and with results reported in document reviewed.
[ ]	[ ]	⋈		Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
⋈	[ ]	[ ]		Safety margins consistent with good engineering practices.
⋈	[ ]	[ ]		Conclusions consistent with analytical results and applicable limits.
⋈	[ ]	[ ]		Results and conclusions address all points required in the problem statement.
[ ]	[ ]	⋈		Format consistent with applicable guides or other standards.
[ ]	[ ]	⋈	**	Review calculations, comments, and/or notes are attached.
⋈	[ ]	[ ]		Document approved (for example, the reviewer affirms the technical accuracy of the document).

Robert Marusich / Robert Marusich — 4/2/03

Technical Peer Reviewer (printed name and signature) — Date

* All "no" responses must be explained below or on an additional sheet.

** Any calculations, comments, or notes generated as part of this review should be signed, dated and attached to this checklist. The material should be labeled and recorded in such a manner as to be understandable to a technically qualified third party.

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APPENDIX G

COMPARISON OF ALL PATHWAYS FARMER UNIT DOSE FACTORS

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COMPARISON OF ALL PATHWAYS FARMER UNIT DOSE FACTORS

This appendix presents two alternate methods for calculating the unit dose factors for the All Pathways Farmer scenario described in Section 3.5. These alternate methods explore the effect of the accumulation of radioactivity in the soil as the well is being used year after year.

The first method uses a preliminary irrigation period ranging from 10 to 100 years. The well is used each year to irrigate fields and pastures, so that the radioactivity can accumulate in the soil before the dose factors are calculated. The farmer is exposed during the 1st, 11th, 21st, 31st, 41st, 51st, 71st, or 101th year, and then moves away from the farm. Because the performance objective for radiation exposure is the annual dose, total doses over several years of exposure are not computed.

The second method calculates the average annual dose using an averaging periods of 10, 20, 30, 40, 50, 70, and 100 years. In this approach the farmer lives in an increasingly contaminated setting. The average dose over the selected period is used for the unit dose factor.

Table G1 shows the All Pathways Farmer unit dose factors as radioactivity accumulates in the soil due to irrigation. Table G2 shows the unit dose factor ratios between the later years and the first year. Many nuclides (e.g., H-3, Ru-106, and TRU) show little increase during the first 100 years. Some nuclides (e.g., K-40, Sr-90, Tc-99, and Cs-137) reach a steady state where annual additions from irrigation water are balanced by annual losses from radioactive decay and leaching. A few nuclides (e.g., Al-26, Nb-94, Ag-108, and Ho-166m) show significant accumulation even after 100 years.

Table G1. All Pathways Farmer Unit Dose Factors for Various Preliminary Irrigation Periods

Nuclide	Year of Exposure for the Unit Dose Factor (mrem/y per pCi/L) – Ground Water Only							
	1st year	11th year	21st year	31st year	41st year	51st year	71st year	101st year
H-3	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05
Be-10	3.07E-03	3.12E-03	3.17E-03	3.22E-03	3.27E-03	3.32E-03	3.42E-03	3.56E-03
C-14	4.84E-03	6.43E-03	7.60E-03	8.45E-03	9.07E-03	9.52E-03	1.01E-02	1.05E-02
Na-22	4.72E-02	1.07E-01	1.11E-01	1.11E-01	1.11E-01	1.11E-01	1.11E-01	1.11E-01
Al-26	2.86E-02	2.77E-01	5.25E-01	7.72E-01	1.02E+00	1.27E+00	1.76E+00	2.49E+00
Si-32+D	7.18E-03	7.78E-03	8.32E-03	8.82E-03	9.28E-03	9.70E-03	1.04E-02	1.13E-02
Cl-36	2.49E-02	1.12E-01	1.25E-01	1.26E-01	1.27E-01	1.27E-01	1.27E-01	1.27E-01
K-40	2.88E-02	5.22E-02	7.09E-02	8.60E-02	9.82E-02	1.08E-01	1.22E-01	1.34E-01
Ca-41	1.15E-03	1.79E-03	2.28E-03	2.67E-03	2.98E-03	3.22E-03	3.55E-03	3.83E-03
Ti-44+D	5.81E-02	2.46E-01	4.08E-01	5.48E-01	6.68E-01	7.71E-01	9.38E-01	1.11E+00
V-49	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05
Mn-54	6.07E-03	1.13E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02	1.13E-02
Fe-55	5.94E-04	5.99E-04	5.99E-04	5.99E-04	5.99E-04	5.99E-04	5.99E-04	5.99E-04
Fe-60+D	1.54E-01	2.73E-01	4.75E-01	7.00E-01	9.29E-01	1.16E+00	1.62E+00	2.31E+00
Co-60	3.99E-02	1.56E-01	1.86E-01	1.94E-01	1.96E-01	1.97E-01	1.97E-01	1.97E-01
Ni-59	3.60E-04	3.79E-04	3.98E-04	4.17E-04	4.36E-04	4.54E-04	4.92E-04	5.48E-04

Table G1. All Pathways Farmer Unit Dose Factors for Various Preliminary Irrigation Periods

Nuclide	Year of Exposure for the Unit Dose Factor (mrem/y per pCi/L) – Ground Water Only							
	1st year	11th year	21st year	31st year	41st year	51st year	71st year	101st year
Ni-63	9.89E-04	1.04E-03	1.09E-03	1.13E-03	1.17E-03	1.21E-03	1.27E-03	1.36E-03
Se-79	1.29E-02	1.35E-02	1.37E-02	1.38E-02	1.38E-02	1.39E-02	1.39E-02	1.39E-02
Rb-87	8.39E-03	1.23E-02	1.61E-02	1.98E-02	2.33E-02	2.66E-02	3.29E-02	4.15E-02
Sr-90+D	1.53E-01	2.42E-01	3.10E-01	3.63E-01	4.04E-01	4.35E-01	4.79E-01	5.13E-01
Zr-93	1.05E-03	1.05E-03	1.06E-03	1.07E-03	1.08E-03	1.09E-03	1.11E-03	1.14E-03
Nb-91	3.44E-04	5.40E-04	7.32E-04	9.18E-04	1.10E-03	1.28E-03	1.62E-03	2.11E-03
Nb-93m	3.30E-04	3.34E-04	3.37E-04	3.39E-04	3.40E-04	3.41E-04	3.42E-04	3.42E-04
Nb-94	1.54E-02	1.60E-01	3.02E-01	4.42E-01	5.81E-01	7.17E-01	9.84E-01	1.37E+00
Mo-93	1.11E-03	1.54E-03	1.86E-03	2.10E-03	2.27E-03	2.41E-03	2.58E-03	2.70E-03
Tc-99	1.75E-03	8.42E-03	1.08E-02	1.16E-02	1.19E-02	1.20E-02	1.20E-02	1.21E-02
Ru-106+D	3.75E-02	3.96E-02	3.96E-02	3.96E-02	3.96E-02	3.96E-02	3.96E-02	3.96E-02
Pd-107	1.98E-04	2.11E-04	2.24E-04	2.36E-04	2.48E-04	2.59E-04	2.81E-04	3.10E-04
Ag-108m+D	1.67E-02	1.58E-01	2.89E-01	4.10E-01	5.22E-01	6.25E-01	8.09E-01	1.03E+00
Cd-109	9.44E-03	9.62E-03	9.62E-03	9.62E-03	9.62E-03	9.62E-03	9.62E-03	9.62E-03
Cd-113m	1.17E-01	1.29E-01	1.36E-01	1.40E-01	1.42E-01	1.43E-01	1.45E-01	1.45E-01
In-115	1.24E-01	1.26E-01	1.28E-01	1.30E-01	1.32E-01	1.34E-01	1.38E-01	1.43E-01
Sn-121m+D	4.55E-03	4.76E-03	4.93E-03	5.09E-03	5.23E-03	5.35E-03	5.55E-03	5.77E-03
Sn-126+D	5.62E-02	2.39E-01	4.22E-01	6.04E-01	7.86E-01	9.67E-01	1.33E+00	1.87E+00
Sb-125	4.45E-03	1.59E-02	1.68E-02	1.68E-02	1.69E-02	1.69E-02	1.69E-02	1.69E-02
Te-125m	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03
I-129	5.25E-01	5.49E-01	5.70E-01	5.87E-01	6.03E-01	6.16E-01	6.37E-01	6.59E-01
Cs-134	1.51E-01	1.90E-01	1.92E-01	1.92E-01	1.92E-01	1.92E-01	1.92E-01	1.92E-01
Cs-135	1.44E-02	1.76E-02	2.07E-02	2.38E-02	2.69E-02	3.00E-02	3.62E-02	4.55E-02
Cs-137+D	1.06E-01	1.70E-01	2.22E-01	2.63E-01	2.95E-01	3.21E-01	3.57E-01	3.88E-01
Ba-133	4.62E-03	2.64E-02	3.72E-02	4.26E-02	4.53E-02	4.67E-02	4.77E-02	4.80E-02
Pm-147	7.43E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04
Sm-147	1.32E-01	1.35E-01	1.38E-01	1.41E-01	1.43E-01	1.46E-01	1.51E-01	1.59E-01
Sm-151	2.78E-04	2.81E-04	2.84E-04	2.87E-04	2.89E-04	2.91E-04	2.95E-04	3.00E-04
Eu-150	1.45E-02	1.35E-01	2.33E-01	3.14E-01	3.81E-01	4.35E-01	5.17E-01	5.93E-01
Eu-152	1.22E-02	8.97E-02	1.36E-01	1.63E-01	1.79E-01	1.88E-01	1.97E-01	2.01E-01
Eu-154	1.50E-02	8.81E-02	1.21E-01	1.35E-01	1.42E-01	1.44E-01	1.46E-01	1.47E-01
Eu-155	1.31E-03	2.78E-03	3.11E-03	3.18E-03	3.20E-03	3.20E-03	3.20E-03	3.20E-03
Gd-152	1.12E-01	1.17E-01	1.23E-01	1.29E-01	1.34E-01	1.40E-01	1.51E-01	1.68E-01
Ho-166m	1.75E-02	1.74E-01	3.27E-01	4.79E-01	6.28E-01	7.75E-01	1.06E+00	1.48E+00
Re-187	8.47E-06	1.15E-05	1.45E-05	1.74E-05	2.02E-05	2.29E-05	2.81E-05	3.54E-05
Tl-204	4.69E-03	4.77E-03	4.78E-03	4.78E-03	4.78E-03	4.78E-03	4.78E-03	4.78E-03
Pb-205	1.09E-03	1.10E-03	1.12E-03	1.13E-03	1.15E-03	1.16E-03	1.19E-03	1.24E-03
Pb-210+D	3.67E+00	3.77E+00	3.83E+00	3.88E+00	3.92E+00	3.95E+00	3.98E+00	4.00E+00
Bi-207	1.41E-02	1.37E-01	2.36E-01	3.16E-01	3.80E-01	4.32E-01	5.07E-01	5.73E-01
Po-209	2.01E+00	2.08E+00	2.15E+00	2.21E+00	2.27E+00	2.33E+00	2.43E+00	2.56E+00
Po-210	1.52E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00
Ra-226+D	9.82E-01	1.17E+00	1.39E+00	1.62E+00	1.86E+00	2.10E+00	2.61E+00	3.39E+00

Table G1. All Pathways Farmer Unit Dose Factors for Various Preliminary Irrigation Periods

Nuclide	Year of Exposure for the Unit Dose Factor (mrem/y per pCi/L) – Ground Water Only							
	1st year	11th year	21st year	31st year	41st year	51st year	71st year	101st year
Ra-228+D	1.05E+00	1.18E+00	1.23E+00	1.25E+00	1.25E+00	1.25E+00	1.25E+00	1.25E+00
Ac-227+D	9.37E+00	9.45E+00	9.51E+00	9.55E+00	9.58E+00	9.60E+00	9.63E+00	9.65E+00
Th-228+D	5.21E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01
Th-229+D	2.55E+00	2.62E+00	2.69E+00	2.75E+00	2.82E+00	2.89E+00	3.02E+00	3.22E+00
Th-230	3.47E-01	3.53E-01	3.61E-01	3.69E-01	3.79E-01	3.89E-01	4.13E-01	4.56E-01
Th-232	1.73E+00	1.85E+00	2.08E+00	2.35E+00	2.62E+00	2.90E+00	3.46E+00	4.30E+00
Pa-231	6.70E+00	6.76E+00	6.85E+00	6.95E+00	7.07E+00	7.19E+00	7.45E+00	7.87E+00
U-232	9.21E-01	1.04E+00	1.14E+00	1.20E+00	1.25E+00	1.28E+00	1.31E+00	1.33E+00
U-233	2.03E-01	2.06E-01	2.09E-01	2.11E-01	2.13E-01	2.14E-01	2.16E-01	2.18E-01
U-234	1.98E-01	2.02E-01	2.05E-01	2.07E-01	2.08E-01	2.09E-01	2.11E-01	2.12E-01
U-235+D	1.88E-01	2.02E-01	2.13E-01	2.20E-01	2.26E-01	2.30E-01	2.35E-01	2.39E-01
U-236	1.89E-01	1.92E-01	1.95E-01	1.97E-01	1.98E-01	1.99E-01	2.00E-01	2.01E-01
U-238+D	1.88E-01	1.93E-01	1.97E-01	2.00E-01	2.02E-01	2.03E-01	2.05E-01	2.06E-01
Np-237+D	2.88E+00	2.94E+00	2.99E+00	3.04E+00	3.09E+00	3.13E+00	3.20E+00	3.29E+00
Pu-236	7.38E-01	7.42E-01	7.47E-01	7.50E-01	7.52E-01	7.54E-01	7.55E-01	7.56E-01
Pu-238	2.02E+00	2.03E+00	2.05E+00	2.06E+00	2.07E+00	2.08E+00	2.09E+00	2.12E+00
Pu-239	2.24E+00	2.25E+00	2.27E+00	2.28E+00	2.30E+00	2.31E+00	2.34E+00	2.39E+00
Pu-240	2.24E+00	2.25E+00	2.27E+00	2.28E+00	2.30E+00	2.31E+00	2.34E+00	2.39E+00
Pu-241+D	4.33E-02	4.36E-02	4.41E-02	4.45E-02	4.50E-02	4.55E-02	4.65E-02	4.80E-02
Pu-242	2.12E+00	2.14E+00	2.15E+00	2.17E+00	2.18E+00	2.19E+00	2.22E+00	2.27E+00
Pu-244+D	2.10E+00	2.14E+00	2.19E+00	2.23E+00	2.28E+00	2.32E+00	2.41E+00	2.55E+00
Am-241	2.30E+00	2.32E+00	2.33E+00	2.35E+00	2.37E+00	2.38E+00	2.41E+00	2.45E+00
Am-242m+D	2.23E+00	2.24E+00	2.26E+00	2.29E+00	2.31E+00	2.34E+00	2.39E+00	2.48E+00
Am-243+D	2.30E+00	2.33E+00	2.36E+00	2.39E+00	2.42E+00	2.45E+00	2.51E+00	2.60E+00
Cm-242	7.20E-02	7.21E-02	7.22E-02	7.22E-02	7.23E-02	7.23E-02	7.24E-02	7.25E-02
Cm-243	1.59E+00	1.61E+00	1.62E+00	1.63E+00	1.64E+00	1.65E+00	1.66E+00	1.66E+00
Cm-244	1.28E+00	1.28E+00	1.29E+00	1.29E+00	1.30E+00	1.30E+00	1.30E+00	1.30E+00
Cm-245	2.37E+00	2.39E+00	2.41E+00	2.43E+00	2.46E+00	2.48E+00	2.53E+00	2.60E+00
Cm-246	2.34E+00	2.36E+00	2.37E+00	2.39E+00	2.40E+00	2.42E+00	2.45E+00	2.50E+00
Cm-247+D	2.17E+00	2.21E+00	2.25E+00	2.30E+00	2.34E+00	2.39E+00	2.48E+00	2.61E+00
Cm-248	8.60E+00	8.66E+00	8.72E+00	8.78E+00	8.84E+00	8.90E+00	9.02E+00	9.19E+00
Cm-250+D	4.91E+01	4.95E+01	4.99E+01	5.03E+01	5.06E+01	5.10E+01	5.17E+01	5.28E+01
Bk-247	2.97E+00	3.00E+00	3.03E+00	3.05E+00	3.08E+00	3.11E+00	3.16E+00	3.24E+00
Cf-248	2.33E-01	2.33E-01	2.34E-01	2.34E-01	2.34E-01	2.34E-01	2.34E-01	2.34E-01
Cf-249	3.39E+00	3.47E+00	3.55E+00	3.63E+00	3.70E+00	3.78E+00	3.92E+00	4.12E+00
Cf-250	1.52E+00	1.54E+00	1.55E+00	1.55E+00	1.56E+00	1.56E+00	1.56E+00	1.56E+00
Cf-251	3.46E+00	3.53E+00	3.59E+00	3.65E+00	3.71E+00	3.77E+00	3.89E+00	4.06E+00
Cf-252	7.63E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01

The prior irrigation periods are 0, 10, 20, 30, 40, 50, 70, and 100 years. The exposure period is 1 year.
The unit dose factors in the first column are the same as the ones shown in Table 12.

Table G2. Comparison Ratios for Various Preliminary Irrigation Periods

Nuclide	Preliminary Irrigation Period							
	0 years	10 years	20 years	30 years	40 years	50 years	70 years	100 years
H-3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Be-10	1.00	1.02	1.03	1.05	1.07	1.08	1.11	1.16
C-14	1.00	1.33	1.57	1.74	1.87	1.97	2.09	2.17
Na-22	1.00	2.26	2.34	2.35	2.35	2.35	2.35	2.35
Al-26	1.00	9.67	18.33	26.97	35.61	44.23	61.43	87.13
Si-32+D	1.00	1.08	1.16	1.23	1.29	1.35	1.45	1.58
Cl-36	1.00	4.51	5.01	5.08	5.09	5.09	5.09	5.09
K-40	1.00	1.81	2.47	2.99	3.41	3.75	4.24	4.67
Ca-41	1.00	1.55	1.98	2.32	2.58	2.79	3.08	3.32
Ti-44+D	1.00	4.24	7.03	9.43	11.50	13.28	16.15	19.12
V-49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mn-54	1.00	1.86	1.86	1.86	1.86	1.86	1.86	1.86
Fe-55	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Fe-60+D	1.00	1.77	3.09	4.55	6.04	7.54	10.55	15.05
Co-60	1.00	3.92	4.67	4.86	4.92	4.93	4.93	4.93
Ni-59	1.00	1.05	1.10	1.16	1.21	1.26	1.36	1.52
Ni-63	1.00	1.05	1.10	1.14	1.18	1.22	1.29	1.37
Se-79	1.00	1.05	1.06	1.07	1.07	1.07	1.07	1.07
Rb-87	1.00	1.47	1.92	2.36	2.77	3.17	3.93	4.95
Sr-90+D	1.00	1.58	2.03	2.38	2.64	2.85	3.13	3.36
Zr-93	1.00	1.01	1.01	1.02	1.03	1.04	1.06	1.09
Nb-91	1.00	1.57	2.13	2.67	3.20	3.72	4.71	6.12
Nb-93m	1.00	1.01	1.02	1.03	1.03	1.04	1.04	1.04
Nb-94	1.00	10.37	19.60	28.70	37.68	46.52	63.85	88.92
Mo-93	1.00	1.38	1.67	1.88	2.04	2.16	2.31	2.43
Tc-99	1.00	4.81	6.15	6.62	6.79	6.85	6.88	6.88
Ru-106+D	1.00	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Pd-107	1.00	1.07	1.13	1.20	1.26	1.31	1.42	1.57
Ag-108m+D	1.00	9.46	17.28	24.51	31.18	37.34	48.30	61.80
Cd-109	1.00	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Cd-113m	1.00	1.10	1.15	1.19	1.21	1.22	1.23	1.24
In-115	1.00	1.02	1.03	1.05	1.06	1.08	1.11	1.15
Sn-121m+D	1.00	1.04	1.08	1.12	1.15	1.18	1.22	1.27
Sn-126+D	1.00	4.26	7.51	10.76	13.99	17.22	23.65	33.23
Sb-125	1.00	3.57	3.77	3.79	3.79	3.79	3.79	3.79
Te-125m	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
I-129	1.00	1.05	1.08	1.12	1.15	1.17	1.21	1.25
Cs-134	1.00	1.26	1.27	1.27	1.27	1.27	1.27	1.27
Cs-135	1.00	1.22	1.43	1.65	1.86	2.08	2.51	3.15
Cs-137+D	1.00	1.61	2.10	2.49	2.80	3.04	3.38	3.68
Ba-133	1.00	5.71	8.06	9.24	9.82	10.11	10.33	10.39
Pm-147	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table G2. Comparison Ratios for Various Preliminary Irrigation Periods

Nuclide	Preliminary Irrigation Period							
	0 years	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Sm-147	1.00	1.02	1.04	1.06	1.08	1.10	1.14	1.20
Sm-151	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.08
Eu-150	1.00	9.26	16.05	21.62	26.20	29.96	35.58	40.77
Eu-152	1.00	7.34	11.09	13.32	14.63	15.42	16.15	16.47
Eu-154	1.00	5.86	8.02	8.98	9.41	9.60	9.72	9.75
Eu-155	1.00	2.12	2.37	2.43	2.44	2.45	2.45	2.45
Gd-152	1.00	1.05	1.10	1.15	1.20	1.25	1.35	1.50
Ho-166m	1.00	9.92	18.71	27.36	35.89	44.29	60.71	84.44
Re-187	1.00	1.36	1.71	2.05	2.38	2.70	3.32	4.18
Tl-204	1.00	1.02	1.02	1.02	1.02	1.02	1.02	1.02
Pb-205	1.00	1.01	1.03	1.04	1.05	1.07	1.09	1.13
Pb-210+D	1.00	1.02	1.04	1.06	1.07	1.07	1.08	1.09
Bi-207	1.00	9.74	16.77	22.43	26.98	30.64	35.95	40.62
Po-209	1.00	1.04	1.07	1.10	1.13	1.16	1.21	1.27
Po-210	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ra-226+D	1.00	1.19	1.41	1.64	1.89	2.14	2.66	3.45
Ra-228+D	1.00	1.12	1.17	1.18	1.19	1.19	1.19	1.19
Ac-227+D	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.03
Th-228+D	1.00	1.06	1.06	1.06	1.06	1.06	1.06	1.06
Th-229+D	1.00	1.03	1.05	1.08	1.11	1.13	1.18	1.26
Th-230	1.00	1.02	1.04	1.07	1.09	1.12	1.19	1.32
Th-232	1.00	1.07	1.20	1.36	1.52	1.68	2.00	2.49
Pa-231	1.00	1.01	1.02	1.04	1.06	1.07	1.11	1.17
U-232	1.00	1.13	1.23	1.31	1.35	1.39	1.42	1.44
U-233	1.00	1.02	1.03	1.04	1.05	1.06	1.07	1.07
U-234	1.00	1.02	1.03	1.04	1.05	1.06	1.06	1.07
U-235+D	1.00	1.08	1.13	1.17	1.20	1.22	1.25	1.27
U-236	1.00	1.02	1.03	1.04	1.05	1.05	1.06	1.07
U-238+D	1.00	1.03	1.05	1.06	1.07	1.08	1.09	1.10
Np-237+D	1.00	1.02	1.04	1.06	1.07	1.09	1.11	1.14
Pu-236	1.00	1.01	1.01	1.02	1.02	1.02	1.02	1.03
Pu-238	1.00	1.01	1.01	1.02	1.02	1.03	1.04	1.05
Pu-239	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Pu-240	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Pu-241+D	1.00	1.01	1.02	1.03	1.04	1.05	1.08	1.11
Pu-242	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Pu-244+D	1.00	1.02	1.04	1.06	1.09	1.11	1.15	1.21
Am-241	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Am-242m+D	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.11
Am-243+D	1.00	1.01	1.03	1.04	1.05	1.07	1.09	1.13
Cm-242	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.01
Cm-243	1.00	1.01	1.02	1.03	1.03	1.04	1.04	1.05

Table G2. Comparison Ratios for Various Preliminary Irrigation Periods

Nuclide	Preliminary Irrigation Period							
	0 years	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Cm-244	1.00	1.01	1.01	1.01	1.01	1.02	1.02	1.02
Cm-245	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.10
Cm-246	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Cm-247+D	1.00	1.02	1.04	1.06	1.08	1.10	1.14	1.20
Cm-248	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Cm-250+D	1.00	1.01	1.01	1.02	1.03	1.04	1.05	1.07
Bk-247	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.09
Cf-248	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01
Cf-249	1.00	1.02	1.05	1.07	1.09	1.12	1.16	1.22
Cf-250	1.00	1.01	1.02	1.02	1.03	1.03	1.03	1.03
Cf-251	1.00	1.02	1.04	1.05	1.07	1.09	1.12	1.17
Cf-252	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01

All ratios are the alternate unit dose factor from Table G1 divided by the dose factors from Table 12.

Table G3 shows the All Pathways Farmer unit dose factors using various averaging periods. Table G4 shows the unit dose factor ratios between the longer averaging periods and the first year. The averaged unit dose factors in Table G3 are smaller than the prior irrigation unit dose factors from Table G1, for the same time period.

Table G3. All Pathways Farmer Unit Dose Factors for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
H-3	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05	4.75E-05
Be-10	3.07E-03	3.09E-03	3.12E-03	3.15E-03	3.17E-03	3.20E-03	3.25E-03	3.32E-03
C-14	4.84E-03	5.60E-03	6.29E-03	6.86E-03	7.33E-03	7.72E-03	8.33E-03	8.93E-03
Na-22	4.72E-02	8.58E-02	9.75E-02	1.02E-01	1.04E-01	1.06E-01	1.07E-01	1.08E-01
Al-26	2.86E-02	1.40E-01	2.64E-01	3.88E-01	5.12E-01	6.36E-01	8.83E-01	1.25E+00
Si-32+D	7.18E-03	7.45E-03	7.74E-03	8.01E-03	8.26E-03	8.51E-03	8.95E-03	9.53E-03
Cl-36	2.49E-02	7.75E-02	9.86E-02	1.08E-01	1.12E-01	1.15E-01	1.18E-01	1.21E-01
K-40	2.88E-02	3.97E-02	5.03E-02	5.96E-02	6.76E-02	7.46E-02	8.62E-02	9.89E-02
Ca-41	1.15E-03	1.45E-03	1.73E-03	1.98E-03	2.19E-03	2.37E-03	2.66E-03	2.97E-03
Ti-44+D	5.81E-02	1.45E-01	2.33E-01	3.13E-01	3.85E-01	4.51E-01	5.67E-01	7.05E-01
V-49	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05	4.16E-05
Mn-54	6.07E-03	1.04E-02	1.08E-02	1.10E-02	1.11E-02	1.11E-02	1.12E-02	1.12E-02
Fe-55	5.94E-04	5.97E-04	5.98E-04	5.98E-04	5.98E-04	5.99E-04	5.99E-04	5.99E-04
Fe-60+D	1.54E-01	1.95E-01	2.78E-01	3.77E-01	4.84E-01	5.93E-01	8.18E-01	1.16E+00
Co-60	3.99E-02	1.05E-01	1.39E-01	1.56E-01	1.66E-01	1.72E-01	1.79E-01	1.84E-01
Ni-59	3.60E-04	3.69E-04	3.78E-04	3.88E-04	3.97E-04	4.06E-04	4.25E-04	4.53E-04
Ni-63	9.89E-04	1.01E-03	1.04E-03	1.06E-03	1.08E-03	1.10E-03	1.14E-03	1.19E-03
Se-79	1.29E-02	1.33E-02	1.35E-02	1.36E-02	1.36E-02	1.37E-02	1.37E-02	1.38E-02

Table G3. All Pathways Farmer Unit Dose Factors for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Rb-87	8.39E-03	1.02E-02	1.21E-02	1.40E-02	1.58E-02	1.76E-02	2.11E-02	2.59E-02
Sr-90+D	1.53E-01	1.95E-01	2.34E-01	2.68E-01	2.96E-01	3.21E-01	3.60E-01	4.01E-01
Zr-93	1.05E-03	1.05E-03	1.05E-03	1.06E-03	1.06E-03	1.07E-03	1.08E-03	1.09E-03
Nb-91	3.44E-04	4.33E-04	5.30E-04	6.25E-04	7.19E-04	8.12E-04	9.92E-04	1.25E-03
Nb-93m	3.30E-04	3.32E-04	3.34E-04	3.35E-04	3.36E-04	3.37E-04	3.39E-04	3.40E-04
Nb-94	1.54E-02	8.05E-02	1.52E-01	2.23E-01	2.94E-01	3.63E-01	5.01E-01	7.02E-01
Mo-93	1.11E-03	1.32E-03	1.50E-03	1.66E-03	1.79E-03	1.90E-03	2.07E-03	2.24E-03
Tc-99	1.75E-03	5.31E-03	7.49E-03	8.73E-03	9.49E-03	9.98E-03	1.06E-02	1.10E-02
Ru-106+D	3.75E-02	3.92E-02	3.94E-02	3.95E-02	3.95E-02	3.95E-02	3.96E-02	3.96E-02
Pd-107	1.98E-04	2.04E-04	2.10E-04	2.17E-04	2.23E-04	2.29E-04	2.41E-04	2.57E-04
Ag-108m+D	1.67E-02	8.15E-02	1.50E-01	2.15E-01	2.76E-01	3.35E-01	4.44E-01	5.87E-01
Cd-109	9.44E-03	9.58E-03	9.60E-03	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.62E-03
Cd-113m	1.17E-01	1.23E-01	1.28E-01	1.31E-01	1.33E-01	1.35E-01	1.38E-01	1.40E-01
In-115	1.24E-01	1.25E-01	1.26E-01	1.27E-01	1.28E-01	1.29E-01	1.31E-01	1.34E-01
Sn-121m+D	4.55E-03	4.65E-03	4.74E-03	4.83E-03	4.91E-03	4.99E-03	5.12E-03	5.28E-03
Sn-126+D	5.62E-02	1.39E-01	2.30E-01	3.21E-01	4.13E-01	5.04E-01	6.85E-01	9.57E-01
Sb-125	4.45E-03	1.18E-02	1.41E-02	1.50E-02	1.55E-02	1.57E-02	1.61E-02	1.63E-02
Te-125m	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03	2.77E-03
I-129	5.25E-01	5.36E-01	5.48E-01	5.58E-01	5.67E-01	5.75E-01	5.90E-01	6.08E-01
Cs-134	1.51E-01	1.78E-01	1.85E-01	1.87E-01	1.88E-01	1.89E-01	1.90E-01	1.90E-01
Cs-135	1.44E-02	1.58E-02	1.74E-02	1.90E-02	2.05E-02	2.21E-02	2.52E-02	2.98E-02
Cs-137+D	1.06E-01	1.36E-01	1.65E-01	1.90E-01	2.12E-01	2.31E-01	2.62E-01	2.96E-01
Ba-133	4.62E-03	1.56E-02	2.38E-02	2.92E-02	3.29E-02	3.55E-02	3.89E-02	4.16E-02
Pm-147	7.43E-04	7.45E-04	7.45E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04	7.46E-04
Sm-147	1.32E-01	1.34E-01	1.35E-01	1.36E-01	1.38E-01	1.39E-01	1.42E-01	1.46E-01
Sm-151	2.78E-04	2.79E-04	2.81E-04	2.82E-04	2.84E-04	2.85E-04	2.87E-04	2.90E-04
Eu-150	1.45E-02	7.05E-02	1.26E-01	1.74E-01	2.17E-01	2.55E-01	3.18E-01	3.90E-01
Eu-152	1.22E-02	5.04E-02	8.14E-02	1.04E-01	1.21E-01	1.33E-01	1.50E-01	1.65E-01
Eu-154	1.50E-02	5.28E-02	7.88E-02	9.52E-02	1.06E-01	1.13E-01	1.23E-01	1.30E-01
Eu-155	1.31E-03	2.14E-03	2.55E-03	2.75E-03	2.86E-03	2.93E-03	3.01E-03	3.07E-03
Gd-152	1.12E-01	1.14E-01	1.17E-01	1.20E-01	1.23E-01	1.26E-01	1.31E-01	1.40E-01
Ho-166m	1.75E-02	8.79E-02	1.65E-01	2.42E-01	3.18E-01	3.93E-01	5.41E-01	7.58E-01
Re-187	8.47E-06	9.85E-06	1.14E-05	1.28E-05	1.43E-05	1.57E-05	1.85E-05	2.24E-05
Tl-204	4.69E-03	4.74E-03	4.76E-03	4.76E-03	4.77E-03	4.77E-03	4.77E-03	4.78E-03
Pb-205	1.09E-03	1.10E-03	1.10E-03	1.11E-03	1.12E-03	1.13E-03	1.14E-03	1.16E-03
Pb-210+D	3.67E+00	3.72E+00	3.76E+00	3.79E+00	3.82E+00	3.84E+00	3.88E+00	3.91E+00
Bi-207	1.41E-02	7.18E-02	1.28E-01	1.76E-01	2.19E-01	2.56E-01	3.17E-01	3.85E-01
Po-209	2.01E+00	2.04E+00	2.08E+00	2.11E+00	2.14E+00	2.17E+00	2.23E+00	2.31E+00
Po-210	1.52E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00
Ra-226+D	9.82E-01	1.07E+00	1.17E+00	1.27E+00	1.39E+00	1.50E+00	1.74E+00	2.12E+00
Ra-228+D	1.05E+00	1.12E+00	1.16E+00	1.19E+00	1.20E+00	1.21E+00	1.22E+00	1.23E+00
Ac-227+D	9.37E+00	9.41E+00	9.44E+00	9.47E+00	9.49E+00	9.51E+00	9.54E+00	9.57E+00

Table G3. All Pathways Farmer Unit Dose Factors for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Th-228+D	5.21E-01	5.42E-01	5.47E-01	5.49E-01	5.50E-01	5.50E-01	5.51E-01	5.51E-01
Th-229+D	2.55E+00	2.58E+00	2.61E+00	2.65E+00	2.68E+00	2.72E+00	2.78E+00	2.88E+00
Th-230	3.47E-01	3.50E-01	3.53E-01	3.57E-01	3.61E-01	3.66E-01	3.75E-01	3.93E-01
Th-232	1.73E+00	1.77E+00	1.86E+00	1.97E+00	2.10E+00	2.23E+00	2.50E+00	2.91E+00
Pa-231	6.70E+00	6.73E+00	6.76E+00	6.81E+00	6.86E+00	6.91E+00	7.03E+00	7.21E+00
U-232	9.21E-01	9.70E-01	1.03E+00	1.07E+00	1.11E+00	1.14E+00	1.18E+00	1.23E+00
U-233	2.03E-01	2.04E-01	2.06E-01	2.07E-01	2.09E-01	2.10E-01	2.11E-01	2.13E-01
U-234	1.98E-01	2.00E-01	2.02E-01	2.03E-01	2.04E-01	2.05E-01	2.06E-01	2.08E-01
U-235+D	1.88E-01	1.95E-01	2.01E-01	2.06E-01	2.10E-01	2.14E-01	2.19E-01	2.25E-01
U-236	1.89E-01	1.90E-01	1.92E-01	1.93E-01	1.94E-01	1.95E-01	1.96E-01	1.98E-01
U-238+D	1.88E-01	1.90E-01	1.93E-01	1.95E-01	1.96E-01	1.97E-01	1.99E-01	2.01E-01
Np-237+D	2.88E+00	2.91E+00	2.94E+00	2.96E+00	2.99E+00	3.01E+00	3.06E+00	3.11E+00
Pu-236	7.38E-01	7.40E-01	7.42E-01	7.44E-01	7.46E-01	7.47E-01	7.49E-01	7.51E-01
Pu-238	2.02E+00	2.03E+00	2.03E+00	2.04E+00	2.04E+00	2.05E+00	2.06E+00	2.07E+00
Pu-239	2.24E+00	2.24E+00	2.25E+00	2.26E+00	2.27E+00	2.27E+00	2.29E+00	2.31E+00
Pu-240	2.24E+00	2.24E+00	2.25E+00	2.26E+00	2.27E+00	2.27E+00	2.29E+00	2.31E+00
Pu-241+D	4.33E-02	4.34E-02	4.36E-02	4.38E-02	4.41E-02	4.43E-02	4.48E-02	4.55E-02
Pu-242	2.12E+00	2.13E+00	2.14E+00	2.14E+00	2.15E+00	2.16E+00	2.17E+00	2.19E+00
Pu-244+D	2.10E+00	2.12E+00	2.14E+00	2.16E+00	2.19E+00	2.21E+00	2.25E+00	2.32E+00
Am-241	2.30E+00	2.31E+00	2.32E+00	2.32E+00	2.33E+00	2.34E+00	2.36E+00	2.38E+00
Am-242m+D	2.23E+00	2.23E+00	2.24E+00	2.25E+00	2.26E+00	2.28E+00	2.30E+00	2.34E+00
Am-243+D	2.30E+00	2.31E+00	2.32E+00	2.34E+00	2.36E+00	2.37E+00	2.40E+00	2.45E+00
Cm-242	7.20E-02	7.21E-02	7.21E-02	7.21E-02	7.22E-02	7.22E-02	7.22E-02	7.23E-02
Cm-243	1.59E+00	1.60E+00	1.60E+00	1.61E+00	1.62E+00	1.62E+00	1.63E+00	1.64E+00
Cm-244	1.28E+00	1.28E+00	1.28E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00	1.29E+00
Cm-245	2.37E+00	2.38E+00	2.39E+00	2.40E+00	2.41E+00	2.42E+00	2.44E+00	2.48E+00
Cm-246	2.34E+00	2.35E+00	2.36E+00	2.36E+00	2.37E+00	2.38E+00	2.40E+00	2.42E+00
Cm-247+D	2.17E+00	2.19E+00	2.21E+00	2.23E+00	2.25E+00	2.27E+00	2.32E+00	2.39E+00
Cm-248	8.60E+00	8.63E+00	8.66E+00	8.69E+00	8.72E+00	8.75E+00	8.81E+00	8.89E+00
Cm-250+D	4.91E+01	4.93E+01	4.95E+01	4.97E+01	4.99E+01	5.01E+01	5.04E+01	5.10E+01
Bk-247	2.97E+00	2.98E+00	3.00E+00	3.01E+00	3.03E+00	3.04E+00	3.07E+00	3.11E+00
Cf-248	2.33E-01	2.33E-01	2.33E-01	2.33E-01	2.33E-01	2.34E-01	2.34E-01	2.34E-01
Cf-249	3.39E+00	3.42E+00	3.46E+00	3.50E+00	3.54E+00	3.58E+00	3.66E+00	3.77E+00
Cf-250	1.52E+00	1.53E+00	1.53E+00	1.54E+00	1.54E+00	1.55E+00	1.55E+00	1.55E+00
Cf-251	3.46E+00	3.49E+00	3.52E+00	3.55E+00	3.58E+00	3.62E+00	3.68E+00	3.77E+00
Cf-252	7.63E-01	7.66E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01	7.67E-01

The averaging periods are 1, 10, 20, 30, 40, 50, 70, and 100 years.
The unit dose factors in the first column are the same as the ones shown in Table 12.

Table G4. Comparison Ratios for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
H-3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Be-10	1.00	1.01	1.02	1.02	1.03	1.04	1.06	1.08
C-14	1.00	1.16	1.30	1.42	1.51	1.59	1.72	1.84
Na-22	1.00	1.82	2.06	2.16	2.21	2.23	2.27	2.29
Al-26	1.00	4.90	9.24	13.56	17.89	22.21	30.83	43.74
Si-32+D	1.00	1.04	1.08	1.12	1.15	1.18	1.25	1.33
Cl-36	1.00	3.11	3.96	4.32	4.51	4.63	4.76	4.86
K-40	1.00	1.38	1.75	2.07	2.35	2.60	3.00	3.44
Ca-41	1.00	1.26	1.51	1.72	1.90	2.06	2.31	2.58
Ti-44+D	1.00	2.50	4.01	5.39	6.64	7.77	9.76	12.14
V-49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mn-54	1.00	1.70	1.78	1.81	1.82	1.83	1.84	1.84
Fe-55	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Fe-60+D	1.00	1.27	1.81	2.45	3.14	3.86	5.32	7.54
Co-60	1.00	2.63	3.48	3.91	4.16	4.31	4.49	4.62
Ni-59	1.00	1.02	1.05	1.08	1.10	1.13	1.18	1.26
Ni-63	1.00	1.02	1.05	1.07	1.09	1.11	1.15	1.21
Se-79	1.00	1.02	1.04	1.05	1.05	1.06	1.06	1.06
Rb-87	1.00	1.21	1.44	1.67	1.89	2.10	2.51	3.09
Sr-90+D	1.00	1.27	1.53	1.75	1.94	2.10	2.36	2.63
Zr-93	1.00	1.00	1.01	1.01	1.01	1.02	1.03	1.04
Nb-91	1.00	1.26	1.54	1.82	2.09	2.36	2.88	3.64
Nb-93m	1.00	1.01	1.01	1.02	1.02	1.02	1.03	1.03
Nb-94	1.00	5.23	9.88	14.49	19.05	23.58	32.50	45.56
Mo-93	1.00	1.18	1.35	1.49	1.61	1.71	1.86	2.01
Tc-99	1.00	3.03	4.28	4.99	5.42	5.70	6.03	6.29
Ru-106+D	1.00	1.04	1.05	1.05	1.05	1.05	1.05	1.05
Pd-107	1.00	1.03	1.06	1.10	1.13	1.16	1.22	1.30
Ag-108m+D	1.00	4.86	8.95	12.83	16.51	20.00	26.49	35.07
Cd-109	1.00	1.01	1.02	1.02	1.02	1.02	1.02	1.02
Cd-113m	1.00	1.05	1.09	1.11	1.14	1.15	1.17	1.19
In-115	1.00	1.01	1.01	1.02	1.03	1.04	1.05	1.08
Sn-121m+D	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.16
Sn-126+D	1.00	2.47	4.10	5.72	7.34	8.96	12.20	17.02
Sb-125	1.00	2.64	3.17	3.37	3.48	3.54	3.61	3.66
Te-125m	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
I-129	1.00	1.02	1.04	1.06	1.08	1.09	1.12	1.16
Cs-134	1.00	1.18	1.22	1.24	1.25	1.25	1.26	1.26
Cs-135	1.00	1.10	1.21	1.31	1.42	1.53	1.75	2.07
Cs-137+D	1.00	1.29	1.57	1.81	2.01	2.19	2.48	2.80
Ba-133	1.00	3.39	5.15	6.32	7.12	7.69	8.42	9.00
Pm-147	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table G4. Comparison Ratios for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Sm-147	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.10
Sm-151	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.04
Eu-150	1.00	4.85	8.64	11.98	14.92	17.53	21.89	26.83
Eu-152	1.00	4.12	6.66	8.50	9.87	10.90	12.31	13.52
Eu-154	1.00	3.51	5.24	6.33	7.05	7.54	8.15	8.63
Eu-155	1.00	1.64	1.95	2.10	2.19	2.24	2.30	2.34
Gd-152	1.00	1.02	1.05	1.07	1.10	1.13	1.18	1.25
Ho-166m	1.00	5.02	9.45	13.84	18.18	22.48	30.95	43.35
Re-187	1.00	1.16	1.34	1.51	1.68	1.85	2.18	2.65
Tl-204	1.00	1.01	1.01	1.02	1.02	1.02	1.02	1.02
Pb-205	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Pb-210+D	1.00	1.01	1.02	1.03	1.04	1.05	1.05	1.06
Bi-207	1.00	5.09	9.06	12.51	15.53	18.16	22.50	27.29
Po-209	1.00	1.02	1.03	1.05	1.07	1.08	1.11	1.15
Po-210	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ra-226+D	1.00	1.08	1.19	1.30	1.41	1.53	1.77	2.15
Ra-228+D	1.00	1.06	1.10	1.13	1.14	1.15	1.16	1.17
Ac-227+D	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02
Th-228+D	1.00	1.04	1.05	1.05	1.06	1.06	1.06	1.06
Th-229+D	1.00	1.01	1.03	1.04	1.05	1.06	1.09	1.13
Th-230	1.00	1.01	1.02	1.03	1.04	1.05	1.08	1.13
Th-232	1.00	1.02	1.08	1.14	1.21	1.29	1.44	1.68
Pa-231	1.00	1.00	1.01	1.02	1.02	1.03	1.05	1.08
U-232	1.00	1.05	1.12	1.17	1.21	1.24	1.29	1.33
U-233	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.05
U-234	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.05
U-235+D	1.00	1.04	1.07	1.10	1.12	1.14	1.17	1.19
U-236	1.00	1.01	1.02	1.02	1.03	1.03	1.04	1.05
U-238+D	1.00	1.01	1.03	1.03	1.04	1.05	1.06	1.07
Np-237+D	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.08
Pu-236	1.00	1.00	1.01	1.01	1.01	1.01	1.02	1.02
Pu-238	1.00	1.00	1.01	1.01	1.01	1.01	1.02	1.03
Pu-239	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Pu-240	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Pu-241+D	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.05
Pu-242	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Pu-244+D	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.11
Am-241	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Am-242m+D	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.05
Am-243+D	1.00	1.01	1.01	1.02	1.03	1.03	1.05	1.07
Cm-242	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cm-243	1.00	1.01	1.01	1.01	1.02	1.02	1.03	1.03

Table G4. Comparison Ratios for Various Averaging Periods

Nuclide	Averaging Period							
	1 year	10 years	20 years	30 years	40 years	50 years	70 years	100 years
Cm-244	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01
Cm-245	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.05
Cm-246	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Cm-247+D	1.00	1.01	1.02	1.03	1.04	1.05	1.07	1.10
Cm-248	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.03
Cm-250+D	1.00	1.00	1.01	1.01	1.01	1.02	1.03	1.04
Bk-247	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.05
Cf-248	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cf-249	1.00	1.01	1.02	1.03	1.05	1.06	1.08	1.11
Cf-250	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.02
Cf-251	1.00	1.01	1.02	1.03	1.04	1.04	1.06	1.09
Cf-252	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

All ratios are the alternate unit dose factor from Table G3 divided by the dose factors from Table 12.

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