
To: Dan Shrum, EnergySolutions **4101M**
From: Susan Wyman, P.E., P.G.
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Subject: Uranium Fate & Transport Modeling, 10,000 years, for EnergySolutions Class A Cells

Whetstone Associates performed fate and transport modeling of uranium and daughter products for the EnergySolutions Class A cell, Class A North, and Class A South disposal cells for a period of over 10,000 years after cell closure. The modeling was performed using the PATHRAE-RAD model (Merrell, et al, 1995). The methodology and input parameters were identical to the previously approved Class A cell modeling (Whetstone, 2000) except that six uranium decay chains were modeled and the model output time was extended to 12,000 years (2,000 years beyond the time period of interest).

Model Input Parameters

The PATHRAE model was run using the input parameters described in the Class A Cell modeling report (Whetstone, 2000), including infiltration rate, path length, moisture content, vadose zone velocity, and aquifer velocity. Six decay chains for uranium were modeled:

1. Cm-244 → Pu-240 → U-236
2. Pu-240 → U-236 → Th-232
3. Am-243 → Pu-239 → U-235
4. Pu-238 → U-234 → Th-230 → Ra-226
5. Pu-242 → U-238 → U-234
6. U-238 → Th-230 → Ra-226

Sixteen isotopes were modeled, including six uranium isotopes (U-232, U-233, U-234, U-235, U-236, and U-238), nine isotopes important in the decay chain calculations (Am-243, Cm-244, Pu-238, Pu-239, Pu-240, Pu-242, Ra-226, Th-230, Th-232), and one isotope as a comparison to previous modeling results (K-40). All 16 isotopes listed in Table 1 were modeled in both the vertical and horizontal modeling runs. In previous modeling (Whetstone, 2000), only Am-243 and K-40 were carried forward to the horizontal modeling, because none of the uranium species arrived at the water table within 1,000 years.

Source concentrations in the model were set at the maximum concentrations for Class A waste (10 C.F.R. 61.55). This approach is conservative, because it assumes that all of the waste is received at the highest concentrations for all constituents. In reality, many waste streams received at the facility will be well below the Class A low-level radioactive waste limits for specific nuclides. Maximum waste concentrations in pCi/g were converted to Ci/m³ using the average waste bulk density of 1,800 kg/m³.

Table 1. Modeled Isotopes

#	ELEMENT	NUCLIDE	Maximum Concent. (pCi/gm)	Maximum Concent. (Ci/m ³)	K _d (L/Kg)	1/2 life		Modeled
49	Americium	Am-243	10000	0.018	1	7370	y	✓
50	Curium	Cm-244	10000	0.018	93.3	18.1	y	✓
43	Plutonium	Pu-238	10000	0.018	10	87.7	y	✓
44	Plutonium	Pu-239	10000	0.018	10	24110	y	✓
45	Plutonium	Pu-240	10000	0.018	10	6564	y	✓
47	Plutonium	Pu-242	10000	0.018	10	373300	y	✓
55	Radium	Ra-226	10000	0.018	10	1600	y	✓
36	Thorium	Th-230	2.06x10 ¹⁰	37130.4	10	75380	y	✓
37	Thorium	Th-232	110000	0.198	10	1.405x10 ⁹	y	✓
N/A	Uranium	U-228	440000000	792	6	9.1	m	no ⁽¹⁾
N/A	Uranium	U-230	440000000	792	6	20.8	d	no ⁽¹⁾
70	Uranium	U-232	2.20x10 ¹³	39650400	6	68.9	y	✓
54	Uranium	U-233	75000	0.135	6	159200	y	✓
38	Uranium	U-234	6210000000	11178	6	245500	y	✓
39	Uranium	U-235	1900	0.00342	6	703800000	y	✓
40	Uranium	U-236	64720000	116.496	6	23420000	y	✓
41	Uranium	U-238	336260	0.605268	6	4470000000	y	✓
N/A	Uranium	U-depleted	370000	0.666	6			no ⁽²⁾
N/A	Uranium	U-natural	680000	1.224	6			no ⁽²⁾
138	Potassium	K-40	7003370	12.606	0.15	1277000000	y	✓

N/A = not applicable, nuclide was not modeled

(1) U-228 and U-230 were not modeled, due to short half lives.

(2) U-natural and U-depleted are included in the specific isotopes modeled.

The model was run for both the top slope (0.265 cm/yr infiltration) and side slope (0.364 cm/yr infiltration) conditions. The infiltration rates, moisture contents, aquifer hydraulic properties, and transport distances used in the fate and transport modeling for uranium species are applicable to the Class A cell, Class A North, and Class A South disposal cells listed in Table 2 because the limiting case with the highest infiltration rate (0.364 cm/yr) and shortest transport distance (90 feet to the compliance well) are included in the modeling. PATHRAE model input parameters for the top slope are shown in Table 3 and for the side slope are shown in Table 4.

Table 2. Infiltration Rates for Class A Cell Models

Disposal Cell	HELP Infiltration Model Run	Description	Infiltration (in/yr)	Infiltration (cm/yr)	Reference
Class A Top Slope	T1	Class A (WLARW) Top slope, base case, 540 ft length, 3% slope	0.104	0.265	Whetstone (2000)
Class A Side Slope	SP1-R3	Class A (WLARW) Side slope, frost protected, 160 ft length, 747' effective length, 20% slope	0.143	0.364	Whetstone (2000)
Class A North Top Slope	Same as Class A	Same as Class A	0.104	0.265	Same as Class A
Class A North Side Slope	Same as Class A	Same as Class A	0.143	0.364	Same as Class A
Class A South Top Slope	T6	Top Slope, 740 ft length, 2.1% slope	0.1087	0.276	Whetstone (2007)
Class A South Side Slope	11E2-S18c	Side-slope, frost prot. layer, 18" filter, L=924 ft, with run-on	0.113	0.286	Whetstone (2007)

Table 3. 10,000-Year Uranium Modeling Source Concentrations, K_d s, and Fractional Release Rates for on LLRW Top Slope (0.265 cm/yr Infiltration)

Waste Characteristics:	Infiltration Rate:	0.00265	m/yr
	Waste Thickness:	1	M
	Waste Moisture Content:	0.058	cm ³ /cm ³
	Waste Bulk Density:	1.8	gm/cm ³
Soil Characteristics:	Soil Thickness:	4.432	M
	Soil Moisture Content:	0.094	cm ³ /cm ³
	Soil Bulk Density:	1.566	gm/cm ³
Aquifer Characteristics:	Aquifer Porosity	0.290	cm ³ /cm ³
	Hydraulic Conductivity:	7.67E-04	cm/sec
	Gradient:	1.00E-03	m/m
	Aquifer Velocity:	0.8341	m/yr
	Aquifer Flux Rate:	0.2419	m ³ /m ² /yr

Pathrae Number	Compound	Symbol	Maximum Concent. (pCi/g)	Maximum Concent. (Ci/m ³)	Distribution Coefficient (K_d) (ml/gm)	Fractional Release Rate (1/yr)	Waste Retardation Factor	1/2 life (Years)
49	Americium	Am-243	10,000.0000	1.80E-02	1	1.43E-03	17.660	7370
50	Curium	Cm-244	10,000	1.80E-02	93.3	1.58E-05	1555.338	18
43	Plutonium	Pu-238	10,000	1.80E-02	10	1.47E-04	167.596	88
44	Plutonium	Pu-239	10,000	1.80E-02	10	1.47E-04	167.596	24110
45	Plutonium	Pu-240	10,000	1.80E-02	10	1.47E-04	167.596	6564
47	Plutonium	Pu-242	10,000	1.80E-02	10	1.47E-04	167.596	373300
55	Radium	Ra-226	10,000	1.80E-02	10	1.47E-04	167.596	1,600
36	Thorium	Th-230	20,628,000,000	3.71E+04	10	1.47E-04	167.596	75,380
37	Thorium	Th-232	110,000	1.98E-01	10	1.47E-04	167.596	1405000000
70	Uranium	U-232	22,028,000,000,000	3.97E+07	6	2.44E-04	100.957	68.9
54	Uranium	U-233	75,000	1.35E-01	6	2.44E-04	100.957	159200
38	Uranium	U-234	6,210,000,000	1.12E+04	6	2.44E-04	100.957	245500
39	Uranium	U-235	1,900	3.42E-03	6	2.44E-04	100.957	703,800,000
40	Uranium	U-236	64,720,000	1.16E+02	6	2.44E-04	100.957	23,420,000
41	Uranium	U-238	336,260	6.05E-01	6	2.44E-04	100.957	447000000
138	Potassium	K-40	7,003,370	1.26E+01	0.15	8.08E-03	3.499	1,277,000,000

Table 4. 10,000-Year Uranium Modeling Source Concentrations, K_d s, and Fractional Release Rates for on LLRW Side Slope (0.364 cm/yr Infiltration)

Waste Characteristics:	Infiltration Rate:	0.00364	m/yr
	Waste Thickness:	1	M
	Waste Moisture Content:	0.061	cm ³ /cm ³
Soil Characteristics:	Waste Bulk Density:	1.8	gm/cm ³
	Soil Thickness:	4.432	M
	Soil Moisture Content:	0.096	cm ³ /cm ³
Aquifer Characteristics:	Soil Bulk Density:	1.566	gm/cm ³
	Aquifer Porosity:	0.290	cm ³ /cm ³
	Hydraulic Conductivity:	7.67E-04	cm/sec
	Gradient:	1.00E-03	m/m
	Aquifer Velocity:	0.8341	m/yr
	Aquifer Flux Rate:	0.2419	m ³ /m ² /yr

Pathrae Number	Compound	Symbol	Maximum Concent. (pCi/g)	Maximum Concent. (Ci/m ³)	Distribution Coefficient (K_d) (ml/gm)	Fractional Release Rate (1/yr)	Waste Retardation Factor	1/2 life (Years)
49	Americium	Am-243	10,000.00000	1.80E-02	1	1.43E-03	17.660	7370
50	Curium	Cm-244	10,000	1.80E-02	93.3	1.58E-05	1555.338	18
43	Plutonium	Pu-238	10,000	1.80E-02	10	1.47E-04	167.596	88
44	Plutonium	Pu-239	10,000	1.80E-02	10	1.47E-04	167.596	24110
45	Plutonium	Pu-240	10,000	1.80E-02	10	1.47E-04	167.596	6564
47	Plutonium	Pu-242	10,000	1.80E-02	10	1.47E-04	167.596	373300
55	Radium	Ra-226	10,000	1.80E-02	10	1.47E-04	167.596	1,600
36	Thorium	Th-230	20,628,000,000	3.71E+04	10	1.47E-04	167.596	75,380
37	Thorium	Th-232	110,000	1.98E-01	10	1.47E-04	167.596	14050000000
70	Uranium	U-232	22,028,000,000,000	3.97E+07	6	2.44E-04	100.957	68.9
54	Uranium	U-233	75,000	1.35E-01	6	2.44E-04	100.957	159200
38	Uranium	U-234	6,210,000,000	1.12E+04	6	2.44E-04	100.957	245500
39	Uranium	U-235	1,900	3.42E-03	6	2.44E-04	100.957	703,800,000
40	Uranium	U-236	64,720,000	1.16E+02	6	2.44E-04	100.957	23,420,000
41	Uranium	U-238	336,260	6.05E-01	6	2.44E-04	100.957	4470000000
138	Potassium	K-40	7,003,370	1.26E+01	0.15	8.08E-03	3.499	1,277,000,000

Model Results

Vertical Model Results

Vertical PATHRAE modeling was performed for the 0.265 cm/yr top slope and the 0.364 cm/yr side slope. The top slope modeling results indicate that five of the seven uranium species (U-234, U-235, U-236, and U-238) would exceed Ground Water Protection Levels (GWPLs) at the water table directly beneath the embankment in 5,000 – 8,300 years after cell closure (Table 5). Uranium concentrations at the water table under the top slope area of the cell would peak at approximately 19,000 years after cell closure, below the top slope. U-232 and U-233 have relatively short half lives, and would not arrive at the water table at concentrations exceeding GWPLs.

The side slope modeling results indicate that five of the seven uranium species (U-234, U-235, U-236, and U-238) would exceed GWPLs at the water table directly beneath the embankment in 3,600 – 6,000 years after cell closure (Table 6). Uranium concentrations at the water table under the side slope area of the cell would peak at approximately 13,000 years after cell closure, below the side slope.

A complete listing of output times and concentrations at the water table is provided in Table 7 for the top slope and Table 8 for the side slope. All 16 constituents were carried forward from the vertical modeling into the horizontal modeling.

Table 5. Peak Concentrations (pCi/L) and Time to Exceed GWPL at the Water Table, 0.265 cm/yr Top Slope Vertical PATHRAE Model Results for Uranium and Progeny

NUCLIDE	TIME TO EXCEED (Year)	PEAK CONCENTRATION (Ci/m ³)	PEAK CONCENTRATION (pCi/L)	PEAK YEAR
Am-243	1,200	3.14E-03	3.14E+06	3,262
Cm-244	-1	---	---	> 102,000
Pu-238	-1	---	---	
Pu-239	-1	1.85E-04	1.85E+05	30,402
Pu-240	-1	2.48E-05	2.48E+04	28,956
Pu-242	-1	4.24E-04	4.24E+05	31,295
Ra-226	-1	6.15E-09	6.15E+00	21,734
Th-230	8,000	6.95E+02	6.95E+11	31,082
Th-232	-1	4.94E-03	4.94E+06	31,380
U-232	-1	---	---	
U-233	7,100	5.15E-03	5.15E+06	18,852
U-234	5,000	4.40E+02	4.40E+11	18,877
U-235	8,300	1.42E-04	1.42E+05	18,903
U-236	5,700	5.27E+00	5.27E+09	19,082
U-238	6,700	2.51E-02	2.51E+07	18,903

NOTES: -1 indicates that compound did not exceed standard within the 12,000 years modeled

--- indicates that concentrations do not peak at the water table within 120,000 yrs

Table 6. Peak Concentrations (pCi/L) and Time to Exceed GWPL at the Water Table, 0.364 cm/yr Side Slope Vertical PATHRAE Model Results for Uranium and Progeny

NUCLIDE	TIME TO EXCEED (Year)	PEAK CONCENTRATION (Ci/m ³)	PEAK CONCENTRATION (pCi/L)	PEAK YEAR
Am-243	800	3.44E-03	3.44E+06	2,364
Cm-244	-1	---	---	> 120,000
K-40	100	1.53E+01	1.53E+10	469
Pu-238	-1	---	---	---
Pu-239	10,000	2.38E-04	2.38E+05	22,159
Pu-240	10,300	5.75E-05	5.75E+04	21,231
Pu-242	9,900	4.34E-04	4.34E+05	22,624
Ra-226	11,000	9.47E-08	9.47E+01	17,068
Th-230	5,700	7.59E+02	7.59E+11	22,500
Th-232	9,000	4.98E-03	4.98E+06	22,654
U-232	-1	---	---	---
U-233	5,100	5.31E-03	5.31E+06	13,630
U-234	3,600	4.50E+02	4.50E+11	13,630
U-235	6,000	1.43E-04	1.43E+05	13,649
U-236	4,100	5.30E+00	5.30E+09	13,779
U-238	4,800	2.53E-02	2.53E+07	13,649

NOTES: -1 indicates that compound did not exceed standard within the 12,000 years modeled

--- indicates that concentrations do not peak at the water table within 120,000 yrs

Horizontal Model Results

The horizontal modeling results (Table 9, Table 10) indicate that none of the uranium species modeled would reach the compliance well within 10,000 years.

Concentrations of K-40, which was run as a surrogate, are similar to the results from previous modeling for the early output times (100 through 1,000 years) which confirms that the longer term model results are comparable to the previously approved modeling results. However, the results are not identical due to differences in timestep discretization. The previous model required very short timesteps during the early years, while the 10,000 year model uses a 100-year timestep. Because uranium does not arrive at the water table before 1,000 years, the coarser timestep used in the current modeling is appropriate for modeling uranium species.

Summary

The fate and transport of uranium species disposed in the Class A cell was evaluated using the PATHRAE model. The model was run for over 10,000 years, for both the top slope and side slope areas of the cell. The modeling indicates that although uranium species would exceed GWPLs at the water table in 5,000 – 8,300 years for the top slope and 3,600 – 6,000 years for the side slope, uranium would not arrive at the compliance well within 10,000 years. Uranium concentrations in groundwater at the compliance well would remain well below GWPLs for at least 10,000 years.

References

- Merrell, G.B., Rogers, V.C., and Chau, T.K., 1995. The PATHRAE-RAD Performance Assessment Code for the Land Disposal of Radioactive Wastes, Rogers & Associates Engineering Corporation, RAE-9500/2-1. March 1995.
- Whetstone Associates, Inc, 2000. Envirocare of Utah Revised Western LARW Cell Infiltration and Transport Modeling, consultants report dated July 19, 2000. Document Number 4104M.000719.
- Whetstone Associates, Inc, 2007. EnergySolutions – Class A South Cell Infiltration and Transport Modeling, consultants report dated Dec 7, 2007. Document Number 4101L.071207.

***Table 7. Radionuclide Concentrations (pCi/L) at the Water Table, 0.265 cm/yr Top Slope
Vertical PATHRAE Model Results for Uranium Isotopes***

***Table 8. Radionuclide Concentrations (pCi/L) at the Water Table, 0.364 cm/yr Side Slope
Vertical PATHRAE Model Results for Uranium Isotopes***

***Table 9. Radionuclide Concentrations (pCi/L) at the Compliance Well, 0.265 cm/yr Top Slope
Horizontal PATHRAE Model Results for Uranium Isotopes***

***Table 10. Radionuclide Concentrations (pCi/L) at the Compliance Well, 0.364 cm/yr Side
Slope Horizontal PATHRAE Model Results for Uranium Isotopes***

TABLE 7. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE

NUCLIDE:	YEAR TO EXCEED:	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
Am-243	1200	0	0	0	0	0	0	3.8E-09	2.6E-06	3.8E-04	1.9E-02	4.5E-01	5.8E+00	4.8E+01	2.8E+02	1.2E+03	4.4E+03	1.3E+04	3.2E+04	7.0E+04	1.4E+05	2.4E+05
Cm-244	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	200	0	1.2E+02	6.9E+06	7.3E+08	6.3E+09	1.4E+10	1.4E+10	7.9E+09	3.2E+09	9.8E+08	2.5E+08	5.8E+07	1.2E+07	2.3E+06	4.3E+05	7.4E+04	1.2E+04	2.0E+03	3.2E+02	5.0E+01	7.6E+00
Pu-238	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	8000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-232	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	7100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	5000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	8300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	5700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	6700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: Year to exceed GWPL reported to next lowest model output year. -1 indicates nuclide does not exceed GWPL in years modeled

Year to exceed GWPL reported to next lowest model output year

TABLE 7. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE

NUCLIDE:	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	
Am-243	4.0E+05	6.2E+05	8.9E+05	1.2E+06	1.6E+06	1.9E+06	2.3E+06	2.6E+06	2.9E+06	3.0E+06	3.1E+06	3.1E+06	3.1E+06	2.9E+06	2.7E+06	2.5E+06	2.2E+06	2.0E+06	1.7E+06	1.5E+06	1.2E+06	1.0E+06	
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
K-40	1.1E+00	1.7E-01	2.5E-02	3.6E-03	5.2E-04	7.4E-05	1.1E-05	1.5E-06	2.1E-07	3.0E-08	4.1E-09	5.7E-10	8.0E-11	1.1E-11	0	0	0	0	0	0	0	0	
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4E-11	7.0E-11	3.1E-10	1.3E-09	5.0E-09	1.8E-08	6.1E-08	1.9E-07	
U-234	0	0	0	0	0	0	0	0	0	8.4E-11	7.3E-10	5.5E-09	3.7E-08	2.2E-07	1.2E-06	5.8E-06	2.6E-05	1.1E-04	4.2E-04	1.5E-03	5.1E-03	1.6E-02	
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.4E-11	1.3E-10	4.7E-10	1.6E-09	5.0E-09	
U-236	0	0	0	0	0	0	0	0	0	0	0	0	6.1E-11	4.1E-10	2.4E-09	1.3E-08	6.5E-08	2.9E-07	1.2E-06	4.7E-06	1.7E-05	5.7E-05	1.8E-04
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2E-11	6.5E-11	3.2E-10	1.4E-09	5.9E-09	2.3E-08	8.2E-08	2.8E-07	8.9E-07	

NOTE: ar. -1 indicates nuclide does not exceed GWPL in years modeled

TABLE 7. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE

NUCLIDE:	4400	4500	4600	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200
Am-243	8.6E+05	7.0E+05	5.6E+05	4.5E+05	3.6E+05	2.8E+05	2.2E+05	1.7E+05	1.3E+05	9.9E+04	7.5E+04	5.7E+04	4.3E+04	3.2E+04	2.4E+04	1.7E+04	1.3E+04	9.4E+03	6.9E+03
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	2.1E-11	8.7E-11	3.3E-10	1.2E-09	4.1E-09	1.4E-08	4.3E-08	1.3E-07	3.8E-07	1.1E-06	2.9E-06	7.5E-06	1.9E-05
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6E-11	4.2E-11	1.1E-10
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	5.8E-07	1.7E-06	4.6E-06	1.2E-05	3.0E-05	7.1E-05	1.6E-04	3.7E-04	7.9E-04	1.7E-03	3.4E-03	6.6E-03	1.3E-02	2.4E-02	4.4E-02	7.8E-02	1.4E-01	2.4E-01	4.0E-01
U-234	4.9E-02	1.4E-01	3.8E-01	9.9E-01	2.5E+00	5.9E+00	1.4E+01	3.1E+01	6.6E+01	1.4E+02	2.8E+02	5.5E+02	1.1E+03	2.0E+03	3.7E+03	6.5E+03	1.1E+04	2.0E+04	3.3E+04
U-235	1.5E-08	4.3E-08	1.2E-07	3.1E-07	7.7E-07	1.8E-06	4.2E-06	9.5E-06	2.0E-05	4.3E-05	8.7E-05	1.7E-04	3.3E-04	6.2E-04	1.1E-03	2.0E-03	3.6E-03	6.1E-03	1.0E-02
U-236	5.5E-04	1.6E-03	4.2E-03	1.1E-02	2.8E-02	6.6E-02	1.5E-01	3.4E-01	7.4E-01	1.5E+00	3.1E+00	6.2E+00	1.2E+01	2.2E+01	4.1E+01	7.3E+01	1.3E+02	2.2E+02	3.7E+02
U-238	2.7E-06	7.6E-06	2.1E-05	5.4E-05	1.4E-04	3.2E-04	7.5E-04	1.7E-03	3.6E-03	7.6E-03	1.5E-02	3.0E-02	5.8E-02	1.1E-01	2.0E-01	3.6E-01	6.3E-01	1.1E+00	1.8E+00

NOTE:

TABLE 7. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE

NUCLIDE:	6300	6400	6500	6600	6700	6800	6900	7000	7100	7200	7300	7400	7500	7600	7700	7800	7900	8000	8100
Am-243	5.0E+03	3.6E+03	2.6E+03	1.9E+03	1.4E+03	9.8E+02	7.0E+02	5.0E+02	3.6E+02	2.5E+02	1.8E+02	1.3E+02	9.0E+01	6.3E+01	4.4E+01	3.1E+01	2.2E+01	1.5E+01	1.1E+01
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	2.0E-11	4.7E-11	1.1E-10	2.5E-10	5.4E-10	1.2E-09	2.4E-09	5.0E-09	1.0E-08	2.0E-08	3.8E-08	7.1E-08	1.3E-07	2.4E-07	4.3E-07	7.7E-07	1.3E-06	2.3E-06	3.9E-06
Pu-240	1.5E-11	3.5E-11	8.1E-11	1.8E-10	3.9E-10	8.3E-10	1.7E-09	3.5E-09	7.0E-09	1.4E-08	2.6E-08	4.9E-08	9.0E-08	1.6E-07	2.9E-07	5.1E-07	8.8E-07	1.5E-06	2.5E-06
Pu-242	2.4E-11	5.6E-11	1.3E-10	2.9E-10	6.5E-10	1.4E-09	2.9E-09	6.0E-09	1.2E-08	2.4E-08	4.6E-08	8.7E-08	1.6E-07	3.0E-07	5.3E-07	9.5E-07	1.6E-06	2.8E-06	4.8E-06
Ra-226	0	0	0	1.7E-11	3.6E-11	7.4E-11	1.5E-10	2.9E-10	5.6E-10	1.1E-09	2.0E-09	3.6E-09	6.4E-09	1.1E-08	1.9E-08	3.3E-08	5.5E-08	9.0E-08	1.5E-07
Th-230	4.6E-05	1.1E-04	2.6E-04	5.8E-04	1.3E-03	2.7E-03	5.7E-03	1.2E-02	2.4E-02	4.6E-02	9.0E-02	1.7E-01	3.2E-01	5.8E-01	1.0E+00	1.8E+00	3.2E+00	5.5E+00	9.3E+00
Th-232	2.6E-10	6.2E-10	1.4E-09	3.3E-09	7.2E-09	1.6E-08	3.3E-08	6.7E-08	1.3E-07	2.7E-07	5.1E-07	9.7E-07	1.8E-06	3.3E-06	6.0E-06	1.1E-05	1.8E-05	3.2E-05	5.4E-05
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	6.6E-01	1.1E+00	1.7E+00	2.7E+00	4.1E+00	6.3E+00	9.5E+00	1.4E+01	2.1E+01	3.0E+01	4.3E+01	6.1E+01	8.5E+01	1.2E+02	1.6E+02	2.2E+02	3.0E+02	3.9E+02	5.2E+02
U-234	5.5E+04	8.9E+04	1.4E+05	2.2E+05	3.5E+05	5.3E+05	8.0E+05	1.2E+06	1.7E+06	2.5E+06	3.6E+06	5.1E+06	7.1E+06	9.9E+06	1.4E+07	1.8E+07	2.5E+07	3.3E+07	4.4E+07
U-235	1.7E-02	2.8E-02	4.4E-02	7.0E-02	1.1E-01	1.6E-01	2.5E-01	3.7E-01	5.4E-01	7.8E-01	1.1E+00	1.6E+00	2.2E+00	3.1E+00	4.2E+00	5.8E+00	7.7E+00	1.0E+01	1.4E+01
U-236	6.2E+02	1.0E+03	1.6E+03	2.5E+03	3.9E+03	6.0E+03	9.0E+03	1.3E+04	2.0E+04	2.8E+04	4.1E+04	5.7E+04	8.0E+04	1.1E+05	1.5E+05	2.1E+05	2.8E+05	3.7E+05	4.9E+05
U-238	3.0E+00	4.9E+00	7.8E+00	1.2E+01	1.9E+01	2.9E+01	4.4E+01	6.5E+01	9.6E+01	1.4E+02	2.0E+02	2.8E+02	3.9E+02	5.5E+02	7.5E+02	1.0E+03	1.4E+03	1.8E+03	2.4E+03

NOTE:

TABLE 7. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE

NUCLIDE:	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	9700	9800	9900	10000
Am-243	7.5E+00	5.2E+00	3.6E+00	2.5E+00	1.7E+00	1.2E+00	8.4E-01	5.8E-01	4.0E-01	2.8E-01	1.9E-01	1.3E-01	9.0E-02	6.2E-02	4.3E-02	2.9E-02	2.0E-02	1.4E-02	9.4E-03
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	6.4E-06	1.1E-05	1.7E-05	2.8E-05	4.4E-05	6.8E-05	1.1E-04	1.6E-04	2.5E-04	3.7E-04	5.5E-04	8.1E-04	1.2E-03	1.7E-03	2.5E-03	3.5E-03	5.0E-03	6.9E-03	9.7E-03
Pu-240	4.2E-06	6.8E-06	1.1E-05	1.7E-05	2.7E-05	4.3E-05	6.6E-05	1.0E-04	1.5E-04	2.2E-04	3.3E-04	4.8E-04	7.0E-04	1.0E-03	1.4E-03	2.0E-03	2.8E-03	3.9E-03	5.4E-03
Pu-242	8.0E-06	1.3E-05	2.2E-05	3.5E-05	5.5E-05	8.7E-05	1.3E-04	2.1E-04	3.1E-04	4.7E-04	7.1E-04	1.0E-03	1.5E-03	2.2E-03	3.2E-03	4.6E-03	6.5E-03	9.1E-03	1.3E-02
Ra-226	2.3E-07	3.7E-07	5.8E-07	8.9E-07	1.3E-06	2.0E-06	3.0E-06	4.4E-06	6.5E-06	9.3E-06	1.3E-05	1.9E-05	2.7E-05	3.7E-05	5.1E-05	6.9E-05	9.4E-05	1.3E-04	1.7E-04
Th-230	1.6E+01	2.6E+01	4.2E+01	6.7E+01	1.1E+02	1.7E+02	2.6E+02	4.0E+02	6.1E+02	9.1E+02	1.4E+03	2.0E+03	2.9E+03	4.3E+03	6.1E+03	8.7E+03	1.2E+04	1.7E+04	2.4E+04
Th-232	9.0E-05	1.5E-04	2.4E-04	3.9E-04	6.2E-04	9.7E-04	1.5E-03	2.3E-03	3.5E-03	5.3E-03	7.9E-03	1.2E-02	1.7E-02	2.5E-02	3.6E-02	5.1E-02	7.2E-02	1.0E-01	1.4E-01
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	6.8E+02	8.9E+02	1.1E+03	1.5E+03	1.9E+03	2.4E+03	3.0E+03	3.7E+03	4.6E+03	5.7E+03	7.0E+03	8.5E+03	1.0E+04	1.2E+04	1.5E+04	1.8E+04	2.1E+04	2.5E+04	2.9E+04
U-234	5.7E+07	7.5E+07	9.7E+07	1.2E+08	1.6E+08	2.0E+08	2.5E+08	3.1E+08	3.9E+08	4.8E+08	5.9E+08	7.1E+08	8.7E+08	1.0E+09	1.3E+09	1.5E+09	1.8E+09	2.1E+09	2.5E+09
U-235	1.8E+01	2.3E+01	3.0E+01	3.9E+01	4.9E+01	6.2E+01	7.8E+01	9.8E+01	1.2E+02	1.5E+02	1.8E+02	2.2E+02	2.7E+02	3.3E+02	3.9E+02	4.7E+02	5.6E+02	6.6E+02	7.8E+02
U-236	6.5E+05	8.4E+05	1.1E+06	1.4E+06	1.8E+06	2.3E+06	2.8E+06	3.5E+06	4.4E+06	5.4E+06	6.6E+06	8.1E+06	9.8E+06	1.2E+07	1.4E+07	1.7E+07	2.0E+07	2.4E+07	2.8E+07
U-238	3.2E+03	4.1E+03	5.3E+03	6.9E+03	8.7E+03	1.1E+04	1.4E+04	1.7E+04	2.1E+04	2.6E+04	3.2E+04	4.0E+04	4.8E+04	5.8E+04	7.0E+04	8.3E+04	9.9E+04	1.2E+05	1.4E+05

NOTE:

TABLE 8. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

NUCLIDE:	YEAR TO EXCEED:	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Am-243	800	0	0	0	0	2.1E-09	1.4E-05	6.4E-03	5.7E-01	1.7E+01	2.3E+02	1.8E+03	9.0E+03	3.3E+04	9.6E+04	2.3E+05	4.5E+05	8.0E+05	1.3E+06	1.8E+06	2.3E+06	2.8E+06	3.2E+06
Cm-244	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	100	1.1E-05	1.1E+06	1.1E+09	1.1E+10	1.4E+10	6.5E+09	1.5E+09	2.5E+08	3.2E+07	3.5E+06	3.3E+05	2.9E+04	2.4E+03	1.9E+02	1.5E+01	1.1E+00	7.7E-02	5.4E-03	3.8E-04	2.6E-05	1.8E-06	1.2E-07
Pu-238	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	10,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	10,300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	9,900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	5,700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-232	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	5,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	3,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6E-11
U-235	6,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	4,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	4,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: Year to exceed GWPL reported to next lowest model output y Year to exceed GWPL reported to next lowest model output year. -1 indicates nuclide does not exceed GWPL in years modeled

TABLE 8. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

NUCLIDE:	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600
Am-243	3.4E+06	3.4E+06	3.3E+06	3.0E+06	2.7E+06	2.3E+06	1.9E+06	1.5E+06	1.2E+06	9.2E+05	6.9E+05	5.1E+05	3.7E+05	2.6E+05	1.9E+05	1.3E+05	8.8E+04	6.0E+04	4.0E+04	2.7E+04	1.8E+04	1.2E+04	7.6E+03	4.9E+03
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	7.8E-09	5.2E-10	3.4E-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2E-11	4.0E-11
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0E-11	3.4E-11
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.3E-11	4.5E-11
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	1.9E-11	1.3E-10	7.9E-10	4.4E-09	2.3E-08	1.1E-07	4.7E-07	1.9E-06	7.4E-06	2.7E-05	9.0E-05
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1E-11	4.1E-11	1.5E-10	5.0E-10
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	1.5E-11	1.3E-10	9.9E-10	6.4E-09	3.7E-08	1.9E-07	8.5E-07	3.5E-06	1.3E-05	4.6E-05	1.5E-04	4.5E-04	1.3E-03	3.5E-03	8.8E-03	2.1E-02	5.0E-02	1.1E-01	2.3E-01	4.8E-01	9.5E-01
U-234	5.6E-10	9.1E-09	1.2E-07	1.2E-06	1.1E-05	8.2E-05	5.4E-04	3.1E-03	1.5E-02	7.1E-02	2.9E-01	1.1E+00	3.9E+00	1.3E+01	3.8E+01	1.1E+02	2.9E+02	7.4E+02	1.8E+03	4.1E+03	9.2E+03	2.0E+04	4.0E+04	7.9E+04
U-235	0	0	0	0	0	2.5E-11	1.6E-10	9.4E-10	4.8E-09	2.2E-08	9.0E-08	3.4E-07	1.2E-06	3.9E-06	1.2E-05	3.3E-05	9.0E-05	2.3E-04	5.5E-04	1.3E-03	2.8E-03	6.0E-03	1.2E-02	2.5E-02
U-236	0	1.0E-10	1.3E-09	1.4E-08	1.2E-07	9.2E-07	6.0E-06	3.4E-05	1.7E-04	7.9E-04	3.3E-03	1.2E-02	4.3E-02	1.4E-01	4.2E-01	1.2E+00	3.2E+00	8.2E+00	2.0E+01	4.6E+01	1.0E+02	2.2E+02	4.5E+02	8.9E+02
U-238	0	0	0	6.8E-11	6.0E-10	4.5E-09	2.9E-08	1.7E-07	8.4E-07	3.8E-06	1.6E-05	6.0E-05	2.1E-04	6.8E-04	2.1E-03	5.9E-03	1.6E-02	4.0E-02	9.8E-02	2.3E-01	5.0E-01	1.1E+00	2.2E+00	4.3E+00

TABLE 8. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

NUCLIDE:	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900	7000
Am-243	3.1E+03	2.0E+03	1.3E+03	8.0E+02	5.0E+02	3.2E+02	2.0E+02	1.2E+02	7.5E+01	4.6E+01	2.8E+01	1.7E+01	1.1E+01	6.5E+00	3.9E+00	2.4E+00	1.4E+00	8.7E-01	5.2E-01	3.1E-01	1.9E-01	1.1E-01	6.7E-02	4.0E-02
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	1.3E-10	3.9E-10	1.1E-09	3.2E-09	8.5E-09	2.2E-08	5.3E-08	1.3E-07	2.9E-07	6.5E-07	1.4E-06	3.0E-06	6.1E-06	1.2E-05	2.4E-05	4.5E-05	8.4E-05	1.5E-04	2.7E-04	4.8E-04	8.3E-04	1.4E-03	2.3E-03	3.8E-03
Pu-240	1.1E-10	3.3E-10	9.5E-10	2.6E-09	6.9E-09	1.8E-08	4.3E-08	1.0E-07	2.3E-07	5.2E-07	1.1E-06	2.3E-06	4.7E-06	9.3E-06	1.8E-05	3.4E-05	6.3E-05	1.1E-04	2.0E-04	3.5E-04	6.0E-04	1.0E-03	1.7E-03	2.7E-03
Pu-242	1.5E-10	4.5E-10	1.3E-09	3.6E-09	9.7E-09	2.5E-08	6.2E-08	1.5E-07	3.4E-07	7.6E-07	1.7E-06	3.5E-06	7.2E-06	1.4E-05	2.8E-05	5.3E-05	1.0E-04	1.8E-04	3.3E-04	5.7E-04	9.9E-04	1.7E-03	2.8E-03	4.6E-03
Ra-226	1.9E-11	5.6E-11	1.6E-10	4.2E-10	1.1E-09	2.6E-09	6.3E-09	1.4E-08	3.2E-08	6.8E-08	1.4E-07	2.9E-07	5.6E-07	1.1E-06	2.0E-06	3.7E-06	6.6E-06	1.2E-05	2.0E-05	3.3E-05	5.5E-05	8.9E-05	1.4E-04	2.2E-04
Th-230	2.9E-04	8.9E-04	2.6E-03	7.2E-03	1.9E-02	4.9E-02	1.2E-01	2.9E-01	6.7E-01	1.5E+00	3.3E+00	6.9E+00	1.4E+01	2.8E+01	5.5E+01	1.1E+02	2.0E+02	3.6E+02	6.4E+02	1.1E+03	1.9E+03	3.3E+03	5.5E+03	9.0E+03
Th-232	1.6E-09	5.0E-09	1.4E-08	4.0E-08	1.1E-07	2.8E-07	6.8E-07	1.6E-06	3.8E-06	8.4E-06	1.8E-05	3.9E-05	8.0E-05	1.6E-04	3.1E-04	5.9E-04	1.1E-03	2.0E-03	3.6E-03	6.4E-03	1.1E-02	1.9E-02	3.1E-02	5.1E-02
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	1.8E+00	3.4E+00	6.1E+00	1.1E+01	1.8E+01	3.1E+01	5.1E+01	8.1E+01	1.3E+02	2.0E+02	3.0E+02	4.4E+02	6.5E+02	9.3E+02	1.3E+03	1.9E+03	2.6E+03	3.5E+03	4.7E+03	6.3E+03	8.3E+03	1.1E+04	1.4E+04	1.8E+04
U-234	1.5E+05	2.8E+05	5.1E+05	9.0E+05	1.5E+06	2.6E+06	4.2E+06	6.8E+06	1.1E+07	1.6E+07	2.5E+07	3.7E+07	5.4E+07	7.8E+07	1.1E+08	1.6E+08	2.2E+08	2.9E+08	4.0E+08	5.3E+08	7.0E+08	9.1E+08	1.2E+09	1.5E+09
U-235	4.7E-02	8.8E-02	1.6E-01	2.8E-01	4.8E-01	8.0E-01	1.3E+00	2.1E+00	3.3E+00	5.1E+00	7.7E+00	1.1E+01	1.7E+01	2.4E+01	3.4E+01	4.8E+01	6.7E+01	9.1E+01	1.2E+02	1.6E+02	2.2E+02	2.8E+02	3.7E+02	4.7E+02
U-236	1.7E+03	3.2E+03	5.7E+03	1.0E+04	1.7E+04	2.9E+04	4.7E+04	7.6E+04	1.2E+05	1.8E+05	2.8E+05	4.1E+05	6.1E+05	8.8E+05	1.2E+06	1.7E+06	2.4E+06	3.3E+06	4.4E+06	5.9E+06	7.8E+06	1.0E+07	1.3E+07	1.7E+07
U-238	8.3E+00	1.5E+01	2.8E+01	4.9E+01	8.5E+01	1.4E+02	2.3E+02	3.7E+02	5.8E+02	9.0E+02	1.4E+03	2.0E+03	3.0E+03	4.3E+03	6.1E+03	8.5E+03	1.2E+04	1.6E+04	2.2E+04	2.9E+04	3.8E+04	5.0E+04	6.5E+04	8.3E+04

TABLE 8. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

NUCLIDE:	7100	7200	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400
Am-243	2.4E-02	1.4E-02	8.4E-03	5.0E-03	2.9E-03	1.7E-03	1.0E-03	6.1E-04	3.6E-04	2.1E-04	1.2E-04	7.3E-05	4.3E-05	2.5E-05	1.5E-05	8.6E-06	5.0E-06	2.9E-06	1.7E-06	1.0E-06	5.9E-07	3.4E-07	2.0E-07	1.2E-07
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	6.1E-03	9.7E-03	1.5E-02	2.4E-02	3.6E-02	5.4E-02	8.1E-02	1.2E-01	1.7E-01	2.5E-01	3.5E-01	5.0E-01	7.0E-01	9.6E-01	1.3E+00	1.8E+00	2.4E+00	3.3E+00	4.3E+00	5.7E+00	7.5E+00	9.7E+00	1.3E+01	1.6E+01
Pu-240	4.3E-03	6.8E-03	1.1E-02	1.6E-02	2.5E-02	3.7E-02	5.4E-02	7.9E-02	1.1E-01	1.6E-01	2.3E-01	3.2E-01	4.5E-01	6.1E-01	8.4E-01	1.1E+00	1.5E+00	2.0E+00	2.6E+00	3.5E+00	4.5E+00	5.8E+00	7.4E+00	9.5E+00
Pu-242	7.4E-03	1.2E-02	1.9E-02	2.9E-02	4.4E-02	6.6E-02	9.9E-02	1.5E-01	2.1E-01	3.1E-01	4.4E-01	6.2E-01	8.7E-01	1.2E+00	1.7E+00	2.3E+00	3.1E+00	4.1E+00	5.5E+00	7.3E+00	9.5E+00	1.2E+01	1.6E+01	2.1E+01
Ra-226	3.5E-04	5.3E-04	8.0E-04	1.2E-03	1.7E-03	2.5E-03	3.6E-03	5.1E-03	7.1E-03	9.8E-03	1.3E-02	1.8E-02	2.4E-02	3.2E-02	4.3E-02	5.6E-02	7.2E-02	9.3E-02	1.2E-01	1.5E-01	1.9E-01	2.3E-01	2.9E-01	3.6E-01
Th-230	1.5E+04	2.3E+04	3.6E+04	5.6E+04	8.6E+04	1.3E+05	1.9E+05	2.8E+05	4.1E+05	6.0E+05	8.5E+05	1.2E+06	1.7E+06	2.3E+06	3.2E+06	4.4E+06	5.9E+06	8.0E+06	1.1E+07	1.4E+07	1.8E+07	2.4E+07	3.1E+07	4.0E+07
Th-232	8.3E-02	1.3E-01	2.1E-01	3.2E-01	4.9E-01	7.4E-01	1.1E+00	1.6E+00	2.4E+00	3.4E+00	4.9E+00	6.9E+00	9.7E+00	1.4E+01	1.9E+01	2.5E+01	3.4E+01	4.6E+01	6.1E+01	8.1E+01	1.1E+02	1.4E+02	1.8E+02	2.3E+02
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	2.3E+04	2.9E+04	3.6E+04	4.4E+04	5.4E+04	6.6E+04	8.0E+04	9.6E+04	1.1E+05	1.4E+05	1.6E+05	1.9E+05	2.2E+05	2.5E+05	2.9E+05	3.4E+05	3.8E+05	4.4E+05	4.9E+05	5.6E+05	6.2E+05	7.0E+05	7.8E+05	8.6E+05
U-234	1.9E+09	2.4E+09	3.0E+09	3.7E+09	4.6E+09	5.6E+09	6.7E+09	8.1E+09	9.6E+09	1.1E+10	1.3E+10	1.6E+10	1.8E+10	2.1E+10	2.5E+10	2.8E+10	3.2E+10	3.7E+10	4.2E+10	4.7E+10	5.3E+10	5.9E+10	6.5E+10	7.2E+10
U-235	6.0E+02	7.5E+02	9.3E+02	1.2E+03	1.4E+03	1.7E+03	2.1E+03	2.5E+03	3.0E+03	3.6E+03	4.2E+03	4.9E+03	5.8E+03	6.7E+03	7.7E+03	8.8E+03	1.0E+04	1.1E+04	1.3E+04	1.5E+04	1.6E+04	1.8E+04	2.0E+04	2.3E+04
U-236	2.2E+07	2.7E+07	3.4E+07	4.2E+07	5.1E+07	6.3E+07	7.6E+07	9.1E+07	1.1E+08	1.3E+08	1.5E+08	1.8E+08	2.1E+08	2.4E+08	2.8E+08	3.2E+08	3.7E+08	4.2E+08	4.7E+08	5.3E+08	5.9E+08	6.6E+08	7.4E+08	8.2E+08
U-238	1.1E+05	1.3E+05	1.7E+05	2.0E+05	2.5E+05	3.1E+05	3.7E+05	4.5E+05	5.3E+05	6.3E+05	7.5E+05	8.7E+05	1.0E+06	1.2E+06	1.4E+06	1.6E+06	1.8E+06	2.0E+06	2.3E+06	2.6E+06	2.9E+06	3.3E+06	3.6E+06	4.0E+06

TABLE 8. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

NUCLIDE:	9500	9600	9700	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300	11400	11500	11600	
Am-243	6.7E-08	3.9E-08	2.3E-08	1.3E-08	7.7E-09	4.5E-09	2.6E-09	1.5E-09	8.7E-10	5.1E-10	2.9E-10	1.7E-10	9.8E-11	5.7E-11	3.3E-11	1.9E-11	1.1E-11	0	0	0	0	0	0
Cm-244	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	2.0E+01	2.6E+01	3.3E+01	4.1E+01	5.1E+01	6.3E+01	7.8E+01	9.5E+01	1.2E+02	1.4E+02	1.7E+02	2.0E+02	2.4E+02	2.9E+02	3.5E+02	4.1E+02	4.8E+02	5.7E+02	6.6E+02	7.7E+02	9.0E+02	1.0E+03	
Pu-240	1.2E+01	1.5E+01	1.9E+01	2.3E+01	2.9E+01	3.5E+01	4.3E+01	5.3E+01	6.4E+01	7.7E+01	9.2E+01	1.1E+02	1.3E+02	1.5E+02	1.8E+02	2.1E+02	2.5E+02	2.9E+02	3.4E+02	3.9E+02	4.5E+02	5.2E+02	
Pu-242	2.6E+01	3.4E+01	4.2E+01	5.3E+01	6.6E+01	8.2E+01	1.0E+02	1.3E+02	1.5E+02	1.9E+02	2.3E+02	2.7E+02	3.3E+02	3.9E+02	4.6E+02	5.5E+02	6.5E+02	7.7E+02	9.0E+02	1.0E+03	1.2E+03	1.4E+03	
Ra-226	4.4E-01	5.3E-01	6.5E-01	7.8E-01	9.3E-01	1.1E+00	1.3E+00	1.5E+00	1.8E+00	2.1E+00	2.4E+00	2.8E+00	3.2E+00	3.7E+00	4.2E+00	4.8E+00	5.4E+00	6.1E+00	6.9E+00	7.7E+00	8.6E+00	9.5E+00	
Th-230	5.1E+07	6.4E+07	8.1E+07	1.0E+08	1.3E+08	1.6E+08	1.9E+08	2.4E+08	2.9E+08	3.6E+08	4.3E+08	5.2E+08	6.2E+08	7.4E+08	8.8E+08	1.0E+09	1.2E+09	1.5E+09	1.7E+09	2.0E+09	2.3E+09	2.7E+09	
Th-232	3.0E+02	3.8E+02	4.7E+02	6.0E+02	7.4E+02	9.2E+02	1.1E+03	1.4E+03	1.7E+03	2.1E+03	2.5E+03	3.1E+03	3.7E+03	4.4E+03	5.2E+03	6.2E+03	7.3E+03	8.6E+03	1.0E+04	1.2E+04	1.4E+04	1.6E+04	
U-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	9.5E+05	1.0E+06	1.1E+06	1.3E+06	1.4E+06	1.5E+06	1.6E+06	1.7E+06	1.9E+06	2.0E+06	2.1E+06	2.3E+06	2.4E+06	2.6E+06	2.7E+06	2.8E+06	3.0E+06	3.1E+06	3.3E+06	3.4E+06	3.6E+06	3.7E+06	
U-234	8.0E+10	8.8E+10	9.6E+10	1.1E+11	1.1E+11	1.2E+11	1.3E+11	1.5E+11	1.6E+11	1.7E+11	1.8E+11	1.9E+11	2.0E+11	2.2E+11	2.3E+11	2.4E+11	2.5E+11	2.7E+11	2.8E+11	2.9E+11	3.0E+11	3.1E+11	
U-235	2.5E+04	2.8E+04	3.0E+04	3.3E+04	3.6E+04	3.9E+04	4.2E+04	4.6E+04	4.9E+04	5.3E+04	5.6E+04	6.0E+04	6.4E+04	6.8E+04	7.2E+04	7.6E+04	8.0E+04	8.4E+04	8.8E+04	9.1E+04	9.5E+04	9.9E+04	
U-236	9.1E+08	1.0E+09	1.1E+09	1.2E+09	1.3E+09	1.4E+09	1.5E+09	1.7E+09	1.8E+09	1.9E+09	2.0E+09	2.2E+09	2.3E+09	2.5E+09	2.6E+09	2.7E+09	2.9E+09	3.0E+09	3.2E+09	3.3E+09	3.5E+09	3.6E+09	
U-238	4.4E+06	4.9E+06	5.4E+06	5.9E+06	6.4E+06	6.9E+06	7.5E+06	8.1E+06	8.7E+06	9.3E+06	1.0E+07	1.1E+07	1.1E+07	1.2E+07	1.3E+07	1.3E+07	1.4E+07	1.5E+07	1.5E+07	1.6E+07	1.7E+07	1.8E+07	

**TABLE 9. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE COMPLIANCE WELL
HORIZONTAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE**

	EXCEEDS	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	
Am-243	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	800	0	0	0	0	0	0	0	0	1.8E+06	1.4E+06	3.6E+05	7.4E+04	1.7E+08	1.6E+08	4.1E+07	8.5E+06	1.4E+09	1.6E+09	4.2E+08	8.7E+07	3.6E+09	4.9E+09	1.3E+09	2.7E+08	
Pu-239	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: Year to exceed GWPL reported to next lowest model output year. -1 indicates nuclide does not exceed GWPL within the 11,900 years modeled

**TABLE 9. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE COMPLIANCE WELL
HORIZONTAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE**

	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800		
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
K-40	4.2E+09	7.1E+09	1.9E+09	4.0E+08	2.7E+09	5.8E+09	1.6E+09	3.4E+08	1.1E+09	3.1E+09	8.7E+08	1.8E+08	3.1E+08	1.2E+09	3.5E+08	7.5E+07	6.9E+07	3.7E+08	1.1E+08	2.4E+07	1.3E+07	9.5E+07	3.0E+07	6.3E+06	0	
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**TABLE 9. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE COMPLIANCE WELL
HORIZONTAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE**

	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900	7000	7100	7200
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	2.3E+06	2.2E+07	7.2E+06	1.6E+06	4.0E+05	4.7E+06	1.6E+06	3.4E+05	7.4E+04	9.1E+05	3.2E+05	7.0E+04	1.4E+04	1.7E+05	6.3E+04	1.4E+04	2.8E+03	3.0E+04	1.1E+04	2.5E+03	5.1E+02	4.8E+03	2.0E+03	4.4E+02
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**TABLE 9. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE COMPLIANCE WELL
HORIZONTAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE**

	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	9.0E+01	7.9E+02	3.4E+02	8.0E+01	1.6E+01	1.2E+02	5.9E+01	1.4E+01	2.7E+00	2.0E+01	9.7E+00	2.3E+00	4.5E-01	2.8E+00	1.5E+00	3.6E-01	7.5E-02	3.9E-01	2.4E-01	5.8E-02	1.2E-02	5.6E-02	3.8E-02	9.5E-03	
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**TABLE 9. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE COMPLIANCE WELL
HORIZONTAL PATHRAE MODEL RESULTS FOR THE 0.265 cm/yr TOP SLOPE**

	9700	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300	11400	11500	11600	11700	11800	11900	12000	
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	1.9E-03	7.8E-03	6.0E-03	1.5E-03	3.0E-04	1.0E-03	9.1E-04	2.3E-04	4.7E-05	1.3E-04	1.4E-04	3.5E-05	7.4E-06	1.7E-05	2.1E-05	5.5E-06	1.1E-06	2.1E-06	3.2E-06	8.6E-07	1.8E-07	2.5E-07	4.6E-07	1.2E-07	0
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 10. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

	EXCEEDS	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	
Am-243	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	400	0	0	0	0	1.9E+05	2.1E+03	2.2E+01	2.5E-01	1.7E+08	1.9E+06	2.0E+04	8.7E+02	1.7E+09	1.9E+07	2.0E+05	4.4E+05	3.2E+09	3.6E+07	3.7E+05	1.0E+07	2.4E+09	2.6E+07	2.8E+05	3.3E+07	
Pu-239	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOTE: Year to exceed GWPL reported to next lowest model output year. -1 indicates nuclide does not exceed GWPL within the 12,000 years modeled

TABLE 10. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800	
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	8.5E+08	9.3E+06	9.8E+04	3.1E+07	1.7E+08	1.8E+06	1.9E+04	1.4E+07	2.5E+07	2.7E+05	2.8E+03	3.7E+06	2.8E+06	3.0E+04	3.2E+02	6.9E+05	2.8E+05	3.0E+03	3.2E+01	9.9E+04	2.3E+04	2.5E+02	2.7E+00	1.2E+04	
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 10. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900	7000	7100	7200	
Am-243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K-40	1.9E+03	2.0E+01	2.1E-01	1.3E+03	1.4E+02	1.5E+00	1.6E-02	1.2E+02	1.0E+01	1.1E-01	1.1E-03	1.1E+01	7.1E-01	7.5E-03	8.0E-05	9.0E-01	4.7E-02	5.0E-04	5.3E-06	6.8E-02	3.0E-03	3.2E-05	3.4E-07	5.0E-03	
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 10. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	9100	9200	9300	9400	9500	9600	
Am-243	0	0	0	0	0	0	0	0	0	0	0	1.0E-11	2.5E-10	1.4E-10	4.5E-11	1.3E-11	0	0	0	0	0	0	0	0	0
K-40	1.9E-04	2.0E-06	2.1E-08	3.7E-04	1.2E-05	1.3E-07	1.4E-09	2.6E-05	7.5E-07	7.9E-09	8.4E-11	1.8E-06	4.7E-08	4.9E-10	0	1.2E-07	2.8E-09	3.0E-11	0	7.5E-09	1.7E-10	0	0	0	4.9E-10
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 10. RADIONUCLIDE CONCENTRATIONS (pCi/L) AT THE WATER TABLE--VERTICAL PATHRAE MODEL RESULTS FOR THE 0.364 cm/yr SIDE SLOPE

	9700	9800	9900	10000	10100	10200	10300	10400	10500	10600	10700	10800	10900	11000	11100	11200	11300	11400	11500	11600	11700	11800	11900	12000
Am-243	0	0	0	0	0	0	0	0	2.2E-07	1.3E-06	6.4E-07	2.1E-07	6.0E-08	1.7E-08	4.5E-09	1.2E-09	3.3E-10	9.1E-11	2.5E-11	0	0	0	0	0
K-40	1.0E-11	0	0	2.9E-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pu-242	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ra-226	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th-232	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-233	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-234	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-236	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U-238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0