

### 3. DOSE

This section provides summary tables for dose calculations completed for the PORTS site. Information is provided for the dose calculation required by the National Emission Standards for Hazardous Air Pollutants for airborne radionuclide emissions. The following tables are provided in this section:

- Table 3.1. Emissions (Ci/year) from DOE PORTS air emission sources – 2006
- Table 3.2. Predicted radiation doses from airborne releases at PORTS – 2006
- Table 3.3. Dose calculations for ambient air monitoring stations – 2006

**Table 3.1. Emissions (Ci/year) from DOE PORTS air emission sources – 2006**

Radionuclide	X-622 GWTF <sup>a,b</sup>		X-623 GWTF <sup>a,b</sup>	X-624 GWTF <sup>a,b</sup>	X-627 GWTF <sup>a,b</sup>	X-326 GB <sup>a,b</sup>
	Air stripper	Clarifier				
Americium-241	8.1E-08	4.1E-08	5.9E-08	1.1E-08	2.3E-07	7.2E-14
Neptunium-237	3.4E-08	6.0E-09	7.2E-11	9.4E-09	5.0E-07	2.5E-13
Plutonium-238	3.5E-08	1.2E-08	3.0E-08	2.7E-08	1.3E-07	5.6E-14
Plutonium-239/240	2.3E-08	6.2E-09	6.1E-08	0	7.5E-08	6.5E-14
Technetium-99	8.3E-07	7.9E-08	5.2E-04	7.7E-07	1.4E-07	7.2E-07
Uranium-233/234	-	-	6.3E-05	1.2E-06	1.3E-06	
Uranium-234	2.4E-05	1.6E-06	-	-	-	4.9E-08
Uranium-235/236	-	-	-	-	1.5E-07	
Uranium-235	5.4E-08	3.7E-09	7.0E-06	1.1E-07	-	1.8E-09
Uranium-236	-	-	4.8E-07	0	-	2.1E-10
Uranium-238	1.6E-07	1.1E-08	8.3E-06	2.3E-07	5.9E-07	8.2E-09
Total	2.5E-05	1.8E-06	6.0E-04	2.4E-06	3.2E-06	7.8E-07

GWTF – groundwater treatment facility. GB – glovebox.

<sup>a</sup>Measurements are provided in scientific notation. The number and sign (+ or -) to the right of the “E” indicate the number of places to the right or left of the decimal point. For example, 3.4E-04 is 0.00034 (the decimal point moves four places to the left); 2.1E+02 is 210 (the decimal point moves two places to the right).

<sup>b</sup>Emissions from the X-622 and X-627 are based on the results of the most recent air emissions testing completed for each facility. The highest emissions of each nuclide were assumed to be emitted from each facility during each hour of operation for the facility in 2006. Emissions from the X-623 and X-624 are calculated based on influent and effluent sampling at each facility and annual throughput. Emissions from the X-326 are based on the mass of materials transferred within the glovebox, analytical data available for each material, and EPA emission factors.

**Table 3.2. Predicted radiation doses from airborne releases at PORTS – 2006**

Effective dose equivalent to:	DOE releases	All PORTS releases (DOE and USEC)
Maximally exposed individual (mrem/year)	0.012	0.017
Population <sup>a</sup> (person-rem/year)	0.053	0.067
Nearest community <sup>b</sup> (person-rem/year)	0.020	0.023

<sup>a</sup>Population within 50 miles (80 km) of plant site.

<sup>b</sup>Piketon, Ohio [for modeling purposes assumed to be 2 miles (3500 m) north of the plant site].

**Table 3.3. Dose calculations for ambient air monitoring stations – 2006**

Station	Parameter <sup>a</sup>	Dose <sup>b</sup> (mrem/year)	Total dose for station <sup>c</sup>	Net dose for station <sup>d</sup>
A3	Americium-241	1.1E-09		
	Neptunium-237	5.2E-10		
	Plutonium-238	3.6E-09		
	Plutonium-239/240	7.9E-10		
	Technetium-99	5.3E-05		
	<b>Uranium-233/234</b>	4.3E-07		
	<b>Uranium-235</b>	1.6E-08		
	Uranium-236	4.2E-09	(0.000053)	
	<b>Uranium-238</b>	3.1E-07	5.3E-05	0
A6	Americium-241	5.6E-10		
	Neptunium-237	1.0E-09		
	Plutonium-238	2.9E-09		
	Plutonium-239/240	7.8E-10		
	Technetium-99	9.9E-05		
	<b>Uranium-233/234</b>	3.0E-07		
	<b>Uranium-235</b>	1.7E-08		
	Uranium-236	2.5E-09	(0.00010)	(0.000036)
	<b>Uranium-238</b>	3.3E-07	1.0E-04	3.6E-05
A8	Americium-241	7.9E-10		
	Neptunium-237	1.0E-09		
	Plutonium-238	1.7E-09		
	Plutonium-239/240	6.9E-10		
	<b>Technetium-99</b>	3.7E-04		
	<b>Uranium-233/234</b>	2.7E-07		
	<b>Uranium-235</b>	1.7E-08		
	Uranium-236	2.5E-09	(0.00037)	(0.00031)
	<b>Uranium-238</b>	2.8E-07	3.7E-04	3.1E-04

**Table 3.3. Dose calculations for ambient air monitoring stations – 2006 (continued)**

Station	Parameter <sup>a</sup>	Dose <sup>b</sup> (mrem/year)	Total dose for station <sup>c</sup>	Net dose for station <sup>d</sup>
A9	Americium-241	7.5E-10		
	Neptunium-237	8.6E-10		
	Plutonium-238	1.5E-09		
	Plutonium-239/240	3.8E-13		
	Technetium-99	1.1E-04		
	<b>Uranium-233/234</b>	3.1E-07		
	<b>Uranium-235</b>	2.1E-08		
	Uranium-236	5.0E-09	(0.00011)	(0.000046)
	<b>Uranium-238</b>	3.4E-07	1.1E-04	4.6E-05
A10	Americium-241	9.0E-10		
	Neptunium-237	1.3E-09		
	Plutonium-238	1.8E-09		
	Plutonium-239/240	1.4E-09		
	<b>Technetium-99</b>	4.6E-04		
	<b>Uranium-233/234</b>	3.3E-07		
	Uranium-235	8.8E-09		
	Uranium-236	2.2E-09	(0.00046)	(0.00040)
	<b>Uranium-238</b>	2.7E-07	4.6E-04	4.0E-04
A12	Americium-241	1.1E-09		
	Neptunium-237	1.5E-09		
	Plutonium-238	2.8E-09		
	Plutonium-239/240	8.6E-10		
	Technetium-99	1.3E-04		
	<b>Uranium-233/234</b>	2.9E-07		
	<b>Uranium-235</b>	2.0E-08		
	Uranium-236	4.4E-09	(0.00013)	(0.000066)
	<b>Uranium-238</b>	2.8E-07	1.3E-04	6.6E-05
A15	Americium-241	5.2E-10		
	Neptunium-237	7.4E-10		
	Plutonium-238	2.5E-09		
	Plutonium-239/240	1.5E-09		
	Technetium-99	8.9E-05		
	<b>Uranium-233/234</b>	3.5E-07		
	<b>Uranium-235</b>	2.2E-08		
	Uranium-236	2.2E-09	(0.000090)	(0.000026)
	<b>Uranium-238</b>	2.4E-07	9.0E-05	2.6E-05
A23	Americium-241	1.0E-09		
	Neptunium-237	8.9E-10		
	Plutonium-238	1.9E-09		
	Plutonium-239/240	1.7E-09		
	Technetium-99	1.1E-04		
	<b>Uranium-233/234</b>	4.4E-07		
	<b>Uranium-235</b>	2.8E-08		
	Uranium-236	3.4E-09	(0.00011)	(0.000046)
	<b>Uranium-238</b>	3.4E-07	1.1E-04	4.6E-05

**Table 3.3. Dose calculations for ambient air monitoring stations – 2006 (continued)**

Station	Parameter <sup>a</sup>	Dose <sup>b</sup> (mrem/year)	Total dose for station <sup>c</sup>	Net dose for station <sup>d</sup>
A24	Americium-241	1.1E-09		
	Neptunium-237	6.3E-10		
	Plutonium-238	3.2E-09		
	Plutonium-239/240	3.9E-10		
	Technetium-99	1.6E-04		
	<b>Uranium-233/234</b>	3.2E-07		
	Uranium-235	6.4E-09		
	Uranium-236	3.2E-09	(0.00016)	0.000096)
	<b>Uranium-238</b>	2.8E-07	1.6E-04	9.6E-05
A28	Americium-241	7.5E-10		
	Neptunium-237	8.9E-10		
	Plutonium-238	2.9E-09		
	Plutonium-239/240	1.3E-09		
	Technetium-99	8.0E-05		
	<b>Uranium-233/234</b>	2.6E-07		
	Uranium-235	6.6E-09		
	Uranium-236	2.2E-09	(0.000081)	(0.000017)
	<b>Uranium-238</b>	2.7E-07	8.1E-05	1.7E-05
A29	Americium-241	2.0E-09		
	Neptunium-237	2.7E-09		
	Plutonium-238	2.3E-09		
	Plutonium-239/240	1.3E-09		
	Technetium-99	7.9E-05		
	<b>Uranium-233/234</b>	3.2E-07		
	<b>Uranium-235</b>	2.1E-08		
	Uranium-236	3.1E-09	(0.000080)	(0.000016)
	<b>Uranium-238</b>	3.6E-07	8.0E-05	1.6E-05
A36	Americium-241	9.2E-10		
	Neptunium-237	5.8E-10		
	Plutonium-238	2.0E-09		
	Plutonium-239/240	1.4E-09		
	<b>Technetium-99</b>	6.9E-04		
	<b>Uranium-233/234</b>	1.7E-06		
	<b>Uranium-235</b>	7.3E-08		
	Uranium-236	2.7E-09	(0.00069)	(0.00063)
	<b>Uranium-238</b>	2.0E-06	6.9E-04	6.3E-04
A37	Americium-241	5.0E-10		
	Neptunium-237	8.4E-10		
	Plutonium-238	2.4E-09		
	Plutonium-239/240	8.2E-10		
	Technetium-99	6.3E-05		
	<b>Uranium-233/234</b>	2.8E-07		
	<b>Uranium-235</b>	1.7E-08		
	Uranium-236	2.4E-09	(0.000064)	
	<b>Uranium-238</b>	2.6E-07	6.4E-05	-

**Table 3.3. Dose calculations for ambient air monitoring stations – 2006 (continued)**

Station	Parameter <sup>a</sup>	Dose <sup>b</sup> (mrem/year)	Total dose for station <sup>c</sup>	Net dose for station <sup>d</sup>
A41	Americium-241	7.6E-10		
	Neptunium-237	5.3E-10		
	Plutonium-238	2.0E-09		
	Plutonium-239/240	1.3E-09		
	Technetium-99	1.0E-04		
	<b>Uranium-233/234</b>	3.6E-07		
	Uranium-235	6.4E-09		
	Uranium-236	4.2E-09	(0.00010)	(0.000036)
	<b>Uranium-238</b>	3.4E-07	1.0E-04	3.6E-05
T7	Americium-241	7.8E-10		
	Neptunium-237	5.2E-10		
	Plutonium-238	3.5E-09		
	Plutonium-239/240	1.4E-09		
	<b>Technetium-99</b>	3.4E-04		
	<b>Uranium-233/234</b>	3.7E-07		
	<b>Uranium-235</b>	1.8E-08		
	Uranium-236	3.0E-09	(0.00034)	(0.00028)
	<b>Uranium-238</b>	2.9E-07	3.4E-04	2.8E-04

<sup>a</sup>Parameters listed in **bold** type were detected at least once in the samples collected in 2006 (see Table 2.7).

<sup>b</sup>The dose calculation is based on the maximum detection of each parameter at each station. For parameters that were not detected, half the maximum detection limit for the parameter was used to calculate the concentration of each parameter in ambient air that is the basis for the dose. Measurements are provided in scientific notation. The number and sign (+ or -) to the right of the “E” indicate the number of places to the right or left of the decimal point. For example, 3.4E-04 is 0.00034 (the decimal point moves four places to the left); 2.1E+02 is 210 (the decimal point moves two places to the right).

<sup>c</sup>The total dose is provided in scientific notation and standard numeric format (in parentheses).

<sup>d</sup>The net dose is calculated by subtracting the total dose at Station A37 (background) from the total dose calculated for each station (the net dose is recorded as zero for stations with a gross dose less than the background station). The net dose is provided in scientific notation and standard numeric format (in parentheses).

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