

2. ENVIRONMENTAL MONITORING

This section provides environmental monitoring data collected by DOE contractors, Lata/Parallax Portsmouth, LLC (LPP) and Uranium Disposition Services, LLC (UDS), as well as the United States Enrichment Corporation (USEC) at or nearby PORTS.

- Table 2.1. Radionuclide concentrations in LPP and USEC NPDES outfall water samples – 2008
- Table 2.2. LPP and UDS NPDES permit summaries – 2008
- Table 2.3. LPP NPDES discharge and compliance rates – 2008
- Table 2.4. UDS NPDES discharge and compliance rates – 2008
- Table 2.5. USEC NPDES discharge monitoring results – 2008
- Table 2.6. Radionuclides in surface water runoff samples from UDS depleted uranium cylinder storage yards – 2008
- Table 2.7. Drainage basin monitoring of surface water and sediment for UDS depleted uranium cylinder storage yards – 2008
- Table 2.8. Ambient air monitoring program summary for radionuclides and fluoride – 2008
- Table 2.9. DOE environmental radiation monitoring program (mrem) – 2008
- Table 2.10. Environmental radiation monitoring (mrem) at locations near UDS depleted uranium cylinder storage yards – 2008
- Table 2.11. Local surface water monitoring program results – 2008
- Table 2.12. Sediment monitoring program results – 2008
- Table 2.13. Soil and vegetation monitoring at ambient air monitoring stations – 2008
- Table 2.14. Biota (fish) monitoring program results – 2008
- Table 2.15. Biota (crops) monitoring program results – 2008
- Table 2.16. Biota (deer) monitoring program results – 2008
- Table 2.17. Off-site dairy monitoring – 2008

**Table 2.1. Radionuclide concentrations in LPP and USEC
NPDES outfall water samples – 2008**

NPDES outfall ^a	Parameter ^b	Number of samples ^c	Minimum ^d	Maximum ^d	Average ^e	DCG ^f
<i>DOE Outfalls^g</i>						
012	americium-241	1(1)	< 0.008764			30
	neptunium-237	1(1)	< 0.03183			30
	plutonium-238	1(1)	< 0.0238			40
	plutonium-239/240	1(1)	< 0.01587			30
	technetium-99	4(4)	0	< 3.1		100,000
	uranium	4(0)	0.91	1.428	1.17	
	uranium-233/234	4(0)	0.5302	0.704	0.586	500
	uranium-235	4(4)	0	< 0.0253		600
	uranium-236	4(4)	0	< 0.01506		500
	uranium-238	4(0)	0.3042	0.4775	0.391	600
013	americium-241	1(1)	< 0.02901			30
	neptunium-237	1(1)	0			30
	plutonium-238	1(1)	0			40
	plutonium-239/240	1(1)	0			30
	technetium-99	4(4)	0	< 2.8		100,000
	uranium	4(0)	0.5828	1.608	1.15	
	uranium-233/234	4(0)	0.4909	1	0.678	500
	uranium-235	4(3)	0	< 0.05227		600
	uranium-236	4(4)	0	< 0.007822		500
	uranium-238	4(0)	0.193	0.5356	0.384	600
015	americium-241	4(4)	0	< 0.02927		30
	neptunium-237	4(4)	0	< 0.007894		30
	plutonium-238	4(4)	< 0.006837	< 0.02362		40
	plutonium-239/240	4(4)	0	< 0.02054		30
	technetium-99	12(12)	0	< 4.92		100,000
	uranium	12(0)	0.1786	1.631	0.756	
	uranium-233/234	12(0)	0.1877	1.981	0.759	500
	uranium-235	12(8)	< 0.008001	0.06957		600
	uranium-236	12(12)	0	< 0.02643		500
	uranium-238	12(0)	0.05924	0.5417	0.251	600
608	americium-241	4(4)	0	< 0.03966		
	neptunium-237	4(4)	0	< 0.007155		
	plutonium-238	4(4)	0	< 0.01427		
	plutonium-239/240	4(4)	0	< 0.007361		
	technetium-99	12(0)	172	1140	699	
	uranium	12(0)	0.4882	1.082	0.777	
	uranium-233/234	12(0)	0.3037	0.6693	0.514	
	uranium-235	12(12)	0	< 0.04491		
	uranium-236	12(12)	0	< 0.02395		
	uranium-238	12(0)	0.1632	0.3619	0.260	
610	americium-241	4(4)	0	< 0.03058		
	neptunium-237	4(4)	0	< 0.01528		
	plutonium-238	4(4)	0	< 0.028		
	plutonium-239/240	4(4)	0	< 0.00762		
	technetium-99	12(1)	< 0.557	829	416	
	uranium	12(0)	< 0.8258	287.9	60.2	
	uranium-233/234	12(0)	1.342	349.8	75.3	
	uranium-235	12(0)	< 0.04333	15.7	3.42	
	uranium-236	12(3)	< 0.01558	2.985		
	uranium-238	12(0)	0.2735	95.33	19.9	

**Table 2.1. Radionuclide concentrations in LPP and USEC
NPDES outfall water samples – 2008 (continued)**

NPDES outfall ^a	Parameter ^b	Number of samples ^c	Minimum ^d	Maximum ^d	Average ^e	DCG ^f
611	americium-241	4(4)	0	< 0.02784		
	neptunium-237	4(4)	< 0.02193	< 0.06149		
	plutonium-238	4(4)	0	< 0.02445		
	plutonium-239/240	4(4)	0	< 0.02189		
	technetium-99	12(3)	0	1310		
	uranium	12(0)	0.9046	7.188	4.68	
	uranium-233/234	12(0)	1.162	9.535	5.26	
	uranium-235	12(0)	0.05408	0.4387	0.249	
	uranium-236	12(8)	< 0.007933	0.0602		
	uranium-238	12(0)	0.299	2.375	1.55	
<i>USEC Outfalls^g</i>						
001	americium-241	5(5)	< 0.031	< 0.086		30
	neptunium-237	5(5)	< 0.023	< 0.1		30
	plutonium-238	5(5)	< 0.019	< 0.077		40
	plutonium-239/240	5(5)	< 0.023	< 0.092		30
	technetium-99	52(34)	< 7	47.5		100,000
002	uranium	52(0)	0.15	6.27	1.42	
	americium-241	5(5)	< 0.021	< 0.083		30
	neptunium-237	5(5)	< 0.025	< 0.108		30
	plutonium-238	5(5)	< 0.029	< 0.13		40
	plutonium-239/240	5(5)	< 0.021	< 0.079		30
003	technetium-99	50(50)	< 7	< 9.6		100,000
	uranium	50(0)	0.376	1.2	0.69	
	americium-241	4(4)	< 0.025	< 0.086		30
	neptunium-237	4(4)	< 0.026	< 0.114		30
	plutonium-238	4(4)	< 0.02	< 0.073		40
004	plutonium-239/240	4(4)	< 0.018	< 0.107		30
	technetium-99	52(0)	100	368	186	100,000
	uranium	52(0)	1.47	16	6.34	
	americium-241	4(4)	< 0.023	< 0.109		30
	neptunium-237	4(4)	< 0.052	< 0.107		30
005	plutonium-238	4(4)	< 0.019	< 0.07		40
	plutonium-239/240	4(4)	< 0.019	< 0.07		30
	technetium-99	49(49)	< 6.99	< 9.56		100,000
	uranium	49(0)	0.236	3.29	0.48	
	americium-241	1(1)	< 0.057			30
005	neptunium-237	1(1)	< 0.058			30
	plutonium-238	1(1)	< 0.073			40
	plutonium-239/240	1(1)	< 0.073			30
	technetium-99	7(7)	< 9.08	< 9.58		100,000
	uranium	7(0)	0.17	0.25	0.22	

**Table 2.1. Radionuclide concentrations in DOE and USEC
NPDES outfall water samples – 2008 (continued)**

NPDES outfall ^a	Parameter ^b	Number of samples ^c	Minimum ^d	Maximum ^d	Average ^e	DCG ^f
009	americium-241	4(4)	< 0.025	< 0.079		30
	neptunium-237	4(4)	< 0.048	< 0.089		30
	plutonium-238	4(4)	< 0.021	< 0.08		40
	plutonium-239/240	4(4)	< 0.021	< 0.095		30
	technetium-99	52(52)	< 7	< 9.57		100,000
	uranium	52(0)	2.64	9.56	4.45	
010	americium-241	4(4)	< 0.02	< 0.078		30
	neptunium-237	4(4)	< 0.048	< 0.095		30
	plutonium-238	4(4)	< 0.018	< 0.058		40
	plutonium-239/240	4(4)	< 0.032	< 0.073		30
	technetium-99	52(52)	< 7	< 9.58		100,000
	uranium	52(0)	0.69	4.48	2.08	
011	americium-241	4(4)	< 0.024	< 0.09		30
	neptunium-237	4(4)	< 0.049	< 0.146		30
	plutonium-238	4(4)	< 0.03	< 0.114		40
	plutonium-239/240	4(4)	< 0.021	< 0.081		30
	technetium-99	52(52)	< 7	< 9.6		100,000
	uranium	52(0)	0.32	1.52	0.86	
012	americium-241	3(3)	< 0.029	< 0.033		30
	neptunium-237	3(3)	< 0.09	< 0.168		30
	plutonium-238	3(3)	< 0.029	< 0.069		40
	plutonium-239/240	3(3)	< 0.069	< 0.095		30
	technetium-99	39(39)	< 6.98	< 9.89		100,000
	uranium	39(0)	0.6	1.84	1.13	
013	americium-241	3(3)	< 0.022	< 0.108		30
	neptunium-237	3(3)	< 0.082	< 0.107		30
	plutonium-238	3(3)	< 0.023	< 0.051		40
	plutonium-239/240	3(3)	< 0.019	< 0.083		30
	technetium-99	39(39)	< 6.97	< 9.69		100,000
	uranium	39(0)	0.39	1.63	0.79	

^aLPP internal NPDES Outfalls 608, 610, and 611 discharge to USEC NPDES Outfall 003 (X-6619 Sewage Treatment Plant).

^bUranium is reported in $\mu\text{g/L}$; all other radionuclides are reported in pCi/L.

^cNumber in parentheses is the number of samples that were below the detection limit.

^dMinimum and maximum values reported as "0" may actually be negative results. Because of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out. These negative value results are reported as "0" in the table for simplicity.

^eAverages were not calculated for outfalls that had greater than 15% of the results below the detection limit. For outfalls with less than 15% of the results below the detection limit, any result below the detection limit was assigned a value at the detection limit to calculate the average for the parameter.

^fDerived Concentration Guide (DCG)(pCi/L). DCGs are not provided for LPP internal outfalls (Outfalls 608, 610, and 611) because water from these outfalls flows through another outfall prior to discharge from the site. A DCG is not available for uranium.

^gOutfalls 012 and 013 are listed under both LPP and USEC because these outfalls were transferred from LPP to USEC beginning on May 1, 2008 and were sampled by both LPP and USEC during 2008.

Table 2.2. LPP and UDS NPDES permit summaries – 2008

Effluent characteristics		Monitoring requirements		Discharge limitations	
Parameter	Units	Measurement frequency	Sampling type	Concentration	
				Monthly	Daily
LPP Outfall 012 (X-2230M Southwest Holding Pond) ^a					
Flow rate	MGD	Daily	24-hour total ^b		
pH	SU	1/2 weeks	Grab		6.5–9.0
Total suspended solids	mg/L	1/2 weeks	Grab	30	45
Oil and grease, total	mg/L	1/2 weeks	Grab	10	20
Chlorine, total residual	mg/L	1/2 weeks ^c	Grab		
Iron, total recoverable	μg/L	1/2 weeks	Grab		
Trichloroethene	μg/L	1/2 weeks	Grab		
PCBs	μg/L	1/quarter	Grab	<i>d</i>	<i>d</i>
LPP Outfall 013 (X-2230N West Holding Pond) ^a					
Flow rate	MGD	Daily	24-hour total ^b		
pH	SU	1/2 weeks	Grab		6.5–9.0
Total suspended solids	mg/L	1/2 weeks	Grab	30	45
Oil and grease, total	mg/L	1/2 weeks	Grab	10	20
Chlorine, total residual	mg/L	1/2 weeks ^c	Grab		
PCBs	μg/L	1/quarter	Grab	<i>d</i>	<i>d</i>
LPP Outfall 015 (X-624 Groundwater Treatment Facility)					
Flow rate	MGD	Daily	24-hour total		
pH ^e	SU	1/2 weeks	Grab		6.5–9.0
Trichloroethene	μg/L	1/2 weeks	Grab	10	10
PCBs	μg/L	1/quarter	Grab	<i>d</i>	<i>d</i>
LPP Outfall 608 (X-622 Groundwater Treatment Facility)					
Flow rate	MGD	Daily	24-hour total		
pH	SU	1/2 weeks	Grab		
Trichloroethene	μg/L	1/2 weeks	Grab		10
1,2- <i>trans</i> -dichloroethene	μg/L	1/2 weeks	Grab	25	66
LPP Outfall 610 (X-623 Groundwater Treatment Facility)					
Flow rate	MGD	Daily	24-hour total		
pH	SU	1/2 weeks	Grab		
Trichloroethene	μg/L	1/2 weeks	Grab	10	10
1,2- <i>trans</i> -dichloroethene	μg/L	1/2 weeks	Grab	25	66

Table 2.2. LPP NPDES permit summary – 2008 (continued)

Effluent characteristics		Monitoring requirements		Discharge limitations	
Parameter	Units	Measurement frequency	Sampling type	Concentration	
				Monthly	Daily
LPP Outfall 611 (X-627 Groundwater Treatment Facility)					
Flow rate	MGD	Daily	24-hour total		
pH ^e	SU	1/2 weeks	Grab		
Trichloroethene	μg/L	½ weeks	Grab	10	10
LPP Outfall 613 (X-6002 Particulate Separator) ^a					
Flow rate	MGD	Daily	24-hour total ^b		
Chlorine, total residual	mg/L	1/2 weeks	Grab		
Total suspended solids	mg/L	1/2 weeks	Grab		
UDS Outfall 001					
Water temperature	°F	Daily	Maximum	<i>f</i>	<i>f</i>
Flow rate	GPD	Daily	24-hour total		
Biochemical oxygen demand, 5-day	mg/L	1/week	24-hour composite		
pH	SU	1/day	Grab		6.5–9.0
Total suspended solids	mg/L	1/ week	24-hour composite	30	45
Total suspended solids, loading	kg/day	1/ week	-	0.9	1.4
Oil and grease, total	mg/L	1/month	Grab		
Nitrogen, ammonia	mg/L	1/week	24-hour composite		
Phosphorus, total	mg/L	1/ week	24-hour composite		
Chlorine, total residual	mg/L	1/day	Grab		0.019
Dissolved solids, sum of	mg/L	1/ week	24-hour composite		1500
Dissolved solids, sum of, loading	kg/day	1/ week	-		45.4

^aOutfall transferred to USEC beginning on May 1, 2008.

^bEstimated.

^cSummer only.

^dNo detectable PCBs.

^eParameter added to the LPP NPDES permit that became effective May 1, 2008.

^fMaximum daily and monthly average limits vary according to month.

Table 2.3. LPP NPDES discharge and compliance rates – 2008

Parameter	NPDES compliance rate (%)	Number of measurements ^a	Concentration			Units
			Minimum	Maximum	Average ^b	
Outfall 012 (X-2230M Southwest Holding Pond) ^c						
Flow rate	d	85	0.018	11.998	0.951	MGD
pH	100	9	7.5	8.5	7.9	SU
Total suspended solids	100	8(0)	4.8	62	21	mg/L
monthly average ^g	100	4	11.9	16.5	13.8	mg/L
Oil and grease, total	100	8(0)	2.5	4.3	3.6	mg/L
monthly average ^g	100	4	3.2	4.1	3.6	mg/L
Iron, total recoverable	e	8(0)	430	5000	2000	μg/L
Trichloroethene	e	8(4)	0.2	< 1		μg/L
PCBs	f	1(1)	< 1			μg/L
Outfall 013 (X-2230N West Holding Pond) ^c						
Flow rate	d	85	0.0074	9.436	0.761	MGD
pH	100	9	6.95	8.63	7.87	SU
Total suspended solids	100	8(0)	2.8	30	12	mg/L
monthly average ^g	100	4	5.4	20	11.4	mg/L
Oil and grease, total	100	8(0)	2	9.3	4.3	mg/L
monthly average ^g	100	4	3.2	7.2	4.4	mg/L
PCBs	f	1(1)	< 1			μg/L
Outfall 015 (X-624 Groundwater Treatment Facility)						
Flow rate	d	366	0	0.0437	0.0096	MGD
pH	100	18	7.43	8.14	7.69	SU
Trichloroethene	100	26(3)	0.17	5.1	1.1	μg/L
monthly average ^g	100	12	0.09	3.2	0.9	μg/L
PCBs	f	4(4)	< 1	< 1		μg/L
Outfall 608 (X-622 Groundwater Treatment Facility)						
Flow rate	d	366	0.0227	0.0825	0.0514	MGD
pH	e	27	7.35	8.10	7.79	SU
Trichloroethene	100	26(0)	0.63	3	1.5	μg/L
1,2-trans-dichloroethene	100	26(26)	< 0.5	< 0.5		μg/L
monthly average ^g	100	12	0	0	0	μg/L
Outfall 610 (X-623 Groundwater Treatment Facility)						
Flow rate	d	366	0	0.0488	0.0077	MGD
pH	e	28	6.53	8.66	7.42	SU
Trichloroethene	100	26(20)	0.17	2.1		μg/L
monthly average ^g	100	12	0	0.7	0.10	μg/L
1,2-trans-dichloroethene	100	26(26)	< 0.5	< 0.5		μg/L
monthly average ^g	100	12	0	0	0	μg/L

Table 2.3. LPP NPDES discharge and compliance rates – 2008 (continued)

Parameter	NPDES compliance rate (%)	Number of measurements ^a	Concentration			Units
			Minimum	Maximum	Average ^b	
Outfall 611 (X-627 Groundwater Treatment Facility)						
Flow rate	<i>d</i>	366	0.014	0.0352	0.0217	MGD
pH	<i>e</i>	18	6.69	8.22	7.84	SU
Trichloroethene	100	26(2)	0.21	4.3	1.0	μg/L
monthly average ^g	100	12	0.25	2.8	0.93	μg/L
Outfall 613 (X-6002 Particulate Separator) ^c						
Flow rate	<i>d</i>	121	0	0.0012	0.00038	MGD
Total suspended solids	<i>e</i>	8(2)	1.2	31		mg/L
Chlorine, total residual	<i>e</i>	9	0.1	0.35	0.21	mg/L

^aNumber in parentheses is the number of samples that were below the detection limit.

^bAverages were not calculated for outfalls that had greater than 15% of the results below the detection limit. For outfalls with less than 15% of the results below the detection limit, any result below the detection limit was assigned a value at the detection limit for calculating an average for the parameter.

^cOutfall transferred to USEC beginning on May 1, 2008.

^dFlow rate does not have a numerical limit; therefore, no compliance rates are generated.

^eMonitoring only required; therefore, no compliance rates are generated.

^fThe permit specifies no detectable PCBs in the effluent without setting a numerical limit of detection.

^gTo compute the monthly average, parameters that are undetected are assumed to be zero.

Table 2.4. UDS NPDES discharge and compliance rates – 2008

Parameter	NPDES compliance rate (%)	Number of measurements ^a	Concentration			Units
			Minimum	Maximum	Average ^b	
Outfall 001						
Biochemical oxygen demand	d	14(0)	-0.0149	4.56	2.16	mg/L
Chlorine, total residual	100	18(9)	0.00375	0.02		mg/L
Dissolved solids	86	14(0)	1.37	4600	1243	mg/L
Flow rate	c	18	278	16000	4295	GPD
Nitrogen-ammonia	d	14(0)	0.02	0.284	0.085	mg/L
Oil and grease	d	9(0)	1.5	4.8	2.5	mg/L
pH	100	18	6.87	7.94	7.30	SU
Phosphorus, total	d	14(0)	0.0227	0.10	0.06	mg/L
Suspended solids, total	93	14(0)	1.6	50	14	mg/L
monthly average	100	5	1.6	24.6	13	mg/L
Temperature	100	18	45	82.04	66	°F

^aNumber in parentheses is the number of samples that were below the detection limit.

^bAverages were not calculated for outfalls that had greater than 15% of the results below the detection limit. For outfalls with less than 15% of the results below the detection limit, any result below the detection limit was assigned a value at the detection limit for calculating an average for the parameter.

^cFlow rate does not have a numerical limit; therefore, no compliance rates are generated.

^dMonitoring only required; therefore, no compliance rates are generated.

Table 2.5. USEC NPDES discharge monitoring results – 2008

Parameter	Number of samples ^a	Concentration			Units
		Minimum	Maximum	Average ^b	
Outfall 001 (X-230J7 East Holding Pond)					
Cadmium, total recoverable	12(11)	< 0.276	< 4.42		μg/L
Chlorine, total residual	88(88)	< 0.02	< 0.02		mg/L
Dissolved solids	48(0)	118	448	192	mg/L
Flow rate	366	0.500	4.280	1.472	MGD
Fluoride, total	12(8)	< 0.01	0.3		mg/L
Oil and grease, total	48(48)	< 5	< 5		mg/L
pH	48(0)	7.18	8.70	7.64	SU
Silver, total recoverable	12(11)	2.1	< 4.52		μg/L
Suspended solids	48(39)	< 2	7		mg/L
Zinc, total recoverable	12(3)	< 1.87	21.8		μg/L
Outfall 002 (X-230K South Holding Pond)					
Cadmium, total recoverable	14(13)	< 0.276	< 4.42		μg/L
Flow rate	366	0	1.669	0.481	MGD
Fluoride, total	12(5)	< 0.1	0.2		mg/L
Mercury, total	12(0)	0.5	8.6	2.6	ng/L
Oil and grease, total	46(46)	< 5	< 5		mg/L
pH	49(0)	4.10	8.59	7.64	SU
Silver, total recoverable	46(44)	< 1	4.77		μg/L
Suspended solids	46(1)	< 2	22.6	9.3	mg/L
Thallium, total recoverable	46(31)	< 1	33.9		μg/L
Outfall 003 (X-6619 Sewage Treatment Plant)					
Acute toxicity, <i>Ceriodaphnia dubia</i>	6(5)	< 1	2.03		Tua
Acute toxicity, <i>Pimephales promelas</i>	6(6)	< 1	< 1		Tua
Ammonia, nitrogen	24(14)	< 0.1	0.7		mg/L
Biochemical oxygen demand	48(45)	< 5	10		mg/L
Chlorine, total residual	137(137)	< 0.02	< 0.02		mg/L
Copper, total recoverable	12(6)	< 3.63	7.65		μg/L
Fecal coliform	24(0)	4	556	68	#/100 mL
Flow rate	366	0.154	0.563	0.283	MGD
Mercury, total	12(0)	4.8	69.1	19.4	ng/L
Nitrite + nitrate	12(0)	4.4	8.7	6.3	mg/L
Oil and grease, total	4(4)	< 5	< 5		mg/L
pH	251(0)	6.60	8.06	7.34	SU
Silver, total recoverable	12(11)	2.1	< 4.52		μg/L
Suspended solids	48(35)	< 2	5		mg/L
Zinc, total recoverable	12(1)	< 1.87	36.4	22.9	μg/L
Outfall 004 (Cooling Tower Blowdown)					
Acute toxicity, <i>Ceriodaphnia dubia</i>	6(6)	< 1	< 1		Tua
Acute toxicity, <i>Pimephales promelas</i>	6(6)	< 1	< 1		Tua

Table 2.5. USEC NPDES discharge monitoring results – 2008 (continued)

Parameter	Number of samples ^a	Concentration			Units
		Minimum	Maximum	Average ^b	
Outfall 004 (Cooling Tower Blowdown) (continued)					
Chlorine, total residual	45(45)	< 0.02	< 0.02		mg/L
Copper, total recoverable	12(0)	12.6	170	34.8	μg/L
Dissolved solids	13(0)	219	298	270	mg/L
Flow rate	366	0	1.479	0.546	MGD
Mercury, total	12(0)	0.96	12.5	2.5	ng/L
Oil and grease, total	12(12)	< 5	< 5		mg/L
pH	12(0)	7.11	8.08	7.62	SU
Suspended solids	13(8)	< 2	21.8		mg/L
Zinc, total recoverable	12(1)	< 1.87	296	66.6	μg/L
Outfall 005 (X-611B Lime Sludge Lagoon)					
Flow rate	92	0	9.963	0.745	MGD
pH	8(0)	6.99	9.35	8.58	SU
Suspended solids	9(1)	< 2	17	7.6	mg/L
Outfall 009 (X-230L North Holding Pond)					
Cadmium, total recoverable	12(12)	< 0.276	< 4.42		μg/L
Flow rate	366	0.145	2.081	0.663	MGD
Fluoride, total	12(1)	< 0.1	0.2	0.2	mg/L
Oil and grease, total	12(12)	< 5	< 5		mg/L
pH	51(0)	7.36	8.83	7.87	SU
Suspended solids	48(0)	2.4	377	26.2	mg/L
Zinc, total recoverable	12(3)	< 1.87	94.7		μg/L
Outfall 010 (X-230J5 Northwest Holding Pond)					
Cadmium, total recoverable	12(11)	< 0.276	4.42		μg/L
Flow rate	366	0.165	0.818	0.345	MGD
Mercury, Total	12(0)	0.079	8.1	2.4	ng/L
Oil and grease, total	12(12)	< 5	< 5		mg/L
pH	24(0)	7.20	8.16	7.75	SU
Suspended solids	24(10)	< 2	41.8		mg/L
Zinc, total recoverable	12(2)	< 1.87	53.9		μg/L
Outfall 011 (X-230J6 Northeast Holding Pond)					
Cadmium, total recoverable	12(11)	< 0.276	< 4.42		μg/L
Chlorine, total residual	54(53)	< 0.02	0.13		mg/L
Copper, total recoverable	12(7)	< 3.63	23.1		μg/L
Flow rate	366	0	0.228	0.015	MGD
Fluoride, total	12(2)	< 0.1	0.2		mg/L
Oil and grease, total	24(24)	< 5	< 5		mg/L
pH	33(0)	6.85	7.97	7.68	SU
Suspended solids	24(16)	< 2	24.8		mg/L
Zinc, total recoverable	12(2)	< 1.87	75.3		μg/L
Outfall 012 (X-230M Southwest Holding Pond) ^c					
Chlorine	16(16)	< 0.02	< 0.02		mg/L
Flow rate	241	0	1.296	0.105	mg/L
Iron	16(0)	111	1490	403	MGD
Oil and grease	16(16)	< 5	< 5		mg/L
PCBs, total	3(3)	< 0.5	< 0.5		μg/L
pH	19(0)	7.37	8.54	7.99	SU
Suspended solids	16(0)	2.4	48	8	mg/L
Trichloroethene	16(16)	< 1	< 1		μg/L

Table 2.5. USEC NPDES discharge monitoring results – 2008 (continued)

Parameter	Number of samples ^a	Concentration			Units
		Minimum	Maximum	Average ^b	
Outfall 013 (X-230N West Holding Pond) ^c					
Chlorine	16(16)	< 0.02	< 0.02		mg/L
Flow rate	241	0	1.186	0.108	MGD
Oil and grease	16(16)	< 5	< 5		mg/L
PCBs, total	3(3)	< 0.5	< 0.5		μg/L
pH	25(0)	7.67	8.80	8.06	SU
Suspended solids	16(11)	< 2	25		mg/L
Outfall 602 (X-621 Coal Pile Runoff Treatment Facility)					
Flow rate	366	0	9.14	0.174	MGD
Iron, total	24(0)	23.3	2960	797	μg/L
Manganese, total	24(0)	3.99	334	100	μg/L
pH	24(0)	7.02	9.30	8.32	SU
Suspended solids	24(1)	< 2	24.2	9.2	mg/L
Outfall 604 (X-700 Bionitrification Facility)					
Copper, total	3(0)	3.7	15.6	8.6	μg/L
Flow rate	91	0	0.0232	0.007	MGD
Iron, total	3(0)	74.7	136	97.4	μg/L
Nickel, total	3(3)	< 2.88	< 2.88		μg/L
Nitrate, nitrogen	3(1)	< 0.1	93.7		mg/L
pH	3(0)	6.82	8.84	8.12	SU
Zinc, total	3(2)	< 1.87	16		μg/L
Outfall 605 (X-705 Decontamination Microfiltration System)					
Ammonia, nitrogen	12(6)	< 0.1	0.4		mg/L
Chromium, hexavalent	12(9)	< 1.06	17		mg/L
Chromium, total	12(12)	< 0.01	< 0.01		μg/L
Copper, total	12(0)	15.6	185	62.7	μg/L
Flow rate	366	0	0.083	0.002	MGD
Iron, total	12(1)	< 7.55	591	115	μg/L
Kjeldahl nitrogen	12(0)	0.5	2.2	1.1	mg/L
Nickel, total	12(2)	< 3.2	35.7		μg/L
Nitrogen, nitrate	12(0)	15.8	103.7	38.5	mg/L
Nitrogen, nitrite	12(7)	< 0.1	< 2		mg/L
Oil and grease, total	12(12)	< 5	< 5		mg/L
pH	12(0)	6.95	9.51	7.77	SU
Sulfate	12(0)	49.1	98.4	65.2	mg/L
Suspended solids	12(9)	< 2	4.4		mg/L
Trichloroethene	12(12)	< 1	< 5		μg/L
Zinc, total	12(0)	4.1	159	30.2	μg/L
Outfall 613 (X-6002 Particulate Separator) ^c					
Chlorine	12(12)	< 0.02	< 0.02		mg/L
Flow rate	214	0	0.0208	0.0026	MGD
Suspended solids	12(6)	< 2	7.4		mg/L

Table 2.5. USEC NPDES discharge monitoring results – 2008 (continued)

Parameter	Number of samples ^a	Concentration			Units
		Minimum	Maximum	Average ^b	
Station Number 801 (Scioto River control sample, upstream of Outfalls 003 and 004)					
48-hr. acute toxicity, Ceriodaphnia dubia	6	0	< 1		% affected
96-hr. acute toxicity, Pimephales promelas	6	0	5		% affected
Station Number 902 (downstream of Outfall 001)					
Water temperature	96	2	28	16	°C
Station Number 903 (downstream of Outfall 002)					
Water temperature	96	1	28	15	°C

^aNumber in parentheses is the number of samples that were below the detection limit.

^bAverages were not calculated for outfalls that had greater than 15% of the results below the detection limit. For outfalls with less than 15% of the results below the detection limit, any result below the detection limit was assigned a value at the detection limit for calculating an average for the parameter.

^cOutfall transferred to USEC beginning on May 1, 2008.

Table 2.6. Radionuclides in surface water runoff samples from UDS depleted uranium cylinder storage yards – 2008

Sample location	Parameter	Units	Number of samples ^a	Minimum ^b	Maximum ^b	Average ^c
X745-C1 ^d	alpha activity	pCi/L	11(7)	< 0.834	5.44	
	beta activity	pCi/L	11(2)	< 2.47	8.6	
	uranium	μg/L	11(0)	1.2	5.4	2.8
X745-C2	alpha activity	pCi/L	12(5)	< 0.476	8.47	
	beta activity	pCi/L	12(3)	< 3.29	11.7	
	uranium	μg/L	12(0)	1.3	18.9	5.7
X745-C3	alpha activity	pCi/L	12(7)	0	181	
	beta activity	pCi/L	12(2)	< 0.937	231	24.2
	uranium	μg/L	12(0)	0.35	9.8	2.2
X745-C4	alpha activity	pCi/L	12(6)	< 0.12	9.02	
	beta activity	pCi/L	12(1)	< 2.79	10.1	6.6
	uranium	μg/L	12(0)	1.5	13.4	4.6
X745-E1	alpha activity	pCi/L	12(8)	< 0.645	4.03	
	beta activity	pCi/L	12(0)	5.29	14.1	9.1
	uranium	μg/L	12(0)	0.38	2	1.2
X745-G1A ^d	alpha activity	pCi/L	7(4)	< 0.522	9.2	
	beta activity	pCi/L	7(1)	< 1.51	13.3	7.3
	uranium	μg/L	7(0)	0.41	5.7	2.3
X745-G2 ^d	alpha activity	pCi/L	11(7)	0	4.84	
	beta activity	pCi/L	11(1)	< 2.68	10.3	6.1
	uranium	μg/L	11(0)	0.26	3.9	2.2

^aNumber in parentheses is the number of samples that were below the detection limit.

^bMinimum values reported as “0” may actually be negative results. Because of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out. These negative value results are reported as “0” in the table for simplicity.

^cAverages were not calculated for locations that had greater than 15% of the results below the detection limit. For locations with less than 15% of the results below the detection limit, any result below the detection limit was assigned a value at the detection limit to calculate the average for the parameter.

^dSampling locations X745-C1 and X745-G2 were dry in September; no samples could be collected. Location X745-G1A was dry from July through November; no samples could be collected.

**Table 2.7. Drainage basin monitoring of surface water and sediment for
UDS depleted uranium cylinder storage yards – 2008**

Location	Parameter ^a	First quarter ^b			Second quarter ^b		
		SW-F	SW-UF	Sed	SW-F	SW-UF	Sed
UDS X01	PCB-1242	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1248	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1254	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1260	0.1U	0.1U	34	0.1U	0.1U	11J
	PCB-1262	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1268	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	Total PCB	0.3U	0.3U	34	0.3U	0.3U	11J
RM-8	PCB-1242	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1248	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1254	0.1U	0.1U	3.3U	0.1U	0.1U	17
	PCB-1260	0.1U	0.1U	73	0.1U	0.1U	23
	PCB-1262	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1268	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	Total PCB	0.3U	0.3U	73	0.3U	0.3U	39
UDS X02	PCB-1242	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1248	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1254	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1260	0.1U	0.1U	210	0.1U	0.1U	44
	PCB-1262	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1268	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	Total PCB	0.3U	0.3U	210	0.3U	0.3U	44
RM-10	PCB-1242	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1248	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1254	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1260	0.1U	0.1U	3.3U	0.1U	0.1U	20
	PCB-1262	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	PCB-1268	0.1U	0.1U	3.3U	0.1U	0.1U	3.3U
	Total PCB	0.3U	0.3U	10U	0.3U	0.3U	20

Table 2.7. Drainage basin monitoring of surface water and sediment for UDS depleted uranium cylinder storage yards – 2008 (continued)

Location	Parameter ^a	Third quarter ^b			Fourth quarter ^b		
		SW-F	SW-UF	Sed	SW-F	SW-UF	Sed
UDS X01	PCB-1242	0.1U	0.1U	3.3U	0.105U	0.104U	25.4U
	PCB-1248	0.1U	0.1U	3.3U	0.105U	0.104U	25.4U
	PCB-1254	0.1U	0.1U	3.3U	0.105U	0.104U	29.4
	PCB-1260	0.1U	0.1U	19	0.105U	0.104U	41.6
	PCB-1262	0.1U	0.1U	3.3U	0.105U	0.104U	25.4U
	PCB-1268	0.1U	0.1U	3.3U	0.105U	0.104U	25.4U
	Total PCB	0.3U	0.3U	19	0.105U	0.104U	71
RM-8	PCB-1242	0.1U	0.1U	3.3U	0.105U	0.103U	25.3U
	PCB-1248	0.1U	0.1U	3.3U	0.105U	0.103U	25.3U
	PCB-1254	0.1U	0.1U	44	0.105U	0.103U	66
	PCB-1260	0.1U	0.1U	60	0.105U	0.103U	125
	PCB-1262	0.1U	0.1U	3.3U	0.105U	0.103U	25.3U
	PCB-1268	0.1U	0.1U	3.3U	0.105U	0.103U	25.3U
	Total PCB	0.3U	0.3U	100	0.105U	0.103U	191
UDS X02	PCB-1242	0.1U	0.1U	3.3U	0.108U	0.11U	5.05U
	PCB-1248	0.1U	0.1U	3.3U	0.108U	0.11U	5.05U
	PCB-1254	0.1U	0.1U	3.3U	0.108U	0.11U	17.8
	PCB-1260	0.1U	0.1U	110	0.108U	0.11U	62.1
	PCB-1262	0.1U	0.1U	3.3U	0.108U	0.11U	5.05U
	PCB-1268	0.1U	0.1U	3.3U	0.108U	0.11U	5.05U
	Total PCB	0.3U	0.3U	110	0.108U	0.11U	79.9
RM-10	PCB-1242	0.1U	0.1U	3.3U	0.107U	1U	4.2U
	PCB-1248	0.1U	0.1U	3.3U	0.107U	1U	4.2U
	PCB-1254	0.1U	0.1U	3.3U	0.107U	1U	4.3
	PCB-1260	0.1U	0.1U	5.4J	0.107U	1U	13
	PCB-1262	0.1U	0.1U	3.3U	0.107U	1U	4.2U
	PCB-1268	0.1U	0.1U	3.3U	0.107U	1U	4.2U
	Total PCB	0.3U	0.3U	5.4J	0.107U	1U	17.3

^aResults for surface water (SW) are reported in $\mu\text{g/L}$; results for sediment (Sed) are reported in $\mu\text{g/kg}$.

^bAbbreviations and data qualifiers are as follows: SW-F – filtered surface water; SW-UF – unfiltered surface water; Sed – sediment; J – the reported value is an estimated concentration greater than the method detection limit but less than the practical quantitation limit; U – undetected.

Table 2.8. Ambient air monitoring program summary for radionuclides and fluoride – 2008

Sampling Location	Parameter ^a	No. of measurements ^b	Minimum ^{c, d}	Maximum ^c	Average ^{c, e}
<i>On-site air samplers</i>					
A8	americium-241	4(4)	0	4.8E-06	
	fluoride	51(24)	2.6E-02	3.2E-01	
	neptunium-237	4(4)	0	0.0E+00	
	plutonium-238	4(4)	2.1E-06	7.6E-06	
	plutonium-239/240	4(4)	0	5.7E-06	
	technetium-99	12(12)	0	9.8E-04	
	uranium	12(0)	6.1E-04	8.9E-03	1.6E-03
	uranium-233/234	12(0)	1.9E-04	2.8E-03	5.4E-04
	uranium-235	12(11)	5.1E-06	1.4E-04	
	uranium-236	12(12)	0	5.6E-06	
A10	uranium-238	12(0)	2.0E-04	3.0E-03	5.3E-04
	americium-241	4(4)	2.5E-09	9.8E-06	
	fluoride	52(26)	1.4E-02	1.1E-01	
	neptunium-237	4(4)	0	8.7E-06	
	plutonium-238	4(4)	0	7.7E-06	
	plutonium-239/240	4(4)	4.3E-09	7.7E-06	
	technetium-99	12(11)	0	2.7E-03	
	uranium	12(0)	6.5E-04	5.2E-03	1.4E-03
	uranium-233/234	12(0)	2.9E-04	1.5E-03	5.4E-04
	uranium-235	12(6)	5.0E-06	7.8E-05	
A29	uranium-236	12(12)	0	9.8E-06	
	uranium-238	12(0)	2.2E-04	1.8E-03	4.5E-04
	americium-241	4(4)	2.6E-09	5.5E-06	
	fluoride	50(26)	2.3E-02	1.8E-01	
	neptunium-237	4(4)	0	2.3E-06	
	plutonium-238	4(4)	2.2E-09	5.0E-06	
	plutonium-239/240	4(4)	0	4.5E-06	
	technetium-99	12(12)	0	1.0E-03	
	uranium	12(0)	6.8E-04	1.5E-03	1.1E-03
	uranium-233/234	12(0)	2.7E-04	6.0E-04	3.6E-04
A36	uranium-235	12(10)	8.0E-06	2.5E-05	
	uranium-236	12(12)	0	1.4E-05	
	uranium-238	12(0)	2.3E-04	4.9E-04	3.6E-04
	americium-241	4(4)	0	5.2E-06	
	fluoride	52(17)	2.1E-02	9.5E-02	
	neptunium-237	4(4)	0	3.8E-06	
	plutonium-238	4(4)	0	5.7E-06	
	plutonium-239/240	4(4)	0	1.9E-06	
	technetium-99	12(6)	0	1.2E-02	
	uranium	12(0)	7.6E-04	1.7E-02	2.7E-03
A40	uranium-233/234	12(0)	2.9E-04	6.8E-03	1.1E-03
	uranium-235	12(4)	7.1E-06	3.1E-04	
	uranium-236	12(11)	0	3.8E-05	
	uranium-238	12(0)	2.5E-04	5.8E-03	9.0E-04
	fluoride	52(11)	2.7E-02	1.3E-01	

Table 2.8. Ambient air monitoring program summary for radionuclides and fluoride – 2008 (continued)

Sampling Location	Parameter ^a	No. of measurements ^b	Minimum ^{c, d}	Maximum ^c	Average ^{c, e}
<i>On-site air samplers</i>					
T7	americium-241	4(4)	0	8.1E-06	
	neptunium-237	4(4)	0	5.7E-06	
	plutonium-238	4(4)	0	3.7E-06	
	plutonium-239/240	4(4)	7.5E-09	7.2E-06	
	technetium-99	12(12)	0	1.5E-03	
	uranium	12(0)	5.1E-04	5.3E-03	1.2E-03
	uranium-233/234	12(0)	1.4E-04	1.4E-03	4.3E-04
	uranium-235	12(9)	0	4.2E-05	
	uranium-236	12(11)	0	1.9E-05	
	uranium-238	12(0)	1.7E-04	1.8E-03	4.0E-04
<i>Off-site air samplers</i>					
A3	americium-241	4(4)	0	2.5E-06	
	fluoride	52(22)	1.7E-02	1.5E-01	
	neptunium-237	4(4)	0	6.1E-06	
	plutonium-238	4(4)	3.6E-06	1.6E-05	
	plutonium-239/240	4(4)	0	7.2E-06	
	technetium-99	12(12)	0	1.1E-03	
	uranium	12(0)	6.8E-04	1.4E-03	1.0E-03
	uranium-233/234	12(0)	2.8E-04	4.1E-04	3.6E-04
	uranium-235	12(9)	0	2.8E-05	
	uranium-236	12(12)	0	1.4E-05	
A6	uranium-238	12(0)	2.3E-04	4.6E-04	3.3E-04
	americium-241	4(4)	0	5.3E-06	
	fluoride	52(31)	2.6E-02	6.6E-02	
	neptunium-237	4(4)	0	1.8E-06	
	plutonium-238	4(4)	0	6.3E-06	
	plutonium-239/240	4(4)	0	3.7E-06	
	technetium-99	12(12)	0	1.3E-03	
	uranium	12(0)	7.1E-04	1.3E-03	1.0E-03
	uranium-233/234	12(0)	2.4E-04	7.7E-04	3.9E-04
	uranium-235	12(9)	2.6E-09	2.7E-05	
A9	uranium-236	12(12)	0	7.6E-06	
	uranium-238	12(0)	2.3E-04	4.5E-04	3.5E-04
	americium-241	4(4)	0	2.7E-06	
	fluoride	52(36)	1.7E-02	2.3E-01	
	neptunium-237	4(4)	0	9.5E-09	
	plutonium-238	4(4)	0	4.2E-06	
	plutonium-239/240	4(4)	4.3E-09	4.2E-06	
	technetium-99	12(12)	0	1.1E-03	
	uranium	12(0)	7.5E-04	1.5E-03	1.0E-03
	uranium-233/234	12(0)	2.9E-04	6.5E-04	4.1E-04
	uranium-235	12(6)	0	3.6E-05	
	uranium-236	12(12)	0	6.3E-06	
	uranium-238	12(0)	2.5E-04	5.0E-04	3.5E-04

Table 2.8. Ambient air monitoring program summary for radionuclides and fluoride – 2008 (continued)

Sampling Location	Parameter ^a	No. of measurements ^b	Minimum ^{c, d}	Maximum ^c	Average ^{c, e}
A12	americium-241	4(4)	2.4E-09	6.0E-06	
	fluoride	52(18)	1.7E-02	2.1E-01	
	neptunium-237	4(4)	0	5.6E-06	
	plutonium-238	4(4)	1.9E-09	1.1E-05	
	plutonium-239/240	4(4)	0	6.1E-06	
	technetium-99	12(10)	0	4.2E-03	
	uranium	12(0)	5.9E-04	8.7E-03	1.7E-03
	uranium-233/234	12(0)	2.6E-04	2.9E-03	6.6E-04
	uranium-235	12(6)	0	1.3E-04	
	uranium-236	12(12)	0	1.5E-05	
A15	uranium-238	12(0)	2.0E-04	2.9E-03	5.6E-04
	americium-241	4(4)	0	6.7E-06	
	fluoride	52(31)	2.0E-02	2.3E-01	
	neptunium-237	4(4)	0	3.9E-06	
	plutonium-238	4(4)	1.8E-09	8.1E-06	
	plutonium-239/240	4(4)	1.9E-09	7.0E-06	
	technetium-99	12(12)	0	1.0E-03	
	uranium	12(0)	5.3E-04	1.8E-03	9.9E-04
	uranium-233/234	12(0)	2.5E-04	5.1E-04	3.5E-04
	uranium-235	12(9)	4.2E-06	2.8E-05	
A23	uranium-236	12(12)	0	6.0E-06	
	uranium-238	12(0)	1.8E-04	6.1E-04	3.3E-04
	americium-241	4(4)	2.4E-09	2.4E-06	
	fluoride	52(19)	1.8E-02	1.6E-01	
	neptunium-237	4(4)	0	3.7E-06	
	plutonium-238	4(4)	0	7.0E-06	
	plutonium-239/240	4(4)	2.0E-06	9.3E-06	
	technetium-99	12(12)	0	1.2E-03	
	uranium	12(0)	6.8E-04	4.3E-03	1.2E-03
	uranium-233/234	12(0)	1.9E-04	1.6E-03	4.6E-04
A24	uranium-235	12(7)	6.0E-06	6.7E-05	
	uranium-236	12(12)	0	1.3E-05	
	uranium-238	12(0)	2.3E-04	1.4E-03	3.9E-04
	americium-241	4(4)	2.4E-06	1.6E-05	
	fluoride	52(28)	2.2E-02	7.3E-02	
	neptunium-237	4(4)	0	0.0E+00	
	plutonium-238	4(4)	2.2E-09	6.0E-06	
	plutonium-239/240	4(4)	0	4.4E-06	
	technetium-99	12(12)	0	1.4E-03	
	uranium	12(0)	6.1E-04	1.1E-02	1.9E-03
	uranium-233/234	12(0)	2.5E-04	3.3E-03	6.5E-04
	uranium-235	12(9)	3.1E-06	1.8E-04	
	uranium-236	12(12)	0	9.4E-06	
	uranium-238	12(0)	2.0E-04	3.6E-03	6.4E-04

Table 2.8. Ambient air monitoring program summary for radionuclides and fluoride – 2008 (continued)

Sampling Location	Parameter ^a	No. of measurements ^b	Minimum ^{c, d}	Maximum ^c	Average ^{c, e}
A28	americium-241	4(4)	0	7.6E-06	
	fluoride	51(28)	1.9E-02	1.8E-01	
	neptunium-237	4(4)	0	1.8E-06	
	plutonium-238	4(4)	3.7E-09	4.5E-06	
	plutonium-239/240	4(4)	0	8.0E-06	
	technetium-99	12(12)	0	1.2E-03	
	uranium	12(0)	4.5E-04	1.2E-03	9.0E-04
	uranium-233/234	12(0)	2.2E-04	4.1E-04	3.0E-04
	uranium-235	12(10)	3.1E-06	2.4E-05	
	uranium-236	12(12)	0	9.1E-06	
	uranium-238	12(0)	1.5E-04	4.2E-04	3.0E-04
A37 (background)	americium-241	4(4)	0	1.0E-05	
	fluoride	52(17)	2.3E-02	9.6E-02	
	neptunium-237	4(4)	0	1.8E-06	
	plutonium-238	4(4)	0	3.5E-06	
	plutonium-239/240	4(4)	2.1E-09	6.4E-06	
	technetium-99	12(12)	0	9.7E-04	
	uranium	12(0)	6.1E-04	1.1E-03	8.6E-04
	uranium-233/234	12(0)	2.4E-04	3.7E-04	3.1E-04
	uranium-235	12(7)	5.8E-06	2.3E-05	
	uranium-236	12(12)	0	7.7E-06	
	uranium-238	12(0)	2.0E-04	3.5E-04	2.9E-04
A41	americium-241	4(4)	2.4E-09	7.2E-06	
	fluoride	52(30)	2.2E-02	1.0E-01	
	neptunium-237	4(4)	0	0.0E+00	
	plutonium-238	4(4)	7.5E-09	4.0E-06	
	plutonium-239/240	4(4)	0	6.8E-06	
	technetium-99	12(12)	0	9.4E-04	
	uranium	12(0)	6.5E-04	1.5E-03	9.4E-04
	uranium-233/234	12(0)	2.4E-04	5.3E-04	3.6E-04
	uranium-235	12(8)	6.5E-09	2.9E-05	
	uranium-236	12(12)	0	1.3E-05	
	uranium-238	12(0)	2.2E-04	4.9E-04	3.2E-04

^aAll parameters are measured in pCi/m³ with the exception of uranium and fluoride which are measured in µg/m³.

^bRadiological samples for technetium-99, uranium, and uranium isotopes are analyzed monthly, samples for americium-241, neptunium-237, plutonium-238, and plutonium-239/240 are analyzed one month per quarter, and samples for fluoride are analyzed weekly. Number in parentheses is the number of samples that were below the detection limit. If the analytical result for a sample was below the detection limit, the ambient air concentration was calculated based on the detection limit for the sample.

^cResults 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).

^dMinimum values reported as "0" may actually be negative results. Because of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out. These negative value results are reported as "0" in the table for simplicity.

^eAverages are not calculated for locations that had greater than 15% of the results below the detection limit.

Table 2.9. DOE environmental radiation monitoring program (mrem) – 2008

Location	First quarter	Second quarter	Third quarter	Fourth quarter	Cumulative annual whole body dose ^a
#1404A	19	20	22	21	82
#518	20	20	21	22	83
#862	30	34	32	33	129
#874	153	201	181	180	715
#906	17	19	19	20	75
#933	43	44	45	48	180
A12	20	21	22	23	86
A15	20	21	21	23	85
A23	21	23	24	23	91
A24	21	22	22	23	88
A28	20	20	20	21	81
A29	20	24	25	24	93
A3	19	21	24	20	84
A36	20	21	21	22	84
A40	17	16	17	16	66
A6	19	21	21	21	82
A8	23	24	25	25	97
A9	21	20	22	24	87
X-230J2	21	21	22	23	87
Control ^b	19	20	19	20	78
Trip blank ^b	20	23	23	23	89

^aThe annual occupational whole body dose limit set by 10 CFR Part 20 is 5000 mrem.

^bThe control dosimeter is sent from the laboratory at the beginning of the quarter, remains at PORTS throughout the quarter in a low background location, and is returned to the laboratory with the other dosimeters at the end of the quarter. The trip blank dosimeter is sent from the laboratory at the beginning of the quarter, accompanies the sample team to the field locations at the beginning and end of each quarter and is returned to the laboratory with the other dosimeters at the end of the quarter. The control and trip blank measurements are an indication of background radiation.

Table 2.10. Environmental radiation monitoring (mrem) at locations near UDS depleted uranium cylinder storage yards – 2008

Location	<u>First quarter</u>			<u>Second quarter</u>		
	Deep ^{a,b}		Shallow ^c	Deep ^{a,b}		Shallow ^c
	X+G	N		X+G	N	
#41	59	ND	59	70	ND	70
#868	408	ND	408	386	ND	386
#874	148	ND	148	187	ND	187
#882	230	ND	230	263	ND	263
#890	60	ND	60	60	ND	60
Trip blank	23	ND	23	23	ND	23

Location	<u>Third quarter</u>			<u>Fourth quarter</u>		
	Deep ^{a,b}		Shallow ^c	Deep ^{a,b}		Shallow ^c
	X+G	N		X+G	N	
#41	67	ND	67	70	ND	70
#868	358	ND	358	433	ND	433
#874	183	ND	183	185	ND	185
#882	256	ND	256	262	ND	262
#890	40	ND	40	57	ND	57
Trip blank	22	ND	22	23	ND	23

^aND – not detected above the minimum reportable dose.

^bDeep dose (dose equivalent at a tissue depth of 1 cm) applies to external whole body exposure and consists of x-ray and gamma radiation (X+G) and neutron radiation (N).

^cShallow dose (dose equivalent at a tissue depth of 0.007 cm) applies to exposure of the skin or an extremity.

Table 2.11. Local surface water monitoring program results – 2008

Location	Parameter ^{a,b}	Second quarter ^{c,d}	Fourth quarter ^{c,d}
Scioto River RW-1 (downstream)	americium-241	0.01297U	0.02262U
	neptunium-237	0.03305U	0.000007208U
	plutonium-238	0.02635U	0.007216U
	plutonium-239/240	0.006593U	0.007194U
	technetium-99	-1.85U	-1.51U
	uranium	2.24	1.473
	uranium-233/234	0.6184	0.6602
	uranium-235	0.008776U	0.009255U
	uranium-236	0.01574U	0U
	uranium-238	0.7518	0.4942
Scioto River RW-6 (upstream)	americium-241	-0.02127U	0.02359U
	neptunium-237	0.00002013U	-0.007627U
	plutonium-238	0.02679U	0.02285U
	plutonium-239/240	0.0134U	-0.007598U
	technetium-99	-4.75U	-0.91U
	uranium	1.789	1.816
	uranium-233/234	0.5837	0.5497
	uranium-235	0.05862U	0.02749U
	uranium-236	0U	0U
	uranium-238	0.5961	0.6079
Little Beaver Creek RW-7 (downstream)	americium-241	-0.03689U	0.01023U
	neptunium-237	-0.1918U	-0.01867U
	plutonium-238	0.01667U	0.01866U
	plutonium-239/240	-0.008308U	0.02798U
	technetium-99	1.45U	3.18U
	uranium	1.347	1.942
	uranium-233/234	1.525	2.592
	uranium-235	0.05778U	0.06507
	uranium-236	0.02223U	0.008355U
	uranium-238	0.4473	0.6467
RW-8 (downstream)	americium-241	0.009632U	0.02114U
	neptunium-237	-0.05191U	0.02488U
	plutonium-238	0.01037U	0.01654U
	plutonium-239/240	0U	0.008269U
	technetium-99	-2.96U	1.03U
	uranium	0.9367	2.096
	uranium-233/234	0.8444	1.981
	uranium-235	0.03501U	0.04243
	uranium-236	0U	0.02286U
	uranium-238	0.3116	0.7002
RW-12 (upstream)	americium-241	0.03076U	0.03418U
	neptunium-237	0.00002213U	0U
	plutonium-238	0.02946U	0.00002074U
	plutonium-239/240	0.02947U	0.006919U
	technetium-99	-2.73U	-4.44U
	uranium	0.01955U	0.09432
	uranium-233/234	0.0529U	0.06965U
	uranium-235	0U	0.009544U
	uranium-236	-0.007316U	-0.008561U
	uranium-238	0.006605U	0.03088U

Table 2.11. Local surface water monitoring program results – 2008 (continued)

Location	Parameter ^{a,b}	Second quarter ^{c,d}	Fourth quarter ^{c,d}
Big Beaver Creek RW-13 (downstream)	americium-241	0.00861U	0.01759U
	neptunium-237	-0.02138U	0.01514U
	plutonium-238	0.01424U	0.02265U
	plutonium-239/240	0.02137U	0.007558U
	technetium-99	-1.27U	-0.544U
	uranium	1.223	1.606
	uranium-233/234	1.468	1.524
	uranium-235	0.1111	0.03358U
	uranium-236	0.007679U	0.01508U
	uranium-238	0.4009	0.5366
RW-5 (upstream)	americium-241	-0.00747U	-0.01036U
	neptunium-237	-0.02098U	0.03694U
	plutonium-238	0.006991U	0.02763U
	plutonium-239/240	-0.01394U	0.00921U
	technetium-99	-3.24U	-2.57U
	uranium	0.1066	1.138
	uranium-233/234	0.06864U	0.5891
	uranium-235	0.01693U	0.01652U
	uranium-236	0.0152U	0U
	uranium-238	0.03424	0.3808
Big Run Creek RW-2 (downstream)	americium-241	-0.0175U	0.04237U
	neptunium-237	0.000007467U	0.008556U
	plutonium-238	0.02237U	0.03413U
	plutonium-239/240	-0.007445U	0.0256U
	technetium-99	-5.25U	-1.69U
	uranium	0.4767	0.1431
	uranium-233/234	0.1589	0.2087
	uranium-235	0.01867U	0.01907U
	uranium-236	-0.008372U	0.01712U
	uranium-238	0.1586	0.04628
RW-3 (downstream)	americium-241	0.01752U	0.009373U
	neptunium-237	-0.01259U	-0.008318U
	plutonium-238	0.006299U	0.01662U
	plutonium-239/240	0.01259U	0.01662U
	technetium-99	-0.821U	-3.69U
	uranium	0.7748	0.4336
	uranium-233/234	1.018	0.7266
	uranium-235	0.009164U	0.007469U
	uranium-236	0.000008221U	-0.0067U
	uranium-238	0.2595	0.145

Table 2.11. Local surface water monitoring program results – 2008 (continued)

Location	Parameter ^{a,b}	Second quarter ^{c,d}	Fourth quarter ^{c,d}
Big Run Creek (continued) RW-33 (upstream)	americium-241	0.02813U	0U
	neptunium-237	-0.04453U	-0.006732U
	plutonium-238	0.00001776U	0.000006721U
	plutonium-239/240	0.02667U	0.006734U
	technetium-99	-2.01U	-5.68U
	uranium	0.04596U	0.1332
	uranium-233/234	0.01547U	0.02242U
	uranium-235	0U	0U
	uranium-236	0U	0.008271U
	uranium-238	0.01544U	0.04471
Background creeks RW-10N	americium-241	0.01704U	0.0264U
	neptunium-237	-0.02631U	0.00001043U
	plutonium-238	0.008766U	0.0000104U
	plutonium-239/240	-0.0175U	0.02082U
	technetium-99	-3.03U	-4.57U
	uranium	0.6844	0.3258
	uranium-233/234	0.2689	0.1838
	uranium-235	0U	0.008404U
	uranium-236	0U	0.007538U
	uranium-238	0.23	0.1087
RW-10S	americium-241	0.01772U	0.02908U
	neptunium-237	-0.007752U	0.02579U
	plutonium-238	0.007761U	0.03429U
	plutonium-239/240	0.00002322U	0U
	technetium-99	-4.15U	-3.13U
	uranium	0.09083U	0.1561
	uranium-233/234	0.01534U	0.0763
	uranium-235	0U	-0.009403U
	uranium-236	0U	0U
	uranium-238	0.03052U	0.0533
RW-10E	americium-241	0.01707U	-0.008334U
	neptunium-237	-0.02748U	-0.007467U
	plutonium-238	0.000006857U	0.007499U
	plutonium-239/240	0.00687U	0.000007469U
	technetium-99	-0.308U	-1.86U
	uranium	0.0867U	0.1061
	uranium-233/234	0.08027	0.05585
	uranium-235	0U	0.00861U
	uranium-236	0U	0.007731U
	uranium-238	0.02913U	0.03483

Table 2.11. Local surface water monitoring program results – 2008 (continued)

Location	Parameter ^{a,b}	Second quarter ^{c,d}	Fourth quarter ^{c,d}
Background creeks RW-10W	americium-241	0.02388U	0.02617U
	neptunium-237	0.00003294U	-0.01681U
	plutonium-238	0.008229U	-0.00839U
	plutonium-239/240	0U	0.000008391U
	technetium-99	-0.921U	-5.46U
	uranium	0.1086U	0.05916U
	uranium-233/234	0.08771	0.05514U
	uranium-235	0U	-0.008482U
	uranium-236	0U	0U
	uranium-238	0.03648U	0.02063U

^aResults are reported in $\mu\text{g/L}$ (uranium) and pCi/L (all other parameters).

^bThe derived concentration guide (DCG) for each radionuclide is as follows: americium-241, 30 pCi/L; neptunium-237, 30 pCi/L; plutonium-238, 40 pCi/L; plutonium-239/240, 30 pCi/L; technetium-99, 100,000 pCi/L; uranium-233/234, 500 pCi/L; uranium-235, 600 pCi/L; uranium-236, 500 pCi/L; uranium-238, 600 pCi/L. All results are well below these DOE standards. A DCG is not available for total uranium.

^cAbbreviations and data qualifiers are as follows: U – undetected.

^dBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

Table 2.12. Sediment monitoring program results – 2008

Parameter	Unit	Location/results ^{a,b}			
Scioto River and outfalls that discharge to the Scioto River					
		RM-6 Upstream @ Piketon	RM-1 Downstream @ Lucasville	RM-9 Outfall 012	RM-10 Outfall 010/Outfall 013
Aluminum	mg/kg	2960N	6410BN	5360N	2820N
Americium-241	pCi/g	0.003062U	0.006561U	0.000005916U	0.006401U
Antimony	mg/kg	0.43BN	0.32BN	1.4N	0.38BN
Arsenic	mg/kg	5.7*	12.6*	17.4*	12.5*
Barium	mg/kg	28.8	60.8	71.1	22.9
Beryllium	mg/kg	0.23	0.48	0.88	0.35
Cadmium	mg/kg	0.21B	0.39	0.88	0.2B
Calcium	mg/kg	26200	14400	5410	1180
Chromium	mg/kg	5.8	10.4	17.1	12.1
Copper	mg/kg	18.2E	12.6E	18.7E	10.7E
Iron	mg/kg	9320N	17800N	47600N	16800N
Lead	mg/kg	8.1	12.4	10.9	8.2
Magnesium	mg/kg	10100	6940	1700	1240
Manganese	mg/kg	251N	465N	2260N	289N
Mercury	mg/kg	0.02B	0.03B	0.03	0.009U
Neptunium-237	pCi/g	-0.002733U	0.002567U	-0.01009U	0.006384U
Nickel	mg/kg	10.1	16.5	30.4	13.4
PCB, total	µg/kg	42	40U	40U	6.5J
PCB-1016	µg/kg	13U	13U	13U	13U
PCB-1221	µg/kg	13U	13U	13U	13U
PCB-1232	µg/kg	13U	13U	13U	13U
PCB-1242	µg/kg	13U	13U	13U	13U
PCB-1248	µg/kg	42	13U	13U	13U
PCB-1254	µg/kg	13U	13U	13U	13U
PCB-1260	µg/kg	13U	13U	13U	6.5J
PCB-1268	µg/kg	13U	13U	13U	13U
Plutonium-238	pCi/g	0.008208U	0.01785U	-0.002516U	0.009545U
Plutonium-239/240	pCi/g	0.002741U	0.007654U	0.007571U	0.00001589U
Selenium	mg/kg	0.43U	0.52B	0.51B	0.4U
Silicon	mg/kg	365*	319*	332*	390*
Silver	mg/kg	0.07U	0.06U	0.06U	0.07U
Technetium-99	pCi/g	0.0366U	-0.0279U	0.0201U	-0.0129U
Thallium	mg/kg	0.43U	0.39U	0.37U	0.4U
Uranium	µg/g	1.062	1.48	1.772	1.61
Uranium-233/234	pCi/g	0.3056	0.4069	0.561	0.6356
Uranium-235	pCi/g	0.006673U	0.01046U	0.03118	0.0202U
Uranium-236	pCi/g	0.002999U	0.00313U	0.002799U	0.006048U
Uranium-238	pCi/g	0.3563	0.4963	0.5927	0.539
Zinc	mg/kg	37.4	60.2	114	58.4

Table 2.12. Sediment monitoring program results – 2008 (continued)

Parameter	Unit	Location/results ^{a,b}			
		<i>Little Beaver Creek</i>			
		<i>RM-12 Upstream</i>	<i>RM-11 X-230J7 Discharge</i>	<i>RM-8 Downstream @ Outfall 009 Discharge</i>	<i>RM-7 Downstream @ Confluence</i>
Aluminum	mg/kg	5830	2980	3780N	5200
Americium-241	pCi/g	0.003278U	0.001845U	0.01935U	0.004984U
Antimony	mg/kg	0.28B	0.73B	0.62BN	0.68B
Arsenic	mg/kg	15.2	8.7	15.9*	17.6
Barium	mg/kg	46.1	13.3	30.2	50
Beryllium	mg/kg	0.59	0.3	0.58	0.61
Cadmium	mg/kg	0.04U	0.33	0.46	0.27B
Calcium	mg/kg	749	50900	37400	1610
Chromium	mg/kg	12.9	12.4	13.4	15.1
Copper	mg/kg	8.2	24.2	11.9E	9.8
Iron	mg/kg	22500	14000	22700N	27700
Lead	mg/kg	14.4	10.5	10.5	11.3
Magnesium	mg/kg	1000	31400	21100	1240
Manganese	mg/kg	615	168	405N	514
Mercury	mg/kg	0.01B	0.05	0.02B	0.01B
Neptunium-237	pCi/g	-0.02199U	0.005907U	-0.002738U	0.00298U
Nickel	mg/kg	11.6	11.3	17.5	20.8
PCB, total	µg/kg	40U	200	98	17J
PCB-1016	µg/kg	13U	13U	13U	13U
PCB-1221	µg/kg	13U	13U	13U	13U
PCB-1232	µg/kg	13U	13U	13U	13U
PCB-1242	µg/kg	13U	13U	13U	13U
PCB-1248	µg/kg	13U	13U	13U	13U
PCB-1254	µg/kg	13U	92	43	8.2J
PCB-1260	µg/kg	13U	110	56	9.1J
PCB-1268	µg/kg	13U	13U	13U	13U
Plutonium-238	pCi/g	0.01098U	0.004711U	0.01094U	0.001483U
Plutonium-239/240	pCi/g	0.01922U	0.01884	0.008209U	0.004447U
Selenium	mg/kg	0.48U	0.39U	0.44B	0.39U
Silicon	mg/kg	378	325	382*	258
Silver	mg/kg	0.08U	0.09B	0.07U	0.07U
Technetium-99	pCi/g	0.228U	2.63	3.14	1.91
Thallium	mg/kg	0.48U	0.39U	0.4U	0.39U
Uranium	µg/g	0.5421	2.192	2.22	1.626
Uranium-233/234	pCi/g	0.2106	4.09	1.89	2.391
Uranium-235	pCi/g	0.01199U	0.1291	0.06748	0.08077
Uranium-236	pCi/g	0U	0.01272	0.003369U	0.01319
Uranium-238	pCi/g	0.1811	0.7246	0.74	0.539
Zinc	mg/kg	31.5	186	80.6	57.3

Table 2.12. Sediment monitoring program results – 2008 (continued)

Parameter	Unit	Location/results ^{a,b}	
Big Beaver Creek			
		RM-5	RM-13
		Upstream	Downstream
Aluminum	mg/kg	6230	3770
Americium-241	pCi/g	0.006128U	0.008228U
Antimony	mg/kg	0.58B	0.37B
Arsenic	mg/kg	7.9	9
Barium	mg/kg	57.4	51.5
Beryllium	mg/kg	0.46	0.41
Cadmium	mg/kg	0.18B	0.54
Calcium	mg/kg	1500	8270
Chromium	mg/kg	9.1	10.5
Copper	mg/kg	9.8	9.8
Iron	mg/kg	13600	13900
Lead	mg/kg	10.5	10.5
Magnesium	mg/kg	1490	3470
Manganese	mg/kg	544	407
Mercury	mg/kg	0.02B	0.02B
Neptunium-237	pCi/g	-0.01767U	-0.005277U
Nickel	mg/kg	15.7	19.1
PCB, total	µg/kg	40U	80
PCB-1016	µg/kg	13U	13U
PCB-1221	µg/kg	13U	13U
PCB-1232	µg/kg	13U	13U
PCB-1242	µg/kg	13U	13U
PCB-1248	µg/kg	13U	13U
PCB-1254	µg/kg	13U	33
PCB-1260	µg/kg	13U	47
PCB-1268	µg/kg	13U	13U
Plutonium-238	pCi/g	0.005039U	0.002644U
Plutonium-239/240	pCi/g	0.005047U	0.01318
Selenium	mg/kg	0.45U	0.42U
Silicon	mg/kg	307	281
Silver	mg/kg	0.08U	0.07U
Technetium-99	pCi/g	0.442	5.47
Thallium	mg/kg	0.45U	0.42U
Uranium	µg/g	0.5641	1.273
Uranium-233/234	pCi/g	0.2087	1.28
Uranium-235	pCi/g	-0.003252U	0.05532
Uranium-236	pCi/g	0.002926U	0.005521U
Uranium-238	pCi/g	0.1898	0.4226
Zinc	mg/kg	39.1	63.9

Table 2.12. Sediment monitoring program results – 2008 (continued)

Parameter	Unit	Location/results ^{a,b}		
		<i>RM-33 Upstream</i>	<i>Big Run Creek RM-3 Downstream</i>	<i>RM-2 Downstream @ Wakefield</i>
Aluminum	mg/kg	5400	7990	5370
Americium-241	pCi/g	0.001403U	0.00161U	0.000003541U
Antimony	mg/kg	0.29B	2.6	0.3B
Arsenic	mg/kg	8.3	60.6	13.4
Barium	mg/kg	48.2	79.7	59
Beryllium	mg/kg	0.56	1.7	0.58
Cadmium	mg/kg	0.16B	0.32B	0.22B
Calcium	mg/kg	1360	1270	681
Chromium	mg/kg	8.9	31.1	9
Copper	mg/kg	7.4	16.4	7.8
Iron	mg/kg	14000	62800	17200
Lead	mg/kg	12.8	40.8	13.1
Magnesium	mg/kg	1110	809	882
Manganese	mg/kg	132	2360	560
Mercury	mg/kg	0.02B	0.03B	0.01B
Neptunium-237	pCi/g	0.000001113U	-0.001271U	0.000001116U
Nickel	mg/kg	13.2	32.5	14.5
PCB, total	µg/kg	40U	56	40U
PCB-1016	µg/kg	13U	13U	13U
PCB-1221	µg/kg	13U	13U	13U
PCB-1232	µg/kg	13U	13U	13U
PCB-1242	µg/kg	13U	13U	13U
PCB-1248	µg/kg	13U	13U	13U
PCB-1254	µg/kg	13U	33	13U
PCB-1260	µg/kg	13U	23	13U
PCB-1268	µg/kg	13U	13U	13U
Plutonium-238	pCi/g	0.004443U	0.003814U	0.004457U
Plutonium-239/240	pCi/g	0.003333U	-0.00254U	0.001114U
Selenium	mg/kg	0.76B	1.3B	0.49U
Silicon	mg/kg	405	437	437
Silver	mg/kg	0.08U	0.16U	0.08U
Technetium-99	pCi/g	-0.0109U	0.216U	0.238U
Thallium	mg/kg	0.48U	0.94U	0.49U
Uranium	µg/g	1.751	4.407	1.772
Uranium-233/234	pCi/g	0.6279	2.029	0.6153
Uranium-235	pCi/g	0.03564	0.1011	0.03668
Uranium-236	pCi/g	-0.002779U	0.006599U	0.007159
Uranium-238	pCi/g	0.5853	1.472	0.5922
Zinc	mg/kg	37.5	98.7	36.4

Table 2.12. Sediment monitoring program results – 2008 (continued)

Parameter	Unit	Location/results ^{a,b}			
		<i>Background creeks</i>			
		<i>RM-10N North background</i>	<i>RM-10S South background</i>	<i>RM-10E East background</i>	<i>RM-10W West background</i>
Aluminum	mg/kg	1720	4730	1050	4880
Americium-241	pCi/g	0.001635U	0.001617U	0.001854U	0.005198U
Antimony	mg/kg	0.22U	0.23U	0.41B	2.3
Arsenic	mg/kg	3.5	11.2	2.1	34.5
Barium	mg/kg	14.1	39.7	9.5	37
Beryllium	mg/kg	0.13B	0.42	0.13B	0.85
Cadmium	mg/kg	0.19	0.09B	0.05U	1.2
Calcium	mg/kg	6160	2000	204	821
Chromium	mg/kg	5.7	12.3	3.4	15
Copper	mg/kg	3.9	7.2	1.2	14.9
Iron	mg/kg	7750	17900	3570	35300
Lead	mg/kg	4.8	10.8	3.5	15.2
Magnesium	mg/kg	2750	1490	104	876
Manganese	mg/kg	140	468	26.6	582
Mercury	mg/kg	0.01U	0.02B	0.01U	0.02B
Neptunium-237	pCi/g	0.002441U	0.000002323U	-0.002667U	-0.002607U
Nickel	mg/kg	8.4	8.9	1.9	31.3
PCB, total	µg/kg	40U	40U	40U	40U
PCB-1016	µg/kg	13U	13U	13U	13U
PCB-1221	µg/kg	13U	13U	13U	13U
PCB-1232	µg/kg	13U	13U	13U	13U
PCB-1242	µg/kg	13U	13U	13U	13U
PCB-1248	µg/kg	13U	13U	13U	13U
PCB-1254	µg/kg	13U	13U	13U	13U
PCB-1260	µg/kg	13U	13U	13U	13U
PCB-1268	µg/kg	13U	13U	13U	13U
Plutonium-238	pCi/g	0.002436U	0.000002316U	0.004U	0.002604U
Plutonium-239/240	pCi/g	-0.001214U	-0.001155U	0.001334U	-0.001297U
Selenium	mg/kg	0.43U	0.47U	0.55U	0.38U
Silicon	mg/kg	317	351	441	303
Silver	mg/kg	0.08B	0.08U	0.17B	0.06U
Technetium-99	pCi/g	0.0327U	0.16U	0.0741U	0.0688U
Thallium	mg/kg	0.43U	0.49B	0.55U	0.38U
Uranium	µg/g	0.6126	1.139	0.2989	3.319
Uranium-233/234	pCi/g	0.1558	0.4225	0.109	1.147
Uranium-235	pCi/g	0.003102U	0.02004	0.001748U	0.0739
Uranium-236	pCi/g	-0.00139U	0.0015U	-0.001566U	0.007212
Uranium-238	pCi/g	0.2056	0.3811	0.1003	1.109
Zinc	mg/kg	23.6	34.4	8.8	107

^aAbbreviations and data qualifiers are as follows: * – duplicate analysis is not within control limits; B (metals) – the result was less than the practical quantitation limit but greater than or equal to the instrument detection limit; E – the reported value is estimated because of the presence of interferences; J (PCBs) – the reported value is an estimated concentration greater than the method detection limit but less than the practical quantitation limit; N – sample spike recovery is not within control limits; U – undetected.

^bBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

Table 2.13. Soil and vegetation monitoring at ambient air monitoring stations – 2008

Parameter ^a	Location/results ^{b,c}			
	<i>A8 – On site at northwest boundary</i>		<i>T7 – On site near X-230L North Holding Pond</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.002661U	0.002386U	0.003697U	0.000005918U
Neptunium-237	-0.005755U	-0.002018U	-0.002718U	-0.0006203U
Plutonium-238	0.0006392U	0.001347U	0.004076U	0.001243U
Plutonium-239/240	-0.0006373U	-0.002015U	0.000682U	0.005595
Technetium-99	0.0155U	-0.0584U	-0.0442U	0.0739U
Uranium	0.006404U	4.99	0.004875U	3.132
Uranium-233/234	0.0000035U	1.566	0.004497U	1.156
Uranium-235	-0.0008635U	0.07694	0.0006931U	0.02465
Uranium-236	-0.0007754U	-0.007667U	0U	0.007377U
Uranium-238	0.002099U	1.67	0.001684U	1.05
	<i>A10 – On site on northwest segment of Perimeter Road</i>		<i>A29 – On site at OVEC</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.000001563U	0U	0.001541U	0.003723U
Neptunium-237	0.00000479U	-0.006997U	-0.004418U	-0.0006275U
Plutonium-238	0U	0.0006371U	0.00000126U	-0.001256U
Plutonium-239/240	0.0006836U	0.0006364U	-0.0006287U	0.005662U
Technetium-99	-0.0467U	-0.000696U	0.128U	-0.0349U
Uranium	0.009842U	2.652	0.01055U	3.002
Uranium-233/234	0.005385U	0.6782	0.003409U	0.9304
Uranium-235	0.0008299U	0.03177	0.001678U	0.04493
Uranium-236	0.0007452U	0.00317U	0U	0.000003664U
Uranium-238	0.003358U	0.8881	0.003395U	1.005
	<i>A36 – On site at X-611 Water Treatment Plant</i>		<i>A6 – North of PORTS in Piketon</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.00294U	0.001682U	-0.0008044U	0.002145U
Neptunium-237	-0.0006791U	-0.001528U	-0.002322U	0.0007124U
Plutonium-238	0.002038U	0.0007651U	0.002321U	0.001419U
Plutonium-239/240	-0.001357U	0.007636	-0.0007727U	-0.002123U
Technetium-99	0.131U	0.143U	0.0499U	-0.0759U
Uranium	0.0265U	1.762	0.006133U	3.181
Uranium-233/234	0.005209U	0.7534	0.006042U	1.225
Uranium-235	0.000000916U	0.01044U	-0.0008267U	0.04972
Uranium-236	-0.0008228U	-0.01873U	-0.0007422U	0.003434U
Uranium-238	0.008909U	0.5913	0.00201U	1.064

Table 2.13. Soil and vegetation monitoring at ambient air monitoring stations – 2008 (continued)

Parameter ^a	Location/results ^{b,c}			
	<i>A24 – North of PORTS at Schuster Road</i>		<i>A41 - North of PORTS at Zahns Corner</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.0008036U	0.0009915U	0.000001528U	0.002841U
Neptunium-237	-0.005168U	0.0006591U	-0.001814U	-0.00132U
Plutonium-238	0.001935U	0.001311U	0.005434U	0.0006599U
Plutonium-239/240	0.000003223U	0.003277U	0.001813U	0.002642U
Technetium-99	0.0738U	-0.0185U	0.0156U	-0.0114U
Uranium	0.01817	3.188	-0.001649U	3.277
Uranium-233/234	0.009951	1.02	0.005823U	0.8679
Uranium-235	0U	0.02908	0.001794U	0.03104
Uranium-236	-0.0008459U	0U	0.001611U	-0.00348U
Uranium-238	0.00611	1.069	-0.0007227U	1.098
	<i>A23 – Northeastern PORTS boundary</i>		<i>A12 – Eastern PORTS boundary</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.002531U	0.002948U	0.001622U	0.003825U
Neptunium-237	0.000002514U	-0.003995U	-0.006284U	0.000007447U
Plutonium-238	0.00251U	0U	0.002511U	0.000744U
Plutonium-239/240	0.0008363U	0.003991U	-0.0006266U	0.00446U
Technetium-99	-0.0342U	0.0933U	0.0132U	-0.0274U
Uranium	-0.0004075U	3.104	0.006996U	2.172
Uranium-233/234	-0.0006407U	0.6984	0.002848U	0.7236
Uranium-235	-0.001598U	0.05441	0.002629U	0.08525
Uranium-236	0.000719U	0.004075U	-0.002359U	0.004507U
Uranium-238	0.00000194U	1.038	0.002129U	0.7221
	<i>A15 – Southeast of PORTS on Loop Road</i>		<i>A3 – Southern PORTS boundary</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.00235U	0.003101U	-0.001566U	0.000001007U
Neptunium-237	0.004814U	-0.001806U	-0.002734U	-0.005909U
Plutonium-238	0.00192U	0.0006029U	0.002731U	0.001968U
Plutonium-239/240	0.000000959U	0.004212U	-0.0006807U	0.005246
Technetium-99	0.0366U	-0.0142U	0.0448U	-0.00432U
Uranium	0.002091U	2.901	0.01325U	2.291
Uranium-233/234	0.01683	0.9764	0.003819U	0.8796
Uranium-235	0U	0.04168	0U	0.0299
Uranium-236	0.000000775U	0.000003738U	0.001409U	0.007675U
Uranium-238	0.0007017U	0.971	0.004445U	0.7672

Table 2.13. Soil and vegetation monitoring at ambient air monitoring stations – 2008 (continued)

Parameter ^a	Location/results ^{b,c}			
	<i>A9 – South of PORTS</i>		<i>A28 – Southwest of PORTS on Camp Creek Road</i>	
	Vegetation	Soil	Vegetation	Soil
Americium-241	0.001611U	0.003416U	0.0008071U	0.00228U
Neptunium-237	-0.002415U	0.0007254U	-0.002311U	-0.005811U
Plutonium-238	0.000000803U	0.002157U	0.001539U	-0.00165U
Plutonium-239/240	-0.0008013U	0.004317U	-0.0007679U	0.009947
Technetium-99	0.133	0.0308U	-0.0532U	0.0676U
Uranium	0.003745U	1.211	0.02099U	3.073
Uranium-233/234	0.006569U	0.4943	0.008488U	0.9687
Uranium-235	0.0008099U	0.0343	0U	0.03451
Uranium-236	0U	0U	-0.0007824U	0U
Uranium-238	0.001312U	0.4039	0.007057	1.03
	<i>A37 – Background station near Otway</i>			
	Vegetation	Soil		
Americium-241	-0.002916U	0.0063U		
Neptunium-237	-0.00584U	0.000002753U		
Plutonium-238	0U	0.001375U		
Plutonium-239/240	-0.002183U	0.008244		
Technetium-99	-0.0314U	0.104U		
Uranium	0.002084U	2.91		
Uranium-233/234	0.004249U	1.082		
Uranium-235	0U	0.05825		
Uranium-236	-0.001566U	0.004754U		
Uranium-238	0.0007084U	0.9724		

^aAll parameters are measured in pCi/g with the exception of uranium which is measured in $\mu\text{g/g}$.

^bAbbreviations and data qualifiers are as follows: U – undetected.

^cBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

Table 2.14. Biota (fish) monitoring program results – 2008

Parameter	Unit	Location/results ^{a,b}		
		<i>Little Beaver Creek (RW-8)^c</i>	<i>Scioto River (RW-1)^c</i>	<i>Big Beaver Creek (RW-13)^c</i>
Americium-241	pCi/g	0.0007465U	0.000000751U	na
Neptunium-237	pCi/g	0.000000662U	-0.001719U	na
PCB, total	µg/kg	250J	600U	na
PCB-1016	µg/kg	200U	200U	245U
PCB-1221	µg/kg	200U	200U	245U
PCB-1232	µg/kg	200U	200U	245U
PCB-1242	µg/kg	200U	200U	245U
PCB-1248	µg/kg	200U	200U	245U
PCB-1254	µg/kg	200U	200U	245U
PCB-1260	µg/kg	250	200U	368
PCB-1268	µg/kg	200U	200U	245U
Plutonium-238	pCi/g	0.001984U	0.002288U	na
Plutonium-239/240	pCi/g	-0.0006591U	0.001716U	na
Technetium-99	pCi/g	-0.0352U	-0.024U	na
Uranium	µg/g	0.01336U	0.001784U	na
Uranium-233/234	pCi/g	0.0117	0.001976U	na
Uranium-235	pCi/g	0.0008013U	0.0008121U	na
Uranium-236	pCi/g	0.0007195U	-0.0007284U	na
Uranium-238	pCi/g	0.004539U	0.000657U	na

^aAbbreviations and data qualifiers are as follows: J – the reported value is an estimated concentration greater than the method detection limit but less than the practical quantitation limit; U – undetected; na – not analyzed.

^bBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

^cThe fish sample for Little Beaver Creek is a mixture of rock bass and blue gill. The fish sample for Scioto River is a mixture of catfish, sheephead, and shovelhead. The fish sample for Big Beaver Creek is catfish.

Table 2.15. Biota (crops) monitoring program results – 2008

Type	Location	Tc-99 ^{a,b,c}	U	U-233/234	U-235	U-238
Field corn	Off-site #1	0.0321U	0.003966U	0.005342	0U	0.001333U
Beans	Off-site #2	-0.0227U	0.006858U	0.00000173U	0U	0.002305U
Cucumber	Off-site #2	-0.0181U	0.000000507U	0.003171U	0U	0.000000631U
Tomatoes	Off-site #2	-0.0369U	0.005825U	0.003922	0U	0.001957U
Zucchini	Off-site #2	-0.0185U	0.01927	0.005077	0.001565U	0.006332
Corn	Off-site #3	-0.0333U	0.000000516U	0.003226U	0U	0U
Peppers	Off-site #3	-0.01U	0.009755	0.002629U	0U	0.003278
Tomatoes	Off-site #4	-0.0285U	0.001724U	0.002542U	0.0007831U	0.0006348U
Zucchini	Off-site #5	-0.0421U	0.003997U	0.003365U	0U	0.001343U

^aResults are reported in $\mu\text{g/g}$ (uranium) and pCi/g (all other parameters). Abbreviations are as follows: Tc-99 – technetium-99, U – uranium, U-233/234 – uranium-233/234, U-235 – uranium-235, U-238 – uranium-238. Data qualifiers are as follows: U – undetected.

^bBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

^cSamples were also analyzed for transuranic radionuclides (americium-241, neptunium-237, plutonium-238, and plutonium-239/240) and uranium-236. None of these radionuclides were detected in the samples.

Table 2.16 Biota (deer) monitoring program results – 2008

Parameter	Units	Result ^{a,b}
<i>kidney</i>		
Americium-241	pCi/g	0.001423U
Neptunium-237	pCi/g	-0.0008802U
Plutonium-238	pCi/g	0.001757U
Plutonium-239/240	pCi/g	0.0008787U
Technetium-99	pCi/g	0.00103U
Uranium	µg/g	0.004995U
Uranium-233/234	pCi/g	0.003887U
Uranium-235	pCi/g	0U
Uranium-236	pCi/g	0.0006148U
Uranium-238	pCi/g	0.001662U
<i>liver</i>		
Americium-241	pCi/g	0U
Neptunium-237	pCi/g	0.000003865U
Plutonium-238	pCi/g	0.001543U
Plutonium-239/240	pCi/g	0U
Technetium-99	pCi/g	0.0172U
Uranium	µg/g	-0.001804U
Uranium-233/234	pCi/g	0.002449U
Uranium-235	pCi/g	0U
Uranium-236	pCi/g	0.0006777U
Uranium-238	pCi/g	-0.00061U
<i>muscle</i>		
Americium-241	pCi/g	0.0007277U
Neptunium-237	pCi/g	0.000000663U
Plutonium-238	pCi/g	0.000663U
Plutonium-239/240	pCi/g	0.001985U
Technetium-99	pCi/g	-0.00344U
Uranium	µg/g	0.000000293U
Uranium-233/234	pCi/g	0.001833U
Uranium-235	pCi/g	0U
Uranium-236	pCi/g	0U
Uranium-238	pCi/g	0.000000608U

^aAbbreviations and data qualifiers are as follows: U – undetected.

^bBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.

Table 2.17 Off-site dairy monitoring – 2008

Parameter	Units	Milk ^{a,b}	Eggs ^{a,b}
<i>Regular sample</i>			
Americium-241	pCi/g	0.002327U	0.0007917U
Neptunium-237	pCi/g	-0.0006956U	-0.001185U
Plutonium-238	pCi/g	0.001392U	0.000000591U
Plutonium-239/240	pCi/g	0.00348U	-0.0005909U
Technetium-99	pCi/g	0.074U	0.0693U
Uranium	µg/g	0.006422U	-0.003739U
Uranium-233/234	pCi/g	0.003609U	-0.00196U
Uranium-235	pCi/g	0U	-0.0008069U
Uranium-236	pCi/g	0U	-0.001449U
Uranium-238	pCi/g	0.002158U	-0.001302U
<i>Duplicate sample</i>			
Americium-241	pCi/g	-0.000851U	0.002385U
Neptunium-237	pCi/g	-0.0007379U	0.0006699U
Plutonium-238	pCi/g	0.002218U	0.003334U
Plutonium-239/240	pCi/g	0U	0.000000666U
Technetium-99	pCi/g	0.0917U	0.0335U
Uranium	µg/g	0.00426U	-0.006058U
Uranium-233/234	pCi/g	0.000002866U	-0.00406U
Uranium-235	pCi/g	0.000000884U	0U
Uranium-236	pCi/g	0.000001588U	-0.0015U
Uranium-238	pCi/g	0.001432U	-0.002028U

^aAbbreviations and data qualifiers are as follows: U – undetected.

^bBecause of the statistical nature of radiation detection, results for samples that have no radioactivity are often negative values because background radioactivity is subtracted out.