Appendix C. Additional Monitoring Results

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Tables

C.0 Additional Monitoring Results

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This appendix contains additional information on monitoring results and supplements data summarized in the main body of the report.

C.1 Onsite Pond

Table C-1. Radionuclide Concentrations in West Lake Sediment.

Radionuclide	2016				2011-2015						
	No. of Samples	Concentration Maximum[a]			No. of Samples	Concentration					
						Average[b]			Maximum[a]		
		pCi/g[c]		*pCi/g*[c]		*pCi/g*[c]		*pCi/g*[c]	*pCi/g*[c]		*pCi/g*[c]
Antimony-125[d]	4	3.2E-02	±	5.3E-02	7	-1.1E-02	±	1.8E-02	6.1E-04	±	2.3E-02
Cesium-134[d,e]	4	9.1E-03	±	2.0E-02	7	1.2E-02	±	4.0E-02	1.2E-02	±	4.0E-02
Cesium-137	4	1.4E+00	±	1.3E-01	7	5.2E-01	±	8.6E-01	1.6E+00	±	1.6E-01
Cobalt-60[d]	4	1.3E-02	±	1.8E-02	7	-9.1E-04	±	1.3E-02	1.1E-02	±	1.8E-02
Europium-152[d]	4	3.3E-02	±	5.4E-02	7	2.7E-03	±	6.3E-02	5.4E-02	±	8.0E-02
Europium-154[d]	4	5.9E-02	±	6.3E-02	7	-2.4E-02	±	4.9E-02	2.7E-02	±	5.8E-02
Europium-155[d,e]	4	5.5E-02	±	6.0E-02	7	3.3E-02	±	7.2E-02	8.5E-02	±	8.6E-02
Gross Alpha[d]	4	2.3E+01	±	7.6E+00	7	7.5E+00	±	6.7E+00	1.2E+01	±	3.1E+00
Gross Beta	4	3.0E+01	±	2.4E+00	7	2.3E+01	±	1.4E+01	2.9E+01	±	2.4E+00
Potassium-40	4	1.6E+01	±	1.4E+00	7	1.5E+01	±	8.5E+00	1.9E+01	±	1.7E+00
Ruthenium-106[d]	4	1.0E-01	±	6.7E-02	7	-4.1E-02	±	1.8E-01	6.3E-02	±	1.6E-01
Strontium-90[d]	4	4.4E-01	±	9.9E-02	7	9.5E-02	±	3.4E-01	4.9E-01	±	9.7E-02
Technetium-99[d]	4	6.0E-01	±	2.8E-01	7	1.4E-01	±	3.7E-01	4.8E-01	±	3.2E-01
Uranium-234	4	9.6E+00	±	1.6E+00	7	3.7E+00	±	4.5E+00	7.6E+00	±	1.1E+00
Uranium-235[d]	4	6.5E-01	±	1.6E-01	7	2.1E-01	±	2.0E-01	3.2E-01	±	8.9E-02
Uranium-238	4	9.3E+00	±	1.5E+00	5	3.4E+00	±	4.0E+00	6.8E+00	±	1.0E+00

[a] Result and maximum values are ± total propagated analytical uncertainty.
[b] Averages are ±2 standard deviations of the mean. Average values calculated using reporting limit values for all results at or below minimum detectable concentrations.
[c] 1 pCi = 0.037 Bq.
[d] Results include concentrations below detection limit.
[e] Included rejected samples due to laboratory interference, low abundance, and/or no valid peak.

Table C-2. Radionuclide Concentrations in West Lake Seep Water.

Radionuclide	2016					2011-2015					DOE-Derived Concentration Standards	Washington State Ambient Surface Water Quality Standard[c]
	No. of samples	Concentration				No. of samples	Concentration					
		Average[a]	Maximum[b] *pCi/L*				Average[a] *pCi/L*		Maximum[b] *pCi/L*			
Tritium	1	[e]	-5.6E+00	±	1.3E+02	3	3.0E+02	± 5.6E+02	6.9E+02	± 2.1E+02	2,000,000	20,000[c,d]
Uranium-234	1	[e]	8.3E+02	±	1.4E+02	4	2.1E+02	± 1.7E+02	2.6E+02	± 3.8E+01	500	—
Uranium-235	1	[e]	4.4E+01	±	1.5E+01	4	1.2E+01	± 1.2E+01	1.9E+01	± 1.3E+01	600	—
Uranium-238	1	[e]	7.7E+02	±	1.3E+02	4	1.8E+02	± 1.5E+02	2.5E+02	± 6.9E+01	600	—

[a] Averages are ±2 standard deviations of the mean.
[b] Maximum values are ± total propagated analytical uncertainty.
[c] WAC 246-290, 40 CFR 141. Dashes indicate no concentration guides available.
[d] WAC 173-201A-250 and EPA-570/9-76-003.
[e] Average values are not calculated when only one sample was analyzed; Sample collected in 2012 did not include Tritium analysis.

Table C-3. Radionuclide Concentrations in West Lake Pond Water.

Radionuclide	2016							2011-2015							DOE-Derived Concentration Standards	Washington State Ambient Surface Water Quality Standard[c]
	No. of samples	Concentration						No. of samples	Concentration							
		Average[a] pCi/L			Maximum[b] pCi/L				Average[a] pCi/L			Maximum[b] pCi/L				
Tritium	2	-1.7E+01	±	2.3E+01	-5.1E+00	±	1.1E+02	7	3.3E+01	±	1.2E+02	1.2E+02	±	1.5E+02	2,000,000	20,000[c,d]
Uranium-234	2	5.4E+03	±	1.1E+04	1.1E+04	±	4.4E+03	7	1.7E+03	±	4.8E+03	6.6E+03	±	1.1E+03	500	—
Uranium-235	2	7.1E+02	±	1.4E+03	1.4E+03	±	1.6E+03	7	7.0E+01	±	1.8E+02	2.5E+02	±	9.4E+01	600	—
Uranium-238	2	6.9E+03	±	1.4E+04	1.4E+04	±	5.2E+03	7	1.7E+03	±	4.6E+03	6.4E+03	±	1.0E+03	600	—

[a] Averages are ±2 standard deviations of the mean.
[b] Maximum values are ± total propagated analytical uncertainty.
[c] WAC 246-290, 40 CFR 141. Dashes indicate no concentration guides available.
[d] WAC 173-201A-250 and EPA-570/9-76-003.

C.2 Ambient Air

Table C-4. Concentrations of Select Radionuclides (pCi/m^3)[a] in On-site Air Samples. (4 Pages)

Radionuclide	2016						2011–2015					EPA Table 2[e,f]
	Site	Number of Samples	Number of Detections[b]	Average[c]	Maximum[d]	Sampler	Number of Samples	Number of Detections[b]	Average[c]	Maximum[d]		
gross α	100-K Area	189	181	1.3E-03 ± 1.6E-03	4.9E-03 ± 1.1E-03	N576	907	869	1.3E-03 ± 1.8E-03	7.8E-03 ± 1.3E-03		2.0E-02
gross α	200-East	574	568	1.4E-03 ± 1.5E-03	5.2E-03 ± 1.0E-03	N158	2723	2649	1.4E-03 ± 1.9E-03	7.6E-03 ± 1.1E-03		
gross α	200-West	587	581	1.5E-03 ± 1.6E-03	5.8E-03 ± 1.1E-03	N433	2938	2866	1.4E-03 ± 2.0E-03	1.4E-02 ± 2.0E-03		
gross α	618-10 BG	112	112	1.3E-03 ± 1.5E-03	4.9E-03 ± 2.1E-03	N548	502	479	1.3E-03 ± 2.3E-03	1.6E-02 ± 2.3E-03		
gross α	ERDF	81	81	1.1E-03 ± 9.1E-04	3.2E-03 ± 1.3E-03	N518	390	372	9.6E-04 ± 9.2E-04	4.0E-03 ± 1.3E-03		
gross β	100-K Area	189	189	1.6E-02 ± 1.8E-02	5.1E-02 ± 5.0E-03	N534	909	908	1.7E-02 ± 2.2E-02	8.4E-02 ± 6.5E-03		9.0E+00
gross β	200-East	574	574	1.5E-02 ± 2.2E-02	1.8E-01 ± 1.3E-02	N158	2723	2722	1.7E-02 ± 2.3E-02	1.2E-01 ± 9.0E-03		
gross β	200-West	587	587	1.5E-02 ± 1.5E-02	4.8E-02 ± 4.6E-03	N554	2938	2938	1.6E-02 ± 2.2E-02	7.6E-02 ± 5.8E-03		
gross β	618-10 BG	112	112	1.8E-02 ± 2.2E-02	6.4E-02 ± 1.1E-02	N549	502	501	1.8E-02 ± 2.6E-02	1.1E-01 ± 9.0E-03		
gross β	ERDF	81	81	1.4E-02 ± 1.5E-02	4.3E-02 ± 7.2E-03	N517	390	390	1.4E-02 ± 1.8E-02	4.8E-02 ± 4.5E-03		
^{90}Sr	100-K Area	14	0	-6.1E-05 ± 4.1E-04	2.8E-04 ± 3.8E-04	N578	74	3	1.3E-05 ± 3.4E-04	7.5E-04 ± 6.3E-04		1.9E-02
^{90}Sr	200-East	43	1	1.3E-04 ± 1.6E-03	5.2E-03 ± 2.1E-03	N158	210	35	6.2E-05 ± 4.0E-04	1.7E-03 ± 5.7E-04		
^{90}Sr	200-West	45	0	-4.3E-05 ± 6.2E-04	5.1E-04 ± 4.7E-04	N956	228	24	6.2E-06 ± 3.2E-04	5.5E-04 ± 4.7E-04		

Table C-4. Concentrations of Select Radionuclides (pCi/m^3)[a] in On-site Air Samples. (4 Pages)

Radionuclide	2016						2011–2015					EPA Table 2[e, f]
	Site	Number of Samples	Number of Detections[b]	Average[c]	Maximum[d]	Sampler	Number of Samples	Number of Detections[b]	Average[c]	Maximum[d]		
^{90}Sr	618-10 BG	8	0	1.0E-04 ± 2.0E-04	2.7E-04 ± 2.5E-04	N579	40	6	9.8E-05 ± 2.2E-04	4.7E-04 ± 2.6E-04		
^{90}Sr	ERDF	6	0	9.4E-06 ± 7.2E-05	3.4E-05 ± 2.0E-04	N482	30	3	7.5E-05 ± 2.3E-04	3.3E-04 ± 3.6E-04		
^{137}Cs	100-K Area	14	0	3.6E-05 ± 3.6E-04	4.3E-04 ± 4.5E-04	N576	74	12	8.3E-05 ± 3.7E-04	4.9E-04 ± 2.0E-04		1.9E-02
^{137}Cs	200-East	43	2	1.6E-04 ± 8.2E-04	2.1E-03 ± 8.7E-04	N158	210	38	2.7E-04 ± 2.7E-03	1.9E-02 ± 6.2E-03		
^{137}Cs	200-West	45	0	7.0E-05 ± 3.6E-04	3.5E-04 ± 4.1E-04	N304	228	23	6.2E-05 ± 3.6E-04	7.6E-04 ± 3.8E-04		
^{137}Cs	618-10 BG	8	0	6.9E-06 ± 8.3E-05	8.5E-05 ± 1.3E-04	N548	40	4	6.3E-05 ± 4.7E-04	1.2E-03 ± 4.0E-04		
^{137}Cs	ERDF	6	0	-3.4E-05 ± 8.0E-05	3.2E-05 ± 1.0E-04	N517	30	3	4.7E-05 ± 1.9E-04	2.9E-04 ± 1.3E-04		
^{238}Pu	100-K Area	12	0	1.8E-06 ± 1.1E-05	1.3E-05 ± 1.6E-05	N578	71	0	1.9E-06 ± 1.1E-05	3.9E-05 ± 5.5E-05		2.10E-03
^{238}Pu	200-East	41	0	5.2E-07 ± 8.1E-06	1.3E-05 ± 2.0E-05	N968	198	3	5.6E-07 ± 6.0E-06	1.3E-05 ± 8.8E-06		
^{238}Pu	200-West	42	0	6.8E-07 ± 6.8E-06	9.9E-06 ± 1.2E-05	N168	210	3	6.1E-07 ± 8.1E-06	3.7E-05 ± 1.9E-05		
^{238}Pu	618-10 BG	8	0	5.7E-06 ± 1.3E-05	1.9E-05 ± 2.9E-05	N579	40	2	4.7E-06 ± 1.8E-05	4.6E-05 ± 2.2E-05		
^{238}Pu	ERDF	6	0	2.0E-06 ± 9.7E-06	7.5E-06 ± 1.9E-05	N482	30	0	8.3E-07 ± 7.1E-06	8.5E-06 ± 9.1E-06		
$^{239/240}$Pu	100-K Area	14	0	1.7E-06 ± 9.8E-06	1.5E-05 ± 3.4E-05	N534	70	9	3.2E-06 ± 1.1E-05	1.8E-05 ± 1.2E-05		2.0E-03
$^{239/240}$Pu	200-East	42	0	-6.8E-08 ± 4.8E-06	5.6E-06 ± 1.4E-05	N158	204	13	1.3E-06 ± 5.4E-06	1.2E-05 ± 6.9E-06		
$^{239/240}$Pu	200-West	43	3	1.1E-05 ± 6.8E-05	2.1E-04 ± 7.8E-05	N165	224	49	1.3E-05 ± 9.2E-05	4.5E-04 ± 1.6E-04		

Table C-4. Concentrations of Select Radionuclides (pCi/m^3)[a] in On-site Air Samples. (4 Pages)

Radionuclide	Site	2016 Number of Samples	2016 Number of Detections[b]	2016 Average[c]	2016 Maximum[d]	Sampler	2011–2015 Number of Samples	2011–2015 Number of Detections[b]	2011–2015 Average[c]	2011–2015 Maximum[d]	EPA Table 2[e, f]
$^{239/240}$Pu	618-10 BG	8	1	2.2E-05 ± 4.4E-05	7.3E-05 ± 5.3E-05	N548	40	27	8.0E-05 ± 2.7E-04	6.8E-04 ± 2.6E-04	
$^{239/240}$Pu	ERDF	5	0	7.1E-06 ± 2.0E-05	2.4E-05 ± 2.9E-05	N482	30	9	5.1E-06 ± 1.8E-05	4.6E-05 ± 2.0E-05	
^{234}U	100-K Area	12	1	7.9E-06 ± 1.0E-05	1.9E-05 ± 1.4E-05	N534	60	29	7.6E-06 ± 9.6E-06	2.1E-05 ± 1.1E-05	7.7E-03
^{234}U	200-East	43	8	1.2E-05 ± 2.2E-05	4.9E-05 ± 4.7E-05	N973	210	107	8.3E-06 ± 1.0E-05	2.6E-05 ± 1.9E-05	
^{234}U	200-West	45	3	1.1E-05 ± 2.2E-05	4.7E-05 ± 3.6E-05	N449	228	112	8.5E-06 ± 1.1E-05	3.4E-05 ± 3.9E-05	
^{234}U	618-10 BG	8	0	5.7E-06 ± 1.5E-05	2.2E-05 ± 2.7E-05	N580	40	20	1.4E-05 ± 3.1E-05	9.2E-05 ± 5.2E-05	
^{234}U	ERDF	6	0	1.0E-05 ± 2.9E-05	3.3E-05 ± 4.1E-05	N517	29	15	1.6E-05 ± 1.7E-05	4.2E-05 ± 2.1E-05	
^{235}U	100-K Area	10	0	2.8E-07 ± 7.3E-06	5.9E-06 ± 1.2E-05	N476	55	4	1.6E-06 ± 4.9E-06	9.7E-06 ± 1.8E-05	7.1E-03
^{235}U	200-East	35	0	3.4E-06 ± 1.0E-05	1.9E-05 ± 2.7E-05	N481	198	8	1.7E-06 ± 5.3E-06	1.7E-05 ± 2.1E-05	
^{235}U	200-West	38	1	7.1E-06 ± 2.4E-05	6.9E-05 ± 5.0E-05	N161	216	17	2.1E-06 ± 5.4E-06	1.2E-05 ± 1.5E-05	
^{235}U	618-10 BG	5	0	7.2E-07 ± 4.5E-06	5.2E-06 ± 1.1E-05	N580	34	2	1.8E-06 ± 7.2E-06	8.4E-06 ± 6.3E-06	
^{235}U	ERDF	5	0	8.8E-07 ± 4.8E-06	4.0E-06 ± 9.8E-06	N518	26	2	2.4E-06 ± 6.3E-06	1.3E-05 ± 2.8E-05	
^{238}U	100-K Area	12	1	3.5E-06 ± 1.1E-05	1.2E-05 ± 1.2E-05	N575	60	27	6.4E-06 ± 9.3E-06	1.9E-05 ± 1.1E-05	8.3E-03
^{238}U	200-East	43	6	7.6E-06 ± 1.7E-05	3.6E-05 ± 3.5E-05	N158	209	104	7.0E-06 ± 9.4E-06	3.0E-05 ± 2.9E-05	
^{238}U	200-West	44	3	7.8E-06 ± 1.6E-05	3.9E-05 ± 3.5E-05	N442	228	115	6.5E-06 ± 7.7E-06	2.1E-05 ± 1.0E-05	

Table C-4. Concentrations of Select Radionuclides (pCi/m^3)[a] in On-site Air Samples. (4 Pages)

Radionuclide	Site	2016 Number of Samples	2016 Number of Detections[b]	2016 Average[c]	2016 Maximum[d]	2011–2015 Sampler	2011–2015 Number of Samples	2011–2015 Number of Detections[b]	2011–2015 Average[c]	2011–2015 Maximum[d]	EPA Table 2[e, f]
^{238}U	618-10 BG	8	0	6.5E-06 ± 1.4E-05	1.7E-05 ± 2.9E-05	N548	40	25	5.6E-05 ± 3.0E-04	7.6E-04 ± 2.6E-04	
^{238}U	ERDF	6	0	8.8E-06 ± 1.8E-05	2.2E-05 ± 3.2E-05	N517	29	19	1.8E-05 ± 2.2E-05	5.3E-05 ± 7.9E-05	
^{241}Am	100-K Area	13	0	9.5E-05 ± 4.9E-04	9.0E-04 ± 2.5E-03	N900	72	10	1.1E-05 ± 4.4E-04	7.3E-04 ± 7.3E-04	1.9E-03
^{241}Am	200-East	43	0	2.9E-05 ± 1.6E-03	1.9E-03 ± 2.2E-03	N582	96	0	-6.0E-05 ± 1.5E-03	1.8E-03 ± 2.5E-03	
^{241}Am	200-West	45	1	9.9E-05 ± 1.6E-03	2.7E-03 ± 4.7E-03	N200	98	6	-2.3E-04 ± 1.7E-03	2.4E-03 ± 2.3E-03	
^{241}Am	618-10 BG	8	0	1.2E-05 ± 2.3E-05	3.7E-05 ± 4.1E-05	N579	40	22	3.5E-05 ± 1.0E-04	2.4E-04 ± 9.4E-05	
^{241}Pu	100-K Area	12	0	1.3E-04 ± 1.7E-03	2.7E-03 ± 3.3E-03	N534	60	1	1.3E-04 ± 9.6E-04	1.6E-03 ± 1.4E-03	1.9E-03
^{241}Pu	200-East	4	0	-2.5E-04 ± 9.8E-04	2.4E-04 ± 4.5E-04	N481	20	0	4.8E-05 ± 6.3E-04	7.7E-04 ± 1.1E-03	
^{241}Pu	200-West	12	0	-1.2E-04 ± 9.5E-04	7.3E-04 ± 1.6E-03	N555	12	1	8.1E-05 ± 1.1E-03	9.8E-04 ± 9.8E-03	

[a] 1 pCi = 0.037 Bq
[b] Number of samples with measurable concentrations of contaminant
[c] Average ± two standard deviations of all samples analyzed
[d] Maximum ± analytical uncertainty
[e] DOE derived concentration guides are shown for gross alpha and gross beta
[f] EPA values are based on an effective dose equivalent of 10 mrem/yr (40 CFR 61, Appendix E, Table 2)

BG = Burial Ground project
D4 = deactivation, decontamination, decommissioning, and demolition
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
ERDF = Environmental Restoration Disposal Facility

Table C-5. Concentrations of Selected Radionuclides (pCi/m^3) [a] in Ambient Air Samples. (3 Pages)

Radionuclide	Site	2016 Number of Samples	2016 Number of Detections[b]	2016 Average[c]	2016 Maximum[d]	2011 - 2015 Sampler	2011 - 2015 Number of Samples	2011 - 2015 Number of Detections[b]	2011 - 2015 Average[c]	2011 - 2015 Maximum[d]	EPA Table 2[e, f]
gross α	Onsite	539	452	7.8E-04 ± 1.3E-03	5.8E-03 ± 1.4E-03	N932	2634	2371	8.6E-04 ± 1.4E-03	8.1E-03 ± 1.1E-03	2.0E-02
gross α	Perimeter	294	247	7.7E-04 ± 1.3E-03	4.7E-03 ± 8.7E-04	N907	1416	1278	8.7E-04 ± 1.5E-03	7.7E-03 ± 1.2E-03	
gross α	Nearby Communities	189	153	7.3E-04 ± 1.1E-03	3.7E-03 ± 8.0E-04	N948	496	467	9.2E-04 ± 1.5E-03	6.0E-03 ± 9.2E-04	
gross α	Distant Community	27	19	6.6E-04 ± 1.2E-03	3.3E-03 ± 7.4E-04	N909	131	108	7.5E-04 ± 1.4E-03	4.2E-03 ± 8.5E-04	
gross β	Onsite	539	539	1.7E-02 ± 1.9E-02	6.1E-02 ± 5.7E-03	N924	2638	2638	2.0E-02 ± 2.8E-02	1.3E-01 ± 1.0E-02	9.0E+00
gross β	Perimeter	294	294	1.7E-02 ± 2.0E-02	6.4E-02 ± 6.7E-03	N937	1416	1416	2.0E-02 ± 2.6E-02	9.5E-02 ± 8.8E-03	
gross β	Nearby Communities	189	189	1.7E-02 ± 2.1E-02	7.2E-02 ± 6.6E-03	N943	906	906	2.0E-02 ± 2.8E-02	1.6E-01 ± 1.6E-02	
gross β	Distant Community	27	27	1.5E-02 ± 1.9E-02	5.2E-02 ± 4.4E-03	N909	131	131	1.8E-02 ± 2.4E-02	9.5E-02 ± 7.4E-03	
^{3}H	Onsite	126	22	4.7E+00 ± 1.2E+01	3.4E+01 ± 9.2E+00	N902	560	342	9.0E+00 ± 2.6E+01	1.1E+02 ± 1.1E+01	1.5E+03
^{3}H	Perimeter	97	5	2.5E+00 ± 9.4E+00	2.7E+01 ± 8.0E+00	N939	448	207	6.0E+00 ± 2.0E+01	9.4E+01 ± 8.9E+00	
^{3}H	Nearby Communities	28	2	4.1E+00 ± 2.2E+01	5.8E+01 ± 1.3E+01	N944	128	59	5.4E+00 ± 1.4E+01	4.8E+01 ± 1.1E+01	
^{3}H	Distant Community	13	1	1.7E+00 ± 4.7E+00	5.8E+00 ± 4.7E+00	N909	65	24	5.1E+00 ± 2.0E+01	7.1E+01 ± 1.2E+01	
^{90}Sr	Onsite	34	0	-4.7E-05 ± 7.2E-04	1.4E-03 ± 1.2E-03	N922	149	2	1.4E-05 ± 3.2E-04	9.7E-04 ± 7.9E-04	1.9E-02

Table C-5. Concentrations of Selected Radionuclides (pCi/m^3) [a] in Ambient Air Samples. (3 Pages)

Radionuclide	Site	2016 Number of Samples	2016 Number of Detections[b]	2016 Average[c]	2016 Maximum[d]	2011 - 2015 Sampler	2011 - 2015 Number of Samples	2011 - 2015 Number of Detections[b]	2011 - 2015 Average[c]	2011 - 2015 Maximum[d]	EPA Table 2[e, f]
^{90}Sr	Perimeter	18	0	-7.5E-05 ± 3.7E-04	3.3E-04 ± 4.3E-04	N935	108	0	1.2E-05 ± 3.2E-04	6.5E-04 ± 6.4E-04	
^{90}Sr	Nearby Communities	6	0	1.7E-05 ± 3.6E-04	2.8E-04 ± 3.0E-04	N945	38	0	7.6E-06 ± 1.9E-04	4.0E-04 ± 5.0E-04	
^{90}Sr	Distant Community	2	0	-1.0E-04 ± 4.2E-05	-8.4E-05 ± 3.6E-04	N909	15	0	2.7E-05 ± 2.1E-04	2.8E-04 ± 2.5E-04	
^{137}Cs	Onsite	40	0	-5.7E-06 ± 3.9E-04	3.2E-04 ± 4.3E-04	N912	207	2	8.3E-05 ± 5.3E-04	1.2E-03 ± 1.0E-03	1.9E-02
^{137}Cs	Perimeter	22	0	9.3E-05 ± 2.8E-04	3.5E-04 ± 2.1E-04	N933	138	2	5.5E-05 ± 7.9E-04	1.9E-03 ± 1.6E-03	
^{137}Cs	Nearby Communities	14	0	-2.8E-06 ± 3.0E-04	3.5E-04 ± 4.6E-04	N948	96	1	1.1E-04 ± 6.8E-04	1.2E-03 ± 7.0E-04	
^{137}Cs	Distant Community	2	0	-6.9E-05 ± 2.7E-04	6.7E-05 ± 2.3E-04	N909	15	0	6.1E-05 ± 6.4E-04	7.7E-04 ± 9.1E-04	
^{234}U	Onsite	28	16	4.7E-05 ± 5.6E-05	1.3E-04 ± 7.6E-05	N920	152	133	3.8E-05 ± 3.0E-05	1.2E-04 ± 7.6E-05	7.7E-03
^{234}U	Perimeter	8	6	5.2E-05 ± 3.2E-05	9.0E-05 ± 5.3E-05	N936	60	53	4.5E-05 ± 3.8E-05	8.3E-05 ± 1.8E-05	
^{234}U	Nearby Communities	10	6	5.8E-05 ± 5.1E-05	1.1E-04 ± 7.0E-05	N945	68	59	4.6E-05 ± 3.1E-05	8.7E-05 ± 1.9E-05	
^{234}U	Distant Community	2	2	7.7E-05 ± 2.3E-05	8.8E-05 ± 5.6E-05	N909	15	12	3.7E-05 ± 3.1E-05	7.2E-05 ± 3.5E-05	
^{238}U	Onsite	28	18	3.8E-05 ± 3.4E-05	6.8E-05 ± 4.6E-05	N920	152	146	4.1E-05 ± 2.6E-05	9.3E-05 ± 6.5E-05	8.3E-03
^{238}U	Perimeter	8	6	4.3E-05 ± 2.4E-05	6.4E-05 ± 5.1E-05	N937	60	56	4.9E-05 ± 3.7E-05	1.2E-04 ± 6.4E-05	
^{238}U	Nearby Communities	10	8	5.9E-05 ± 3.0E-05	8.1E-05 ± 5.3E-05	N946	68	66	4.9E-05 ± 2.2E-05	8.0E-05 ± 6.9E-05	
^{238}U	Distant Community	2	1	3.5E-05 ± 1.4E-05	4.1E-05 ± 3.7E-05	N909	15	13	3.6E-05 ± 2.5E-05	6.0E-05 ± 2.5E-05	

Table C-5. Concentrations of Selected Radionuclides (pCi/m^3) [a] in Ambient Air Samples. (3 Pages)

Radionuclide	Site	2016 Number of Samples	2016 Number of Detections[b]	2016 Average[c]	2016 Maximum[d]	Sampler	2011 - 2015 Number of Samples	2011 - 2015 Number of Detections[b]	2011 - 2015 Average[c]	2011 - 2015 Maximum[d]	EPA Table 2[e, f]
$^{239/240}$Pu	Onsite	39	0	-1.4E-06 ± 1.2E-05	1.1E-05 ± 1.9E-05	N931	194	7	1.2E-06 ± 2.5E-05	1.6E-04 ± 5.2E-05	2.0E-03
$^{239/240}$Pu	Perimeter	18	0	-3.9E-07 ± 1.1E-05	1.0E-05 ± 2.4E-05	N938	103	3	4.1E-07 ± 6.2E-06	1.8E-05 ± 1.9E-05	
$^{239/240}$Pu	Nearby Communities	8	0	2.5E-06 ± 1.3E-05	1.1E-05 ± 2.6E-05	N946	51	4	-7.8E-08 ± 6.9E-06	1.0E-05 ± 3.7E-06	
$^{239/240}$Pu	Distant Community	2	0	-1.7E-06 ± 3.9E-06	2.6E-07 ± 2.6E-06	N909	15	0	6.1E-08 ± 2.9E-06	2.7E-06 ± 2.6E-06	
^{241}Am	Onsite	40	0	1.2E-05 ± 2.1E-03	2.2E-03 ± 2.7E-03	N929	207	3	1.0E-05 ± 1.9E-03	4.0E-03 ± 3.2E-03	1.9E-03
^{241}Am	Perimeter	22	0	1.4E-04 ± 1.4E-03	1.7E-03 ± 2.0E-03	N933	138	0	-1.1E-04 ± 2.1E-03	2.1E-03 ± 2.3E-03	
^{241}Am	Nearby Communities	14	0	1.3E-04 ± 1.9E-03	2.8E-03 ± 2.1E-03	N949	96	0	-2.2E-04 ± 3.0E-03	5.1E-03 ± 5.3E-03	
^{241}Am	Distant Community	2	0	5.0E-05 ± 2.1E-04	1.6E-04 ± 1.6E-03	N909	15	0	-5.3E-04 ± 3.1E-03	1.8E-03 ± 2.1E-03	

[a] 1 pCi = 0.037 Bq.
[b] Number of samples with measurable concentrations of contaminant. Detection is defined as a value reported above the minimum detectable activity and above the total propagated analytical uncertainty.
[c] Average ± two standard deviations of all samples analyzed.
[d] Maximum ± analytical uncertainty
[e] DOE derived concentration guides are shown for gross alpha and gross beta
[f] EPA values are based on an effective dose equivalent of 10 mrem/year (40 CFR 61, Appendix E, Table 2).

C.3 Columbia River Water

Table C-6. Radionuclide Concentrations in Columbia River Water (Richland, Washington). (2 Pages)

Radionuclide [b]		2016				2011-2015				WA Ambient Surface Water Quality Standard [d]
		Number of		Concentration [a]		Number of		Concentration [a]		
		Samples	Detects	Maximum (pCi/L) [c]	Average (pCi/L) [c]	Samples	Detects	Maximum (pCi/L) [c]	Average (pCi/L) [c]	
Composite System										
Strontium-90		14	0	3.04E-02 ± 2.54E-02	-6.24E-03 ± 4.72E-02	62	0	5.58E-02 ± 3.70E-02	1.51E-02 ± 4.90E-02	8
Tritium		14	14	4.92E+01 ± 1.15E+01	3.00E+01 ± 2.15E+01	62	62	1.08E+02 ± 1.70E+01	3.19E+01 ± 2.97E+01	20000
Technetium-99		14	0	4.01E-01 ± 3.22E-01	3.21E-01 ± 4.88E-01	62	0	6.18E-01 ± 4.48E-01	5.40E-02 ± 4.73E-01	900
Uranium-234		14	14	3.35E-01 ± 6.07E-02	2.90E-01 ± 7.57E-02	62	62	3.40E-01 ± 7.49E-02	2.61E-01 ± 7.11E-02	--
Uranium-235		14	3	3.41E-02 ± 2.36E-02	1.58E-02 ± 2.19E-02	62	16	7.81E-02 ± 3.59E-02	1.57E-02 ± 2.80E-02	--
Uranium-238		14	14	2.53E-01 ± 5.53E-02	2.19E-01 ± 1.89E-02	62	62	2.82E-01 ± 6.34E-02	2.14E-01 ± 6.01E-02	--
Continuous System										
Cesium-137	D[b]	12	0	2.35E-03 ± 2.25E-03	-5.47E-04 ± 3.14E-03	44	0	1.67E-03 ± 3.08E-03	-5.61E-05 ± 1.90E-03	200
	P[b]	12	0	4.4E-03 ± 5.6E-03	3.0E-04 ± 5.0E-03	44	0	6.0E-03 ± 4.7E-03	6.9E-04 ± 4.0E-03	
Plutonium-238[e]	D[b]	12	0	4.1E-05 ± 5.0E-05	-7.5E-06 ± 5.9E-05	23	0	8.7E-05 ± 7.4E-05	8.1E-06 ± 6.2E-05	600
	P[b]	12	2	7.9E-04 ± 3.1E-04	7.6E-05 ± 4.4E-04	23	1	3.6E-04 ± 1.6E-04	4.0E-05 ± 1.8E-04	
Plutonium-239/240[e]	D[b]	12	0	8.3E-05 ± 7.5E-05	1.5E-05 ± 3.2E-05	23	0	6.3E-05 ± 4.7E-05	8.1E-06 ± 4.1E-05	--
	P[b]	12	0	7.5E-05 ± 1.0E-04	2.3E-05 ± 5.9E-05	23	0	1.4E-04 ± 1.3E-04	1.2E-05 ± 1.8E-04	

[a] Maximum values are ± total propagated analytical uncertainty (2 sigma). Averages are ±2 standard deviations of the mean.
[b] Radionuclides measured using the continuous system show the particulate (P) and dissolved (D) fractions separately. Other radionuclides are based on unfiltered water samples collected by the composite system (see Section 7.2).
[c] 1 pCi = 0.037 Bq.
[d] WAC 173-201A-250 and EPA-570/9-76-003; WAC 246-290; 40 CFR 141.
[e] Samples from 2011 were not included as there was no distinguishing characters within the database to differentiate between filter and resin. Plutonium-238 and Plutonium 239/240 were analyzed quarterly in previous years resulting in less samples.

== = No concentration guides available
WA = Washington State

Table C-7. Radionuclide Concentrations in Columbia River Water (Priest Rapids Dam, Washington). (2 Pages)

Radionuclide [b]		2016				2011-2015				WA Ambient Surface Water Quality Standard [d]
		Number of		Concentration [a]		Number of		Concentration [a]		
		Samples	Detects	Maximum (pCi/L) [c]	Average (pCi/L) [c]	Samples	Detects	Maximum (pCi/L) [c]	Average (pCi/L) [c]	
Composite System										
Strontium-90		14	0	3.59E-02 ± 3.51E-02	2.01E-03 ± 4.27E-02	62	0	5.37E-02 ± 3.74E-02	1.26E-02 ± 4.49E-02	8
Tritium		14	12	2.68E+01 ± 7.26E+00	1.46E+01 ± 1.00E+01	62	61	2.98E+01 ± 8.77E+00	1.77E+01 ± 1.00E+01	20000
Technetium-99		14	0	4.54E-01 ± 4.67E-01	7.16E-02 ± 5.76E-01	62	0	6.01E-01 ± 4.60E-01	6.50E-03 ± 4.18E-01	900
Uranium-234		14	14	3.36E-01 ± 6.49E-02	2.56E-01 ± 9.22E-02	62	62	3.23E-01 ± 7.13E-02	2.28E-01 ± 7.15E-02	--
Uranium-235		14	4	7.07E-02 ± 5.69E-02	2.24E-02 ± 3.47E-02	62	16	7.37E-02 ± 3.25E-02	1.35E-02 ± 2.74E-02	--
Uranium-238		14	14	2.73E-01 ± 1.04E-01	2.10E-01 ± 6.74E-02	62	62	2.41E-01 ± 6.19E-02	1.83E-01 ± 5.46E-02	--
Continuous System										
Cesium-137	D[b]	13	0	2.2E-03± 2.6E-03	1.2E-04 ± 1.7E-03	45	0	4.00E-03 ± 2.3E-03	3.7E-04 ± 1.8E-03	200
	P[b]	13	0	4.9E-03 ± 7.1E-03	9.1E-04 ± 3.3E-03	47	0	5.1E-03 ± 4.9E-03	6.2E-04 ± 4.1E-03	
Plutonium-238[e]	D[b]	13	0	1.7E-05 ± 4.2E-05	-1.1E-05 ± 5.1E-05	24	0	5.4E-05 ± 7.0E-05	5.4E-06 ± 3.9E-05	600
	P[b]	12	1	4.9E-04 ± 2.8E-04	5.2E-05 ± 2.8E-04	23	2	5.2E-04 ± 5.1E-05	2.4E-05 ± 2.8E-04	
Plutonium-239/240[e]	D[b]	13	0	3.5E-05 ± 4.8E-05	-4.3E-06 ± 3.5E-05	24	0	8.8E-05 ± 6.30E-05	7.5E-06 ± 4.8E-05	--
	P[b]	12	0	2.0E-04 ± 1.8E-04	4.7E-05 ± 1.0E-04	23	1	2.4E-04 ± 1.1E-04	2.8E-05 ± 1.3E-04	

[a] Maximum values are ± total propagated analytical uncertainty (2 sigma). Averages are ±2 standard deviations of the mean.
[b] Radionuclides measured using the continuous system show the particulate (P) and dissolved (D) fractions separately. Other radionuclides are based on unfiltered water samples collected by the composite system (see Section 7.2).
[c] 1 pCi = 0.037 Bq.
[d] WAC 173-201A-250 and EPA-570/9-76-003; WAC 246-290; 40 CFR 141.
[e] Samples from 2011 were not included as there was no distinguishing characters within the database to differentiate between filter and resin.
NOTE: Plutonium-238 and Plutonium 239/240 were analyzed quarterly in previous years resulting in less samples.

-- = no concentration guides available
WA = Washington State

Table C-8. 2016 Radionuclide Concentrations in Columbia River Transect Water Samples.

Transect/Radionuclide	No. of Detections	No. of Samples	Concentration[a]					
			Maximum *pCi/L*[b]			Average *pCi/L*[b]		
Vernita Bridge (HRM 0.3)								
Strontium-90[c]	0	8	0.04	±	0.04	0.01	±	0.04
Technitium-99[c]	0	8	0.14	±	0.54	-0.26	±	0.57
Tritium	8	8	21.5	±	11.1	13.4	±	7.7
Uranium-234	8	8	0.36	±	0.07	0.27	±	0.08
Uranium-235	4	8	0.05	±	0.03	0.03	±	0.04
Uranium-238	8	8	0.28	±	0.06	0.22	±	0.06
100—N Area (HRM 9.5)								
Strontium-90[c]	0	6	0.05	±	0.04	0.0004	±	0.06
Tritium	6	6	25.1	±	10.5	18.7	±	6.0
Uranium-234	6	6	0.26	±	0.05	0.24	±	0.03
Uranium-235	3	6	0.03	±	0.02	0.016	±	0.012
Uranium-238	6	6	0.20	±	0.04	0.18	±	0.03
Hanford Townsite (HRM 28.7)								
Strontium-90[c]	0	6	0.020	±	0.03	0.01	±	0.025
Tritium	6	6	108.0	±	37.2	45.7	±	85.5
Uranium-234	6	6	0.28	±	0.05	0.24	±	0.06
Uranium-235	3	6	0.05	±	0.02	0.03	±	0.02
Uranium-238	6	6	0.20	±	0.05	0.18	±	0.05
300 Area (HRM 43.1)								
Strontium-90[c]	0	5	0.02	±	0.03	-0.0027	±	0.02
Tritium	5	5	39.1	±	9.3	20.1	±	19.7
Uranium-234	5	5	0.59	±	0.10	0.30	±	0.30
Uranium-235	1	5	0.02	±	0.02	0.01	±	0.01
Uranium-238	5	5	0.45	±	0.08	0.24	±	0.08
Richland (HRM 46.4)								
Strontium-90[c]	0	10	0.04	±	0.04	-0.0013	±	0.05
Technitium-99	1	10	-0.14	±	0.50	-0.30	±	0.27
Tritium	12	10	49.6	±	12.6	23.0	±	24.8
Uranium-234	12	10	0.38	±	0.07	0.31	±	0.10
Uranium-235	5	10	0.07	±	0.03	0.02	±	0.04
Uranium-238	12	10	0.31	±	0.07	0.24	±	0.06

[a] Maximum values ± total propagated analytical uncertainty; Average values ± 2stdv.
[b] 1 pCi = 0.037 Bq.
[c] Less than the laboratory—reported detection limit.
HRM = Hanford river marker.

Table C-9. Dissolved Metal Concentrations in Columbia River Transect Water Near Hanford Site. (3 Pages)

Metal	No. of Samples	No. of Detections	Maximum (µg/L)[a]	Minimum (µg/L)[a]	Average (±2 SD) (µg/L)[a,c]		Minimum Detectable Concentrations (µg/L)	Washington State Ambient Surface Water Quality Chronic Toxicity Level[b]
Vernita Bridge								
Antimony	8	0	—	—	—	—	1	N/A
Arsenic	8	2	1.87	1.70	1.74	0.13	1.7	190
Beryllium	8	0	—	—	—	—	0.2	N/A
Cadmium	8	0	—	—	—	—	0.11	N/A
Chromium	8	0	—	—	—	—	2	10
Copper	8	8	0.63	0.43	0.54	0.12	0.35	6
Hexavalent Chromium	4	0	—	—	—	—	1.5	10
Lead	8	0	—	—	—	—	0.5	1.1
Nickel	8	0	—	—	—	—	0.5	83
Selenium	8	0	—	—	—	—	1.5	5
Silver	8	0	—	—	—	—	0.2	N/A
Thallium	8	0	—	—	—	—	0.45	N/A
Uranium	8	8	0.63	0.53	0.58	0.09	0.067	N/A
Zinc	8	2	4.18	3.50	3.66	0.56	3.5	55
100-N Area								
Antimony	7	0	—	—	—	—	1	N/A
Arsenic	7	0	—	—	—	—	1.7	190
Beryllium	7	0	—	—	—	—	0.2	N/A
Cadmium	7	0	—	—	—	—	0.11	N/A
Chromium	7	0	—	—	—	—	2	10
Copper	7	7	0.77	0.51	0.58	0.17	0.35	6
Hexavalent Chromium	6	0	—	—	—	—	1.5	10
Lead[d]	7	1	0.50	0.17	0.45	0.23	0.5	1.1
Nickel	7	0	—	—	—	—	0.5	83
Selenium	7	0	—	—	—	—	1.5	5
Silver	7	0	—	—	—	—	0.2	N/A
Thallium	7	0	—	—	—	—	0.45	N/A
Uranium	7	7	0.63	0.53	0.58	0.09	0.067	N/A
Zinc	7	2	4.20	3.50	3.70	0.56	3.5	55

Table C-9. Dissolved Metal Concentrations in Columbia River Transect Water Near Hanford Site. (3 Pages)

Metal	No. of Samples	No. of Detections	Maximum (µg/L)[a]	Minimum (µg/L)[a]	Average (±2 SD) (µg/L)[a,c]		Minimum Detectable Concentrations (µg/L)	Washington State Ambient Surface Water Quality Chronic Toxicity Level[b]
Hanford Townsite								
Antimony	6	0	—	—	—	—	1	N/A
Arsenic	6	4	1.86	1.70	1.76	0.12	1.7	190
Beryllium	6	0	—	—	—	—	0.2	N/A
Cadmium	6	0	—	—	—	—	0.11	N/A
Chromium	6	0	—	—	—	—	2	10
Copper	6	6	0.58	0.44	0.50	0.10	0.35	6
Hexavalent Chromium	6	0	—	—	—	—	1.5	10
Lead	6	0	—	—	—	—	0.5	1.1
Nickel	6	0	—	—	—	—	0.5	83
Selenium	6	0	—	—	—	—	1.5	5
Silver	6	0	—	—	—	—	0.2	N/A
Thallium	6	0	—	—	—	—	0.45	N/A
Uranium	6	6	0.51	0.47	0.48	0.03	0.067	N/A
Zinc	6	0	—	—	—	—	3.5	55
300 Area								
Antimony	5	0	—	—	—	—	1	N/A
Arsenic	5	0	—	—	—	—	1.7	190
Beryllium	5	0	—	—	—	—	0.2	N/A
Cadmium	5	0	—	—	—	—	0.11	N/A
Chromium	5	0	—	—	—	—	2	10
Copper	5	5	0.54	0.42	0.50	0.08	0.35	6
Hexavalent Chromium	5	0	—	—	—	—	1.5	10
Lead	5	0	—	—	—	—	0.5	1.1
Nickel	5	0	—	—	—	—	0.5	83
Selenium	5	0	—	—	—	—	1.5	5
Silver	5	0	—	—	—	—	0.2	N/A
Thallium	5	0	—	—	—	—	0.45	N/A
Uranium	5	5	1.26	0.54	0.73	0.54	0.067	N/A
Zinc	5	0	—	—	—	—	3.5	55

Table C-9. Dissolved Metal Concentrations in Columbia River Transect Water Near Hanford Site. (3 Pages)

Metal	No. of Samples	No. of Detections	Maximum (µg/L)[a]	Minimum (µg/L)[a]	Average (±2 SD) (µg/L)[a,c]		Minimum Detectable Concentrations (µg/L)	Washington State Ambient Surface Water Quality Chronic Toxicity Level[b]
Richland								
Antimony	10	0	—	—	—	—	1	N/A
Arsenic	10	4	2.22	1.70	1.79	0.32	1.7	190
Beryllium	10	0	—	—	—	—	0.2	N/A
Cadmium	10	0	—	—	—	—	0.11	N/A
Chromium	10	0	—	—	—	—	2	10
Copper	10	10	0.88	0.37	0.55	0.27	0.35	6
Hexavalent Chromium	5	0	—	—	—	—	1.5	10
Lead	10	0	—	—	—	—	0.5	1.1
Nickel	10	5	1.07	0.50	0.75	0.50	0.5	83
Selenium	10	0	—	—	—	—	1.5	5
Silver	10	0	—	—	—	—	0.2	N/A
Thallium	10	0	—	—	—	—	0.45	N/A
Uranium	10	10	0.88	0.53	0.65	0.19	0.067	N/A
Zinc	10	2	3.99	3.50	3.57	0.31	3.5	55

[a] Dashes indicate results at or below minimum detectable concentrations.
[b] WAC 173-201A-240, and WAC 173-201A-250. Table 240(3) Toxic Substances Criteria for the protection of aquatic life. For hardness—dependent criteria, the minimum value of 47 mg CaCo3/L, for 1992 through 2000 water samples collected near Vernita Bridge by the U.S. Geological Survey was used. Parts per million (ppm) values are equivalent to the reported micrograms per liter (µg/L) concentrations shown.
[c] Average calculated using reporting limit values for all results at or below minimum detectable concentrations.
[d] Single detected value.

SD = Standard deviation

C.4 Sediment in Columbia Riverbed and Hanford Shorelines

Table C-10. Radionuclide Concentrations in Columbia River and Shoreline Sediment (Near Hanford Site). (4 Pages)

Sediment Location	Radionuclide	2016					2011-2015				
		No. of Samples	No. of Detects	Maximum Concentration[a] *pCi/g*		*pCi/g*	No. of Samples	No. of Detects	Average Concentration[a] *pCi/g*		*pCi/g*
Adjacent to Locke Island	Cesium-137	1	0	1.53E-02	±	2.47E-02	3	0	7.56E-03	±	1.81E-02
	Cobalt-60	1	0	-1.72E-02	±	1.41E-02	3	0	-4.40E-03	±	2.11E-02
	Europium-152	1	0	1.49E-01	±	7.66E-02	3	0	-1.29E-02	±	1.04E-02
	Europium-155[b]	1	0	N/A			3	0	N/A		
	Plutonium-239/240	1	0	-1.93E-03	±	4.47E-03	3	0	1.78E-03	±	3.91E-03
	Uranium-234	1	1	1.13E+00	±	1.38E-01	3	3	1.39E+00	±	1.14E-01
	Uranium-235	1	1	1.11E-01	±	3.00E-02	3	3	9.02E-02	±	2.51E-03
	Uranium-238	1	1	1.21E+00	±	1.47E-01	3	3	1.34E+00	±	1.72E-01
Adjacent to Savage Island	Cesium-137	1	1	4.16E-02	±	2.33E-02	3	3	3.66E-02	±	1.36E-02
	Cobalt-60	1	0	-7.28E-04	±	1.08E-02	3	0	6.01E-03	±	1.06E-02
	Europium-152	1	0	N/A			3	0	-1.38E-02	±	8.63E-03
	Europium-155[b]	1	0	-2.12E-02	±	2.30E-02	3	0	4.45E-03	±	7.28E-02
	Plutonium-239/240	1	0	4.02E-03	±	6.41E-03	3	0	1.19E-03	±	2.98E-03
	Uranium-234	1	1	5.88E-01	±	8.18E-02	3	3	8.25E-01	±	3.03E-01
	Uranium-235	1	1	6.27E-02	±	2.18E-02	3	3	6.50E-02	±	3.39E-02
	Uranium-238	1	1	6.48E-01	±	8.81E-02	3	3	7.53E-01	±	2.43E-01
100-D Spring 102-1	Cesium-137	3	3	1.12E-01	±	5.63E-02	4	4	1.39E-01	±	8.25E-02
	Cobalt-60	3	0	1.99E-04	±	7.10E-03	4	1	1.61E-02	±	5.34E-02
	Europium-152	3	0	3.90E-02	±	9.26E-02	4	0	1.65E-02	±	5.40E-02
	Europium-155	3	0	1.08E-02	±	4.72E-02	4	1	4.29E-02	±	7.77E-03
	Plutonium-239/240	3	1	1.61E-02	±	9.70E-03	4	2	1.22E-03	±	2.93E-03
	Uranium-234	3	3	5.85E-01	±	1.00E-01	4	4	4.68E-01	±	1.23E-01

Table C-10. Radionuclide Concentrations in Columbia River and Shoreline Sediment (Near Hanford Site). (4 Pages)

Sediment Location	Radionuclide	2016					2011-2015				
		No. of Samples	No. of Detects	Maximum Concentration[a] *pCi/g*		*pCi/g*	No. of Samples	No. of Detects	Average Concentration[a] *pCi/g*		*pCi/g*
	Uranium-235	3	3	6.81E-02	±	1.30E-02	4	4	4.91E-02	±	2.09E-02
	Uranium-238	3	3	5.79E-01	±	1.00E-01	4	4	4.95E-01	±	7.47E-02
100F Slough	Cesium-137	1	1	2.01E-01	±	5.03E-02	5	5	1.85E-01	±	5.42E-02
	Cobalt-60	1	0	1.75E-03	±	2.45E-02	5	0	2.31E-03	±	1.89E-02
	Europium-152	1	0	4.71E-02	±	6.68E-02	5	0	1.25E-03	±	4.89E-02
	Europium-155	1	0	-2.97E-02	±	5.90E-02	5	0	4.67E-02	±	3.94E-02
	Plutonium-239/240	1	0	-5.12E-04	±	7.70E-03	5	2	2.33E-03	±	1.96E-03
	Uranium-234	1	1	6.58E-01	±	8.87E-02	5	5	5.51E-01	±	1.92E-01
	Uranium-235	1	1	4.51E-02	±	1.83E-02	5	5	5.97E-02	±	1.93E-02
	Uranium-238	1	1	6.40E-01	±	8.66E-02	5	5	4.90E-01	±	1.64E-01
100-K Spring 63-1	Cesium-137	2	2	1.22E-01	±	5.55E-02	2	2	7.14E-02	±	8.92E-02
	Cobalt-60	2	0	2.84E-02	±	3.04E-02	2	0	4.00E-04	±	5.14E-03
	Europium-152	2	0	3.84E-03	±	4.09E-02	2	0	-1.61E-02	±	2.90E-02
	Europium-155[b]	2	0	N/A			2	0	N/A		
	Plutonium-239/240	2	0	8.31E-03	±	8.54E-03	1	0	2.47E-03	±	7.88E-04
	Uranium-234	2	2	1.34E+00	±	1.58E-01	2	2	9.03E-01	±	3.74E-01
	Uranium-235	2	2	7.79E-02	±	2.50E-02	2	2	5.17E-02	±	5.40E-03
	Uranium-238	2	2	1.24E+00	±	1.48E-01	2	2	8.13E-01	±	2.46E-01
Hanford Slough	Cesium-137	1	1	2.19E-01	±	3.24E-02	6	6	2.46E-01	±	3.42E-02
	Cobalt-60	1	0	-8.99E-03	±	1.35E-02	6	0	-5.80E-03	±	4.43E-02
	Europium-152	1	0	3.20E-03	±	2.44E-02	6	0	3.63E-02	±	5.82E-02
	Europium-155[b]	1	0	N/A			6	0	4.74E-02	±	1.06E-01
	Plutonium-239/240[b]	1	1	4.79E-03	±	7.78E-03	6	0	2.58E-03	±	1.66E-03
	Uranium-234	1	1	5.93E-01	±	8.14E-02	6	6	1.33E+00	±	2.50E+00
	Uranium-235	1	1	6.77E-02	±	2.24E-02	6	5	8.97E-02	±	1.73E-01

Table C-10. Radionuclide Concentrations in Columbia River and Shoreline Sediment (Near Hanford Site). (4 Pages)

Sediment Location	Radionuclide	2016					2011-2015				
		No. of Samples	No. of Detects	Maximum Concentration[a] *pCi/g*		*pCi/g*	No. of Samples	No. of Detects	Average Concentration[a] *pCi/g*		*pCi/g*
	Uranium-238	1	1	6.45E-01	±	8.67E-02	6	6	7.79E-01	±	4.04E-01
McNary Dam	Cesium-137	2	2	2.23E-01	±	4.68E-02	10	10	2.31E-01	±	4.26E-02
	Cobalt-60	2	0	1.40E-02	±	2.53E-02	10	0	5.06E-03	±	4.20E-02
	Europium-152	2	0	7.56E-02	±	7.93E-02	10	0	5.18E-02	±	8.06E-02
	Europium-155	2	0	3.37E-02	±	6.45E-02	10	0	8.71E-02	±	3.33E-02
	Plutonium-239/240	2	2	1.33E-02	±	1.20E-02	10	7	9.00E-03	±	8.71E-03
	Uranium-234	2	2	1.51E+00	±	1.66E-01	10	10	1.45E+00	±	2.54E-01
	Uranium-235	2	2	1.06E-01	±	3.12E-02	10	10	7.57E-02	±	2.61E-02
	Uranium-238	2	2	1.22E+00	±	1.38E-01	10	10	1.23E+00	±	1.77E-01
Priest Rapids Dam	Cesium-137	2	2	2.96E-01	±	7.80E-02	10	10	2.54E-01	±	7.25E-02
	Cobalt-60	2	0	2.04E-02	±	2.86E-02	10	0	-5.17E-03	±	1.69E-02
	Europium-152	2	0	2.72E-03	±	7.63E-02	10	10	-8.08E-03	±	8.01E-02
	Europium-155[b]	2	0	7.81E-02	±	9.05E-02	10	0	6.07E-02	±	4.98E-02
	Plutonium-239/240	2	2	1.44E-02	±	1.12E-02	10	10	9.94E-03	±	1.91E-03
	Uranium-234	2	2	1.41E+00	±	1.59E-01	10	10	1.21E+00	±	3.07E-01
	Uranium-235	2	2	9.37E-02	±	2.49E-02	10	10	7.63E-02	±	4.50E-02
	Uranium-238	2	2	1.25E+00	±	1.43E-01	10	10	1.08E+00	±	2.55E-01
White Bluffs Slough	Cesium-137	1	1	2.88E-01	±	7.86E-02	5	5	3.74E-01	±	1.27E-01
	Cobalt-60	1	0	-3.08E-03	±	2.94E-02	5	0	4.84E-04	±	1.41E-02
	Europium-152[b]	1	0	7.06E-02	±	8.70E-02	5	0	9.24E-02	±	1.49E-01
	Europium-155[b]	1	0	5.87E-02	±	8.14E-02	5	0	7.89E-02	±	2.82E-02
	Plutonium-239/240	1	0	8.00E-03	±	8.47E-03	5	3	3.39E-03	±	2.36E-03
	Uranium-234	1	1	1.15E+00	±	1.51E-01	5	5	9.24E-01	±	2.69E-01
	Uranium-235	1	1	1.21E-01	±	3.41E-02	5	5	6.02E-02	±	5.53E-02

Table C-10. Radionuclide Concentrations in Columbia River and Shoreline Sediment (Near Hanford Site). (4 Pages)

Sediment Location	Radionuclide	2016					2011-2015				
		No. of Samples	No. of Detects	Maximum Concentration[a] *pCi/g*		*pCi/g*	No. of Samples	No. of Detects	Average Concentration[a] *pCi/g*		*pCi/g*
	Uranium-238	1	1	1.09E+00	±	1.44E-01	5	5	9.12E-01	±	3.11E-01

[a] Maximum Concentrations ± Analytical Uncertainty; Average Concentrations ± 2stdv
[b] Includes samples rejected by the analytical laboratory due to low abundance or no valid peak.

N/A = Not applicable

Table C-11. Dissolved Metal Concentration Ranges in Columbia River Sediment (Near Hanford Site).

Metal	Priest Rapids Dam *(mg/kg dry weight)*	Hanford Reach [a] *(mg/kg dry weight)*	McNary Dam *(mg/kg dry weight)*
Antimony	0.86 - 1.1	0.52 - 2.6	0.88 - 0.89
Arsenic	5.3 - 5.5	1.3 - 8.5	4.7 - 6.0
Beryllium	0.91 - 1.05	0.45 - 1.45	1.1 - 1.3
Cadmium	3.1 - 4.5	0.24 - 2.7	0.95 - 0.97
Chromium	31 - 33.8	8.6 - 88.3	22.1 - 22.2
Copper	39.2 - 49.3	7.6 - 31.6	24.8 - 28.9
Lead	33.6 - 37.1	6.7 - 68.4	19.3 - 19.6
Mercury	0.11 - 0.12	0.004 – 0.05	0.07 – 0.09
Nickel	34 - 35.5	6.5 - 19.9	20.4 - 21.6
Selenium	1.8 - 3.2	0.62 - 2.0	2.6 - 2.8
Silver	0.95 - 1.06	0.48 - 0.79	1.0 - 1.03
Thallium	1.3 - 1.5	0.65 - 3.3	1.1 - 1.4
Zinc	338 - 409	57.0 - 383	176 - 200
No. of Samples	**2**	**13**	**2**

[a] 100-F Slough (n=1), Hanford Slough (n=1), White Bluffs Slough (n=1), Adjacent to Locke Island (n=1), Adjacent to Savage Island (n=1), 100-H 145-1 (n=2), 100-D Spring 102-1 (n=2), 100-K 63-1 (n=2), 300 Area (n=2); where n = number of samples.

Table C-12. Total Organic Carbon in Columbia River Sediment.

Sediment Location	2016			2011-2015		
	No. of Samples	Concentration[a] Minimum *mg/kg*	Concentration[a] Maximum *mg/kg*	No. of Samples	Concentration[a] Minimum *mg/kg*	Concentration[a] Maximum *mg/kg*
Adjacent to Locke Island[b]	0	N/A	N/A	1	N/A	1.17E+03
Adjacent to Salvage Island[b]	0	N/A	N/A	1	N/A	2.24E+03
100-D Spring 102-1	2	3.34E+03	4.35E+03	4	1.59E+03	5.87E+03
100F Slough	1	N/A	2.18E+03	5	1.43E+03	2.61E+03
100-K Spring 63-1	2	5.90E+03	1.81E+04	1	N/A	1.39E+04
Hanford Slough	1	N/A	1.20E+04	6	5.29E+03	1.70E+04
McNary Dam	2	2.34E+04	2.52E+04	10	4.45E+03	2.42E+04
Priest Rapids Dam	2	1.51E+04	3.71E+04	10	1.47E+04	3.95E+04
White Bluffs Slough	1	N/A	1.24E+04	5	6.30E+03	1.68E+04

[a] 1 mg/kg = µg/kg divided by 1000
[b] Adjacent to Locke and Savage Island sediment was analyzed in 2014, 2015, and 2016 but testing did not include TOC analyses.

C.5 Shoreline Seep Water

Table C-13. Radionuclide Concentrations in Columbia River Shoreline Seep Water. (3 Pages)

Location/ Radionuclide	2016 No. of Samples	2016 No. of Detects	Concentration pCi/L[a] Maximum[c]			2011-2015 No. of Samples	2011-2015 No. of Detects	Concentration pCi/L[a] Average[d]			Washington State Ambient Surface Water Quality Standard pCi/L[a, b]
100-B Area (Spring 38-3)											
Strontium-90	1	0	-1.99E+00	±	5.77E-01	5	0	2.02E-03	±	7.62E-02	8
Tritium	1	1	3.99E+02	±	1.66E+02	5	5	1.02E+03	±	3.21E+02	20,000
100-B Area (Spring 39-2)											
Strontium-90	1	1	1.85E+00	±	3.06E-01	2	2	2.35E+00	±	4.15E-01	8
Tritium	1	1	1.46E+03	±	3.92E+02	2	2	1.98E+03	±	4.45E+02	20,000
100-D Area (Spring 110-1)											
Alpha (gross)	1	0	2.61E+00	±	2.29E+00	6	1	1.33E+00	±	2.31E+00	15
Beta (gross)	1	1	6.93E+00	±	2.21E+00	6	4	5.52E+00	±	7.49E+00	50
Strontium-90[e]	1	0	5.39E-01	±	5.05E-01	6	3	1.55E+00	±	2.84E+00	8
Technetium-99	1	0	-4.34E+00	±	4.67E+00	5	0	2.32E-01	±	4.72E-01	900
Tritium	1	1	1.85E+03	±	4.06E+02	6	6	1.42E+03	±	2.09E+03	20,000
Uranium-234	1	1	1.18E+00	±	3.97E-01	5	5	5.89E-01	±	8.22E-01	–
Uranium-235	1	0	9.92E-02	±	1.45E-01	5	3	3.24E-02	±	3.84E-02	–
Uranium-238	1	1	1.50E+00	±	4.28E-01	5	5	4.90E-01	±	6.74E-01	–
100-F (Spring 207-1)											
Strontium-90	2	0	2.64E-01	±	3.69E-01	3	0	-1.11E-02	±	4.76E-02	8
Tritium	3	3	4.29E+02	±	1.80E+02	3	3	4.07E+02	±	8.39E+01	900
100-H Area (Spring 152-2)											
Strontium-90	0	0	—			1	1	5.43E+00	±	9.45E-01	8

Table C-13. Radionuclide Concentrations in Columbia River Shoreline Seep Water. (3 Pages)

Location/ Radionuclide	2016		Concentration pCi/L[a]			2011-2015		Concentration pCi/L[a]			Washington State Ambient Surface Water Quality Standard pCi/L[a, b]
	No. of Samples	No. of Detects	Maximum[c]			No. of Samples	No. of Detects	Average[d]			
Tritium	0	0	—			2	1	3.67E+02	±	3.99E+02	900
100-H Area (Spring 145-1)											
Strontium-90	0	0	—			3	0	-9.53E-04	±	3.15E-02	8
Tritium	0	0	—			3	2	2.40E+02	±	1.35E+02	900
100-K Area (Spring 63-1)											
Alpha (gross)	1	0	1.70E-01	±	1.91E+00	4	1	1.88E+00	±	2.47E+00	15
Beta (gross)	1	1	5.22E+00	±	2.18E+00	4	4	8.99E+00	±	1.30E+01	50
Carbon-14	4	4	3.02E+02	±	5.76E+01	7	5	4.36E+02	±	1.43E+03	2,000
Strontium-90	1	0	-8.51E-01	±	4.01E-01	4	0	-5.04E-03	±	4.58E-02	8
Tritium	1	0	7.18E+00	±	1.43E+02	4	2	5.55E+02	±	9.32E+02	20,000
100-N Area (Spring 8-13)											
Alpha (gross)	1	0	7.62E-01	±	2.11E+00	5	0	1.22E+00	±	1.92E+00	15
Beta (gross)	1	1	3.95E+00	±	2.19E+00	5	2	2.70E+00	±	3.47E+00	50
Strontium-90	1	0	-6.79E-01	±	3.36E-01	5	0	1.97E-02	±	2.94E-02	8
Tritium	1	1	4.00E+03	±	8.09E+02	5	5	3.00E+03	±	3.87E+03	20,000
100-N Area (Spring 89-1)											
Strontium-90	1	1	5.19E+01	±	8.74E+00	4	4	1.94E+01	±	2.94E+01	8
Tritium	1	1	1.47E+03	±	3.36E+02	4	3	6.89E+02	±	1.10E+03	20,000
Hanford Town site (Hanford Spring 28-2)											
Alpha (gross)	1	1	6.60E+00	±	3.34E+00	4	1	2.54E+00	±	1.46E+00	15
Beta (gross)	1	1	4.07E+01	±	5.07E+00	4	4	3.29E+01	±	2.71E+01	50
Tritium	1	1	2.12E+04	±	4.13E+03	4	4	2.03E+04	±	1.91E+04	20,000

Table C-13. Radionuclide Concentrations in Columbia River Shoreline Seep Water. (3 Pages)

Location/ Radionuclide	2016		Concentration pCi/L[a]			2011-2015		Concentration pCi/L[a]			Washington State Ambient Surface Water Quality Standard pCi/L[a, b]
	No. of Samples	No. of Detects	Maximum[c]			No. of Samples	No. of Detects	Average[d]			
300 Area (300 Area Spring 42-2 and 300 Area Spring DR 42-2)											
Alpha (gross)	2	2	3.10E+01	±	5.61E+00	10	10	3.89E+01	±	5.17E+01	15
Beta (gross)	2	2	2.34E+01	±	3.39E+00	10	10	2.19E+01	±	1.85E+01	50
Tritium	2	2	3.78E+03	±	7.66E+02	10	10	4.24E+03	±	1.19E+03	20,000
Uranium-234	2	2	2.39E+01	±	2.79E+00	10	10	2.20E+01	±	2.67E+01	–
Uranium-235	2	2	2.28E+00	±	5.60E-01	10	10	1.69E+00	±	2.06E+00	–
Uranium-238	2	2	2.57E+01	±	2.97E+00	10	10	2.12E+01	±	2.58E+01	–

[a] 1 pCi = 0.037 Bq.
[b] WAC 246-290, 40 CFR 141; WAC 173-201A-250; EPA-570/9-76-003; Appendix Table D.4
[c] Maximum values are ± total propagated analytical uncertainty.
[d] Averages are ± 2 standard deviations of the mean.
[e] Some sample results were rejected due to analytical laboratory interference.
-- = no concentration guides available.

Table C-14. Metals and Anions in Columbia River Water Shoreline Seep Water. (5 Pages)

Location	Analyte	No. of Samples	No. of Detects	Filtered/ Unfiltered[a]	Range (min-max)[b]			Unit	Regulatory limit[c]
100B (39-2 and 38-3)	***Metals***								
	Antimony	2	0	Filtered	1.00E+00			µg/L	N/A
	Arsenic	2	2	Filtered	1.77E+00	-	2.27E+00	µg/L	190
	Cadmium	2	0	Filtered	3.00E-01			µg/L	0.59
	Chromium	2	1	Filtered	3.00E+00	-	4.93E+00	µg/L	10[e]
	Chromium	2	2	Unfiltered	4.85E+00	-	3.71E+01	µg/L	96[f]
	Copper	2	1	Filtered	3.50E-01	-	5.17E+00	µg/L	6
	Hexavalent Chromium	2	1	Filtered	1.50E+00	-	5.10E+00	µg/L	10
	Hexavalent Chromium	2	1	Unfiltered	1.50E+00	-	4.90E+00	µg/L	10
	Lead	2	1	Filtered	5.00E-01	-	6.57E-01	µg/L	1.1
	Nickel	2	1	Filtered	5.00E-01	-	5.00E-01	µg/L	83
	Selenium	2	0	Unfiltered	2.00E+00			µg/L	5
	Thallium	2	0	Filtered	6.00E-01			µg/L	N/A
	Zinc	2	1	Filtered	3.50E+00	-	1.69E+01	µg/L	55
	Anions								
	Nitrate	2	2	Unfiltered	3.56E+03	-	7.17E+03	µg/L	10[g]
100D (110-1)	***Metals***								
	Antimony	1	0	Filtered	1.00E+00			µg/L	N/A
	Arsenic	1	0	Filtered	1.70E+00			µg/L	190
	Cadmium	1	0	Filtered	3.00E-01			µg/L	0.59
	Chromium	1	1	Filtered	1.03E+01			µg/L	10[e]
	Chromium	1	1	Unfiltered	1.12E+01			µg/L	96[f]
	Hexavalent Chromium	1	1	Filtered	9.10E+00			µg/L	10
	Hexavalent Chromium	1	1	Unfiltered	7.10E+00			µg/L	10
	Copper	1	1	Filtered	5.17E-01			µg/L	6

Table C-14. Metals and Anions in Columbia River Water Shoreline Seep Water. (5 Pages)

Location	Analyte	No. of Samples	No. of Detects	Filtered/ Unfiltered[a]	Range (min-max)[b]			Unit	Regulatory limit[c]
	Lead	1	0	Filtered	5.00E-01			µg/L	1.1
	Nickel	1	1	Filtered	6.57E-01			µg/L	83
	Selenium	1	1	Unfiltered	2.05E+00			µg/L	5
	Thallium	1	0	Filtered	6.00E-01			µg/L	N/A
	Zinc	1	1	Filtered	5.26E+00			µg/L	55
	Anions								
	Nitrate	1	1	Unfiltered	1.81E+04			µg/L	10[g]
100F (207-1, 211-1)	***Metals***								
	Antimony	4	0	Filtered	1.00E+00			µg/L	N/A
	Arsenic	4	4	Filtered	2.50E+00	-	3.28E+00	µg/L	190
	Cadmium	4	0	Filtered	1.00E-01	-	3.00E-01	µg/L	0.59
	Chromium	4	4	Filtered	4.60E+00	-	1.20E+01	µg/L	10[e]
	Chromium	4	4	Unfiltered	6.81E+00	-	9.65E+00	µg/L	96[f]
	Hexavalent Chromium	3	3	Filtered	4.20E+00	-	8.90E+00	µg/L	10
	Hexavalent Chromium	3	3	Unfiltered	4.70E+00	-	8.80E+00	µg/L	10
	Copper	4	3	Filtered	3.50E-01	-	8.20E-01	µg/L	6
	Lead	4	1	Filtered	2.10E-01	-	5.00E-01	µg/L	1.1
	Nickel	4	0	Filtered	5.00E-01	-	8.00E-01	µg/L	83
	Selenium	4	0	Unfiltered	1.60E+00	-	2.00E+00	µg/L	5
	Thallium	4	0	Filtered	5.50E-01	-	6.00E-01	µg/L	N/A
	Zinc	4	2	Filtered	3.50E+00	-	9.30E+00	µg/L	55
	Anions								
	Nitrate	4	4	Unfiltered	2.39E+04	-	2.74E+04	µg/L	10[g]
100H (145-1, 152-2)	***Metals***								
	Sample collections were unsuccessful in 2016 at both locations.								
	Anions								

Table C-14. Metals and Anions in Columbia River Water Shoreline Seep Water. (5 Pages)

Location	Analyte	No. of Samples	No. of Detects	Filtered/ Unfiltered[a]	Range (min-max)[b]			Unit	Regulatory limit[c]
	Sample collections were unsuccessful in 2016 at both locations.								
100K (63-1)	***Metals***								
	Antimony	1	0	Filtered	1.00E+00			µg/L	N/A
	Arsenic	1	0	Filtered	1.70E+00			µg/L	190
	Cadmium	1	0	Filtered	3.00E-01			µg/L	0.59
	Chromium	1	0	Filtered	3.00E+00			µg/L	10[e]
	Chromium	1	0	Unfiltered	3.00E+00			µg/L	96[f]
	Hexavalent Chromium	1	0	Filtered	1.50E+00			µg/L	10
	Hexavalent Chromium	1	0	Unfiltered	1.50E+00			µg/L	10
	Copper	1	1	Filtered	6.42E-01			µg/L	6
	Lead	1	0	Filtered	5.00E-01			µg/L	1.1
	Nickel	1	0	Filtered	5.00E-01			µg/L	83
	Selenium	1	0	Unfiltered	2.00E+00			µg/L	5
	Thallium	1	0	Filtered	6.00E-01			µg/L	N/A
	Zinc	1	1	Filtered	5.44E+00			µg/L	55
	Anions								
	Nitrate	1	1	Unfiltered	1.55E+03			µg/L	10[g]
100N (8-13, 89-1)	***Metals***								
	Antimony	2	1	Filtered	1.00E+00	-	1.16E+00	µg/L	N/A
	Arsenic	2	2	Filtered	3.16E+00	-	1.10E+01	µg/L	190
	Cadmium	2	0	Filtered	3.00E-01			µg/L	0.59
	Chromium	2	1	Filtered	3.00E+00	-	8.93E+00	µg/L	10[e]
	Chromium	2	1	Unfiltered	3.00E+00	-	9.19E+00	µg/L	96[f]
	Hexavalent Chromium	2	1	Filtered	1.50E+00	-	8.50E+00	µg/L	10
	Hexavalent Chromium	2	1	Unfiltered	1.50E+00	-	5.90E+00	µg/L	10

Table C-14. Metals and Anions in Columbia River Water Shoreline Seep Water. (5 Pages)

Location	Analyte	No. of Samples	No. of Detects	Filtered/ Unfiltered[a]	Range (min-max)[b]			Unit	Regulatory limit[c]
	Copper	2	2	Filtered	3.80E-01	-	1.07E+00	µg/L	6
	Lead	2	0	Filtered		5.00E-01		µg/L	1.1
	Nickel	2	1	Filtered	5.00E-01	-	6.97E-01	µg/L	83
	Selenium	2	0	Unfiltered		2.00E+00		µg/L	5
	Thallium	2	0	Filtered		6.00E-01		µg/L	N/A
	Zinc	2	1	Filtered	3.50E+00	-	4.55E+00	µg/L	55
	Anions								
	Nitrate	2	2	Unfiltered	2.36E+04	-	2.47E+04	µg/L	10[g]
Hanford Townsite (25-4)	***Metals***								
	Antimony	1	0	Filtered		1.00E+00		µg/L	N/A
	Arsenic	1	0	Filtered		1.70E+00		µg/L	190
	Cadmium	1	0	Filtered		3.00E-01		µg/L	0.59
	Chromium	1	0	Filtered		3.00E+00		µg/L	10[e]
	Chromium	1	0	Unfiltered		3.00E+00		µg/L	96[f]
	Hexavalent Chromium	1	0	Filtered		1.50E+00		µg/L	10
	Hexavalent Chromium	1	0	Unfiltered		1.50E+00		µg/L	10
	Copper	1	1	Filtered		6.94E-01		µg/L	6
	Lead	1	0	Filtered		5.00E-01		µg/L	1.1
	Nickel	1	0	Filtered		5.00E-01		µg/L	83
	Selenium	1	1	Unfiltered		2.58E+00		µg/L	5
	Thallium	1	0	Filtered		6.00E-01		µg/L	N/A
	Zinc	1	1	Filtered		3.58E+00		µg/L	55
	Anions								
	Nitrate	1	1	Unfiltered		2.72E+03		µg/L	10[g]
300 Area[d] (42-2, DR 42-2)	***Anions***								
	Nitrate	2	2	Unfiltered	1.01E+04	-	1.86E+04	µg/L	10[g]

Table C-14. Metals and Anions in Columbia River Water Shoreline Seep Water. (5 Pages)

Location	Analyte	No. of Samples	No. of Detects	Filtered/ Unfiltered[a]	Range (min-max)[b]	Unit	Regulatory limit[c]

[a] Dissolved concentrations are associated with filtered samples; Recoverable concentrations are associated with unfiltered samples.
[b] For non-detects, one value is shown for the method detection limit (MDL); Multiple values are shown on non-detects if the laboratory method detection limit differed during the analyses process.
[c] Ambient water quality criteria values or chronic toxicity unless otherwise noted (WAC 173-201A-240).
[d] 300 Area seeps did not have metals analyses performed during 2016.
[e] Value for hexavalent chromium.
[f] Value for trivalent chromium.
[g] Washington State drinking water standard utilized (WAC 246-290).

C.6 References

40 CFR 61. Appendix E, "Compliance Procedures Methods for Determining Compliance with Subpart I," Table 2, "Concentration Levels for Environmental Compliance." *Code of Federal Regulations*, as amended. Online at http://www.ecfr.gov/cgi-bin/text-idx?SID=da9d22320b65cc64e47ba92143fafad7&mc=true&node=ap40.10.61_1359.e&rgn=div9.

40 CFR 141. "National Primary Drinking Water Regulations." *Code of Federal Regulations*, as amended. Online at http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr141_main_02.tpl.

EPA 1975. *National Interim Primary Drinking Water Regulations*. EPA-570/9-76-003. U.S. Environmental Protection Agency, Washington, D.C. Online at https://nepis.epa.gov/Exe/ZyPDF.cgi/2000J6TU.PDF?Dockey=2000J6TU.PDF.

WAC 173-201A-240. "Toxic Substances." *Washington Administrative Code*, as amended. Online at http://apps.leg.wa.gov/wac/default.aspx?cite=173-201a-240.

WAC 173-201A-250. "Radioactive Substances." *Washington Administrative Code*, as amended. Online at http://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-250.

WAC 246-290. "Group A Public Water Supplies." *Washington Administrative Code*, as amended. Online at http://apps.leg.wa.gov/wac/default.aspx?cite=246-290.