

**K**

**Periphyton Metals Data and EPCs  
for Kuskokwim River Assessment  
Area**



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## Appendix K

### Periphyton Metals Data and EPCs for Kuskokwim River Assessment Area

This appendix presents analytical results (Tables K-1 and K-2) and exposure point concentrations (EPCs, Table K-3) for periphyton samples collected from the Kuskokwim River assessment area in 2014 by the United States Department of Interior Bureau of Land Management. Periphyton sample stations are shown in Figures 5-1 and 5-2. Seven periphyton sample stations were located within the Kuskokwim River assessment area (Kusko-14-PERI-13 through Kusko-14-PERI-19). At each location, duplicate periphyton samples (A and B) were collected for analysis. The greater of the two sample results from each station were used when calculating EPCs, as per Alaska Department of Environmental Conservation (2008) guidance. The EPCs developed from the periphyton data were used in the BERA Supplement as an alternate estimate of contaminant levels in the food of the green-winged teal.

#### Reference

Alaska Department of Environmental Conservation. 2008. *Guidelines for Data Reporting, Data Reduction, and Treatment of Non-Detect Results, Technical Memorandum 08-001*, prepared by Alaska DEC, Division of Spill Prevention and Response, Contaminated Sites Program, 12 August 2008.



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**Table K-1. Periphyton Sample Results for Kuskokwim River Assessment Area (BLM 2014).**

Analyte	Sample Location ID		Units	Kusko-14-PERI-13		Kusko-14-PERI-14		Kusko-14-PERI-15		Kusko-14-PERI-16		Kusko-14-PERI-26		Kusko-14-PERI-18		Kusko-14-PERI-19	
	General Location Description			Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta		Downriver of Red Devil Creek Delta	
	Nearby RI Supplement Sediment Sample Location			KR088		KR092		KR096		KR098				KR100			
	Sample ID	Method		Kusko-14-PERI-13A	Kusko-14-PERI-13B	Kusko-14-PERI-14A	Kusko-14-PERI-14B	Kusko-14-PERI-15A	Kusko-14-PERI-15B	Kusko-14-PERI-16A	Kusko-14-PERI-16B	Kusko-14-PERI-26A	Kusko-14-PERI-26B	Kusko-14-PERI-18A	Kusko-14-PERI-18B	Kusko-14-PERI-19A	Kusko-14-PERI-19B
<b>Total Inorganic Elements</b>																	
Aluminum	EPA 6020	µg/g dry	22753	15290	22941	16629		19708	16406	17043	23988	44024	20691	29048	13718	19853	
Antimony	EPA 6020	µg/g dry	13.9	13.7	3.3	4.5		57.9	3.1	3.2	2.6	3.1	2.2	2.3	1.9	1.6	
Arsenic	EPA 6020	µg/g dry	35.7	26.0	26.8	23.0		34.1	24.3	22.2	38.2	37.7	30.9	26.4	15.7	17.3	
Barium	EPA 6020	µg/g dry	308.1	230.1	326.5	228.6		273.2	231.9	237.0	351.6	683.4	299.8	451.2	190.3	276.2	
Beryllium	EPA 6020	µg/g dry	0.9	0.6	0.9	0.6		0.8	0.6	0.6	0.9	1.4	0.8	1.0	0.4	0.7	
Boron	EPA 6020	µg/g dry	10.9	7.9	12.8	7.8		10.2	6.4	7.4	10.1	33.3	8.9	21.0	8.5	13.6	
Cadmium	EPA 6020	µg/g dry	0.5	0.4	0.4	0.4		0.3	0.4	0.4	0.6	0.6	0.5	0.4	0.2	0.3	
Chromium	EPA 6020	µg/g dry	43.2	32.6	45.7	33.9		39.6	35.2	34.2	50.1	76.2	39.8	52.3	25.8	34.8	
Copper	EPA 6020	µg/g dry	32.9	25.5	30.9	27.0		32.2	31.2	25.2	44.0	45.5	34.7	31.9	18.0	21.2	
Iron	EPA 6020	µg/g dry	35081	27875	33621	27419		31926	31925	27740	43206	45073	35277	32999	18971	25417	
Lead	EPA 6020	µg/g dry	11.3	8.3	10.0	9.0		10.1	10.0	8.3	14.8	16.1	11.5	11.6	6.2	7.6	
Magnesium	EPA 6020	µg/g dry	8600	6459	8471	6782		7619	7438	6843	10690	11795	8622	8293	4463	6064	
Manganese	EPA 6020	µg/g dry	646.3	514.0	616.6	493.4		575.5	516.9	485.1	930.6	1013.8	730.8	633.6	338.9	489.9	
Mercury	EPA 245.7	µg/g dry	5.99	6.87	0.25	0.19		4.56	0.40	0.47	0.14	0.16	0.23	0.15	0.21	0.11	
Molybdenum	EPA 6020	µg/g dry	1.4	1.0	1.3	1.1		1.2	1.4	1.0	1.7	1.8	1.3	1.4	1.0	0.9	
Nickel	EPA 6020	µg/g dry	37.2	29.0	36.3	31.1		34.2	32.5	29.1	46.7	46.8	36.9	32.8	19.0	24.8	
Selenium	EPA 6020	µg/g dry	0.6	0.5	0.6	0.5		0.4	0.5	0.4	0.9	0.9	0.7	0.4	0.4	0.5	
Strontium	EPA 6020	µg/g dry	90.6	60.2	80.0	67.2		64.0	70.1	76.6	88.9	93.0	72.9	73.0	26.9	45.1	
Vanadium	EPA 6020	µg/g dry	65.6	49.2	71.5	50.4		60.8	50.3	52.0	75.7	125.3	63.3	84.8	39.8	58.1	
Zinc	EPA 6020	µg/g dry	109.2	83.1	107.5	89.6		98.3	96.5	84.5	139.7	140.6	110.6	101.3	59.8	71.8	
<b>Percent Solids</b>																	
Percent Solids	SM 2540 B	% Dry	34.4	33.6	34.6	38		19.3	24.9	37.8	50	41.6	24.7	36.1	28.7	36	39.7
<b>Methylmercury</b>																	
Methylmercury (as Mercury)	EPA 1630 Mod/FGS-070	ng/g wet	0.5 U	0.5 U	0.5 U	0.5 U		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
<b>Inorganic Arsenic</b>																	
Inorganic Arsenic	EPA 1632	mg/kg wet	2.82	2.59	4.65	2.05		4.21	3.15	4.58	3.69	4.37	1.76	2.2	2.28	3.53	2.63

**Key:**  
 EPA = Environmental Protection Agency  
 µg/g = micrograms per kilogram  
 mg/kg = milligrams per kilogram  
 ng/g = nanograms per gram  
 % = percent

**Table K-2. ProUCL Input for Periphyton Samples Collected from Kuskokwim River Assessment Area and Used in Red Devil Mine BERA Supplement.**

SampleID <sup>a, b</sup>	Antimony	D_Antimony	Arsenic	D_Arsenic	Barium	D_Barium	Beryllium	D_Beryllium	Cadmium	D_Cadmium	Chromium	D_Chromium	Copper	D_Copper	Lead	D_Lead	Manganese	D_Manganese	Mercury	D_Mercury	Nickel	D_Nickel	Selenium	D_Selenium	Vanadium	D_Vanadium	Zinc	D_Zinc
Kusko-14-PERI-13A/B	13.94	1	35.66	1	308.14	1	0.90	1	0.46	1	43.16	1	32.93	1	11.28	1	646.30	1	6.87	1	37.24	1	0.63	1	65.58	1	109.19	1
Kusko-14-PERI-14A/B	4.52	1	26.84	1	326.53	1	0.85	1	0.42	1	45.70	1	30.94	1	10.04	1	616.57	1	0.25	1	36.34	1	0.58	1	71.54	1	107.54	1
Kusko-14-PERI-15B	57.92	1	34.14	1	273.21	1	0.77	1	0.32	1	39.63	1	32.24	1	10.10	1	575.46	1	4.56	1	34.24	1	0.35	1	60.78	1	98.31	1
Kusko-14-PERI-16A/B	3.24	1	24.33	1	236.99	1	0.64	1	0.40	1	35.18	1	31.23	1	9.96	1	516.93	1	0.47	1	32.51	1	0.48	1	52.05	1	96.47	1
Kusko-14-PERI-26A/B	3.05	1	38.17	1	683.42	1	1.41	1	0.64	1	76.22	1	45.50	1	16.08	1	1013.82	1	0.16	1	46.76	1	0.87	1	125.34	1	140.60	1
Kusko-14-PERI-18A/B	2.33	1	30.86	1	451.21	1	0.98	1	0.47	1	52.25	1	34.68	1	11.61	1	730.79	1	0.23	1	36.86	1	0.74	1	84.77	1	110.55	1
Kusko-14-PERI-19A/B	1.93	1	17.31	1	276.24	1	0.68	1	0.28	1	34.80	1	21.16	1	7.61	1	489.88	1	0.21	1	24.76	1	0.46	1	58.11	1	71.79	1

**Notes:**

a = Greater of duplicate samples (A and B) taken at each location.

b = Form Table G-1.

**Table K-3. ProUCL Output Summary for Periphyton Samples Collected from Kuskokwim River Assessment Area and Used in Red Devil Mine BERA Supplement.**

Analyte	Units	Number of Observations	Number of Detections	Mean of Detected	SD of Detected	Maximum Detected	Distribution (detects only)	UCL Statistic	95% UCL	EPC	EPC Source
Antimony	µg/dry g	7	7	12.42	20.49	57.92	Lognormal	95% Chebyshev (Mean, Sd) UCL	46.18	46.18	UCL
Arsenic	µg/dry g	7	7	29.62	7.29	38.17	Normal	95% Student's-t UCL	34.97	34.97	UCL
Barium	µg/dry g	7	7	365.1	156.1	683.4	Gamma	95% Adjusted Gamma UCL	551	551	UCL
Beryllium	µg/dry g	7	7	0.889	0.261	1.413	Normal	95% Student's-t UCL	1.081	1.081	UCL
Cadmium	µg/dry g	7	7	0.426	0.115	0.636	Normal	95% Student's-t UCL	0.511	0.511	UCL
Chromium	µg/dry g	7	7	46.7	14.38	76.22	Normal	95% Student's-t UCL	57.26	57.26	UCL
Copper	µg/dry g	7	7	32.67	7.145	45.5	Normal	95% Student's-t UCL	37.92	37.92	UCL
Lead	µg/dry g	7	7	10.95	2.601	16.08	Normal	95% Student's-t UCL	12.86	12.86	UCL
Manganese	µg/dry g	7	7	655.7	177.3	1014	Normal	95% Student's-t UCL	785.9	785.9	UCL
Mercury	µg/dry g	7	7	1.821	2.743	6.87	Approx. Lognormal	99% Chebyshev (Mean, Sd) UCL	12.14	6.87	Max.
Nickel	µg/dry g	7	7	35.53	6.561	46.76	Normal	95% Student's-t UCL	40.35	40.35	UCL
Selenium	µg/dry g	7	7	0.587	0.178	0.874	Normal	95% Student's-t UCL	0.718	0.718	UCL
Vanadium	µg/dry g	7	7	74.02	24.96	125.3	Normal	95% Student's-t UCL	92.35	92.35	UCL
Zinc	µg/dry g	7	7	104.9	20.59	140.6	Normal	95% Student's-t UCL	120	120	UCL

**Key:**

BERA = Baseline ecological risk assessment

EPC = Exposure point concentration

SD = Standard deviation

UCL = Upper confidence level



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