H

Red Devil Creek Benthic Macroinvertebrate Metals Data Used to Develop Trophic Transfer Factors

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Appendix H

Red Devil Creek Benthic Macroinvertebrate Metals Data Used to Develop Trophic Transfer Factors

This appendix includes a summary of the metals data for composite benthic-macroinvertebrate samples collected from Red Devil Creek by the United States Department of Interior Bureau of Land Management (BLM) in 2010 and 2011 (see Tables H-1 and H-2). The exposure point concentrations developed from these data (see Table H-3) were used in the Baseline Ecological Risk Assessment (BERA) Supplement to develop benthos-to-sculpin trophic transfer factors (see Appendix I).

Table H-1. Red Devil Creek Benthic Macroinvertebrate Sample Composition (from E&E 2014, Appendix N)

Dataset	Client Sample ID	Order	Family	Genus	Number of Individuals	Wet Wt. (grams)	Functional Feeding Guild
June 2010	RED DEVIL 1/Macro	Ephemeroptera	Baetidae	Baetis	406	1.2	Collector
June 2010	RED DEVIL 2/Macro	Ephemeroptera	Baetidae	Baetis	270	1.2	Collector
June 2010	RED DEVIL 3/Macro	Ephemeroptera	Baetidae	Baetis	425	1.25	Collector
Aug 2010	2-RD-1 R. Devil CK-macro	Ephemeroptera	Heptageniidae	Cinygmula	125	1.00	Scraper
Aug 2010	2-RD-2 R. Devil CK-macro	Ephemeroptera	Heptageniidae	Cinygmula	176	1.03	Scraper
Aug 2010	2-RD-3 R. Devil CK-macro	Ephemeroptera	Heptageniidae	Cinygmula	149	1.10	Scraper
RDC June 2011	RDMACR01-1	Ephemeroptera	Baetidae	Baetis	390	1.12	Collector
RDC June 2011	RDMACR01-2	Plecoptera	Nemouridae	Zapada	106	0.55	Facultative shredder
RDC June 2011	RDMACR01-3	Ephemeroptera	Baetidae	Baetis	400	1.13	Collector
RDC Sept 2011	RDMACRO2-1	Plecoptera	Nemouridae	Zapada	937	4.28	Facultative shredder

Table H-2. Benthic Macroinvertebrate Metals Data from Red Devil Creek Used in BERA and BERA Supplement (from E&E 2014, Appendix N)

Dataset	Lab ID	Client Sample ID	Sb (mg/kg wet)		As (mg/kg wet)		Ba (mg/kg wet)		Be (mg/kg wet)		Cd (mg/kg wet)		Cr (mg/kg wet)		Cu (mg/kg wet)		Fe (mg/kg wet)	
			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
June 2010	263	RED DEVIL 1/Macro	20.389		81.238		4.843		0.025	U	0.116		0.441		6.564		761.3	J-
June 2010	264	RED DEVIL 2/Macro	18.953		98.798		5.907		0.025	U	0.082		0.327		10.384		781.1	J-
June 2010	265	RED DEVIL 3/Macro	21.437		126.444		6.612		0.025	U	0.097		0.368		12.405		974	J-
RDC June 2011	1110262-10	RDMACR01-1	na		235		8.82		0.066	U	0.084		0.52		7.55		1670	
RDC June 2011	1110262-11	RDMACR01-2	na		29.1		2.08		0.076	U	0.003	U	0.06	U	7.9		305	
RDC June 2011	1110262-12	RDMACR01-3	na		144		7.7		0.064	U	0.085		0.5		6.93		1190	
RDC Sept 2011	1110264-17	RDMACRO2-1	na		277		14.6		0.065	U	0.025		0.67		8.75		2570	

Dataset	Lab ID	Client Sample ID	Pb (mg/kg wet)		Mn (mg/kg wet)		Hg (mg/kg wet)		Ni (mg/kg wet)		Se (mg/kg wet)		V (mg/kg wet)		Zn (mg/kg wet)	
			Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
June 2010	263	RED DEVIL 1/Macro	0.146		27.841		2.01		0.557		1.002		0.397		22.551	J-
June 2010	264	RED DEVIL 2/Macro	0.131		41.995		2.38		1.257		3.386		0.433		40.575	J-
June 2010	265	RED DEVIL 3/Macro	0.154		50.779		1.6		1.409		4.046		0.472		44.92	J-
RDC June 2011	1110262-10	RDMACR01-1	0.169		51.1		0.372		1.25		2.58		0.626		48.6	
RDC June 2011	1110262-11	RDMACR01-2	0.005	U	9		0.217		0.538		1.33		0.05	U	36.2	
RDC June 2011	1110262-12	RDMACR01-3	0.178		37.3		0.375		0.997		1.92		0.566		44.6	
RDC Sept 2011	1110264-17	RDMACRO2-1	0.333		164		2.41		2.96		0.12	U	1.09		27.6	

Dataset	Lab ID	Client Sample ID	Methyl Hg (mg/kg wet)	
			Result	Q
June 2010	1007-189-41	RED DEVIL 1/Macro	0.0238	
June 2010	1007-189-42	RED DEVIL 2/Macro	0.0594	
June 2010	1007-189-43	RED DEVIL 3/Macro	0.0504	
Aug 2010	1009071-10	2-RD-1 R. Devil CK-macro	0.131	
Aug 2010	1009071-11	2-RD-2 R. Devil CK-macro	0.0706	
Aug 2010	1009071-12	2-RD-3 R. Devil CK-macro	0.0587	
RDC June 2011	1110262-10	RDMACR01-1	0.0324	
RDC June 2011	1110262-11	RDMACR01-2	0.0826	
RDC June 2011	1110262-12	RDMACR01-3	0.0271	
RDC Sept 2011	1110264-17	RDMACRO2-1	0.0304	

Key:
BERA = baseline ecological risk assessment
J = estimated value
na = not analyzed
Q = Qualifier
RDC = Red Devil Creek
U = not detected

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Table H-3. Benthic Macroinvertebrate Composite Sample EPCs Used in Red Devil Mine Site BERA and BERA Supplement (from E&E 2014, Appendix O).

Data Set	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
Benthos	Antimony	mg/kg W	3	3	20.2596667	1.24704023	21.437	--	--	--	21.437	Max Det.
Benthos	Arsenic	mg/kg W	7	7	141.7	87.01	277	Normal	95% Student's-t UCL	205.6	205.6	95% UCL
Benthos	Barium	mg/kg W	7	7	7.223	3.903	14.6	Normal	95% Student's-t UCL	10.09	10.09	95% UCL
Benthos	Beryllium	mg/kg W	7	0	--	--	--	--	--	--	--	--
Benthos	Cadmium	mg/kg W	7	6	0.0815	0.0305	0.116	Normal	95% KM (t) UCL	0.0995	0.0995	95% UCL
Benthos	Chromium	mg/kg W	7	6	0.471	0.123	0.67	Normal	95% KM (t) UCL	0.543	0.543	95% UCL
Benthos	Copper	mg/kg W	7	7	8.64	2.09	12.41	Normal	95% Student's-t UCL	10.18	10.18	95% UCL
Benthos	Lead	mg/kg W	7	6	0.185	0.0743	0.333	Lognormal	95% KM (Chebyshev) UCL	0.296	0.296	95% UCL
Benthos	Manganese	mg/kg W	7	7	54.57	50.41	164	Gamma	95% Approximate Gamma UCL	111.1	111.1	95% UCL
Benthos	Mercury	mg/kg W	7	7	1.338	0.989	2.41	Normal	95% Student's-t UCL	2.064	2.064	95% UCL
Benthos	Methylmercury	mg/kg W	10	10	0.0566	0.0328	0.131	Normal	95% Student's-t UCL	0.0756	0.0756	95% UCL
Benthos	Nickel	mg/kg W	7	7	1.281	0.816	2.96	Normal	95% Student's-t UCL	1.88	1.88	95% UCL
Benthos	Selenium	mg/kg W	7	6	2.377	1.187	4.046	Normal	95% KM (t) UCL	3.076	3.076	95% UCL
Benthos	Vanadium	mg/kg W	7	6	0.597	0.256	1.09	Normal	95% KM (t) UCL	0.752	0.752	95% UCL
Benthos	Zinc	mg/kg W	7	7	37.86	9.664	48.6	Normal	95% Student's-t UCL	44.96	44.96	95% UCL

Key:
BERA = baseline ecological risk assessment
EPC = exposure point concentration
KM = Kaplan-Meier
Max det. = maximum detected concentration
mg/kg W= milligrams per kilogram (wet weight)
RDM = Red Devil Mine
SD = standard deviation
UCL = upper confidence limit (on average concentration)

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