Tables

Table 1. Relationship between haul road sample stations

Approximate Mileage from Port	Sample Station Names				
	Road Surface	Dustfall	Road Cores	Road Shoulder Fines	Vegetation Transects
0	RS-01				
0.25	RS-02				
0.50	RS-03				
0.75	RS-04				
1	RS-05		RC-PORT	RF-PORT	
1.25	RS-06				
1.50	RS-07	DN-01, DS-01	RC-01	RF-01	HR-01
1.75	RS-08				
2	RS-09				
2.5	RS-10				
3	RS-11	DN-02, DS-02	RC-02	RF-02	HR-02
4	RS-12				
6	RS-13				
8	RS-14				
10.9	RS-15				
13.8	RS-16				
16.8	RS-17				
19.8	RS-18				
22.9	RS-19	DN-03, DS-03	RC-03	RF-03	HR-03
25.9	RS-20				
28.9	RS-21				
31.9	RS-22	DN-04, DS-04	RC-04	RF-04	HR-04
34.9	RS-23				
37.9	RS-24				
40.9	RS-25	DN-05, DS-05	RC-05	RF-05	HR-05
42.9	RS-26				
44.9	RS-27				
45.6	RS-28				
46.3	RS-29	DN-06, DS-06	RC-06	RF-06	HR-06
46.6	RS-30				
46.90	RS-31				
47.10	RS-32	DN-07, DS-07	RC-07	RF-07	HR-07
47.30	RS-33				
47.6 (Airport)	RS-34		RC-08	RF-08	

Note: DN - north side dustfall collector sample
DS - south side dustfall collector sample
RC - road core sample
RF - road shoulder fines sample
RS - road surface sample

Table 2. Road surface soil metals analytical results

Survey Station	Field Replicate	Metals							
		Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
RS-01		--	7.70	13.3	--	--	875	--	2,470
RS-02		--	5.50	8.40	--	--	415	--	1,570
RS-03		--	3.50	7.80	--	--	363	--	1,390
RS-04		--	6.70	39.3	--	--	1,180	--	6,610
RS-05		8,600	6.20	21.0	26,400	24,400	696	9,590	3,580
RS-06		--	5.10	11.9	--	--	462	--	2,170
RS-07		9,340	9.20	5.90	41,600	28,000	265	7,260	1,080
RS-08		--	10.5	3.90	--	--	193	--	728
RS-09		--	7.10	3.00	--	--	204	--	603
RS-10		--	4.10	7.00	--	--	440	--	1,340
RS-11		11,400	2.60	2.40	11,500	29,000	149	4,360	480
RS-12		--	6.00	1.20	--	--	87.2	--	275
RS-13	1	--	5.70	2.80	--	--	127	--	471
RS-13	2	--	5.00	2.60	--	--	112	--	428
RS-14		--	7.80	1.20	--	--	66.3	--	317
RS-15		--	3.90	1.20	--	--	69.9	--	210
RS-16		--	5.30	1.00 *U*	--	--	59.6	--	185
RS-17		--	5.00	3.10	--	--	159	--	537
RS-18		--	3.40	2.10	--	--	86.6	--	302
RS-19		3,780	2.80	1.80	74,900	11,000	74.1	28,000	269
RS-20		--	2.30	2.40	--	--	75.4	--	340
RS-21		--	1.70	1.60	--	--	30.3	--	191
RS-22		1,240	4.60	2.00	95,400	2,650	49.3	48,900	278
RS-23		--	5.10	2.50	--	--	73.9	--	394
RS-24		--	4.40	3.30	--	--	144	--	557
RS-25		12,100	3.80	1.80	14,800	25,500	64.2	11,300	349
RS-26		--	3.40	3.10	--	--	111	--	593
RS-27		--	2.90	1.30	--	--	62.9	--	308
RS-28		--	4.00	2.50	--	--	111	--	523
RS-29	1	10,600	5.50	2.90	21,500	25,800	144	12,300	605
RS-29	2	10,600	5.00	2.50	26,800	22,400	134	15,900	494
RS-30		--	15.1	6.50	--	--	572	--	738
RS-31		--	5.70	5.50	--	--	240	--	966
RS-32		4,740	11.7	6.80	30,800	17,700	352	14,000	1,230
RS-33	1	--	18.4	4.50	--	--	274	--	801
RS-33	2	--	13.1	4.00	--	--	253	--	755
RS-34		5,330	14.8	3.90	9,900	17,900	296	5,040	804

Note: All metals results reported in mg/kg dry weight.

-- - no sample collected
J - estimated value
U - undetected at detection limit shown

Table 3. Road surface soil grain density and grain size analytical results

Survey Station	Field Replicate	Grain Density (g/cc dry)	Grain-size Determination				
			>15 μm (% dry)	10–15 μm (% dry)	5–10 μm (% dry)	1–5 μm (% dry)	0.375–1 μm (% dry)
RS-01		--	--	--	--	--	--
RS-02		--	--	--	--	--	--
RS-03		--	--	--	--	--	--
RS-04		--	--	--	--	--	--
RS-05		2.72	76.54	3.05	7.34	10.77	2.30
RS-06		--	--	--	--	--	--
RS-07		2.68	82.58	2.73	5.56	7.62	1.51
RS-08		--	--	--	--	--	--
RS-09		--	--	--	--	--	--
RS-10		--	--	--	--	--	--
RS-11		2.71	71.60	4.05	9.75	12.24	2.37
RS-12		--	--	--	--	--	--
RS-13	1	--	--	--	--	--	--
RS-13	2	--	--	--	--	--	--
RS-14		--	--	--	--	--	--
RS-15		--	--	--	--	--	--
RS-16		--	--	--	--	--	--
RS-17		--	--	--	--	--	--
RS-18		--	--	--	--	--	--
RS-19		2.69	86.89	2.12	4.40	5.41	1.18
RS-20		--	--	--	--	--	--
RS-21		--	--	--	--	--	--
RS-22		2.71	88.55	2.00	3.62	4.63	1.19
RS-23		2.71	--	--	--	--	--
RS-24		--	--	--	--	--	--
RS-25		2.72	85.08	2.04	4.29	6.96	1.64
RS-26		--	--	--	--	--	--
RS-27		--	--	--	--	--	--
RS-28		--	--	--	--	--	--
RS-29	1	2.71	84.22	2.60	5.07	6.65	1.45
RS-29	2	2.71	86.28	2.57	4.45	5.50	1.21
RS-30		--	--	--	--	--	--
RS-31		--	--	--	--	--	--
RS-32		2.69	80.27	3.13	6.49	8.41	1.70
RS-33	1	--	--	--	--	--	--
RS-33	2	--	--	--	--	--	--
RS-34		2.70	87.92	1.61	3.75	5.57	1.15

Note: -- no sample collected

Table 4. Road core analytical results

Survey Station	Sample ID	Upper Depth (in.)	Lower Depth (in.)	Metals							
				Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
RC-PORT	RC-PORT-A	0	4	--	4.70	3.80	--	--	200	--	566
	RC-PORT-B	4	8	--	2.90	1.00 *U*	--	--	19.0	--	114
	RC-PORT-C	8	12	--	7.60	1.00 *U*	--	--	15.5	--	69.8
RC-01	RC-01-A	0	4	--	7.20	1.90	--	--	53.3	--	324
	RC-01-B	4	8	--	5.20	5.10	--	--	67.6	--	970
	RC-01-C	8	12	--	10.1	1.00 *U*	--	--	23.0	--	82.9
RC-02	RC-02-A	0	4	--	2.60	1.00 *U*	--	--	64.0	--	198
	RC-02-B	4	8	--	2.80	1.00 *U*	--	--	21.2	--	59.4
RC-03	RC-03-A	0	4	--	3.90	1.00 *U*	--	--	13.5	--	106
	RC-03-B	4	8	--	1.00 *UJ*	1.10	--	--	9.40 *U*	--	64.2
	RC-03-C	8	12	--	7.10	1.00 *U*	--	--	11.6	--	75.2
RC-04	RC-04-A	0	4	--	1.30	1.30	--	--	15.3	--	102
	RC-04-B	4	8	--	2.40	1.00	--	--	4.40	--	87.9
	RC-04-C	8	12	--	2.40	1.30	--	--	3.80	--	84.1
RC-05	RC-05-A	0	4	--	4.40	2.10	--	--	122	--	520
	RC-05-B	4	8	--	3.50	1.30	--	--	74.2	--	316
	RC-05-C	8	12	--	4.15	1.55	--	--	61.0	--	264
RC-06	RC-06-A	0	4	12,100	3.45	1.25	7,320	25,900	80.4	8,010	379
	RC-06-B	4	8	--	8.60	1.90	--	--	121	--	394
	RC-06-C	8	12	--	23.4	1.00 *U*	--	--	16.0	--	47.7
RC-07	RC-07-A	0	4	--	4.10	1.40	--	--	88.0	--	387
	RC-07-B	4	8	--	14.7	1.20	--	--	89.2	--	352
	RC-07-C	8	12	--	25.4	1.00 *U*	--	--	14.6	--	81.3
RC-08	RC-08-A	0	4	--	24.2	1.00 *U*	--	--	23.7	--	90.0
	RC-08-B	4	8	--	29.9	1.00 *U*	--	--	14.3	--	42.2
	RC-08-C	8	12	--	32.0	1.00 *U*	--	--	10.3 *U*	--	26.5
RC-09	RC-09-A	0	4	--	28.2	1.20	--	--	96.4	--	251
	RC-09-B	4	8	--	29.9	1.00 *U*	--	--	27.8	--	72.8
	RC-09-C	8	12	--	20.40	1.00 *U*	--	--	16.3	--	96.4

Note: All metals results reported in mg/kg dry weight.

-- - no sample collected

J - estimated value

U - undetected at detection limit shown

Table 5. Road shoulder fines metals analytical results

Survey Station	Field Replicate	Metals							
		Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
RF-PORT		8,930	7.50	27.9	30,200	24,100	1,060	12,300	4,910
RF-01		6,850	7.80	6.70	21,000	25,100	301	6,130	1,220
RF-02		7,380	4.80	6.20	16,600	25,000	299	8,130	1,150
RF-03		3,930	3.60	3.75	77,300	10,500	116	35,600	565
RF-04	1	2,490	6.50	4.40	74,300	5,010	146	38,700	754
RF-04	2	3,300	6.70	5.10	82,200	5,910	182	41,000	859
RF-05		16,600	5.70	3.90	22,700	27,600	180	17,600	1,490
RF-06		12,100	6.40	29.3	14,700	25,000	2,440	11,900	4,840
RF-07		9,890	28.0	17.3	29,300	27,600	978	17,900	3,140
RF-08		3,780	11.4	9.45	11,500	16,000	494	7,470	1,620

Note: All metals results reported in mg/kg, dry weight.

Table 6. Road shoulder fines grain density and grain size analytical results

Survey Station	Field Replicate	Grain Density (g/cc dry)	Grain-size Determination >15 μm (% dry)	10–15 μm (% dry)	5–10 μm (% dry)	1–5 μm (% dry)	0.375–1 μm (% dry)
RF-PORT		--	66.30	5.27	11.23	14.01	3.20
RF-01		--	88.68	1.35	3.47	5.39	1.10
RF-02		2.71	83.13	2.28	5.37	7.68	1.54
RF-03		2.69	80.62	3.88	6.42	7.20	1.88
RF-04	1	--	80.88	2.50	5.61	8.62	2.39
RF-04	2	--	79.86	2.60	5.93	9.06	2.54
RF-05		--	55.59	6.03	14.27	19.39	4.72
RF-06		--	70.56	5.82	10.15	10.63	2.85
RF-07		--	47.16	7.15	17.15	23.41	5.12
RF-08		--	89.81	1.84	3.40	4.03	0.920

Note: -- - no sample collected

Table 7. Material sites soil analytical results

Survey Station	Field Replicate	Metals							
		Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
MS-2-M		12,100	9.20	1.10	6,630	31,600	36.9 *J*	5,230	190
MS-3-M		3,060	20.2	1.00 *U*	4,740	21,400	35.2 *J*	1,090	101
MS-5-M		12,400	12.8	1.00 *U*	5,480	37,300	22.6 *J*	5,020	106
MS-6-M		7,380	6.40	1.00 *U*	2,550	28,400	34.3 *J*	1,660	87.4
MS-9-M	1	2,110	2.90	1.30	77,200	5,300	8.60 *J*	39,600	89.8
MS-9-M	2	2,340	5.40	3.30	96,100	6,200	8.90 *J*	49,700	199

Note: All metals results reported in mg/kg, dry weight.

J - estimated value

U - undetected at detection limit shown

Table 8. Material sites surface water analytical results

Survey Station	Field Replicate	Metals							
		Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
MS-2-W		50 *U*	5 *U*	5 *U*	286,000	35.0 *UJ*	2.1 *UJ*	136,000	53.3 *UJ*
MS-3-W		60.6	5 *U*	5 *U*	58,900	61.3 *UJ*	2.2 *UJ*	32,600	10 *U*
MS-6-W		244	5 *U*	5 *U*	19,300	333 *UJ*	2 *U*	4,850	10 *U*
MS-10-W	1	50 *U*	5 *U*	5 *U*	47,000	77.1 *UJ*	2 *U*	8,770	78 *UJ*
MS-10-W	2	50 *U*	5 *U*	5 *U*	46,300	73.8 *UJ*	2 *U*	8,700	77.1 *UJ*

Note: All results reported in µg/L, unfiltered.

J - estimated value

U - undetected at detection limit shown

Table 9. September 2001 dustfall analytical results

Survey Station	Sample ID	Sample Mass	Metals							
			Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
D-01	D1-NA	579	6.53	0.0057	0.0225	23	17.8	0.526	8.52	3.85
	D1-NB	447	4.29	0.0043	0.0152	12.1	11.9	0.337	4.99	2.62
	D1-SA	214	2.44	0.0022	0.0075	10.1	5.76	0.242	2.8	1.24
D-02	D2-NA	448	3.98	0.003	0.0115	11	11.8	0.287	5.6	1.98
	D2-NB	533	3.83	0.0028	0.0141	12.6	11.1	0.329	6.16	2.35
	D2-SA	90.2	1.05	0.0006	0.0033	4.33	3.29	0.109	2.35	0.677
	D2-SB	75	1.25	0.0009	0.0037	5.74	3.41	0.122	2.24	0.609
D-03	D3-NA	258	1.37	0.0010	0.0025	34.1	4.23	0.0527	17.4	0.478
	D3-NB	509	3.87	0.0021	0.0039	38.5	6.67	0.129	17.2	0.675
	D3-SA	40.5	0.335	0.00010 *U*	0.0005	4.64	0.683	0.014	2.16	0.0754
	D3-SB	25.7	0.153	0.0003 *U*	0.0003 *U*	3.72	0.53	0.0129	1.75	0.0339
D-04	D4-NA	484	1.58	0.0011	0.0037	56.1	3.3	0.132	27.6	0.607
	D4-NB	269	0.86	0.0007	0.0022	34.1	1.72	0.067	17.6	0.367
	D4-SA	89.7	0.374	0.0002	0.0008	12.7	0.691	0.0257	6.22	0.149
	D4-SB	117	0.437	0.0003	0.0013	15	0.946	0.0519	7.32	0.199
D-05	D5-NA	461	5.28	0.0025	0.0041	20.9	9.71	0.161	10.9	0.765
	D5-NB	485	4.89	0.0022	0.0043	22.9	9.91	0.154	11.9	0.778
	D5-SA	143	1.78	0.0008	0.0016	8.1	2.95	0.061	4.11	0.294
	D5-SB	109	1.54	0.0007	0.0016	6.93	2.33	0.0557	3.59	0.273
D-06	D6-NA	213	2.21	0.0012	0.0023	5.9	4.16	0.0841	2.62	0.386
	D6-NB	158	1.62	0.0010	0.0025	6.29	3.82	0.0905	3.02	0.434
	D6-SA	63.5	0.607	0.0002	0.0007	2.2	0.902	0.0199	0.958	0.105
	D6-SB	52.4	0.385	0.0002	0.0007	1.87	0.641	0.0181	0.766	0.0941
D-07	D7-NA	271	1.72	0.0032	0.0042	6.77	4.71	0.154	3.46	0.757
	D7-NB	333	1.51	0.0023	0.0029	8.48	3.83	0.167	3.62	0.472
	D7-SA	130	0.945	0.0014	0.0022	5.44	1.98	0.0882	2.11	0.343
	D7-SB	105	0.733	0.0011	0.0018	3.79	1.73	0.0812	1.6	0.282

Note: All results reported in mg, dry weight.

Samples were collected from August 22 to September 21 (30 days) in collectors with a diameter of 0.0206 m^2.

J - estimated value

U - undetected at detection limit shown

Table 10. September 2001 dustfall deposition rates

Survey Station	Sample ID	Mass	Metals							
			Aluminum	Arsenic	Cadmium	Calcium	Iron	Lead	Magnesium	Zinc
D-01	D1-NA	937	10.6	0.00923	0.0364	37.2	28.8	0.852	13.8	6.23
	D1-NB	724	6.95	0.00696	0.0246	19.6	19.3	0.546	8.08	4.24
	D1-SA	346	3.95	0.00356	0.0121	16.4	9.32	0.392	4.53	2.01
D-02	D2-NA	725	6.44	0.00486	0.0186	17.8	19.1	0.465	9.07	3.21
	D2-NB	863	6.20	0.00453	0.0228	20.4	18.0	0.533	9.97	3.80
	D2-SA	146	1.70	0.000971	0.00534	7.01	5.33	0.176	3.80	1.10
	D2-SB	121	2.02	0.00146	0.00599	9.29	5.52	0.198	3.63	0.986
D-03	D3-NA	418	2.22	0.00162	0.00405	55.2	6.85	0.085	28.2	0.774
	D3-NB	824	6.27	0.00340	0.00631	62.3	10.8	0.209	27.8	1.09
	D3-SA	65.6	0.542	0.000162 *U*	0.000809	7.51	1.11	0.023	3.50	0.122
	D3-SB	41.6	0.248	0.000486 *U*	0.000486 *U*	6.02	0.858	0.0209	2.83	0.0549
D-04	D4-NA	784	2.56	0.00178	0.00599	90.8	5.34	0.214	44.7	0.983
	D4-NB	435	1.39	0.00113	0.00356	55.2	2.78	0.108	28.5	0.594
	D4-SA	145	0.605	0.000324	0.00130	20.6	1.12	0.0416	10.1	0.241
	D4-SB	189	0.707	0.000486	0.00210	24.3	1.53	0.0840	11.9	0.322
D-05	D5-NA	746	8.55	0.00405	0.00664	33.8	15.7	0.261	17.6	1.24
	D5-NB	785	7.92	0.00356	0.00696	37.1	16.0	0.249	19.3	1.26
	D5-SA	232	2.88	0.00130	0.00259	13.1	4.78	0.0988	6.65	0.476
	D5-SB	176	2.49	0.00113	0.00259	11.2	3.77	0.0902	5.81	0.442
D-06	D6-NA	345	3.58	0.00194	0.00372	9.55	6.73	0.136	4.24	0.625
	D6-NB	256	2.62	0.00162	0.00405	10.2	6.18	0.147	4.89	0.703
	D6-SA	103	0.983	0.000324	0.00113	3.56	1.46	0.0322	1.55	0.170
	D6-SB	84.8	0.623	0.000324	0.00113	3.03	1.04	0.0293	1.24	0.152
D-07	D7-NA	439	2.78	0.00518	0.00680	11.0	7.63	0.249	5.60	1.23
	D7-NB	539	2.44	0.00372	0.00469	13.7	6.20	0.270	5.86	0.764
	D7-SA	210	1.53	0.00227	0.00356	8.81	3.21	0.143	3.42	0.555
	D7-SB	170	1.19	0.00178	0.00291	6.14	2.80	0.131	2.59	0.457

Note: All results reported in $mg/m^2/day$, dry weight.

Samples were collected from August 22 to September 21 (30 days) in collectors with a diameter of 0.0206 m^2.

U - undetected at detection limit

Table 11. Analytical results for moss collected along haul road transects

Transect	Transect Orientation	Distance from Haul Road															
		Cadmium				Lead				Zinc				Calcium			
		3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m
HR-01	north	27.2	13.3	1.66	--	875	424	66.2	--	4,180	2,040	273	--	26,300	12,800	2,720	--
HR-02	south	21.5	6.14	0.502	--	654	217	9.54	--	3,140	949	59.2	--	19,100	7,190	3,960	--
HR-03	north	8.16 [a]	2.93	0.940	--	231 [a]	108	35.5	--	1,160 [a]	435	164	--	93,300 [a]	24,700	7,020	--
HR-04	north	8.86	6.07	1.21	--	252	187	38.5	--	1,240	889	167	--	115,000	60,900	11,800	--
HR-05	south	9.25	3.13	1.00	--	329	117	24.1	--	1,360	460	118	--	72,400	9,800	2,660	--
HR-06	north	10.3	10.9	14.1	4.61	336	463	648	182	1,440	1,200	1,450	433	12,400	6,520	5,910	7,800
HR-07	south	23.1	15.9 [a]	4.27	2.59	824	631 [a]	167	81.6	3,190	1,900 [a]	407	228	33,700	7,560 [a]	2,310	4,990
		Aluminum				Arsenic				Iron				Magnesium			
		3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m
HR-01	north	43,300 *J*	23,700 *J*	1,750 *J*	--	12.9	6.50	1.45	--	27,900	15,100	1,180	--	12,300	4,790	1,320	--
HR-02	south	47,900 *J*	12,500 *J*	196 *J*	--	13.8	3.82	0.380	--	30,900	8,170	152	--	12,200	2,780	1,360	--
HR-03	north	21,800 *J* [a]	8,220 *J*	6,550 *J*	--	6.75 [a]	2.60	1.50	--	12,700 [a]	4,840	4,540	--	50,300 [a]	11,700	3,670	--
HR-04	north	9,550 *J*	5,680 *J*	914 *J*	--	4.21	2.44	0.383	--	6,330	3,650	528	--	63,400	32,200	5,790	--
HR-05	south	20,900 *J*	6,960 *J*	701 *J*	--	10.1	1.84	0.200 *U*	--	11,800	3,980	488	--	40,600	4,710	1,420	--
HR-06	north	39,100 *J*	14,500 *J*	2,440 *J*	650 *J*	10.1	5.03	2.93	1.18	23,800	9,050	2,270	714	11,200	4,250	1,980	917
HR-07	south	30,600 *J*	9,060 *J* [a]	695 *J*	404 *J*	15.7	6.28 [a]	0.859	0.234	19,600	6,060 [a]	631	363	20,100	3,660 [a]	1,240	1,030

Note: Concentrations in mg/kg dry weight.

Moss collected was *Hylocomium splendens*.

Transects ordered from the port site to the mine.

-- - no sample collected

J - estimated value

U - undetected at detection limit shown

[a] Average of two replicates.

Table 12. Analytical results for moss collected at spill sites

Spill Site	Distance From Haul Road[a] (m)	Cadmium (mg/kg dry)	Lead (mg/kg dry)	Zinc (mg/kg dry)	Calcium (mg/kg dry)
SP-12	15	15.5 [b]	458 [b]	1,890 *J* [b]	13,100 [b]
SP-14	30	15.3	995	2,580 *J*	18,600
SP-30	25	7.71	338	1,430 *J*	87,600
SP-20	3	13.4	572	1,780 *J*	115,000
SP-27	10	8.70	552	982 *J*	117,000
SP-13	15	7.20	456	830 *J*	105,000
SP-04	8	6.65	364	822 *J*	86,000
SP-11	NR	7.07	460	864 *J*	84,200
SP-25	NR	8.38	453	1,600 *J*	21,500

Note: Moss collected was *Hylocomium splendens.*

Spill sites listed in order of increasing distance from the mine.

NR - not recorded
J - estimated value

[a] Distances from the haul road to sampling locations are approximate.

[b] Average of two replicates.

Table 13. Analytical results for port site vegetation

	Cadmium				Lead				Zinc				Calcium			
Station	Moss	Lichen	Willow	Salmon-berry	Moss	Lichen	Willow	Salmon-berry	Moss	Lichen	Willow	Salmon-berry	Moss	Lichen	Willow	Salmon-berry
PO-01	6.82	--	--	--	323	--	--	--	1,370 *J*	--	--	--	4,280	--	--	--
PO-02	13.6	--	--	--	622	--	--	--	2,540 *J*	--	--	--	4,710	--	--	--
PO-03	--	--	--	0.415[b]	--	--	--	0.565	--	--	--	21.8	--	--	--	680
PO-04	10.5 [a]	5.63	--	--	526 [a]	207	--	--	2,090 *J* [a]	1,010 *J*	--	--	3,910 [a]	1,670	--	--
PO-05	32.8	--	--	--	1,670	--	--	--	6,480 *J*	--	--	--	12,000	--	--	--
PO-06	20.0	--	--	--	937	--	--	--	3,950 *J*	--	--	--	10,400	--	--	--
PO-07	13.2	--	1.66	--	381	--	11.4	--	1,580 *J*	--	290	--	4,560	--	4,810	--
PO-09	6.87	--	--	--	377	--	--	--	1,560 *J*	--	--	--	4,700	--	--	--
PO-10	43.2	--	--	--	466	--	--	--	1,930 *J*	--	--	--	35,700	--	--	--
PO-11	5.53	5.42	--	--	365	182	--	--	1,260 *J*	1,020 *J*	--	--	4,310	2,000	--	--
PO-13	8.11	--	0.753	--	382	--	4.80	--	1,580 *J*	--	212	--	3,310	--	5,730	--
PO-15	8.49	--	--	--	363	--	--	--	1,500 *J*	--	--	--	3,850	--	--	--
PO-16	48.4	--	--	--	368	--	--	--	1,520 *J*	--	--	--	8,920	--	--	--
PO-17	8.87	5.94	1.21	0.366[b]	374	218	15.6	0.687	1,550 *J*	1,050 *J*	196	17.7	3,760	1,720	3,730	720
PO-18	15.9	--	--	0.229[b]	358	--	--	0.820	1,480 *J*	--	--	25.8	4,890	--	--	951

Note: Concentrations in mg/kg dry weight.

Moss - *Hylocomium splendens*
Lichen - *Peltigera aphthosa*
Willow - *Salix pulchra*
Salmonberry - *Rubus chamaemorus*

-- - no sample collected
J - estimated value

[a] Average of two replicates.

[b] Percent moisture in salmonberries was 83.6, 87.6, and 85.5 percent for stations 3, 17, and 18, respectively.

Table 14. Analytical results for lichen collected along haul road transects

		Distance from Haul Road															
	Transect	Cadmium				Lead				Zinc				Calcium			
Transect	Orientation	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m
HR-01	north	--	8.88	--	--	--	375	--	--	--	1,610	--	--	--	11,000		--
HR-02	south	--	2.93	0.259	--	--	107	6.86	--	--	545 *J*	82.2 *J*	--	--	3,880	1,590	--
HR-03	north	--	--	0.469	--	--	--	17.8	--	--	--	115 *J*	--	--	--	3,620	--
HR-04	north	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
HR-05	south	--	--	0.442	--	--	--	10.6	--	--	--	85.2 *J*	--	--	--	1,320	--
HR-06	north	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
HR-07	south	11.9	8.42	1.82	0.969	660	379	53.7	27.2	1,720 *J*	1,040 *J*	185 *J*	121 *J*	9,870	4,680	1,070	1,940

Note: Concentrations in mg/kg dry weight.

Lichen collected was *Peltigera aphthosa*.

Transects ordered from the port site to the mine.

-- - no sample collected

J - estimated value

Table 15. Analytical results for willow leaves collected along haul road transects

		Distance from Haul Road															
	Transect	Cadmium				Lead				Zinc				Calcium			
Transect	Orientation	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m	3 m	100 m	1,000 m	2,000 m
HR-01	north	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HR-02	south	7.75	0.499	0.708	--	45.6	4.21	0.856	--	546	122	136	--	12,500	7,790	6,670	--
HR-03	north	4.67	0.936	1.37	--	16.5	3.94	0.431	--	263	131	159	--	15,900	7,830	6,550	--
HR-04	north	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HR-05	south	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HR-06	north	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HR-07	south	4.85	3.27	2.66	2.30	21.7	9.71	1.24	0.804	241	161	137	139	9,980	7,430	8,380	10,800

Note: Concentrations in mg/kg dry weight.
Willow collected was *Salix pulchra* .
Transects ordered from the port site to the mine.
-- - no sample collected

Table 16. Analytical results for salmonberries collected along haul road transects

		Distance from Haul Road									
	Transect	Percent Moisture		Cadmium		Lead		Zinc		Calcium	
Transect	Orientation	3 m	100 m	3 m	100 m	3 m	100 m	3 m	100 m	3 m	100 m
HR-01	north	86.9	88.0	1.58	0.346	13.5	1.10	70.5	24.8	2,230	1,290
HR-02	south	--	--	--	--	--	--	--	--	--	--
HR-03	north	--	--	--	--	--	--	--	--	--	--
HR-04	north	88.5	88.2	0.414	0.0581	4.15	0.462	37.3	15.8	4,220	1,740
HR-05	south	--	--	--	--	--	--	--	--	--	--
HR-06	north	--	--	--	--	--	--	--	--	--	--
HR-07	south	--	--	--	--	--	--	--	--	--	--

Note: Concentrations in mg/kg dry weight.
Berry collected was *Rubus chamaemorus*.
Transects ordered from the port site to the mine.
-- - no sample collected

Table 17. Surface water analytical results and ratios to ambient water quality criteria

				Total		Acute		Chronic			Acute		Chronic			Acute		Chronic	
		Ca	Mg	Hardness	Lead		Ratio		Ratio	Zinc		Ratio		Ratio	Cadmium		Ratio		Ratio
	Date	(mg/L)	(mg/L)	(mg/L as $CaCO_3$)	(µg/L)	AWQC	Conc/AWQC	AWQC	Conc/AWQC	(µg/L)	AWQC	Conc/AWQC	AWQC	Conc/AWQC	(µg/L)	AWQC	Conc/AWQC	AWQC	Conc/AWQC
AWQC at a Hardness of 100 mg/L as $CaCO_3$				**100**		**82**		**3.2**			**120**		**120**			**4.5**		**2.5**	
Tutak Creek																			
Upstream of Road	07/11/01	11.6	3.96	45.27	0.4 *U*	30	0.01 *U*	1.2	0.34 *U*	2 *U*	61	0.03 *U*	61	0.03 *U*	0.1 *U*	1.8	0.05 *U*	1.3	0.08 *U*
At Road	07/11/01	12.3	4.11	47.64	0.4 *U*	32	0.01 *U*	1.2	0.32 *U*	2 *U*	64	0.03 *U*	64	0.03 *U*	0.1 *U*	2.0	0.05 *U*	1.4	0.07 *U*
Downstream of Road	07/11/01	13.1	4.21	50.05	0.4 *U*	34	0.01 *U*	1.3	0.30 *U*	2 *U*	67	0.03 *U*	67	0.03 *U*	0.1 *U*	2.1	0.05 *U*	1.4	0.07 *U*
At Mouth	07/11/01	16.5	5.5	63.85	0.4 *U*	46	0.009 *U*	1.8	0.22 *U*	2 *U*	82	0.02 *U*	82	0.02 *U*	0.1 *U*	2.7	0.04 *U*	1.7	0.06 *U*
Upstream of Road	08/06/01	14.1	4.26	52.75	0.4 *U*	36	0.01 *U*	1.4	0.28 *U*	2 *U*	70	0.03 *U*	70	0.03 *U*	0.1 *U*	2.2	0.05 *U*	1.5	0.07 *U*
At Road	08/06/01	13.9	4.17	51.88	0.4 *U*	35	0.01 *U*	1.4	0.29 *U*	2.2	69	0.03	69	0.03	0.1 *U*	2.2	0.05 *U*	1.5	0.07 *U*
Downstream of Road	08/06/01	14.3	4.23	53.13	0.4 *U*	36	0.01 *U*	1.4	0.28 *U*	2 *U*	70	0.03 *U*	70	0.03 *U*	0.1 *U*	2.2	0.05 *U*	1.5	0.07 *U*
At Mouth	08/06/01	12.7	3.82	47.44	0.4 *U*	32	0.01 *U*	1.2	0.32 *U*	2 *U*	64	0.03 *U*	64	0.03 *U*	0.1 *U*	1.9	0.05 *U*	1.4	0.07 *U*
Upstream of Road	09/15/01	16.5	4.98	61.71	0.04 *U*	44	0.0009 *U*	1.7	0.02 *U*	10 *U*	80	0.13 *U*	80	0.13 *U*	0.1 *U*	2.6	0.04 *U*	1.7	0.06 *U*
At Road	09/15/01	14.2	4.45	53.78	0.15	37	0.004	1.4	0.10	10 *U*	71	0.14 *U*	71	0.14 *U*	0.1 *U*	2.2	0.04 *U*	1.5	0.07 *U*
Downstream of Road	09/15/01	15	4.64	56.56	0.25	40	0.006	1.5	0.16	10 *U*	74	0.14 *U*	74	0.14 *U*	0.1 *U*	2.4	0.04 *U*	1.6	0.06 *U*
At Mouth	09/15/01	13.7	4.31	51.96	0.22	35	0.006	1.4	0.16	10 *U*	69	0.15 *U*	69	0.15 *U*	0.1 *U*	2.2	0.05 *U*	1.5	0.07 *U*
Upstream of Road	10/08/01	20.8	6.19	77.43	0.4 *U*	59	0.007 *U*	2.3	0.17 *U*	2 *U*	96	0.02 *U*	96	0.02 *U*	0.1 *U*	3.4	0.03 *U*	2.0	0.05 *U*
At Road	10/08/01	19.2	5.87	72.12	0.4 *U*	54	0.007 *U*	2.1	0.19 *U*	2 *U*	91	0.02 *U*	91	0.02 *U*	0.1 *U*	3.1	0.03 *U*	1.9	0.05 *U*
Downstream of Road	10/08/01	18.6	5.56	69.34	0.4 *U*	51	0.008 *U*	2.0	0.20 *U*	2 *U*	88	0.02 *U*	88	0.02 *U*	0.1 *U*	3.0	0.03 *U*	1.8	0.05 *U*
At Mouth	10/08/01	17.6	5.4	66.18	0.4 *U*	48	0.008 *U*	1.9	0.21 *U*	2 *U*	84	0.02 *U*	84	0.02 *U*	0.1 *U*	2.8	0.04 *U*	1.8	0.06 *U*
Straight Creek																			
Upstream of Road	07/11/01	12.8	6.29	57.86	0.4 *U*	41	0.01 *U*	1.6	0.25 *U*	2 *U*	75	0.03 *U*	75	0.03 *U*	0.1 *U*	2.4	0.04 *U*	1.6	0.06 *U*
Downstream of Road	07/11/01	8.32	3.3	34.36	0.4 *U*	21	0.02 *U*	0.8	0.49 *U*	2 *U*	48	0.04 *U*	48	0.04 *U*	0.1 *U*	1.4	0.07 *U*	1.1	0.09 *U*
Upstream of Road	08/06/01	10.9	5.3	49.04	0.4 *U*	33	0.01 *U*	1.3	0.31 *U*	2 *U*	66	0.03 *U*	66	0.03 *U*	0.1 *U*	2.0	0.05 *U*	1.4	0.07 *U*
At Road	08/06/01	13	5.3	54.29	0.4 *U*	38	0.01 *U*	1.5	0.27 *U*	2 *U*	71	0.03 *U*	71	0.03 *U*	0.1 *U*	2.3	0.04 *U*	1.5	0.07 *U*
Downstream of Road	08/06/01	10.5	4.2	43.51	0.4 *U*	28	0.01 *U*	1.1	0.36 *U*	2 *U*	59	0.03 *U*	59	0.03 *U*	0.1 *U*	1.8	0.06 *U*	1.3	0.08 *U*
Upstream of Road	09/15/01	11.6	5.66	52.27	0.47	36	0.01	1.4	0.34	10 *U*	69	0.14 *U*	69	0.14 *U*	0.1 *U*	2.2	0.05 *U*	1.5	0.07 *U*
At Road	09/15/01	13.4	5.73	57.06	0.17	40	0.004	1.6	0.11	10 *U*	74	0.13 *U*	74	0.13 *U*	0.1 *U*	2.4	0.04 *U*	1.6	0.06 *U*
Downstream of Road	09/15/01	11.3	4.82	48.06	0.15	32	0.005	1.3	0.12	10 *U*	64	0.16 *U*	64	0.16 *U*	0.1 *U*	2.0	0.05 *U*	1.4	0.07 *U*
At Mouth	09/15/01	25.8	3.76	79.91	0.04 *U*	61	0.0007 *U*	2.4	0.02 *U*	10 *U*	99	0.10 *U*	99	0.10 *U*	0.1 *U*	3.5	0.03 *U*	2.1	0.05 *U*
Upstream of Road	10/09/01	18.3	8.81	81.97	0.4 *U*	63	0.006 *U*	2.5	0.16 *U*	2 *U*	101	0.02 *U*	101	0.02 *U*	0.1 *U*	3.6	0.03 *U*	2.1	0.05 *U*
At Road	10/09/01	22.1	9.58	94.63	0.4 *U*	76	0.005 *U*	3.0	0.13 *U*	2 *U*	114	0.02 *U*	114	0.02 *U*	0.1 *U*	4.2	0.02 *U*	2.4	0.04 *U*
Downstream of Road	10/09/01	17.5	7.8	75.82	0.4 *U*	57	0.007 *U*	2.2	0.18 *U*	2 *U*	95	0.02 *U*	95	0.02 *U*	0.1 *U*	3.3	0.03 *U*	2.0	0.05 *U*
Omikviorok River																			
NF Upstream of Road	07/11/01	26.5	5.43	88.53	0.4 *U*	70	0.006 *U*	2.7	0.15 *U*	5.16	108	0.05	108	0.05	0.1 *U*	3.9	0.03 *U*	2.2	0.04 *U*
SF Upstream of Road	07/11/01	16.7	5.23	63.24	0.4 *U*	46	0.009 *U*	1.8	0.23 *U*	2 *U*	81	0.02 *U*	81	0.02 *U*	0.1 *U*	2.7	0.04 *U*	1.7	0.06 *U*
At Road	07/11/01	22.2	5.32	77.34	0.4 *U*	59	0.007 *U*	2.3	0.17 *U*	2 *U*	96	0.02 *U*	96	0.02 *U*	0.1 *U*	3.4	0.03 *U*	2.0	0.05 *U*
Downstream of Road	07/11/01	21.8	5.16	75.68	0.4 *U*	57	0.007 *U*	2.2	0.18 *U*	2 *U*	95	0.02 *U*	95	0.02 *U*	0.1 *U*	3.3	0.03 *U*	2.0	0.05 *U*
At Mouth	07/11/01	32.6	3.69	96.60	0.4 *U*	78	0.005 *U*	3.0	0.13 *U*	2 *U*	116	0.02 *U*	116	0.02 *U*	0.1 *U*	4.3	0.02 *U*	2.4	0.04 *U*
NF Upstream of Road	08/05/01	24.7	4.99	82.22	0.4 *U*	64	0.006 *U*	2.5	0.16 *U*	2 *U*	102	0.02 *U*	102	0.02 *U*	0.1 *U*	3.6	0.03 *U*	2.1	0.05 *U*
SF Upstream of Road	08/05/01	18	5.31	66.81	0.4 *U*	49	0.008 *U*	1.9	0.21 *U*	2.18	85	0.03	85	0.03	0.1 *U*	2.9	0.03 *U*	1.8	0.06 *U*
At Road	08/05/01	22.4	4.78	75.62	0.4 *U*	57	0.007 *U*	2.2	0.18 *U*	2 *U*	95	0.02 *U*	95	0.02 *U*	0.1 *U*	3.3	0.03 *U*	2.0	0.05 *U*
Downstream of Road	08/05/01	19.4	4.39	66.52	0.4 *U*	49	0.008 *U*	1.9	0.21 *U*	2 *U*	85	0.02 *U*	85	0.02 *U*	0.1 *U*	2.9	0.04 *U*	1.8	0.06 *U*
At Mouth	08/05/01	27.8	3.48	83.75	0.4 *U*	65	0.006 *U*	2.5	0.16 *U*	2 *U*	103	0.02 *U*	103	0.02 *U*	0.1 *U*	3.7	0.03 *U*	2.1	0.05 *U*
NF Upstream of Road	09/15/01	25.3	5.56	86.07	0.04 *U*	67	0.0006 *U*	2.6	0.02 *U*	10 *U*	106	0.09 *U*	106	0.09 *U*	0.1 *U*	3.8	0.03 *U*	2.2	0.05 *U*
SF Upstream of Road	09/15/01	17.4	5.86	67.58	0.04 *U*	50	0.0008 *U*	1.9	0.02 *U*	10 *U*	86	0.12 *U*	86	0.12 *U*	0.1 *U*	2.9	0.03 *U*	1.8	0.06 *U*
At Road	09/15/01	24.4	5.52	83.66	0.13	65	0.002	2.5	0.05	10 *U*	103	0.10 *U*	103	0.10 *U*	0.1 *U*	3.7	0.03 *U*	2.1	0.05 *U*
Downstream of Road	09/15/01	21.1	5.1	73.69	0.59	55	0.01	2.2	0.27	10 *U*	93	0.11 *U*	93	0.11 *U*	0.1 *U*	3.2	0.03 *U*	1.9	0.05 *U*
At Mouth	09/15/01	27.3	4.15	85.26	0.05	67	0.0008	2.6	0.02	10 *U*	105	0.10 *U*	105	0.10 *U*	0.1 *U*	3.8	0.03 *U*	2.2	0.05 *U*

Table 17. (cont.)

	Date	Ca (mg/L)	Mg (mg/L)	Total Hardness (mg/L as $CaCO_3$)	Lead (μg/L)	Acute AWQC	Acute Ratio Conc/AWQC	Chronic AWQC	Chronic Ratio Conc/AWQC	Zinc (μg/L)	Acute AWQC	Acute Ratio Conc/AWQC	Chronic AWQC	Chronic Ratio Conc/AWQC	Cadmium (μg/L)	Acute AWQC	Acute Ratio Conc/AWQC	Chronic AWQC	Chronic Ratio Conc/AWQC
NF Upstream of Road	10/09/01	30.9	6.43	103.64	0.4 *U*	85	0.005 *U*	3.3	0.12 *U*	2 *U*	123	0.02 *U*	123	0.02 *U*	0.1 *U*	4.7	0.02 *U*	2.5	0.04 *U*
SF Upstream of Road	10/09/01	26.6	8.12	99.86	0.4 *U*	81	0.005 *U*	3.2	0.13 *U*	2 *U*	120	0.02 *U*	120	0.02 *U*	0.1 *U*	4.5	0.02 *U*	2.5	0.04 *U*
At Road	10/09/01	28.8	6.75	99.71	0.4 *U*	81	0.005 *U*	3.2	0.13 *U*	2 *U*	120	0.02 *U*	120	0.02 *U*	0.1 *U*	4.5	0.02 *U*	2.5	0.04 *U*
Downstream of Road	10/09/01	29.1	6.67	100.13	0.4 *U*	82	0.005 *U*	3.2	0.13 *U*	2 *U*	120	0.02 *U*	120	0.02 *U*	0.1 *U*	4.5	0.02 *U*	2.5	0.04 *U*
At Mouth	10/09/01	33.9	3.71	99.93	0.4 *U*	82	0.005 *U*	3.2	0.13 *U*	2 *U*	120	0.02 *U*	120	0.02 *U*	0.1 *U*	4.5	0.02 *U*	2.5	0.04 *U*
New Heart Creek																			
NF Upstream of Road	07/12/01	28	2.67	80.91	0.454	62	0.007	2.4	0.19	2 *U*	100	0.02 *U*	100	0.02 *U*	0.1 *U*	3.6	0.03 *U*	2.1	0.05 *U*
SF Upstream of Road	07/12/01	26.1	2.33	74.77	0.4 *U*	56	0.007 *U*	2.2	0.18 *U*	3.29	94	0.04	94	0.04	0.1 *U*	3.3	0.03 *U*	2.0	0.05 *U*
At Road	07/12/01	34.9	4.08	103.95	0.4 *U*	86	0.005 *U*	3.3	0.12 *U*	3.91	124	0.03	124	0.03	0.1 *U*	4.7	0.02 *U*	2.5	0.04 *U*
Downstream of Road	07/12/01	47.7	4.69	138.42	0.4 *U*	124	0.003 *U*	4.8	0.08 *U*	2 *U*	158	0.01 *U*	158	0.01 *U*	0.1 *U*	6.5	0.02 *U*	3.2	0.03 *U*
At Mouth 1	07/12/01	54.2	4.11	152.26	0.4 *U*	139	0.003 *U*	5.4	0.07 *U*	2 *U*	171	0.01 *U*	171	0.01 *U*	0.1 *U*	7.3	0.01 *U*	3.4	0.03 *U*
At Mouth 2	07/12/01	53	6.67	159.81	0.4 *U*	148	0.003 *U*	5.8	0.07 *U*	2 *U*	178	0.01 *U*	178	0.01 *U*	0.1 *U*	7.7	0.01 *U*	3.6	0.03 *U*
NF Upstream of Road	08/06/01	40.9	3.89	118.15	0.4 *U*	101	0.004 *U*	3.9	0.10 *U*	2 *U*	138	0.01 *U*	138	0.01 *U*	0.1 *U*	5.5	0.02 *U*	2.8	0.04 *U*
SF Upstream of Road	08/06/01	28.6	2.48	81.63	0.4 *U*	63	0.006 *U*	2.5	0.16 *U*	2 *U*	101	0.02 *U*	101	0.02 *U*	0.1 *U*	3.6	0.03 *U*	2.1	0.05 *U*
At Road	08/06/01	42.4	5.18	127.20	0.4 *U*	111	0.004 *U*	4.3	0.09 *U*	2.89	147	0.02	147	0.02	0.1 *U*	5.9	0.02 *U*	3.0	0.03 *U*
Downstream of Road	08/06/01	42.8	4.52	125.48	0.4 *U*	109	0.004 *U*	4.2	0.09 *U*	2 *U*	145	0.01 *U*	145	0.01 *U*	0.1 *U*	5.8	0.02 *U*	2.9	0.03 *U*
At Mouth 1	08/06/01	37.7	3.28	107.64	0.4 *U*	90	0.004 *U*	3.5	0.11 *U*	2 *U*	128	0.02 *U*	128	0.02 *U*	0.1 *U*	4.9	0.02 *U*	2.6	0.04 *U*
NF Upstream of Road	09/04/01	53.7	5.16	155.34	0.05	143	0.0003	5.6	0.009	8.4	174	0.05	174	0.05	0.2	7.4	0.03	3.5	0.06
SF Upstream of Road	09/04/01	33.8	2.9	96.34	0.04 *U*	78	0.0005 *U*	3.0	0.01 *U*	2 *U*	116	0.02 *U*	116	0.02 *U*	0.1 *U*	4.3	0.02 *U*	2.4	0.04 *U*
At Road	09/04/01	57.9	7.75	176.49	0.43	168	0.003	6.6	0.07	6.8	194	0.04	194	0.04	0.1 *U*	8.6	0.01 *U*	3.8	0.03 *U*
Downstream of Road	09/04/01	58.4	6.15	171.15	0.04 *U*	162	0.0002 *U*	6.3	0.006 *U*	4.5	189	0.02	189	0.02	0.1 *U*	8.3	0.01 *U*	3.8	0.03 *U*
At Mouth 1	09/04/01	48.8	3.89	137.87	0.04 *U*	123	0.0003 *U*	4.8	0.008 *U*	16.1	157	0.10	157	0.10	0.1	6.5	0.02	3.2	0.03
NF Upstream of Road	10/08/01	55.7	5.18	160.41	0.4 *U*	149	0.003 *U*	5.8	0.07 *U*	2 *U*	179	0.01 *U*	179	0.01 *U*	0.1 *U*	7.7	0.01 *U*	3.6	0.03 *U*
At Road	10/08/01	61.3	7.68	184.69	0.488	178	0.003	6.9	0.07	11.1	202	0.06	202	0.06	0.1 *U*	9.0	0.01 *U*	4.0	0.03 *U*
Downstream of Road	10/08/01	56.6	6	166.04	2.37	156	0.02	6.1	0.39	34.4	184	0.19	184	0.19	0.1 *U*	8.0	0.01 *U*	3.7	0.03 *U*
At Mouth 1	10/08/01	56.2	4.85	160.30	0.4 *U*	149	0.003 *U*	5.8	0.07 *U*	2 *U*	179	0.01 *U*	179	0.01 *U*	0.1 *U*	7.7	0.01 *U*	3.6	0.03 *U*
Aufeis Creek																			
NF Upstream of Road	07/11/01	6.25	2.32	25.16	0.4 *U*	14	0.03 *U*	0.5	0.73 *U*	2 *U*	37	0.05 *U*	37	0.05 *U*	0.1 *U*	1.0	0.10 *U*	0.8	0.12 *U*
SF Upstream of Road	07/11/01	22.1	3.73	70.54	0.4 *U*	52	0.008 *U*	2.0	0.20 *U*	2 *U*	89	0.02 *U*	89	0.02 *U*	0.1 *U*	3.0	0.03 *U*	1.9	0.05 *U*
At Road	07/11/01	19.5	3.19	61.83	0.4 *U*	44	0.009 *U*	1.7	0.23 *U*	2.29	80	0.03	80	0.03	0.1 *U*	2.6	0.04 *U*	1.7	0.06 *U*
Downstream of Road	07/11/01	23.3	3.5	72.59	0.4 *U*	54	0.007 *U*	2.1	0.19 *U*	2 *U*	91	0.02 *U*	91	0.02 *U*	0.13	3.1	0.04	1.9	0.07
At Mouth 1	07/11/01	29.4	3.35	87.21	0.4 *U*	69	0.006 *U*	2.7	0.15 *U*	2 *U*	107	0.02 *U*	107	0.02 *U*	0.1 *U*	3.9	0.03 *U*	2.2	0.05 *U*
At Mouth 2	07/11/01	36.1	3.62	105.05	0.4 *U*	87	0.005 *U*	3.4	0.12 *U*	2 *U*	125	0.02 *U*	125	0.02 *U*	0.1 *U*	4.8	0.02 *U*	2.6	0.04 *U*
NF Upstream of Road	08/06/01	8.25	2.9	32.54	0.4 *U*	20	0.02 *U*	0.8	0.52 *U*	2 *U*	46	0.04 *U*	46	0.04 *U*	0.1 *U*	1.3	0.08 *U*	1.0	0.10 *U*
SF Upstream of Road	08/06/01	29.7	4.79	93.89	0.4 *U*	75	0.005 *U*	2.9	0.14 *U*	2 *U*	114	0.02 *U*	114	0.02 *U*	0.1 *U*	4.2	0.02 *U*	2.3	0.04 *U*
At Road	08/06/01	22.3	3.87	71.62	0.4 *U*	53	0.007 *U*	2.1	0.19 *U*	2 *U*	90	0.02 *U*	90	0.02 *U*	0.1 *U*	3.1	0.03 *U*	1.9	0.05 *U*
Downstream of Road	08/06/01	25.1	4.01	79.19	0.4 *U*	61	0.007 *U*	2.4	0.17 *U*	2 *U*	98	0.02 *U*	98	0.02 *U*	0.1 *U*	3.5	0.03 *U*	2.0	0.05 *U*
At Mouth 2	08/06/01	26.1	3.27	78.64	0.4 *U*	60	0.007 *U*	2.3	0.17 *U*	2 *U*	98	0.02 *U*	98	0.02 *U*	0.1 *U*	3.4	0.03 *U*	2.0	0.05 *U*
NF Upstream of Road	09/04/01	11.3	3.69	43.41	0.04 *U*	28	0.001 *U*	1.1	0.04 *U*	2 *U*	59	0.03 *U*	59	0.03 *U*	0.1 *U*	1.8	0.06 *U*	1.3	0.08 *U*
SF Upstream of Road	09/04/01	40.6	6.3	127.32	0.04 *U*	111	0.0004 *U*	4.3	0.009 *U*	2 *U*	147	0.01 *U*	147	0.01 *U*	0.1 *U*	5.9	0.02 *U*	3.0	0.03 *U*
At Road	09/04/01	31.2	5.06	98.74	0.13	80	0.002	3.1	0.04	2 *U*	119	0.02 *U*	119	0.02 *U*	0.1 *U*	4.5	0.02 *U*	2.4	0.04 *U*
Downstream of Road	09/04/01	35.3	5.34	110.13	0.04 *U*	92	0.0004 *U*	3.6	0.01 *U*	2 *U*	130	0.02 *U*	130	0.02 *U*	0.1 *U*	5.0	0.02 *U*	2.7	0.04 *U*
At Mouth 2	09/04/01	30.6	3.56	91.07	0.05	72	0.0007	2.8	0.02	2 *U*	111	0.02 *U*	111	0.02 *U*	0.1 *U*	4.1	0.02 *U*	2.3	0.04 *U*
NF Upstream of Road	10/09/01	15.8	4.63	58.52	0.4 *U*	41	0.010 *U*	1.6	0.25 *U*	2 *U*	76	0.03 *U*	76	0.03 *U*	0.1 *U*	2.5	0.04 *U*	1.6	0.06 *U*
SF Upstream of Road	10/09/01	54.2	7.75	167.25	0.4 *U*	157	0.003 *U*	6.1	0.07 *U*	2 *U*	185	0.01 *U*	185	0.01 *U*	0.1 *U*	8.1	0.01 *U*	3.7	0.03 *U*
At Road	10/09/01	38.5	6.05	121.05	0.4 *U*	104	0.004 *U*	4.1	0.10 *U*	2.07	141	0.01	141	0.01	0.1 *U*	5.6	0.02 *U*	2.9	0.03 *U*
Downstream of Road	10/09/01	40.2	5.97	124.96	0.4 *U*	108	0.004 *U*	4.2	0.09 *U*	2 *U*	145	0.01 *U*	145	0.01 *U*	0.1 *U*	5.8	0.02 *U*	2.9	0.03 *U*
At Mouth 2	10/09/01	64.6	5.89	185.56	0.4 *U*	179	0.002 *U*	7.0	0.06 *U*	2 *U*	202	0.01 *U*	202	0.01 *U*	0.1 *U*	9.1	0.01 *U*	4.0	0.02 *U*
Maximum Values (for detected results)					**2.37**		**0.02**		**0.39**	**34.4**		**0.19**		**0.19**	**0.2**		**0.04**		**0.07**

Table 17. (cont.)

Note: Calcium and magnesium results are in mg/L unfiltered; cadmium, lead and zinc results are in µg/L unfiltered; all criteria are in µg/L.
Ambient water quality criteria from EPA 822-Z-99-001, April 1999.
No result exceeded the ambient water quality criteria for total recoverable metals.

Ca - calcium
Mg - magnesium
AWQC - ambient water quality criteria

Hardness was calculated per Standard Methods for the Examination of Water and Wastewater, 1989 using the formula:

Hardness (mg/L as $CaCO_3$) = (2.497*[Ca])+(4.118*[Mg]), where Ca and Mg are in mg/L

The following are the hardness dependent formulas for acute ambient water quality criteria for total recoverable metals.

Cadmium	exp(1.128*ln(hardness)-3.6867)
Lead	exp(1.273*ln(hardness)-1.460)
Zinc	exp(0.8473*ln(hardness)+0.884)

The following are the hardness dependent formulas for chronic ambient water quality criteria for total recoverable metals.

Cadmium	exp(0.7852*ln(hardness)-2.715)
Lead	exp(1.273*ln(hardness)-4.705)
Zinc	exp(0.8473*ln(hardness)+0.884)

Table 18. Comparison of metal concentrations in moss collected along haul road transects by Exponent and the National Park Service

	Cadmium								
	Exponent			NPS (north side)			NPS (south side)		
Transect Point	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error
3 m	4	8.61	0.621	5	12.0	1.9	3	11.2	3.0
100 m	3	4.04	1.01	3	4.1	0.8	3	1.6	0.4
1,000 m	3	1.05	0.0819	6	0.8	0.1	3	0.5	0.1

	Lead								
	Exponent			NPS (north side)			NPS (south side)		
Transect Point	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error
3 m	4	261	26.7	5	430	38	3	363	38
100 m	3	137	25.0	3	159	29	3	55	14
1,000 m	3	32.7	4.39	6	33	7	3	12	3

	Zinc								
	Exponent			NPS (north side)			NPS (south side)		
Transect Point	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error
3 m	4	1,230	86.9	5	1,962	328	3	1,853	511
100 m	3	595	147	3	763	145	3	305	76
1,000 m	3	150	89.2	6	187	22	3	114	2

Note: Concentrations reported in mg/kg dry weight.

Moss collected was *Hylocomium splendens* .

Exponent data include only samples collected at transects HR-03, HR-04, and HR-05; north and south transect data are pooled.

NPS sample sizes, means, and standard errors are as reported in Table 1 of Ford and Hasselbach (2001).

NPS - National Park Service