BIOLOGICAL AND SEDIMENT MONITORING PROGRAM

AT

ROSE AND ANVIL CREEKS, FARO, Y.T.
2006

R-6, July 25, 2006

Submitted to:
DELOITTE & TOUCHE INC

Prepared by:
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November 2006

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LETTER OF TRANSMITTAL

November 28, 2006

Doug Sedgwick
Deloitte & Touche Ltd
121 King Street West, Suite 300
Toronto, ON
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Dear Doug:

Re: **Biological and Sediment Monitoring Programs at Rose and Anvil Creeks, Faro, YT, 2006**

We are pleased to submit herewith, the above report covering the environmental monitoring programs as stipulated in Water Licence Number QZ03-059. The above monitoring programs were completed in the summer of 2006 at the Faro Mine Site property and the receiving waters.

Water and stream sediment chemistry displayed good quality for the support of freshwater aquatic life. Healthy communities of benthic invertebrates were present at each site.

Should you have any questions or comments on the report, please do not hesitate to contact the undersigned.

Sincerely,

Bonnie Burns
Laberge Environmental Services

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1.0 BACKGROUND

On August 16, 1994, Anvil Range Mining Corporation (Anvil) was officially assigned Licence Number IN89-001, which was originally issued to Curragh Resources Inc, by the Yukon Territory Water Board. On December 21, 1996, mining temporarily ceased but the mill continued to operate until March 1997. In late August 1997, mining resumed with milling commencing in October. However both operations shut down in late January 1998. Low metal prices (zinc and lead) and financial difficulties experienced by Anvil indicated that this closure had the potential to be long term. An amended water licence, number QZ95-003 was issued to Anvil on January 30, 1998. In April 1998, Deloitte and Touche Inc became the interim receivers for the Faro Mine property, operations and assets. They have also acted as caretakers of the site bearing responsibility for the requirements under the water licence. On March 30, 2004, Deloitte and Touche Inc was issued licence QZ03-059 to continue care and maintenance of the site and to conduct and/or manage additional studies and plans, for another five years.

To comply with Part G, Section 64, of the new licence a biological and sediment monitoring program is to be undertaken every two years on the Rose Creek system. The Licence states that three replicate samples of benthic macro-invertebrate fauna are to be collected from seven sites located on Rose and Anvil Creeks. These benthic organisms are to be identified, enumerated and the data evaluated. Stream sediment and water samples are to be collected concurrently.

Deloitte & Touche Inc contracted Laberge Environmental Services (LES) to conduct the biological and sediment monitoring surveys. This report contains all data collected during the 2006 program. Some comparisons with past monitoring programs have been included.

2.0 STUDY AREA

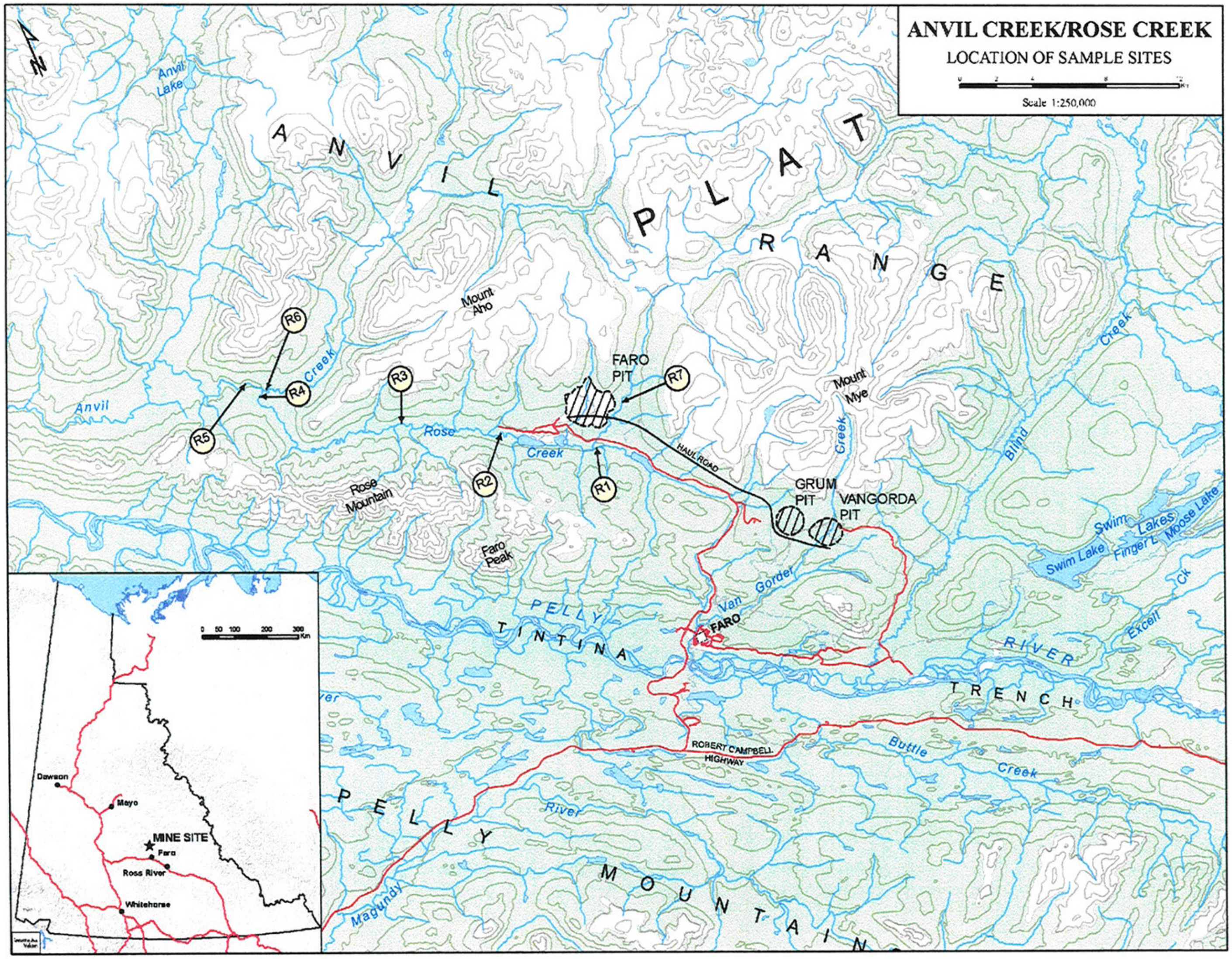
The Faro mine site is located approximately 20 road kilometres north of the Town of Faro at approximately 62° 20' N and 133° 25' W (Figure 1).

The study area lies within the ecoregion Yukon Plateau - North. The mean annual temperature for this region is approximately –5°C with a summer mean of 10.5°C and a winter mean of -20°C. Northern boreal forests exist at elevations up to 1500 m asl. White and black spruce form the most common forest types with aspen and balsam poplar occupying disturbed areas. (Yukon Ecoregions Working Group, 2006).

The biological monitoring sites are established on Rose and Anvil Creeks at the following locations (Figure 1):

R1	Upstream of the confluence of the North Fork of Rose Creek and downstream of the dewatered freshwater reservoir.
R2	In the mixing zone downstream of the intersection of the Rose Creek diversion canal and the outlet of the tailings pond, just downstream of X-14.
R3	Rose Creek approximately half way between the tailings pond outlet and Anvil Cr.
R4	Rose Creek just upstream of Anvil Creek.
R5	Anvil Creek approximately 200 metres downstream of Rose Creek.
R6	Anvil Creek immediately upstream of Rose Creek.
R6A*	Anvil Creek approximately 1.3 kilometres upstream of Rose Creek
R7	North Fork of Rose Creek upstream of the confluence with the Faro Creek diversion.

* R6A is not a licensed site but for the 2006 survey this site was examined in order to provide chemical and biological data for the fisheries program (WMEC 2006). The physical characteristics of R6A are more favourable from a fish sampling aspect than R6, and a request was made to investigate if the other attributes of both sites were similar.


ANVIL CREEK/ROSE CREEK
LOCATION OF SAMPLE SITES
Scale 1:250,000
N
Anvil Lake
ANVIL PLATEAU RANGE
Mount Aho
FARO PIT
R1
R2
R3
R4
R5
R6
R7
Anvil Creek
Rose Creek
Rose Mountain
Faro Peak
HAUL ROAD
Mount Mye
Creek
GRUM PIT
VANGORDA PIT
Blind Creek
Swim Lake
Swim Lakes
Finger L.
Moose Lake
Van Gorder
FARO
PELLY
TINTINA
RIVER
TRENCH
Excell Ck
ROBERT CAMPBELL HIGHWAY
Buttle Creek
PELLY MOUNTAINS
River
Magundy
Dawson
Mayo
MINE SITE
Faro
Ross River
Whitehorse

3.0 METHODS

The 2006 biological monitoring program consisted of two field surveys conducted on July 24th to 26th, and on August 28th and 29th. Helicopter access was required for the sites situated on the lower mainstem of Rose Creek and the sites on Anvil Creek. The remaining sites were accessed by vehicle and on foot.

3.1 Water Quality

Water quality samples were collected at each site in July and in August. The samples were collected in a fast flowing section of the stream upstream of the sediment and benthic sampler locations.

3.1.1 Field Measurements

In-situ measurements were taken at each site during both surveys. Conductivity and temperature were determined with an Orion conductivity meter model 126. Dissolved oxygen readings were obtained using an Accumet AP64 dissolved oxygen meter and pH measurements were taken using a Denver Instrument UP-5 pH meter.

3.1.2 Chemical Analyses

All sample bottles were supplied by Cantest Laboratories of Burnaby, B.C. and were provided to LES personnel at the Faro Mine Security Office. At each site, the sample bottles were rinsed three times with the sample water prior to filling. Samples were collected in two-litre plastic bottles for sulphates, alkalinity, hardness, colour, turbidity and nonfilterable residue analyses. Ammonia samples were collected in 500 mL plastic bottles and preserved with sulphuric acid. Samples to be analyzed for total metals and dissolved metals were collected in 250 mL acid washed plastic bottles. The total metals samples were preserved with nitric acid. The dissolved metals samples were left unpreserved to be filtered and treated at the lab. Samples were kept cool prior to shipment to Cantest.

3.2 Water Quantity

Discharge was measured at each of the sites, where possible, on both visits. An area with a uniform cross section was chosen and the velocity and depth were measured using a AA Price velocity meter. Ten or more readings were taken across the profile of the stream. Total discharge was calculated as the sum of these individual discharges (area x velocity).

3.3 Stream Sediment Sampling

Triplicate stream sediment samples were collected from each site in July. Sample sites were selected from areas of deposition along the stream bank, generally characterized by the finest grain size evident at the site. Samples were collected with a stainless steel trowel and placed in glass soil jars. The samples were packed with ice packs when shipped to Cantest.

At the lab, the samples were dried and passed through a 100 mesh (0.15 mm) stainless steel sieve. The portion passing through the sieve was run through an ICP scan for the determination of total metal concentrations.

3.4 Benthic Invertebrate Sampling

3.4.1 Field Collection

Artificial substrate samplers were used for benthic invertebrate sampling. The basket samplers were cylindrical in shape, measured 26 cm long with a diameter of 17 cm, and were constructed of galvanized wire with a one centimetre mesh. Each substrate sampler was filled with washed indigenous gravels collected from the stream bed or the bank at each sample site. The surface area provided by this 'artificial substrate' was approximately 6000 $\pm$ 1000 cm^2 (Baker 1979).

Three rock filled samplers were submerged in riffle areas of the stream at each site in July. These samplers were left to colonize for five weeks. On August 28th and 29th, 2006, the artificial substrate samplers were retrieved by placing a screened bucket with a 300 micron mesh, downstream and under the basket. On shore the basket was opened in the bucket. Individual rocks were then carefully washed in the screened bucket to remove and collect all invertebrates from that sample. The detritus and benthic invertebrates remaining in the bucket were placed in a one litre nalgene bottle and preserved with 10% formalin. These samples were sent to Charles Low PhD, an entomologist in Victoria, B.C. for enumeration and identification.

3.4.2 Laboratory Analysis

All samples were washed through two screens with mesh sizes 1 millimetre and 180 microns. All of the organisms retained by the coarse screen were counted and identified, whereas the organisms on the 180 micron screen were subsampled as necessary. A Folsom plankton splitter was used for the subsampling. The split fraction that was analyzed is indicated underneath the station number in Appendix C. The majority of the benthos was identified to the genus level.

4.0 RESULTS AND DISCUSSION

4.1 Water Quality

Water quality samples were collected at each of the sites on both visits during the summer of 2006. The analytical results are presented in Appendix A. Eleven parameters (Sb, Be, Bi, B, Cd, Hg, P, Ag, Te, Th, and Zr) were below the method detection limit in all of the samples.

Part 3 of Schedule B specifically requests the analysis of total hardness, alkalinity, sulphate, suspended solids, ammonia, and total and dissolved copper, iron, lead and zinc. The results for these parameters and the in-situ data are presented in Table 1, with discussion per parameter presented below.

4.1.1 Temperature

The temperature values reflected the diurnal and seasonal timing of the sampling, ranging from 4.1°C at R6 on August 29th to 12.9°C at R2 on July 24th.

4.1.2 Conductivity and Total Hardness

Calcium and magnesium are considered to be the primary contributors to hardness but other cations such as strontium, barium, manganese, iron and aluminum also contribute to total hardness. The upstream Rose Creek sites R1 and R7 were medium soft and the rest of the sites were hard to very hard. Conductivity, which is a measure of the ionic constituents in water, had a similar trend to total hardness with lower values in the upstream sites and considerably higher values in the downstream sites.

4.1.3 pH and Alkalinity

All pH values were near neutral to slightly alkaline ranging from 7.04 to 8.46. Alkalinity is a measure of the buffering capacity of natural waters against changes in pH relating to the carbonate system. Alkalinity values were fairly consistent throughout each watershed. Anvil Creek had higher alkalinity concentrations than the sites on Rose Creek.

4.1.4 Dissolved Oxygen

All sites were well aerated.

TABLE 1

WATER QUALITY DATA, 2006

Sample Site	R1		R2		R3		R4		R5		R6		R6A		R7	
Date, 2006	July 24	Aug 29	July 24	Aug 28	July 25	Aug 29	July 25	Aug 29	July 25	Aug 29	July 25	Aug 29	July 25	Aug 29	July 26	Aug 29
Flow, m^3/sec	1.804	1.694	2.668	2.510	3.449	3.069	4.317	3.802	7.940	6.960	3.623	3.158	3.889	3.099	0.985	1.105
Temp °C	9.3	7.6	12.9	8.2	10.6	7.1	9.8	5.3	8.5	4.5	8.1	4.1	8.4	5.4	7.3	5.9
Conductivity uS/cm (in-situ)	208	176	356	324	361	448	521	312	285	268	268	264	285	266	210	178
pH (in-situ)	8.24	7.04	8.28	7.29	8.17	7.45	8.21	7.45	8.35	7.62	8.34	7.59	8.46	7.67	8.25	7.10
D.O. (mg/L)	13.5	11.6	11.6	10.8	12.9	11.0	13.3	11.8	14.4	12.7	14.5	12.6	14.5	8.3	14.9	11.4
Alkalinity mg/L as CaCO3	81.4	78.7	88.6	92.7	89.9	91.2	93	95	122	129	127	133	133	145.0	82.9	77.5
Sulphate	13.3	12.3	136	127	113.0	101	97.9	88	27.2	25.8	20.1	20.0	20.2	20.1	8.0	6.9
Ammonia	<0.01	<0.01	0.13	0.13	0.09	0.09	0.05	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
NFR	<1	<1	3	<1	<1	<1	<1	<1	1	<1	2	<1	1	<1	<1	<1
Copper - total	0.0010	0.002	0.0011	<0.001	0.0008	<0.001	0.001	0.001	0.0007	<0.001	0.001	<0.001	0.0006	<0.001	0.0005	<0.001
- dissolved	0.0006	<0.001	0.0006	<0.001	0.0006	<0.001	0.0006	<0.001	0.0005	<0.001	0.0005	<0.001	0.0005	<0.001	0.0004	<0.001
Iron - total	0.15	0.14	0.26	0.26	0.19	0.19	0.15	0.17	0.15	0.15	0.16	0.16	0.14	0.16	0.14	0.16
- dissolved	0.05	<0.05	0.02	<0.05	0.02	<0.05	0.01	<0.05	0.01	<0.05	0.03	<0.05	0.02	<0.05	0.04	<0.05
Lead - total	0.0006	<0.001	0.0005	<0.001	0.0002	<0.001	0.0003	<0.001	<0.0002	<0.001	0.0003	<0.001	<0.0002	<0.001	0.0002	<0.001
- dissolved	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001	<0.0002	<0.001
Zinc - total	0.016	0.021	0.021	**0.040**	0.013	0.026	0.009	0.018	0.002	<0.005	0.001	<0.005	<0.001	<0.005	<0.001	<0.005
- dissolved	0.012	0.020	0.018	0.029	0.012	0.020	0.008	0.016	0.003	<0.005	0.001	<0.005	<0.001	<0.005	<0.001	<0.005
Total Hardness mg/L as CaC03	90.3	81	214	184	192	164	176	163	139	145	140	142	130	138	86.6	76

NOTES: All units in mg/L unless otherwise indicated. Values in **bold** indicate the CCME guideline has been exceeded.

4.1.5 Sulphate

Sulphate concentrations were low in the upper Rose Creek sites and in Anvil Creek. Concentrations were significantly greater at R2 and gradually decreased downstream to R4. The presence of sulphate here is due to the fact that the tailings impoundments were discharging at X5 during both sampling periods. Sulphate concentrations normally vary from 10 to 80 mg/L in surface waters (CCREM, 1987).

4.1.6 Ammonia

Ammonia was detected at R2, R3 and R4 but was well below the CCME recommended guideline of 0.7 mg/L NH_3.

4.1.7 Non Filterable Residue (NFR)

All waters were very clear on both sampling dates, and ranged from below the method detection limit of 1 mg/L to 3 mg/L of suspended solids.

4.1.8 Total and Dissolved Metals

The values in bold in Table 1 indicate that the CCME guideline for the protection of freshwater aquatic life was exceeded for that parameter in that sample. The toxicity of some metals varies with the hardness of the sample waters (Table 2). Generally, toxicity of several metals to freshwater aquatic organisms increases as the hardness of the water decreases.

Copper and lead concentrations were very low when sporadically detected. The CCME guidelines were met at all sites for these two metals.

Iron was detected at all sites but remained below the guideline of 0.3 mg/L.

Zinc was detected throughout and the CCME guideline was slightly exceeded on one occasion only, at R2 in the August total metals sample.

The above metal concentrations have been discussed in relation to the CCME guidelines. It is important to note that the limits as set out under the Water Licence issued by the Yukon Territory Water Board apply to the discharge point and there is no obligation to meet the CCME criteria in the receiving waters at this time.

The water quality characteristics of R6 and R6A are very similar.

TABLE 2 CCME RECOMMENDED GUIDELINES FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE					
HARDNESS as $CaCO_3$ mg/L		COPPER mg/L	LEAD mg/L	IRON mg/L	ZINC mg/L
0 - 60	soft	0.002	0.001	0.3	0.03
60 - 120	medium soft	0.002	0.002	0.3	0.03
120 - 180	hard	0.003	0.004	0.3	0.03
>180	very hard	0.004	0.007	0.3	0.03

4.1.9 Quality Assurance / Quality Control

Blind duplicates were set to the lab during both sampling episodes as an analytical check. A review of the data in Appendix A shows good correlation for all parameters tested.

4.2 Water Quantity

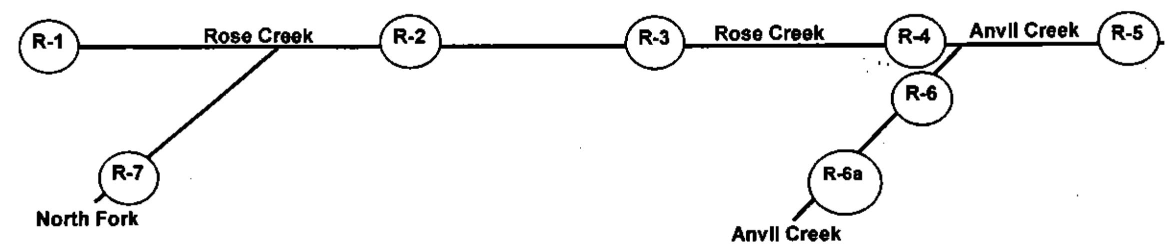
Water flow was measured at each of the sites in July and August. These data are presented in Table 1 with the water quality data. Water levels were fairly high in July and were not that much lower in August. The discharge at R7, North Fork of Rose Creek, was slightly higher in August than in July.

4.3 Stream Sediments

Triplicate stream sediment samples were collected from all sites during the July visit. The results for the metals analyses were averaged and the standard deviation was calculated to determine the spread of metal concentrations at each site (Appendix B). A few metals, especially those with high concentrations, showed some variability. Of the 29 metals analyzed, the concentrations of antimony, beryllium, molybdenum, silver and tin were below the method detection limit.

Six metals (arsenic, cadmium copper, mercury, lead and zinc) known to be toxic to the aquatic environment were examined in detail. The mean concentrations of these metals were compared to the CCME (1999) interim freshwater sediment quality guidelines (ISQG) and to the probable effects levels (PEL) (Table 3). Generally, concentrations greater than the PEL have a 50% incidence of creating adverse biological effects. A schematic accompanies Table 3 indicating where the tributaries enter the main stems of Rose and Anvil Creeks.

TABLE 3 STREAM SEDIMENT METAL CONCENTRATIONS (ug/g), JULY 2006



Site #	Station Description	Arsenic ug/g	Cadmium ug/g	Copper ug/g	Lead ug/g	Mercury ug/g	Zinc ug/g
R-1	Rose Creek upstream	<10	<0.5	10.0	22.7	0.01	**131**
R-7	North Fork of Rose Creek	**14.0**	0.6	17.3	14.7	0.02	81.3
R-2	Rose Creek d/s tailings ponds	[illegible]	**1.2**	**60.7**	[illegible]	0.18	[illegible]
R-3	Rose Creek midway between R-2 and R-4	**15.0**	**0.8**	**46.3**	[illegible]	0.10	[illegible]
R-4	Rose Creek just u/s of Anvil Creek	**16.0**	**1.0**	**47.0**	[illegible]	0.09	[illegible]
R-6a	Anvil Creek 700 m u/s Rose Creek	**12.7**	**1.1**	**47.0**	17.3	0.03	**142**
R-6	Anvil Creek just u/s Rose Creek	**11.3**	**1.0**	33.0	14.7	0.02	109
R-5	Anvil Creek d/s Rose Creek	**13.0**	**1.0**	**38.3**	24.7	0.04	**149**
ISQG		5.9	0.6	35.7	35.0	0.2	123
PEL		17.0	3.5	197.0	91.3	0.486	315

Note: ISQG = Interim freshwater Sediment Quality Guidelines, in **bold** where exceeded.
PEL = Probable Effects Level (>50% of adverse effects occur above this level), shaded and in **bold** where exceeded.

The highest concentrations of the examined metals in the stream sediments occurred at R2. Since this site is immediately downstream of the tailings facility, it would receive the greatest impact from mining related activity. Concentrations of these metals were somewhat lower downstream at sites R3 and R4. The PEL for arsenic, lead and zinc was exceeded at R2. Although concentrations were not quite as high, the PEL for lead and zinc was also exceeded at R3 and R4. The ISQG was exceeded for arsenic, cadmium and copper at most sites but concentrations were generally well below the PEL. The ISQG for zinc was exceeded at the background locations of R1 and R6A indicating that although these sites are not impacted from mining operations, they do exist in mineralized zones. R6A appears to lie in a more mineralized zone than R6. The lowest concentration of each metal was documented at the background sites, R1 or at R7.

4.3.1 Comparisons with Past Data

Limited data exists on the geochemistry of the stream sediments in the Rose Creek system. Metals in sediments have not been a licensed requirement for this system until the issuance of Licence # QZ03-059 in March 2004. In 1996, stream sediment samples were voluntarily collected and analyzed for metals during the Rose Creek biological monitoring program (Burns, 1997).

Environment Canada conducted environmental impact surveys downstream of the tailings impoundment in 1983 (Godin and Osler, 1985) and in 1973 (Hoos and Holman, 1973). Table 4 shows comparisons of selected metal concentrations upstream on Rose Creek, R1, and at the downstream sites of R2 to R5. All data represents the mean of triplicate samples (N=3) except in 1983 which is the average of two sets of triplicate samples collected in July and August (N=6). Environment Canada did not collect samples at R5 resulting in only three sets of temporal data. Arsenic was not one of the six metals analyzed in 1973. The detection limit for cadmium was very high in 1973 and this set of data has been excluded. Each parameter has also been graphed (Figures 2 to 5) and includes either the PEL or the ISQG, which ever is more meaningful for that data set.

TABLE 4

COMPARISONS OF METAL CONCENTRATIONS IN SEDIMENTS, 1973, 1983, 1996, 2004 AND 2006

	Arsenic (ppm)					Cadmium (ppm)					Lead (ppm)					Zinc (ppm)				
	1973	1983	1996	2004	2006	1973	1983	1996	2004	2006	1973	1983	1996	2004	2006	1973	1983	1996	2004	2006
R1		15	6	12	<10		0.8	0.6	0.7	<0.05	280	124	74	125	23	270	260	221	203	131
R2		86	32	20	24		1.2	1.6	1.3	1.2	83	775	310	207	179	180	918	617	482	694
R3		104	31	16	15		1.1	1.0	0.8	0.8	280	681	244	165	143	440	996	581	376	464
R4		51	32	14	16		1.1	2.1	0.7	1.0		585	267	153	120		885	908	293	470
R5			14	11	13			0.8	0.9	1.0			20	69	25			161	212	149

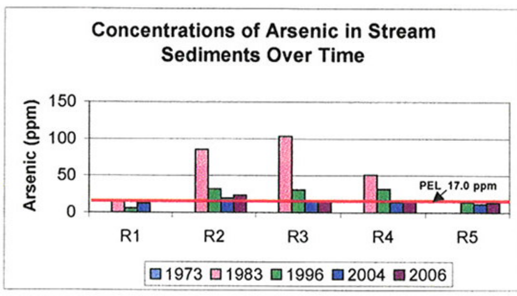


Figure 2 Concentrations of Arsenic in the Stream Sediments Over Time

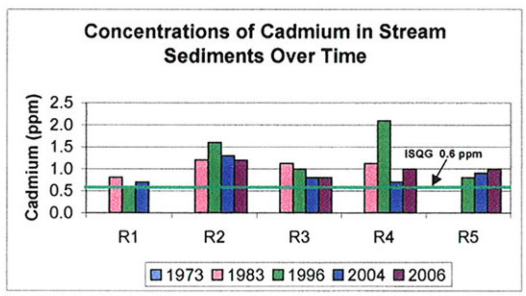


Figure 3 Concentrations of Cadmium in the Stream Sediments Over Time

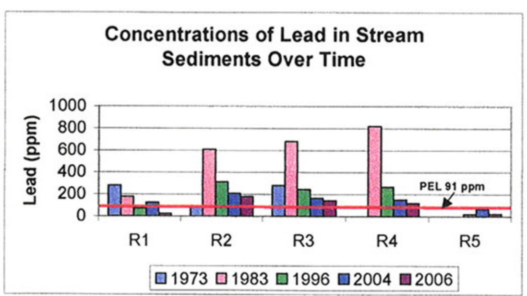


Figure 4 Concentrations of Lead in the Stream Sediments Over Time

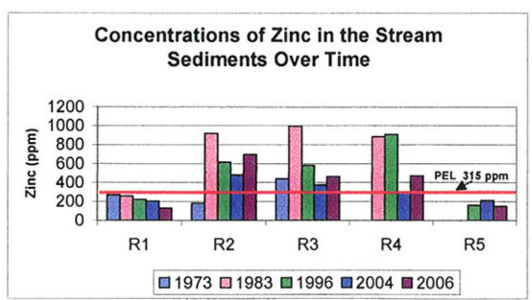


Figure 5 Concentrations of Zinc in the Stream Sediments Over Time

In March of 1975, a tailings spill released 245,000 cubic metres of tailings slurry into Rose Creek

(Godin and Osler, 1985). The 1983 data for arsenic and lead was consistently high at the downstream sites (R2, R3 and R4), and are the highest documented to date. Concentrations of zinc were also elevated in 1983 at R2 and R3. These elevated levels could represent lingering effects from the tailings spill of 1975.

Concentrations of arsenic and lead have decreased significantly at the downstream sites since 1983. It appears that arsenic concentrations have leveled off but lead levels continue to display a downward trend. The level of cadmium tends to be relatively stable at each site although concentrations at R4 do show some fluctuation. Concentrations were lower at the background site, R1 throughout the study period.

Metals in sediments are often difficult to interpret because levels can vary widely as a function of natural mineralization of local soils within a given watershed. Based on the current data set, it appears that concentrations of various metals have been decreasing since 1983. Concentrations of the selected metals at R5 are very similar to those at the upstream site R1. Lead levels however have generally been greater at R1 than at R5, although there was a significant decrease in lead concentrations in the stream sediments at R1 in the 2006 samples. This very low concentration cannot be readily explained as the exact same location was sampled in 2006 as in previous years. In addition, the analysis for each of the triplicates was similar with a low standard deviation, thus confirming the low concentration reported in 2006.

4.4 Benthic Invertebrates

Three phyla were found in Rose and Anvil Creeks; Arthropoda, Annelida and Nematoda. A total of 49,852 organisms representing 84 different taxonomic groups were identified within these three phyla. These data are presented in Appendix C.

4.4.1 Abundance and Taxonomic Richness

The total number of organisms for the triplicates at each site was summed to give a total abundance value for that site. Populations ranged from 838 individuals at R7 to 16,685 individuals at R1.

Taxonomic richness was determined for each site by enumerating all taxonomic groups identified from species to phylum, as a measure of community diversity. All communities were diverse with 38 different taxonomic groups identified at R5 and R7, to 57 identified at R1.

Abundance and diversity were plotted and are displayed in Figure 6. To aid in interpretation, the stations were arranged on the X-axis to demonstrate where the tributaries, R7, R6a and R6, enter the mainstem of Rose or Anvil Creek.

SITE	SITE DESCRIPTION	ABUNDANCE	TAXOMONIC RICHNESS
R1	Rose Creek upstream	16,685	57
R7	North Fork of Rose Creek	838	38
R2	Rose Creek d/s tailings ponds and diversion canal	1,596	53
R3	Rose Creek midway between R2 and R4	3,282	48
R4	Rose Creek just u/s of Anvil Creek	4,252	51
R6A	Anvil Creek approx 1 km u/s Rose Creek	12,497	49
R6	Anvil Creek just u/s of Rose Creek	8,934	45
R5	Anvil Creek d/s of Rose Creek	1,768	38

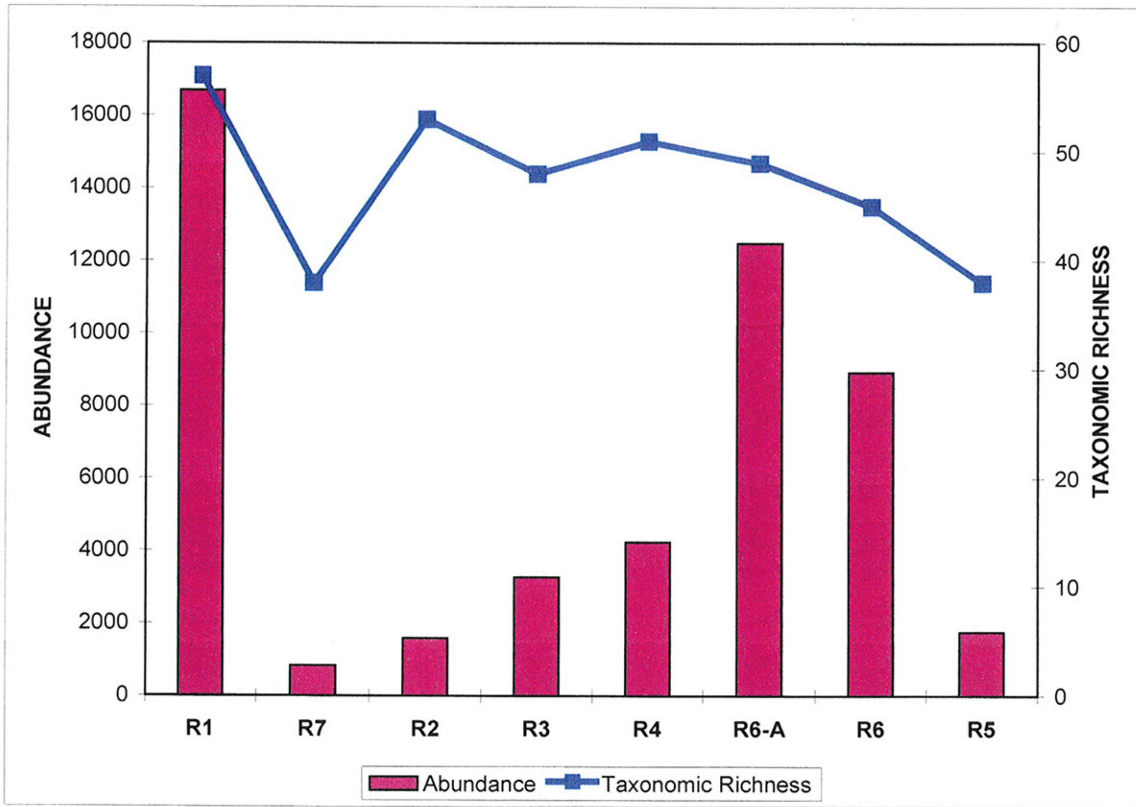


FIGURE 6 Abundance and Taxonomic Richness at Rose and Anvil Creeks, 2006

The population at R1 was the greatest and most diverse. The community at R7 was depressed, especially when compared with the other background sites. This site is located upstream of any potential impacts on the North Fork of Rose Creek and it is not readily apparent why the population here would be so low. However, after reviewing the downloaded water level data from the datalogger at R7, it is evident that the North Fork of Rose Creek experienced four major and several moderate rainfall peaks during the colonization period (Figure 7). The benthic samplers were installed on July 26th, the decline of high water experienced the previous week. Peak flows of approximately 2 m^3/sec occurred on August 15 and 22, resulting in very high velocities at the benthic monitoring site. Bedload transport and scour are likely to have occurred under these conditions, effectively flushing the substrate-dwelling invertebrates from the site. High discharge can displace invertebrates from one subhabitat such as riffle areas where the baskets were installed, into glides or backwater areas downstream (Lehmkuhl and Anderson, 1972). This allowed very little time (seven days since August 22nd) for recolonization to take place. The most abundant species found at R7 (*Cinygmula sp., Zapada sp.* and *Cricotopus sp.*) are 'clingers' (Merrit and Cummins, 1988). Most invertebrates are not strong swimmers and this characteristic allows them to remain in their preferred high velocity habitats. The current at R7 is not normally high, especially when compared to the habitat conditions at R1 and R6. As such, R7 probably had higher numbers of invertebrates that are sprawlers or burrowers who would not be adapted for maintaining position in high flows and were consequently displaced.

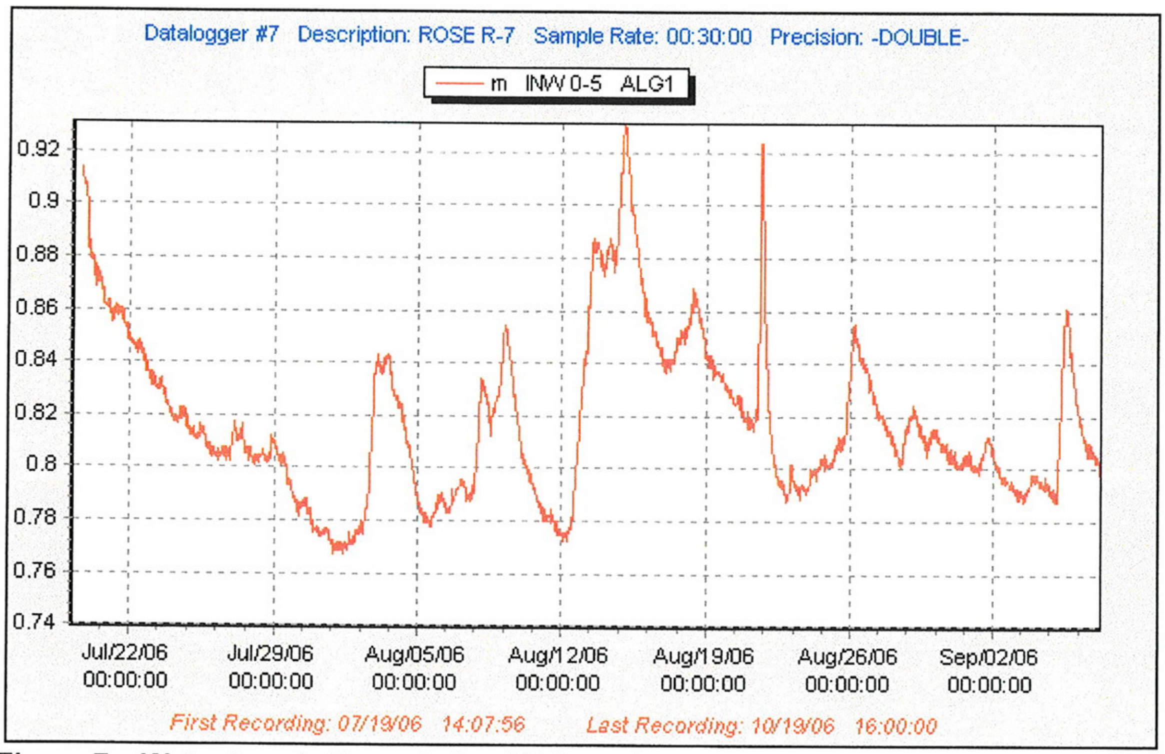


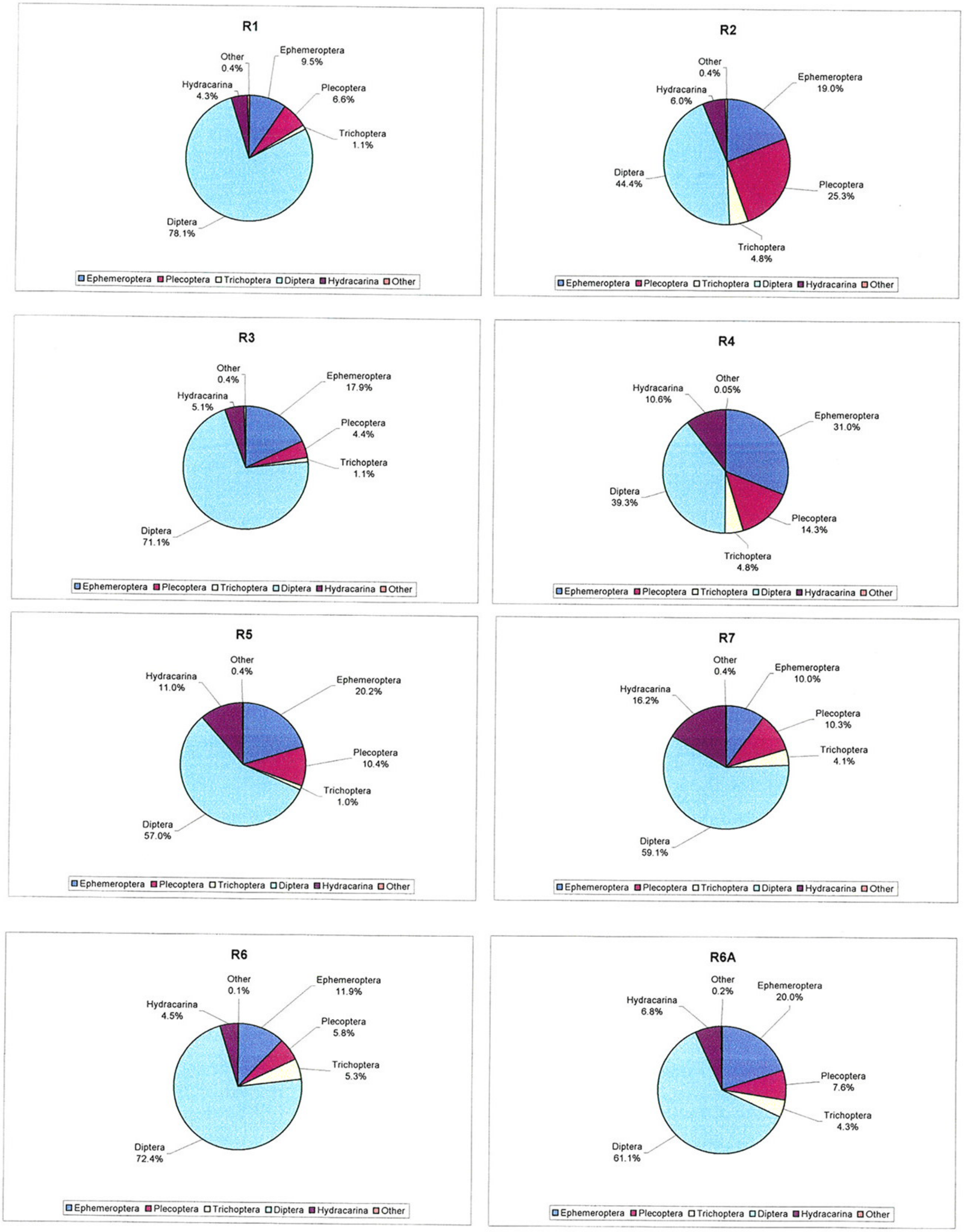
Figure 7 Water Levels Recorded at R7 from July 19 to Sept 19, 2006.

The population downstream of the tailings facility, R2, was fairly low, and populations increased progressively downstream on Rose Creek. There were low numbers in the community in Anvil Creek downstream of Rose Creek at R5, similar to those recorded at R2. The water level and velocity was high in August and the difficulties encountered in retrieval of the baskets under these conditions at R5 could have allowed organisms to become dislodged and lost into the water current. Populations were high on the background sites on Anvil Creek, R6 and R6-A.

4.4.2 Distribution

The composition of the benthos communities was calculated as a percentage of the major taxonomic orders present, with pie charts generated for each site (Figure 8). The grouping "Other" is made up of invertebrates from Nematoda, Copepoda, Homoptera, Hymenoptera, Lepidoptera,

Figure 8 The Composition of the Benthic Invertebrate Community at Each Site, 2006



Thyansoptera, Oligochaeta and/or Ostracoda. Based on the percentages, taxa were then classified with respect to their dominance within the community (Table 5).

Diptera was the dominant order at all of the sites and formed from 39% of the community at R4 to 78% of the community at R1. The majority of the Dipterans belonged to the subfamily Diamesinae. Over one quarter (26.5%) of invertebrates collected throughout the study area was *Diamesa sp.*

Ephemeroptera shared dominance at R4 and was generally the subdominant order at the other sites. The high numbers of Ephemeroptera (an insect order that is sensitive to chemical pollution) collected throughout the study area indicate favourable water and sediment conditions.

Plecoptera shared dominance at R2 and was usually common at the other sites. There was no subdominant group at R1.

A significant number of Hydracarina was documented in the study area in 2006, and was subdominant at R4, and common at the other sites. Hydracarina, water mites, belong to the class Arachnida. Most Hydracarina parasitize insects or mollusks. The most abundant Hydracarina found in the study area was *Unioncola sp.* (representing 5% of the total number of invertebrates collected) which is known to parasitize chironomids (a family of Diptera). Chironomids were abundant at all sites and mollusks were absent from the study area in 2006.

Trichoptera was common and 'Other' was rare or incidental.

TABLE 5
TAXONOMIC DISTRIBUTION OF BENTHIC INVERTEBRATES

SITE	DOMINANT (≥25%)	SUBDOMINANT (10% to 24.9%)	COMMON (1.0% to 9.9%)	RARE (0.1% to 0.9%)	INCIDENTAL (<0.1%)
R1	Diptera		Ephemeroptera Plecoptera Hydracarina Trichoptera	Other	
R2	Diptera Plecoptera	Ephemeroptera	Hydracarina Trichoptera	Other	
R3	Diptera	Ephemeroptera	Hydracarina Plecoptera Trichoptera	Other	
R4	Diptera Ephemeroptera	Plecoptera Hydracarina	Trichoptera		Other
R5	Diptera	Ephemeroptera Hydracarina Plecoptera	Trichoptera	Other	
R6	Diptera	Ephemeroptera	Plecopera Trichoptera Hyracarina		Other
R6A	Diptera	Ephemeroptera	Plecoptera Hydracarina Trichoptera	Other	
R7	Diptera	Hydracarina Plecoptera Ephemeroptera	Trichoptera	Other	

The insect orders Ephemeroptera, Trichoptera and Plecoptera are sensitive to most types of pollution (Rosenberg and Resh, 1993). Lehmkuhl (1979) has identified several groups within these insect orders that have very low tolerance to chemical pollution. Eleven of these taxa (five taxa within Plecoptera, four taxa within Ephemeroptera and two taxa within Trichoptera) have been identified in the Rose and Anvil Creek study area. Table 6 summarizes the presence or absence of each of these taxa per site. Ten out of eleven taxa were present at R1, R2 and R4, nine at R3, R6 and R6A, eight at R7 and seven at R5.

All sites had good representation of pollution sensitive insects. Interestingly, the site furthest downstream on the system, R5, had the lowest number of sensitive insect types, however the potentially impacted sites upstream at R2 and R4 had 10 out of 11 types present. As discussed in the previous section, abundance may be lower at R5 due to the difficulty in retrieving the samplers in the high velocity conditions. Some of the organisms that may have been swept away possibly belonged to the sensitive insect genera and species that were identified at the other sites. Similarly, with such a low population at R7, there likely would also be fewer sensitive organisms. The water and stream sediment quality at these two sites would tend to indicate that the lower number of sensitive insect types documented is probably due to physical habitat restrictions rather than chemical influences.

TABLE 6

Presence (+) and Absence (-) of Sensitive Taxa at Rose and Anvil Creeks

Sensitive Taxa	R1	R2	R3	R4	R5	R6	R6-A	R7
Plecoptera								
Nemouridae	+	+	+	+	+	+	+	+
Perlodidae	+	+	+	+	+	+	+	+
Capniidae	+	+	+	+	+	+	-	+
Taeniopterigidae	+	+	+	+	+	+	+	-
Chloroperlidae	+	+	-	+	+	+	+	+
Ephemeroptera								
Epeorus	+	-	+	+	-	+	+	+
Ephemerellidae	+	+	+	+	+	+	+	+
Rithrogena	+	+	+	+	+	+	+	+
Paraleptophlebia	-	+	-	-	-	-	-	-
Trichoptera								
Brachycentriidae	+	+	+	+	-	-	+	-
Rhyacophilidae	+	+	+	+	-	+	+	+
Total # of sensitive taxa:	10	10	9	10	7	9	9	8

After Lehmkuhl (1979)

4.4.3 Comparisons with Past Data

Several studies to assess the health of ecosystems have been conducted using benthic macroinvertebrates (Rosenberg and Resh, 1993). Their abundance and taxonomic diversity respond to a wide range of impacts including sedimentation, organic loading and changes in chemical water quality. Using benthic invertebrates as biomonitoring tools offers many advantages for the following reasons; they are ubiquitous, they are abundant and easy to collect, there are a large number of species offering a spectrum of responses to environmental stress, they are generally sedentary and therefore are representative of local conditions, and they have long life cycles compared to other groups (i.e. periphyton). As such, benthic macroinvertebrates act as continuous monitors of the water they inhabit. Assessments are often based on taxa richness and the abundance of pollution sensitive insect orders.

Over the years various agencies and companies have collected benthic data from the Rose Creek system using various sampling methods at varying times of the open water season. Summaries of the past eighteen years of Company (Anvil Range and Curragh Resources) monitoring data have been tabulated (Table 7). In each of these ten surveys, artificial substrate samplers were used, the same sample site locations were employed and the sampling personnel were consistent. In addition, the physical quality of the habitat (riparian vegetation and stream substrate) at each of these sites has changed relatively little over the past eighteen years. All sites have mineral substrates of varying particle sizes with very little organic (moss, algal) growth. Consequently, some temporal and spatial comparisons can appropriately be made.

Figure 9 shows the abundance at each site for the ten surveys examined. Table 8 displays the specific data with some statistics. The populations of the benthic communities at each of the sites generally fluctuated significantly over the eighteen years examined, with R4 showing the most stable population in terms of abundance. The highest population documented throughout the study period occurred at R5 where almost 67,000 individuals were collected in 2000. The lowest populations occurred in 1988 at R1 to R5. Note that R6 and R7 were not sampled until 1990. The overall lowest population consisted of a total of 32 individuals collected from R3 in 1988. The population at R3 has fluctuated considerably and had a maximum of almost 55,000 organisms collected in 1994. Abundance values were consistently lower in 2006 than in 2004, with a significant decrease at some of the sites (R1, R2, R3 and R7). The abundance value recorded in 2006 at R7 is the lowest since this site has been sampled.

Generally the communities have been diverse over time, with the greatest diversity occurring at R1. Taxonomic richness values were considerably lower from 1988 to 1992 including the background sites. All sites have been consistently more diverse since 1994.

The overall trend appears to be an increase in the number of sensitive taxa colonizing all of the sites over the eighteen year period.

As the site receiving the greatest potential impact from the tailings facility, the stream sediments at R2 contained the highest concentration of metals with several parameters exceeding the probable effects levels (refer back to Table 3). Although these concentrations would indicate a high incidence of adverse effects to the biotic community, the community was diverse with good representation of chemical sensitive organisms. Admittedly, population numbers had decreased considerably at R2 in 2006, however both the diversity and the number of sensitive taxa present had increased. There also was a shift in dominance from Diptera in 2004 to Diptera and Plecoptera in 2006. Plecoptera, an insect order with low tolerance to chemical pollution, formed 25% of the community here (refer back to Figure 8). These data would indicate that although high concentrations of metals exist in the stream sediments, they presumably are not in a bioavailable form and therefore are not negatively impacting the biotic community.

Despite relatively low population numbers over the years at R4, the taxonomic richness and high numbers of sensitive taxa documented in recent years, indicate a healthy benthic community.

Diptera, alone or with one of the pollution sensitive orders, dominated the communities at most of the sites over time. R7 has always been dominated by Diptera and appears to be a stable population.

Table 7

Comparison of Benthic Data over a 18 Year Period

Site	Year	Total Abundance	Taxonomic Richness	Number of Sensitive Taxa	Dominant Taxa
R1	1988	128	24	6	Plecoptera & Ephemeroptera
	1990	1,373	21	6	Diptera & Ephemeroptera
	1992	1,141	27	7	Diptera
	1994	5,489	60	9	Ephemeroptera
	1996	1,629	57	8	Diptera
	1998	50,808	57	10	Diptera & Ephemeroptera
	2000	5,368	57	10	Diptera
	2002	9,988	60	8	Diptera
	2004	55,191	49	8	Diptera
	2006	16,685	57	10	Diptera
R2	1988	115	24	6	Diptera
	1990	4,564	20	4	Annelida & Diptera
	1992	400	14	3	Diptera
	1994	920	47	8	Ephemeroptera & Diptera
	1996	991	37	9	Diptera & Ephemeroptera
	1998	1,945	47	8	Diptera & Ephemeroptera
	2000	6,611	48	7	Diptera & Ephemeroptera
	2002	11,639	54	8	Diptera & Oligochaeta
	2004	38,042	43	9	Diptera
	2006	1,596	53	10	Diptera & Plecoptera
R3	1988	32	8	1	Diptera
	1990	2,455	20	6	Annelida & Diptera
	1992	321	12	2	Diptera
	1994	54,875	49	9	Ephemeroptera & Plecoptera
	1996	144	25	7	Diptera
	1998	13,491	39	10	Diptera
	2000	18,929	42	7	Ephemeroptera
	2002	1,808	40	6	Oligochaeta & Diptera
	2004	30,826	41	11	Diptera & Ephemeroptera
	2006	3,282	48	9	Diptera
R4	1988	116	15	2	Diptera
	1990	2,175	20	4	Diptera
	1992	312	14	1	Diptera
	1994	2,366	53	8	Ephemeroptera & Diptera
	1996	666	35	9	Ephemeroptera
	1998	8,148	48	10	Ephemeroptera & Diptera
	2000	N.D.	N.D.	N.D.	N.D.
	2002	4,430	52	9	Diptera
	2004	4,964	44	10	Diptera
	2006	4,252	51	10	Diptera & Ephemeroptera
R5	1988	425	22	7	Diptera & Plecoptera
	1990	3,470	25	7	Diptera
	1992	1,263	25	6	Diptera & Acarina
	1994	4,115	55	7	Diptera
	1996	2,726	43	9	Diptera
	1998	7,974	44	10	Diptera & Ephemeroptera
	2000	66,975	54	10	Diptera
	2002	15,088	45	8	Diptera
	2004	2,206	44	9	Diptera
	2006	1,768	38	7	Diptera
R6	1988	N.D.	N.D.	N.D.	N.D.
	1990	3,477	25	8	Diptera
	1992	3,911	31	7	Diptera
	1994	15,431	46	7	Diptera & Ephemeroptera
	1996	2,741	45	8	Diptera
	1998	26,944	43	9	Diptera & Ephemeroptera
	2000	39,344	56	10	Diptera
	2002	1,232	36	6	Diptera
	2004	8,759	46	8	Diptera & Ephemeroptera
	2006	8,934	45	9	Diptera
R7	1988	N.D.	N.D.	N.D.	N.D.
	1990	2,467	26	6	Diptera
	1992	1,053	22	4	Diptera
	1994	14,756	44	6	Diptera
	1996	7,029	45	8	Diptera
	1998	39,292	44	9	Diptera
	2000	4,574	40	8	Diptera
	2002	10,965	37	7	Diptera
	2004	32,380	44	9	Diptera
	2006	838	38	8	Diptera

N.D. = not done

Figure 9 Abundance of Benthic Invertebrates in Rose and Anvil Creeks over an Eighteen Year Period

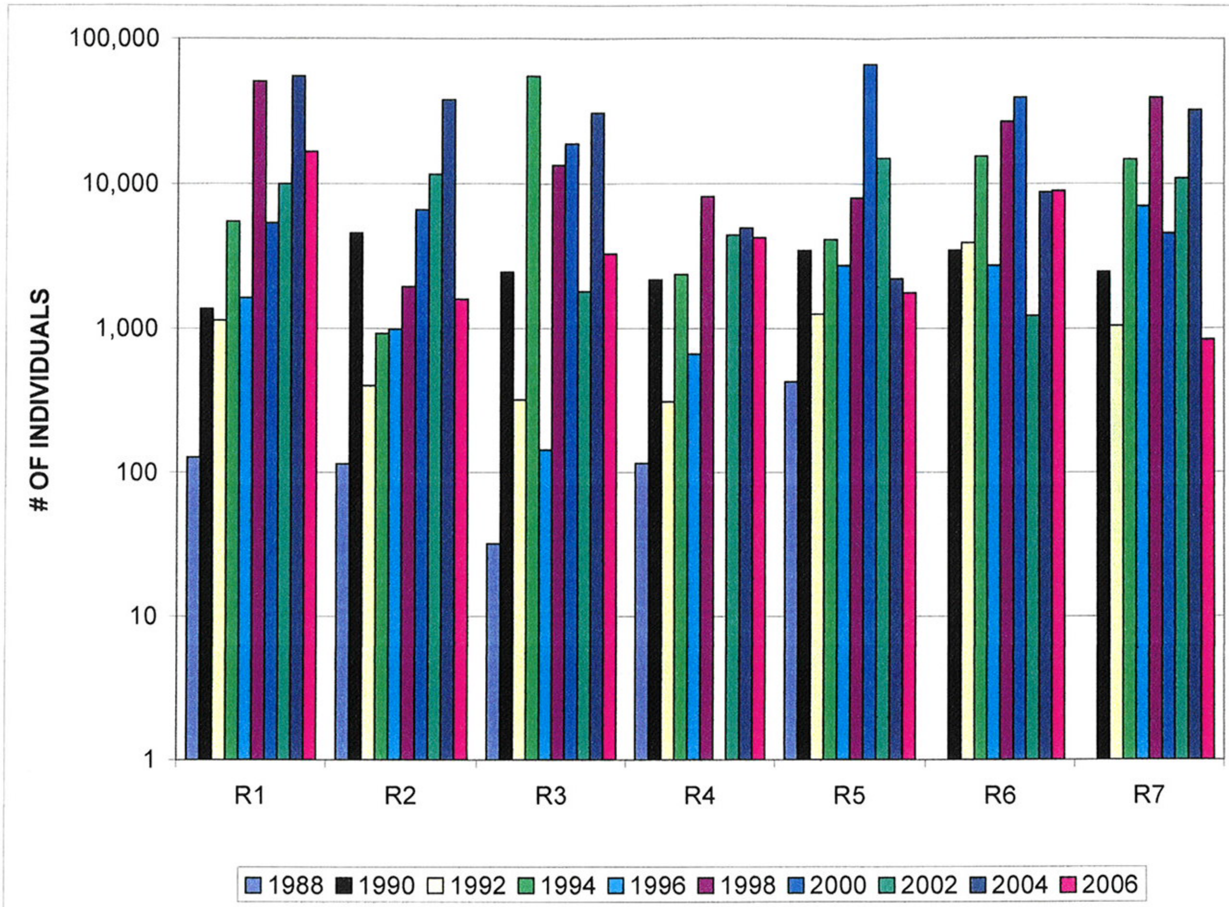


TABLE 8

ABUNDANCE WITH SOME STATISTICS COVERING AN EIGHTEEN YEAR PERIOD

	R1	R2	R3	R4	R5	R6	R7
1988	128	115	32	116	425	N.D.	N.D.
1990	1,373	4,564	2,455	2,175	3,470	3,477	2,467
1992	1,141	400	321	312	1,263	3,911	1,053
1994	5,489	920	54,875	2,366	4,115	15,431	14,756
1996	1,629	991	144	666	2,726	2,741	7,029
1998	50,808	1,945	13,491	8,148	7,974	26,944	39,292
2000	5,368	6,611	18,929		66,975	39,344	4,574
2002	9,988	11,639	1,808	4,430	15,088	1,232	10,965
2004	55,191	38,042	30,826	4,964	2,206	8,759	32,380
2006	16,685	1,596	3,282	4,252	1,768	8,934	838
Mean	14,780	6,682	12,616	3,048	10,601	12,308	12,595
Standard Deviation	20,779	11,590	18,044	2,646	20,274	12,950	14,057
Maximum	55,191	38,042	54,875	8,148	66,975	39,344	39,292
Year of Maximum	2004	2004	1994	1998	2000	2000	1998
Minimum	128	115	32	116	425	1,232	838
Year of Minimum	1988	1988	1988	1988	1988	2002	2006

Note that due to high water in 2000 the baskets could not be retrieved at R4.

5.0 SUMMARY

Overall, the water samples collected at the sites in this study and analyzed for the selected parameters, indicated good water quality for the support of freshwater aquatic life. The waters tested were clear, slightly alkaline and well aerated. Concentrations of total and dissolved metals were generally very low where detected. The CCME guideline for zinc was slightly exceeded at R2 in August.

The highest concentration of metals in stream sediments occurred at R2 where several parameters exceeded the CCME probable effects levels. This has made no apparent effect on the benthic community dwelling here however, as the community was diverse and a high number of pollution sensitive taxa were present. Concentrations in the sediments downstream of R2 at R3 and R4 were high as well but supported robust, healthy benthic communities.

The composition of the benthic communities was fairly similar at all sites with Diptera dominating each population. There was also a large presence of Ephemeroptera and Plecoptera that shared dominance or were subdominant at several sites. The presence of numerous kinds of sensitive taxa indicates healthy habitats. Although R2 is located downstream of the tailings impoundments and is potentially the most impacted site in the study area (highest concentrations of metals in the stream sediments), ten out of the eleven chemically sensitive species identified in the study area were collected here. The community at R1 also had ten out of 11 sensitive species and the stream sediments here generally had the lowest concentrations of metals. The presence of these types of insects found at both these sites of differing chemical characteristics indicate that the metals examined at R2 are likely stable and are not bioavailable to the resident biota.

An examination of the fisheries site located upstream on Anvil Creek (R6A) showed it to exhibit similar characteristics as the downstream site near the confluence with Rose Creek, R6. The only difference was a higher concentration of some of the metals in the stream sediments indicating that the upstream site lies in a slightly more mineralized zone than R6.

Based on data collected in 2006, and comparisons with historic data, it appears that effluent from the tailings system currently has minimal, if any, impact on the receiving environment.

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APPENDIX A

WATER QUALITY DATA

JULY AND AUGUST 2006

APPENDIX A

WATER QUALITY DATA JULY 2006

Client: Anvil Range Mining Corporation
Download Date: 4/8/2006
Project Name: Rose Cr Benthics
Project Number: July 24,25,26 2006
Chain of Custody: 2028448, 2028449, 2028450, 2028451
Samples received: 07/28/2006

TABLE: Results of WATER Analyses

Sample ID CANTEST ID Date Sampled		R-1. Rose Cr U/S 607280366 07/24/2006	R-2. Rose Cr @ X-14 607280368 07/24/2006	R-3. Rose Cr Mid-way 607280371 07/26/2006	R-4. Rose Cr U/S Anvil 607280372 07/26/2006	R-4. Duplicate 607280374 07/26/2006
Parameter	**Units**					
Conventional Parameters						
pH, Laboratory	pH units	8.13	8.14	8.16	-	8.18
Conductivity	uS/cm	181	428	372	-	353
Hardness CaCO3	mg/L	75.3	200	162	147	156
Hardness (Total) CaCO3	mg/L	90.3	214	192	175	176
Total Suspended Solids	mg/L	< 1	3	< 1	-	< 1
Total Alkalinity CaCO3	mg/L	81.4	86.6	89.9	-	93
Bicarbonate Alkalinity HCO3	mg/L	99.3	108	110	-	113
Carbonate Alkalinity CO3	mg/L	< 0.5	< 0.5	< 0.5	-	< 0.5
Hydroxide Alkalinity OH	mg/L	< 0.5	< 0.5	< 0.5	-	< 0.5
Dissolved Sulphate SO4	mg/L	13.3	136	113	-	97.9
Ammonia Nitrogen N	mg/L	< 0.01	0.13	0.09	-	0.05
Metals Analysis						
Total Aluminum Al	mg/L	0.019	0.035	0.019	0.019	0.018
Total Antimony Sb	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Arsenic As	mg/L	0.0004	0.0004	0.0003	0.0003	0.0003
Total Barium Ba	mg/L	0.045	0.04	0.042	0.053	0.052
Total Beryllium Be	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Bismuth Bi	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Boron B	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total Cadmium Cd	mg/L	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004
Total Calcium Ca	mg/L	26.1	67.3	59.4	53.3	53.4
Total Chromium Cr	mg/L	0.0002	0.0002	< 0.0002	0.0003	< 0.0002
Total Cobalt Co	mg/L	< 0.0002	0.0008	0.0004	0.0002	0.0002
Total Copper Cu	mg/L	0.001	0.0011	0.0008	0.0011	0.001
Total Iron Fe	mg/L	0.15	0.26	0.19	0.15	0.15
Total Lead Pb	mg/L	0.0006	0.0005	0.0002	0.0005	0.0003
Total Lithium Li	mg/L	0.0029	0.0057	0.0054	0.0045	0.0047
Total Magnesium Mg	mg/L	6.07	11	10.7	10.2	10.3
Total Manganese Mn	mg/L	0.026	0.648	0.412	0.219	0.218
Total Mercury Hg	ug/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Molybdenum Mo	mg/L	0.0005	0.0005	0.0005	0.0006	0.0006
Total Nickel Ni	mg/L	0.0005	0.0019	0.0015	0.001	0.0011
Total Phosphorus P	mg/L	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Total Potassium K	mg/L	0.51	1.36	1.36	1.3	1.32
Total Selenium Se	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Silicon Si	mg/L	5.01	4.07	4.56	4.3	4.43
Total Silver Ag	mg/L	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Total Sodium Na	mg/L	2.03	5.03	4.9	4.35	4.38
Total Strontium Sr	mg/L	0.109	0.215	0.204	0.194	0.192
Total Tellurium Te	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Thallium Tl	mg/L	< 0.00002	0.00005	0.00004	0.00002	0.00002
Total Thorium Th	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Total Tin Sn	mg/L	0.0002	< 0.0002	< 0.0002	0.0002	0.0002
Total Titanium Ti	mg/L	0.0007	0.0013	0.0006	0.0008	0.0006
Total Uranium U	mg/L	0.0009	0.001	0.001	0.001	0.0009
Total Vanadium V	mg/L	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002
Total Zinc Zn	mg/L	0.016	0.021	0.013	0.009	0.009
Total Zirconium Zr	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Aluminum Al	mg/L	0.004	0.004	0.005	0.003	0.004
Dissolved Antimony Sb	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Arsenic As	mg/L	0.0004	0.0003	0.0003	0.0003	0.0003
Dissolved Barium Ba	mg/L	0.038	0.04	0.038	0.046	0.047
Dissolved Beryllium Be	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Bismuth Bi	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Boron B	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dissolved Cadmium Cd	mg/L	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004
Dissolved Calcium Ca	mg/L	21.8	60.7	48.6	43.8	46.5
Dissolved Chromium Cr	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Cobalt Co	mg/L	< 0.0002	0.0007	0.0004	< 0.0002	< 0.0002
Dissolved Copper Cu	mg/L	0.0006	0.0006	0.0006	0.0006	0.0006
Dissolved Iron Fe	mg/L	0.05	0.02	0.02	0.01	0.01
Dissolved Lead Pb	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Lithium Li	mg/L	0.0024	0.0059	0.005	0.004	0.0043
Dissolved Magnesium Mg	mg/L	5.07	11.6	9.8	9.01	9.52
Dissolved Manganese Mn	mg/L	0.016	0.653	0.375	0.172	0.181
Dissolved Molybdenum Mo	mg/L	0.0004	0.0005	0.0005	0.0005	0.0006
Dissolved Nickel Ni	mg/L	0.0005	0.0018	0.0013	0.0009	0.001
Dissolved Phosphorus P	mg/L	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dissolved Potassium K	mg/L	0.4	1.35	1.2	1.08	1.15
Dissolved Selenium Se	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Silicon Si	mg/L	4.18	4.53	4.46	4.12	4.19
Dissolved Silver Ag	mg/L	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Sodium Na	mg/L	1.67	5.12	4.44	3.72	3.95
Dissolved Strontium Sr	mg/L	0.093	0.215	0.187	0.168	0.175
Dissolved Tellurium Te	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Thallium Tl	mg/L	< 0.00002	0.00005	0.00003	< 0.00002	< 0.00002
Dissolved Thorium Th	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dissolved Tin Sn	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Titanium Ti	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Uranium U	mg/L	0.0007	0.001	0.0009	0.0008	0.0008
Dissolved Vanadium V	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Zinc Zn	mg/L	0.012	0.018	0.012	0.009	0.008
Dissolved Zirconium Zr	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

APPENDIX A **WATER QUALITY DATA JULY 2006**

Client:
Download Date:
Project Name:
Project Number:
Chain of Custody:
amples received:

TABLE: Results of WATER /

Sample ID	R-5, Anvil Cr D/S Rose	R-6, Anvil Cr U/S Rose	R-6A, Anvil Cr @ Paul's Site	R-7, North Fork Rose Cr
CANTEST ID	607280375	607280377	607280379	607280378
Date Sampled	07/25/2006	07/25/2006	07/25/2006	07/25/2006
Parameter				
Conventional Parameters				
pH, Laboratory	8.32	8.33	8.33	8.16
Conductivity	275	267	251	169
Hardness CaCO3	123	135	131	76
Hardness (Total) CaCO3	139	140	130	66.6
Total Suspended Solids	1	2	1	< 1
Total Alkalinity CaCO3	122	127	133	82.9
Bicarbonate Alkalinity HCO3	146	150	151	101
Carbonate Alkalinity CO3	1.8	2.2	2.6	< 0.5
Hydroxide Alkalinity OH	< 0.5	< 0.5	< 0.5	< 0.5
Dissolved Sulphate SO4	27.2	20.1	20.2	7.95
Ammonia Nitrogen N	< 0.01	< 0.01	< 0.01	< 0.01
Metals Analysis				
Total Aluminum Al	0.031	0.035	0.027	0.025
Total Antimony Sb	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Arsenic As	0.0004	0.0004	0.0003	0.0005
Total Barium Ba	0.063	0.066	0.062	0.047
Total Beryllium Be	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Bismuth Bi	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Boron B	< 0.01	< 0.01	< 0.01	< 0.01
Total Cadmium Cd	< 0.00004	< 0.00004	< 0.00004	< 0.00004
Total Calcium Ca	38.9	38.9	35.9	25.4
Total Chromium Cr	< 0.0002	0.0002	< 0.0002	0.0004
Total Cobalt Co	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Copper Cu	0.0007	0.0013	0.0006	0.0005
Total Iron Fe	0.15	0.16	0.14	0.14
Total Lead Pb	< 0.0002	0.0003	< 0.0002	0.0002
Total Lithium Li	0.0018	0.0016	0.0014	0.0026
Total Magnesium Mg	10.2	10.4	9.78	5.59
Total Manganese Mn	0.028	0.012	0.011	0.011
Total Mercury Hg	< 0.02	< 0.02	< 0.02	< 0.02
Total Molybdenum Mo	0.001	0.0011	0.001	0.0005
Total Nickel Ni	0.0004	0.0005	0.0004	< 0.0002
Total Phosphorus P	< 0.03	< 0.03	< 0.03	< 0.03
Total Potassium K	0.96	0.95	0.87	0.42
Total Selenium Se	0.0006	0.0005	0.0004	< 0.0002
Total Silicon Si	4.33	4.49	4.03	4.8
Total Silver Ag	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Total Sodium Na	1.92	1.68	1.6	1.9
Total Strontium Sr	0.123	0.119	0.112	0.102
Total Tellurium Te	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Thallium Tl	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Total Thorium Th	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Total Tin Sn	0.005	0.0002	0.0003	0.0003
Total Titanium Ti	0.0011	0.0013	0.001	0.0009
Total Uranium U	0.0014	0.0015	0.0014	0.0009
Total Vanadium V	0.0003	0.0003	0.0003	< 0.0002
Total Zinc Zn	0.002	0.001	< 0.001	< 0.001
Total Zirconium Zr	< 0.002	< 0.002	< 0.002	< 0.002
Dissolved Aluminum Al	0.004	0.005	0.005	0.007
Dissolved Antimony Sb	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Arsenic As	0.0003	0.0004	0.0003	0.0004
Dissolved Barium Ba	0.053	0.061	0.06	0.041
Dissolved Beryllium Be	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Bismuth Bi	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Boron B	< 0.01	< 0.01	< 0.01	< 0.01
Dissolved Cadmium Cd	< 0.00004	< 0.00004	< 0.00004	< 0.00004
Dissolved Calcium Ca	34.1	37.2	35.9	22.2
Dissolved Chromium Cr	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Cobalt Co	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Copper Cu	0.0005	0.0005	0.0005	0.0004
Dissolved Iron Fe	0.01	0.03	0.02	0.04
Dissolved Lead Pb	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Lithium Li	0.0016	0.0015	0.0015	0.0023
Dissolved Magnesium Mg	9.16	10.1	10.1	5
Dissolved Manganese Mn	0.018	0.0046	0.0058	0.0054
Dissolved Molybdenum Mo	0.0009	0.0011	0.001	0.0005
Dissolved Nickel Ni	0.0004	0.0004	0.0003	< 0.0002
Dissolved Phosphorus P	< 0.03	< 0.03	< 0.03	< 0.03
Dissolved Potassium K	0.79	0.88	0.84	0.36
Dissolved Selenium Se	0.0005	0.0006	0.0005	< 0.0002
Dissolved Silicon Si	4.15	4.48	4.48	4.46
Dissolved Silver Ag	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Sodium Na	1.69	1.63	1.57	1.63
Dissolved Strontium Sr	0.106	0.112	0.107	0.087
Dissolved Tellurium Te	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Thallium Tl	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Dissolved Thorium Th	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dissolved Tin Sn	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Titanium Ti	< 0.0002	< 0.0002	< 0.0002	0.0002
Dissolved Uranium U	0.0012	0.0013	0.0013	0.0007
Dissolved Vanadium V	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Zinc Zn	0.003	0.001	< 0.001	< 0.001
Dissolved Zirconium Zr	< 0.002	< 0.002	< 0.002	< 0.002

APPENDIX A

WATER QUALITY DATA AUGUST 2006

Client: Mining Corporation
Download Date: 11/9/2006
Project Name: Cr Benthics
Project Number:
Chain of Custody: 2030366
mples received: 1/9/2006

ABLE: Results of WATER Analyses

Sample ID		R-1	Duplicate	R-2	R-3	R-4	R-5	R-6	R-6A	R-7
Site Description		Rose Cr U/S	R-1	Rose Cr @ X-14	Rose Cr Midway	Rose Cr U/S Anvil	Anvil Cr D/S Rose	Anvil Cr U/S Rose	Anvil Cr-Paul's Site	North Fork Rose
CANTEST ID		609020005	609020013	609020006	609020007	609020008	609020009	609020010	609020012	609020011
Date Sampled		08/29/2006	08/29/2006	08/28/2006	08/29/2006	08/29/2006	08/29/2006	08/29/2006	08/29/2006	08/29/2006
Parameter	**Units**									
Conventional Parameters										
pH, Laboratory	pH units	8.02	-	8.09	8.13	8.17	8.31	8.31	8.28	8.12
Conductivity	uS/cm	172	-	408	362	345	284	279	280	158
Hardness CaCO3	mg/L	76	78	178	155	149	133	138	130	70
Hardness (Total) CaCO3	mg/L	81	82	184	164	163	145	142	138	76
Total Suspended Solids	mg/L	< 1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total Alkalinity CaCO3	mg/L	78.7	-	92.7	91.2	95	129	133	145	77.5
Bicarbonate Alkalinity HCO3	mg/L	96	-	113	111	116	153	158	177	94.5
Carbonate Alkalinity CO3	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	2.1	2	< 0.5	< 0.5
Hydroxide Alkalinity OH	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dissolved Sulphate SO4	mg/L	12.3	-	127	101	87.8	25.8	20	20.1	6.9
Ammonia Nitrogen N	mg/L	< 0.01	-	0.13	0.09	0.03	< 0.01	< 0.01	< 0.01	< 0.01
Metals Analysis										
Total Aluminum Al	mg/L	0.015	0.01	0.011	0.01	0.018	0.014	0.024	0.016	0.019
Total Antimony Sb	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Arsenic As	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Barium Ba	mg/L	0.04	0.039	0.041	0.039	0.054	0.062	0.064	0.064	0.043
Total Beryllium Be	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Bismuth Bi	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Boron B	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Cadmium Cd	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Total Calcium Ca	mg/L	23.8	24.3	55.3	49.3	48.7	40.9	39.7	38.5	23.1
Total Chromium Cr	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Cobalt Co	mg/L	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Copper Cu	mg/L	0.002	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Iron Fe	mg/L	0.14	0.15	0.26	0.19	0.17	0.15	0.16	0.16	0.16
Total Lead Pb	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Lithium Li	mg/L	0.003	0.003	0.006	0.005	0.005	0.002	0.002	0.002	0.003
Total Magnesium Mg	mg/L	5.13	5.1	11.1	9.95	9.87	10.4	10.4	10.2	4.43
Total Manganese Mn	mg/L	0.026	0.025	0.95	0.63	0.37	0.052	0.013	0.013	0.012
Total Mercury Hg	ug/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Molybdenum Mo	mg/L	< 0.0005	< 0.0005	0.0005	0.0005	0.0006	0.0009	0.0009	0.0009	< 0.0005
Total Nickel Ni	mg/L	< 0.001	< 0.001	0.003	0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Phosphorus P	mg/L	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
tal Potassium K	mg/L	0.5	0.6	1.5	1.3	1.3	1	1	1	0.5
tal Selenium Se	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Silicon Si	mg/L	4.8	4.8	4.1	4.3	4.3	4.2	4.2	4.1	4.7
Total Silver Ag	mg/L	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025
Total Sodium Na	mg/L	1.98	1.95	5.11	4.57	4.09	1.96	1.67	1.62	1.86
Total Strontium Sr	mg/L	0.09	0.09	0.19	0.17	0.16	0.11	0.1	0.1	0.085
Total Tellurium Te	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Thallium Tl	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Total Thorium Th	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Total Tin Sn	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Titanium Ti	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Uranium U	mg/L	0.0008	0.0008	0.0011	0.001	0.001	0.0015	0.0015	0.0015	0.0008
Total Vanadium V	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Zinc Zn	mg/L	0.021	0.018	0.04	0.026	0.018	< 0.005	< 0.005	< 0.005	< 0.005
Total Zirconium Zr	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dissolved Metals										
Dissolved Aluminum Al	mg/L	< 0.005	0.01	< 0.005	< 0.005	0.006	< 0.005	0.006	< 0.005	0.009
Dissolved Antimony Sb	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Arsenic As	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Barium Ba	mg/L	0.036	0.037	0.037	0.036	0.049	0.06	0.061	0.059	0.038
Dissolved Beryllium Be	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Bismuth Bi	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Boron B	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dissolved Cadmium Cd	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Calcium Ca	mg/L	22.5	23.4	53.3	48.8	44.7	37.2	38.3	36.2	21.2
Dissolved Chromium Cr	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Cobalt Co	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Copper Cu	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Iron Fe	mg/L	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dissolved Lead Pb	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Lithium Li	mg/L	0.003	0.003	0.006	0.005	0.004	0.002	0.002	0.002	0.002
Dissolved Magnesium Mg	mg/L	4.86	4.88	10.8	9.27	9	9.68	10.2	9.51	4.08
Dissolved Manganese Mn	mg/L	0.019	0.019	0.9	0.56	0.33	0.03	0.006	0.007	0.007
Dissolved Molybdenum Mo	mg/L	< 0.0005	< 0.0005	< 0.0005	0.0005	< 0.0005	0.0009	0.0009	0.0009	< 0.0005
Dissolved Nickel Ni	mg/L	< 0.001	< 0.001	0.002	0.002	0.002	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Phosphorus P	mg/L	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
Dissolved Potassium K	mg/L	0.5	0.5	1.4	1.2	1.2	0.9	0.9	0.9	0.4
Dissolved Selenium Se	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Silicon Si	mg/L	4.5	4.5	3.9	4.1	3.9	3.9	4.1	3.8	4.3
Dissolved Silver Ag	mg/L	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025
Dissolved Sodium Na	mg/L	1.98	1.95	5.1	4.47	3.96	1.96	1.67	1.68	1.86
Dissolved Strontium Sr	mg/L	0.085	0.086	0.18	0.16	0.15	0.1	0.1	0.093	0.076
Dissolved Tellurium Te	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
issolved Thallium Tl	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
issolved Thorium Th	mg/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dissolved Tin Sn	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Titanium Ti	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Uranium U	mg/L	0.0007	0.0007	0.001	0.0008	0.0009	0.0013	0.0013	0.0013	0.0007
Dissolved Vanadium V	mg/L	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dissolved Zinc Zn	mg/L	0.02	0.018	0.029	0.02	0.016	< 0.005	< 0.005	< 0.005	< 0.005
Dissolved Zirconium Zr	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

APPENDIX B

SEDIMENT DATA, 2006

APPENDIX B **STREAM SEDIMENT CONCENTRATIONS, JULY 2006**

Sample ID	Date Sampled	pH	Strong Acid Soluble Metals Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
		pH units	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
R1-A	07/24/2006	7.8	< 10	< 10	103.0	< 1	< 0.5	23.0	10.0	11.0	23.0
R1-B	07/24/2006	7.8	< 10	< 10	102.0	< 1	< 0.5	15.0	10.0	11.0	29.0
R1-C	07/24/2006	7.7	< 10	< 10	88.0	< 1	< 0.5	13.0	8.0	8.0	16.0
Mean		**7.8**	**N.D.**	**N.D.**	**97.7**	**N.D.**	**N.D.**	**17.0**	**9.3**	**10.0**	**22.7**
S.D.		**0.1**	**0**	**0.0**	**8.4**	**0**	**0.0**	**5.3**	**1.2**	**1.7**	**6.5**
R2-A	07/24/2006	7.7	< 10	29.0	508.0	< 1	1.4	49.0	28.0	64.0	214.0
R2-B	07/24/2006	7.9	< 10	23.0	476.0	< 1	1.3	60.0	28.0	61.0	162.0
R2-C	07/25/2006	7.8	< 10	19.0	327.0	< 1	1.0	45.0	19.0	57.0	160.0
Mean		**7.8**	**N.D.**	**23.7**	**437.0**	**N.D.**	**1.2**	**51.3**	**25.0**	**60.7**	**178.7**
S.D.		**0.1**	**0**	**5.0**	**96.6**	**0**	**0.2**	**7.8**	**5.2**	**3.5**	**30.6**
R3-A	07/25/2006	7.7	< 10	11.0	161.0	< 1	0.6	26.0	16.0	44.0	146.0
R3-B	07/25/2006	7.6	< 10	20.0	505.0	< 1	1.3	48.0	29.0	58.0	166.0
R3-C	07/25/2006	7.7	< 10	14.0	244.0	< 1	0.5	31.0	16.0	37.0	117.0
Mean		**7.7**	**N.D.**	**15.0**	**303.3**	**N.D.**	**0.8**	**35.0**	**20.3**	**46.3**	**143.0**
S.D.		**0.1**	**0**	**4.6**	**179.5**	**0**	**0.4**	**11.5**	**7.5**	**10.7**	**24.6**
R4-A	07/25/2006	7.5	< 10	< 10	226.0	< 1	0.7	26.0	17.0	39.0	97.0
R4-B	07/25/2006	7.7	< 10	16.0	498.0	< 1	1.1	64.0	25.0	51.0	135.0
R4-C	07/25/2006	7.7	< 10	16.0	533.0	< 1	1.1	48.0	26.0	51.0	128.0
Mean		**7.6**	**N.D.**	**16.0**	**419.0**	**N.D.**	**1.0**	**46.0**	**22.7**	**47.0**	**120.0**
S.D.		**0.1**	**0**	**0.0**	**168.1**	**0**	**0.2**	**19.1**	**4.9**	**6.9**	**20.2**
R5-A	07/25/2006	7.9	< 10	< 10	238.0	< 1	0.8	40.0	14.0	32.0	24.0
R5-B	07/25/2006	7.7	< 10	13.0	289.0	< 1	0.9	41.0	16.0	38.0	28.0
R5-C	07/25/2006	7.5	< 10	13.0	247.0	< 1	1.2	43.0	17.0	45.0	22.0
Mean		**7.7**	**N.D.**	**13.0**	**258.0**	**N.D.**	**1.0**	**41.3**	**15.7**	**38.3**	**24.7**
S.D.		**0.2**	**0**	**0.0**	**27.2**	**0**	**0.2**	**1.5**	**1.5**	**6.5**	**3.1**
R6-A	07/25/2006	7.8	< 10	10.0	114.0	< 1	< 0.5	27.0	11.0	16.0	10.0
R6-B	07/25/2006	7.7	< 10	12.0	211.0	< 1	1.0	57.0	17.0	41.0	17.0
R6-C	07/25/2006	7.9	< 10	12.0	204.0	< 1	1.0	41.0	16.0	42.0	17.0
Mean		**7.8**	**N.D.**	**11.3**	**176.3**	**N.D.**	**1.0**	**41.7**	**14.7**	**33.0**	**14.7**
S.D.		**0.1**	**0**	**1.2**	**54.1**	**0**	**0.0**	**15.0**	**3.2**	**14.7**	**4.0**
R6A-A	07/25/2006	7.4	< 10	13.0	239.0	< 1	1.2	53.0	19.0	51.0	18.0
R6A-B	07/25/2006	7.6	< 10	11.0	188.0	< 1	0.9	40.0	16.0	41.0	16.0
R6A-C	07/25/2006	7.4	< 10	14.0	200.0	< 1	1.1	41.0	17.0	49.0	18.0
Mean		**7.5**	**N.D.**	**12.7**	**209.0**	**N.D.**	**1.1**	**44.7**	**17.3**	**47.0**	**17.3**
S.D.		**0.1**	**0**	**1.5**	**26.7**	**0**	**0.2**	**7.2**	**1.5**	**5.3**	**1.2**
R7-A	07/26/2006	7.4	< 10	< 10	92.0	< 1	< 0.5	17.0	8.0	10.0	9.0
R7-B	07/26/2006	7.3	< 10	14.0	216.0	< 1	0.6	27.0	12.0	19.0	16.0
R7-C	07/26/2006	7.3	< 10	< 10	188.0	< 1	0.6	30.0	12.0	23.0	19.0
Mean		**7.3**	**N.D.**	**14.0**	**165.3**	**N.D.**	**0.6**	**24.7**	**10.7**	**17.3**	**14.7**
S.D.		**0.1**	**0**	**0.0**	**65.0**	**0**	**0.0**	**6.8**	**2.3**	**6.7**	**5.1**

N.D. = not detected

APPENDIX B **STREAM SEDIMENT CONCENTRATIONS, JULY 2006**

Sample ID	Mercury ug/g	Molybdenu ug/g	Nickel ug/g	Selenium ug/g	Silver ug/g	Tin ug/g	Vanadium ug/g	Zinc ug/g	Aluminum ug/g	Boron ug/g	Calcium ug/g
R1-A	0.01	< 4	23.0	0.2	< 2	< 5	20.000	122.000	9880	< 1	3040
R1-B	0.02	< 4	21.0	0.3	< 2	< 5	15.000	157.000	7510	< 1	2340
R1-C	0.01	< 4	15.0	0.2	< 2	< 5	12.000	113.000	6600	< 1	2160
Mean	**0.01**	**N.D.**	**19.7**	**0.2**	**N.D.**	**N.D.**	**16.667**	**130.667**	**7997**	**N.D.**	**2513**
S.D.	**0.01**	**0**	**4.2**	**0.1**	**0**	**0**	**4.041**	**23.245**	**1693**	**0**	**465**
R2-A	0.19	< 4	56.0	0.9	< 2	< 5	36.000	736.000	19600	< 1	8460
R2-B	0.14	< 4	62.0	0.9	< 2	< 5	36.000	843.000	21200	1	11200
R2-C	0.20	< 4	45.0	0.6	< 2	< 5	31.000	502.000	18400	< 1	8210
Mean	**0.18**	**N.D.**	**54.3**	**0.8**	**N.D.**	**N.D.**	**34.333**	**693.667**	**19733**	**1**	**9290**
S.D.	**0.03**	**0**	**8.6**	**0.2**	**0**	**0**	**2.887**	**174.397**	**1405**	**0**	**1659**
R3-A	0.06	< 4	32.0	0.3	< 2	< 5	20.000	326.000	10000	< 1	2700
R3-B	0.14	< 4	52.0	0.7	< 2	< 5	32.000	727.000	18400	< 1	7020
R3-C	0.10	< 4	33.0	0.4	< 2	< 5	26.000	338.000	13000	< 1	5140
Mean	**0.10**	**N.D.**	**39.0**	**0.5**	**N.D.**	**N.D.**	**26.000**	**463.667**	**13800**	**N.D.**	**4953**
S.D.	**0.04**	**0**	**11.3**	**0.2**	**0**	**0**	**6.000**	**228.132**	**4257**	**0**	**2166**
R4-A	0.05	< 4	41.0	0.5	< 2	< 5	26.000	280.000	9380	< 1	4020
R4-B	0.11	< 4	56.0	0.8	< 2	< 5	34.000	546.000	18000	< 1	6880
R4-C	0.11	< 4	56.0	0.8	< 2	< 5	32.000	584.000	17700	1	6760
Mean	**0.09**	**N.D.**	**51.0**	**0.7**	**N.D.**	**N.D.**	**30.667**	**470.000**	**15027**	**1.00**	**5887**
S.D.	**0.03**	**0**	**8.7**	**0.2**	**0**	**0**	**4.163**	**165.638**	**4892**	**0.00**	**1618**
R5-A	0.03	< 4	40.0	0.6	< 2	< 5	52.000	134.000	17500	< 1	6170
R5-B	0.04	< 4	43.0	0.8	< 2	< 5	52.000	153.000	19700	1	6470
R5-C	0.04	< 4	47.0	0.8	< 2	< 5	61.000	160.000	20400	1	6450
Mean	**0.04**	**N.D.**	**43.3**	**0.7**	**N.D.**	**N.D.**	**55.000**	**149.000**	**19200**	**1.00**	**6363**
S.D.	**0.01**	**0**	**3.5**	**0.1**	**0**	**0**	**5.196**	**13.454**	**1513**	**0.00**	**168**
R6-A	0.01	< 4	30.0	0.4	< 2	< 5	35.000	69.000	10100	< 1	4320
R6-B	0.03	< 4	48.0	0.8	< 2	< 5	61.000	133.000	20300	1	7130
R6-C	0.03	< 4	45.0	0.7	< 2	< 5	58.000	126.000	20700	1	6760
Mean	**0.02**	**N.D.**	**41.0**	**0.6**	**N.D.**	**N.D.**	**51.333**	**109.333**	**17033**	**1.00**	**6070**
S.D.	**0.01**	**0**	**9.6**	**0.2**	**0**	**0**	**14.224**	**35.105**	**6008**	**0.00**	**1527**
R6A-A	0.04	< 4	52.0	0.8	< 2	< 5	65.000	144.000	21900	< 1	7490
R6A-B	0.03	< 4	46.0	0.7	< 2	< 5	61.000	135.000	19400	< 1	6030
R6A-C	0.03	< 4	48.0	0.7	< 2	< 5	66.000	146.000	20500	< 1	5950
Mean	**0.03**	**N.D.**	**48.7**	**0.7**	**N.D.**	**N.D.**	**64.000**	**141.667**	**20600**	**N.D.**	**6490**
S.D.	**0.01**	**0**	**3.1**	**0.1**	**0**	**0**	**2.646**	**5.859**	**1253**	**0**	**867**
R7-A	0.01	< 4	17.0	0.3	< 2	< 5	19.000	54.000	9780	< 1	2540
R7-B	0.03	< 4	23.0	0.8	< 2	< 5	30.000	95.000	15700	< 1	4790
R7-C	0.03	< 4	26.0	0.7	< 2	< 5	32.000	95.000	16800	< 1	5050
Mean	**0.02**	**N.D.**	**22.0**	**0.6**	**N.D.**	**N.D.**	**27.000**	**81.333**	**14093**	**N.D.**	**4127**
S.D.	**0.01**	**0**	**4.6**	**0.3**	**0**	**0**	**7.000**	**23.671**	**3776**	**0**	**1380**

N.D. = not detected

APPENDIX B **STREAM SEDIMENT CONCENTRATIONS, JULY 2006**

Sample ID	Iron ug/g	Magnesium ug/g	Manganese ug/g	Phosphorus ug/g	Potassium ug/g	Sodium ug/g	Strontium ug/g	Titanium ug/g	Zirconium ug/g
R1-A	16100	4590	1090	604	565	138.0	30.0	131.0	2.0
R1-B	14600	3410	1220	421	743	138.0	25.0	158.0	2.0
R1-C	13400	2700	1060	317	548	130.0	49.0	108.0	2.0
Mean	**14700**	**3567**	**1123**	**447**	**619**	**135.3**	**34.7**	**132.3**	**2.0**
S.D.	**1353**	**955**	**85**	**145**	**108**	**4.6**	**12.7**	**25.0**	**0.0**
R2-A	29300	6960	6700	907	1610	266.0	54.0	452.0	2.0
R2-B	28100	7620	5450	792	1880	311.0	61.0	431.0	2.0
R2-C	23800	6660	2240	929	1540	307.0	48.0	410.0	2.0
Mean	**27067**	**7080**	**4797**	**876**	**1677**	**294.7**	**54.3**	**431.0**	**2.0**
S.D.	**2892**	**491**	**2301**	**74**	**180**	**24.9**	**6.5**	**21.0**	**0.0**
R3-A	18100	4670	2880	483	825	132.0	22.0	169.0	2.0
R3-B	23900	6210	9240	898	1480	288.0	53.0	435.0	2.0
R3-C	19900	4940	3000	907	999	239.0	40.0	354.0	1.0
Mean	**20633**	**5273**	**5040**	**763**	**1101**	**219.7**	**38.3**	**319.3**	**1.7**
S.D.	**2969**	**822**	**3638**	**242**	**339**	**79.8**	**15.6**	**136.3**	**0.6**
R4-A	18300	4820	3560	828	787	135.0	27.0	184.0	1.0
R4-B	23500	6770	6670	781	1340	278.0	49.0	434.0	1.0
R4-C	22400	6790	7550	782	1340	266.0	49.0	416.0	1.0
Mean	**21400**	**6127**	**5927**	**797**	**1156**	**226.3**	**41.7**	**344.7**	**1.0**
S.D.	**2740**	**1132**	**2096**	**27**	**319**	**79.3**	**12.7**	**139.4**	**0.0**
R5-A	20400	6890	731	1250	1100	220.0	35.0	449.0	2.0
R5-B	21700	7360	1340	1140	1330	260.0	38.0	495.0	2.0
R5-C	22900	7710	970	1130	1310	229.0	37.0	527.0	2.0
Mean	**21667**	**7320**	**1014**	**1173**	**1247**	**236.3**	**36.7**	**490.3**	**2.0**
S.D.	**1250**	**411**	**307**	**67**	**127**	**21.0**	**1.5**	**39.2**	**0.0**
R6-A	18600	5260	632	1330	663	91.0	24.0	148.0	2.0
R6-B	22500	7850	690	1160	1450	232.0	37.0	532.0	2.0
R6-C	21800	7690	580	1100	1380	233.0	37.0	496.0	2.0
Mean	**20967**	**6933**	**634**	**1197**	**1164**	**185.3**	**32.7**	**392.0**	**2.0**
S.D.	**2079**	**1451**	**55**	**119**	**436**	**81.7**	**7.5**	**212.1**	**0.0**
R6A-A	24900	8330	1260	1100	1550	234.0	40.0	545.0	2.0
R6A-B	22000	7330	500	1140	1200	204.0	34.0	455.0	2.0
R6A-C	23000	7640	559	1080	1280	207.0	35.0	505.0	2.0
Mean	**23300**	**7767**	**773**	**1107**	**1343**	**215.0**	**36.3**	**501.7**	**2.0**
S.D.	**1473**	**512**	**423**	**31**	**183**	**16.5**	**3.2**	**45.1**	**0.0**
R7-A	14800	3620	506	510	962	130.0	24.0	262.0	1.0
R7-B	20400	4610	1200	916	1560	158.0	34.0	460.0	1.0
R7-C	19500	4930	529	878	1770	178.0	35.0	500.0	1.0
Mean	**18233**	**4387**	**745**	**768**	**1431**	**155.3**	**31.0**	**407.3**	**1.0**
S.D.	**3007**	**683**	**394**	**224**	**419**	**24.1**	**6.1**	**127.4**	**0.0**

N.D. = not detected

APPENDIX C

BENTHIC INVERTEBRATE DATA, 2006

APPENDIX C

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series	R1a	R1b	R1c	R2a	R2b	R2c	R3a	R3b	R3c	R4a	R4b	R4c
Fines split to:	1/16	1/16	1/8		1/2				1/8	1/4	1/4	1/4
YLUM ARTHROPODA												
ss Insecta												
Insecta P												1
Order Ephemeroptera												
Ephemeroptera A												
Family Siphlonuridae												
Ameletus sp					2		2			19	4	
Family Baetidae												
Baetis sp	1055	211	198	7	132	85	23	55	468	155	227	336
Family Heptageniidae												
Cinygmula sp	36	1	2		32	21	1	6	8	125	143	29
Heptagenia sp				3		2						
Epeorus sp			1						4			1
Rhithrogena sp		1			2			1	2	13	90	52
Family Ephemerellidae												
Drunella doddsi	6	1	5		1			6		1	1	2
Drunella flavilinea	20	3	1			1	1				1	1
Drunella grandis	2	2	1			5				1	1	
Ephemerellidae J	11		25	2	8			3	8	29	58	27
Family Leptophlebiidae												
Paraleptophlebia sp				1								
Order Plecoptera												
Family Capnidae												
Capnia sp	34		1	6	11		1	2		126	83	45
Family Perlodidae												
Isoperla sp	22	2	3		20	17	2	1	10	5	5	
Megarcys sp	2				1		2		3	1	2	
Skwala curvata	5			2		2	2		2		1	1
Skwala paralella	1		2			3		1		6	9	1
nily Chloroperlidae												
Sweltsa sp group	1			1	4					8	3	1
Family Nemouridae												
Zapada sp	252	142	117	4	230	93	16	15	85	60	86	104
Podmosta sp	146	2	19									
Family Taenioptergidae												
Taenionema sp	206	113	28	4	2	3		1			60	1
Family Pteronarcyidae												
Pteronarcella sp					1							
Order Trichoptrea												
Trichoptera Unid Juv			8					3		8	12	
Trichoptera A											2	
Family Hydropsychidae												
Arctopsyche sp	5			1	37	13		3	3	12	60	32
Family Brachycentridae												
Brachycentrus sp							5	1	3		1	4
Micrasema sp	1	2				1				4	28	12
Family Limneptiidae												
Dicosmoecus	1		1	3	2	3				1	3	
Ecclisomyia sp	1											
Family Glossosmatidae												
Glossosoma sp											4	
Family Hydroptilidae												
Hydroptila sp												
Family Rhyacophilidae												
Rhyacophilidae Juv	43	96	11	1		2	1				4	8
Rhyacophila (acropedes or vao)	5	5		2	7	5	4		4		3	7
Rhyacophila hyalinata	3	2	2				8					
Rhyacophila vagrita												1
rder Diptera												
Diptera Unid A	1						1					
Family Chironomidae												
Chironomidae A	1					1			1			

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series	R1a	R1b	R1c	R2a	R2b	R2c	R3a	R3b	R3c	R4a	R4b	R4c
Fines split to:	1/16	1/16	1/8		1/2				1/8	1/4	1/4	1/4
Chironomidae P	20			3	5	1	12	1	43	16	5	8
Chironomidae L	3241	738	303	12	48	17	5	22	152	111	7	35
Prodiamesa sp												
SubFamily Orthocladinae												
Brillia sp	22				3		6		8		4	1
Cardiocladius sp	151	71	39		58	12	10	3	61	112	133	168
Cricotopus sp	308	330	148	25	224	89	29	15	126	130	136	182
Synorthocladius sp										1		
Thienemanniella sp	33		16									
Sub Family Diamesinae												
Diamesa sp	2772	2454	885		15	10	195	11	885	69	40	147
Eukiefferiella sp	145	99	66	1	13	9	19		127	36	22	56
Euryhapsis sp		48			1			2		6	4	11
Sub Family Chironominae												
Micropsectra sp				2		1						4
Rheotanytarsus sp	132		106	20	50	24		1		4	28	4
Sub Family Tanypodinae												
Thienemannimyia			1	14	16	4		1	1	4		
Family Ceratopogonidae												
Mallochohelia sp	1			1		1	4		9			
Family Empididae												
Chelifera sp	1			1		3						
Weidemannia sp												
Family Psychodidae												
Pericoma sp	5	2	1			2	5			4	5	
Family Simulidae												
Simulidae A	1											
Cnephia sp	1											4
Prosimulium L						1	5		17			
Prosimulium P												
Simulium sp L	443	287	69		10	4	205	18	320	35	38	89
Simulium sp P	67	5	11	1	1		10		5	4		6
Family Tipulidae												
Dicranota sp	1				6							
Hesperoconopa sp												
Order Homoptera												
Homoptera Unid A			1					1			1	
Homoptera unid N					1							
Family Aphididae												
Order Hymenoptera												
Hymenoptera A								1				
Family Formicidae										1		
Order Lepidoptera L	1											
Order Thysanoptera		1										
Class Arachnida												
Order Aranaea												
Order Hydracarina												
Hydracarina Unid J	51		9	1	4			15			4	
Lebertia sp	1	17			3	2	1	3		2	8	17
Neumannia sp					1							
Sperchon sp		2	1	4	8		1	9		37	16	58
Unioncola sp	327	224	89	21	47	4	1	17	120	137	112	54
Oribatei												5
Class Crustacea												
Sub Class Copepoda												
Sub Order Cyclopoida				1								
Sub Class Ostracoda												
Candona sp	2			2					8			

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C **BENTHIC MACRO-INVERTEBRATE DATA, 2006**

Laberge 06A R series	R1a	R1b	R1c	R2a	R2b	R2c	R3a	R3b	R3c	R4a	R4b	R4c
Fines split to:	1/16	1/16	1/8		1/2				1/8	1/4	1/4	1/4
YLUM ANNILIDA												
ss Oligochaeta												
FamilyEnchytraeidae	17	1					2					
Family Naididae												
Chaetogaster sp				2								
Nais sp												
Family Tubificidae	16		2				1					
PHYLUM NEMATODA	32					1	1					
Total per sample:	9651	4862	2172	148	1006	442	581	218	2483	1283	1454	1515
Total per site:	16685			1596			3282			4252		
Taxonomic Richness per sample:	49	28	33	29	35	33	32	28	27	34	41	37
Taxonomic Richness per site:	57			53			48			51		

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series	R5a	R5b	R5c	R6a	R6b	R6c	R6a-a	R6a-b	R6a-c	R7a	R7b	R7c
Fines split to:			1/4	1/2	1/8	1/16	1/16	1/16	1/16			
`HYLUM ARTHROPODA												
.ass Insecta												
Insecta P												
Order Ephemeroptera												
Ephemeroptera A					1			1				
Family Siphlonuridae												
Ameletus sp	1										1	4
Family Baetidae												
Baetis sp	10	16	156	56	465	307	422	851	192	5		1
Family Heptageniidae												
Cinygmula sp	8	16	51	3	32	16	82	135	15	44	1	3
Heptagenia sp	2	2									3	2
Epeorus sp				5	17		4	6	12	4	2	1
Rhithrogena sp	6	10	30	17	23	23	23	12	19	2	2	
Family Ephemerellidae												
Drunella doddsi	2	1	3	7	43	4	42	136	10			
Drunella flavilinea				10	1	6	3	3	3	1		
Drunella grandis	1	1	4	3	2	4	2	9	3		1	
Ephemerellidae J	4	8	26	5	17		144	243	129	4	2	1
Family Leptophlebiidae												
Paraleptophlebia sp												
Order Plecoptera												
Family Capnidae												
Capnia sp	11	6	48	18	80	19				17	6	10
Family Perlodidae												
Isoperla sp		1					29	91	18		1	2
Megarcys sp				5	4	3	1		2			
Skwala curvata			2					3	2			
Skwala paralella	1	4	6	8		1	34	4	32	4		5
ımily Chloroperlidae												
Sweltsa sp group	1				1			3			1	1
Family Nemouridae												
Zapada sp	9	7	71	109	95	101	235	144	211	22	5	12
Podmosta sp			5		2	2						
Family Taenioptergidae												
Taenionema sp		4	8	6	27	36	32	64	43			
Family Pteronarcyidae												
Pteronarcella sp												
Order Trichoptrea												
Trichoptera Unid Juv												
Trichoptera A												
Family Hydropsychidae												
Arctopsyche sp	1	4	10	21	117	322	55	264	203		1	2
Family Brachycentridae												
Brachycentrus sp									1			
Micrasema sp												
Family Limneptiildae												
Dicosmoecus	1		1	1		2	1	2		15	4	11
Ecclisomyia sp												
Family Glossosmatidae												
Glossosoma sp												
Family Hydroptilidae												
Hydroptila sp					1							
Family Rhyacophilidae												
Rhyacophilidae Juv								2	1	1		
Rhyacophila (acropedes or vao)				2	3	4	1	2	5			
Rhyacophila hyalinata							1					
Rhyacophila vagrita												
Order Diptera												
Diptera Unid A				1	1	1						
Family Chironomidae												
Chironomidae A		1		1	1						1	

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C | **BENTHIC MACRO-INVERTEBRATE DATA, 2006**

Laberge 06A R series Fines split to:	R5a	R5b	R5c 1/4	R6a 1/2	R6b 1/8	R6c 1/16	R6a-a 1/16	R6a-b 1/16	R6a-c 1/16	R7a	R7b	R7c
Chironomidae P	4		2	17	47	146	48	19	24	3		4
Chironomidae L	19	4	47	21	44	84	103	82	90	20	4	14
Prodiamesa sp							1					
SubFamily Orthocladinae												
Brillia sp			4									
Cardiocladius sp	23	5	36	55	146	85	95	24	61	23	3	25
Cricotopus sp	95	54	416	153	295	520	1458	181	390	67	34	192
Synorthocladius sp												
Thienemanniella sp	1						16					3
Sub Family Diamesinae												
Diamesa sp	12	4	45	402	634	1615	760	1587	643	1		16
Eukiefferiella sp	2	3	173	122	330	586	69	722	718	17	2	45
Euryhapsis sp	1		4		8	1	65	32	16	3	1	2
Sub Family Chironominae												
Micropsectra sp												
Rheotanytarsus sp	7	2	38		1	1		96		1	1	
Sub Family Tanypodinae												
Thienemannimyia					1					2	2	
Family Ceratopogonidae												
Mallochohelia sp												
Family Empididae												
Chelifera sp												
Weidemannia sp							1					
Family Psychodidae												
Pericoma sp			3				1		1	1		
Family Simulidae												
Simulidae A												
Cnephia sp				1		1	1					
Prosimulium L				9	98	170	65	5	19	1		
Prosimulium P				5	12	11	1		9			
Simulium sp L	1		1	102	269	358	21	83	113	4	2	
Simulium sp P				8	51	46	1		9			
Family Tipulidae												
Dicranota sp					8				8			
Hesperoconopa sp											1	
Order Homoptera												
Homoptera Unid A					1							
Homoptera unid N												
Family Aphididae					3		1	1				
Order Hymenoptera												
Hymenoptera A												
Family Formicidae												
Order Lepidoptera L												
Order Thysanoptera			1									
Class Arachnida												
Order Aranaea												
Order Hydracarina												
Hydracarina Unid J	1			2		16	17		24	1	3	
Lebertia sp		1	2	1					8		1	2
Neumannia sp												
Sperchon sp	2	2	1		9	16	17	48	33	4		13
Unioncola sp	52	18	116	60	168	129	240	304	160	39	16	57
Oribatei								1				
Class Crustacea												
Sub Class Copepoda												
Sub Order Cyclopoida												
Sub Class Ostracoda												
Candona sp												

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series	R5a	R5b	R5c	R6a	R6b	R6c	R6a-a	R6a-b	R6a-c	R7a	R7b	R7c
Fines split to:			1/4	1/2	1/8	1/16	1/16	1/16	1/16			
YLUM ANNILIDA												
.ass Oligochaeta												
FamilyEnchytraeidae				1			1					1
Family Naididae												
Chaetogaster sp												
Nais sp	1											
Family Tubificidae								1				
PHYLUM NEMATODA		1	4		1	2	16			1		1
Total per sample:	279	175	1314	1237	3059	4638	4109	5161	3227	307	101	430
Total per site:	1768			8934			12497			838		
Taxonomic Richness per sample:	28	24	30	33	39	33	39	34	35	27	26	26
Taxonomic Richness per site:	38			45			49			38		

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C **BENTHIC MACRO-INVERTEBRATE DATA, 2006**

Laberge 06A R series Fines split to:	Totals	%
'HYLUM ARTHROPODA		
ass Insecta		
Insecta P	1	0.002
Order Ephemeroptera		
Ephemeroptera A	2	0.004
Family Siphlonuridae		
Ameletus sp	33	0.07
Family Baetidae		
Baetis sp	5433	10.9
Family Heptageniidae		
Cinygmula sp	810	1.6
Heptagenia sp	14	0.03
Epeorus sp	57	0.11
Rhithrogena sp	328	0.7
Family Ephemerellidae		
Drunella doddsi	271	0.5
Drunella flavilinea	55	0.1
Drunella grandis	42	0.08
Ephemerellidae J	754	1.5
Family Leptophlebiidae		
Paraleptophlebia sp	1	0.002
Order Plecoptera		
Family Capnidae		
Capnia sp	524	1.1
Family Perlodidae		
Isoperla sp	229	0.5
Megarcys sp	26	0.05
Skwala curvata	22	0.044
Skwala paralella	122	0.2
nily Chloroperlidae		
Sweltsa sp group	25	0.05
Family Nemouridae		
Zapada sp	2225	4.5
Podmosta sp	176	0.4
Family Taenioptergidae		
Taenionema sp	638	1.3
Family Pteronarcyidae		
Pteronarcella sp	1	0.002
Order Trichoptrea		
Trichoptera Unid Juv	31	0.06
Trichoptera A	2	0.004
Family Hydropsychidae		
Arctopsyche sp	1166	2.3
Family Brachycentridae		
Brachycentrus sp	15	0.03
Micrasema sp	48	0.10
Family Limneptiidae		
Dicosmoecus	52	0.1
Ecclisomyia sp	1	0.002
Family Glossosmatidae		
Glossosoma sp	4	0.008
Family Hydroptilidae		
Hydroptila sp	1	0.002
Family Rhyacophilidae		
Rhyacophilidae Juv	170	0.3
Rhyacophila (acropedes or vao)	59	0.1
Rhyacophila hyalinata	16	0.03
Rhyacophila vagrita	1	0.002
'der Diptera		
Diptera Unid A	5	0.01
Family Chironomidae		
Chironomidae A	7	0.01

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

APPENDIX C

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series Fines split to:	Totals	%
Chironomidae P	428	0.9
Chironomidae L	5223	10.5
Prodiamesa sp	1	0.002
SubFamily Orthocladinae		
Brillia sp	48	0.10
Cardiocladius sp	1399	2.8
Cricotopus sp	5597	11.2
Synorthocladius sp	1	0.002
Thienemanniella sp	69	0.1
Sub Family Diamesinae		
Diamesa sp	13202	26.5
Eukiefferiella sp	3382	6.8
Euryhapsis sp	205	0.4
Sub Family Chironominae		
Micropsectra sp	7	0.01
Rheotanytarsus sp	516	1.0
Sub Family Tanypodinae		
Thienemannimyia	46	0.09
Family Ceratopogonidae		
Mallochohelia sp	16	0.03
Family Empididae		
Chelifera sp	5	0.01
Weidemannia sp	1	0.002
Family Psychodidae		
Pericoma sp	30	0.06
Family Simulidae		
Simulidae A	1	0.002
Cnephia sp	8	0.02
Prosimulium L	390	0.8
Prosimulium P	38	0.08
Simulium sp L	2472	5.0
Simulium sp P	225	0.5
Family Tipulidae		
Dicranota sp	23	0.05
Hesperoconopa sp	1	0.002
Order Homoptera		
Homoptera Unid A	4	0.008
Homoptera unid N	1	0.002
Family Aphididae	5	0.01
Order Hymenoptera		
Hymenoptera A	1	0.002
Family Formicidae	1	0.002
Order Lepidoptera L	1	0.002
Order Thysanoptera	2	0.004
Class Arachnida		
Order Aranaea		
Order Hydracarina		
Hydracarina Unid J	148	0.3
Lebertia sp	69	0.1
Neumannia sp	1	0.002
Sperchon sp	281	0.6
Unioncola sp	2512	5.0
Oribatei	6	0.01
Class Crustacea		
Sub Class Copepoda		
Sub Order Cyclopoida	1	0.002
Sub Class Ostracoda		
Candona sp	12	0.02

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged

BENTHIC MACRO-INVERTEBRATE DATA, 2006

Laberge 06A R series	Totals	%
Fines split to:		
PHYLUM ANNILIDA		
Class Oligochaeta		
FamilyEnchytraeidae	23	0.05
Family Naididae		
Chaetogaster sp	2	0.004
Nais sp	1	0.002
Family Tubificidae	20	0.04
PHYLUM NEMATODA	60	0.1
Total per sample:	49852	
Total per site:		
Taxonomic Richness per sample:	84	
Taxonomic Richness per site:		

Unid = unidentified J = juvenile P = pupae L = larvae A = adult D = damaged