Minto Explorations Ltd.

A SUBSIDIARY OF CAPSTONE MINING LTD.

Appendix F

Benthic Monitoring Program Report

2 Lamb Street
Georgetown, Ontario
L7G 3M9

January 30, 2009

Mr. David Petkovich
Senior Environmental Manager
Access Consulting Group
No. 3 Calcite Business Center
151 Industrial Road
Whitehorse, Yukon
Y1A 2V3

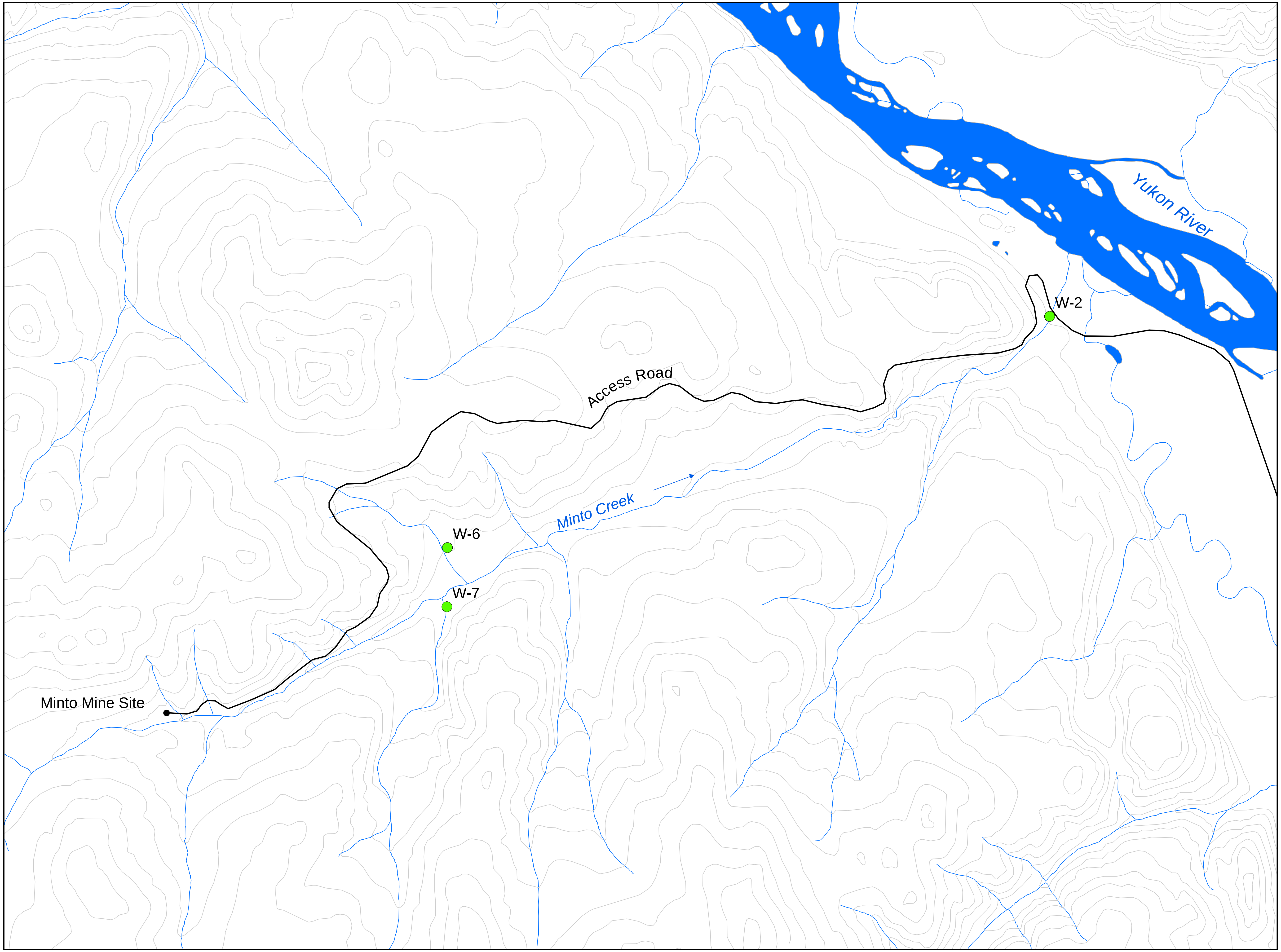
Dear Mr. Petkovich:

Re: Minto Mine Water Use Licence Benthic Invertebrate Community Survey Results

The Minto Mine is required to conduct operational monitoring of its aquatic receiving environment as a condition of effluent discharge under Yukon Territory Water Board Water Use Licence (WUL) QZ06-006. In accordance with this WUL, effluent flow, surface water chemistry, sediment chemistry and benthic macroinvertebrate communities must be routinely monitored in Minto Creek (Station W2) and two tributaries uninfluenced by mine effluent discharge (Stations W6 and W7; Figure 1). In 2008, Minnow Environmental Inc. (Minnow) was retained by the Access Consulting Group (Access) to assist in implementing the benthic invertebrate community component of the operational monitoring program with the objective of characterizing current biological conditions at established monitoring stations. This letter report details the methods and results of the 2008 benthic invertebrate community program and provides temporal comparison to studies conducted in 1994 (baseline) and 2006 (mine operational).

1.0 Methods

WUL benthic invertebrate community monitoring was undertaken by Minnow and Access on September 9th and 10th 2008 at Minto Creek effluent-exposed Station W2 and at reference Stations W6 and W7 on south- and north-flowing tributaries to Minto Creek, respectively (Figure 1). Quantitative sampling was conducted at riffle habitats containing cobble and/or gravel substrate in each area using a Hess sampler (0.1 m^2) outfitted with 250 µm mesh. One sample was collected at each monitoring location consisting of a two-grab composite. For each grab, the substrate within the sampler was disturbed and gently scrubbed (by hand and nail brush) with care taken to ensure that all dislodged organic material was swept into



Minto Mine Project

Water Use Licence Benthic Invertebrate Sampling Program

Minto Explorations Ltd.
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Legend

- Benthic Invertebrate Sampling Site
- Access Road
- Contour
- Water Course
- Intermittent Water Course
- Water Body

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115I/10 and 115I/11

Figure 1

Benthic Invertebrate Sample Sites

Scale: 1:30000

0 200 400 800 1,200 m

minnow environmental inc.
ACCESS CONSULTING GROUP

Drawn by: HD/PI	Checked by: DP	Date: Jan. 2009

Our File: D:\Project\AllProjects\Minto\EEM\Jan09\Fig1_1_BenthicInverSites.mxd the sampler collection net. The substrate was disturbed to a depth of approximately 10 cm over a period of approximately 5 minutes. This procedure was repeated for the second grab, following which all of the material contained in the collection net was carefully transferred to a sampling jar. The benthic invertebrate samples were then preserved to a level of 10% buffered formalin in ambient water.

A number of supporting field measures and observations were collected concurrently with benthic invertebrate sample collection at each station, including station coordinates, *in situ* water quality measurements, physical stream measurements and general habitat observations. Station coordinates were recorded from a Geographic Positioning System (GPS) unit. Water temperature, dissolved oxygen, specific conductance, pH and redox potential (ORP) were measured at mid-water column using a YSI 650 MDS (Multiparameter Display System) meter equipped with a YSI 6820 Sonde (Yellow Springs Instruments Inc., Yellow Springs, OH). Physical stream measures of water velocity and depth were measured at each station using a Flo-Mate Model 2000 portable velocity meter (Marsh-McBirney Inc., Frederick, MD) and meter stick, respectively. Photographs of each sampling station/area were also taken to support general habitat descriptions.

Benthic invertebrate samples were shipped to Zaranko Environmental Assessment Services (ZEAS; Nobleton, Ontario) for processing. Upon arrival at the laboratory, a biological stain was added to each benthic invertebrate sample to increase sorting efficiency. Samples were then rinsed in a 250 µm sieve with clean water and the sample material was examined under a stereomicroscope at a magnification of ten times. All organisms were removed from each sample and placed into vials containing 70% ethanol according to major taxonomic groups (i.e., order or family levels). A senior taxonomist then enumerated and identified the benthic organisms to the lowest practical level (typically genus or species) using up-to-date taxonomic keys.

Benthic invertebrate communities were characterized using summary metrics including invertebrate abundance (number of organisms per m^2), taxon richness (as identified to the lowest practical level), Simpson's Evenness index and percent composition of dominant/indicator taxa (calculated as the abundance of each respective dominant/indicator taxon relative to the total number of organisms in the sample). Simpson's evenness ("E") index was computed using the formula outlined in Smith and Wilson (1996). This index takes into account both the relative abundance and number of taxa at each station to produce a value ranging from 0 to 1. A high value (i.e., >0.9) generally reflects moderate abundance of a relatively high number of taxa, and can often be associated with good environmental quality whereas a low value (i.e., <0.6) typically reflects a community with a high abundance of only a few taxa, which may indicate poor environmental quality.

Dominant/indicator taxon groups were defined as those groups representing greater than roughly 5% of total organism abundance. In the current dataset, the dominant taxon groups included chironomids (non-biting midges), ephemeropterans/plecopterans (mayflies/stoneflies), oligochaetes (aquatic worms) and nematans (roundworms). Chironomids include a highly diverse, ubiquitous group that exhibit a wide range of sensitivities to various chemical stressors, but in general are considered tolerant of contaminant inputs (e.g., Taylor and Bailey 1999). Mayfly and stonefly taxa exhibit a broad range of habitat requirements and sensitivities to various metal and/or organic enrichment sources, but in general are considered sensitive to contaminant inputs (Rosenberg and Resh 1993; Taylor and Bailey 1999). Finally, aquatic oligochaetes and nematans are typically considered highly tolerant of low oxygen environments characteristic of organic- and/or nutrient-enriched (i.e., eutrophic) environments (Pennak 1978). Although oligochaetes can show variable sensitivity to metals (e.g., Malueg et al 1984; Wiederholm et al. 1987), they are generally considered relatively tolerant to high metal concentrations (Chapman et al. 1982a,b). Therefore, a proportionately higher abundance of this taxon group may be indicative of poor environmental conditions.

2.0 Results

2.1 Water Quality

At the time of sampling, water temperatures were generally cool, ranging from 3.0°C at Station W6 to 5.8°C at Station W2 (Table 1). Dissolved oxygen concentrations were well above the Canadian Water Quality Guideline (CWQG) for the protection of aquatic life (i.e., 6.5 mg/L) and saturation levels were high at each station (Table 1). Aqueous pH levels were slightly alkaline and well within the acceptable range defined by CWQG at all stations (Table 1). Specific conductance values were elevated in the main stem of Minto Creek (Station W2) compared to the monitored tributaries (Stations W6 and W7; Table 1), reflecting the discharge of mine effluent to Minto Creek. Aqueous redox measures were positive at all stations (Table 1) which, consistent with high dissolved oxygen levels, suggested oxidizing conditions at all areas. Overall, water quality at the WUL monitoring stations appeared acceptable based on comparison of *in situ* measures to national criteria for the protection of aquatic life.

2.2 Benthic Invertebrate Community

2008 Benthic Invertebrate Community

Benthic invertebrate taxon richness and density ranged from 12 to 17 taxa and from 350 to 5,445 organisms per m^2, respectively, at Minto Mine WUL monitoring stations (Figure 2). Both taxon richness and density were highest at main stem Minto Creek Station W2, and lowest at south-flowing tributary Station W6 (Figure 2). In general, taxon richness at Minto Mine WUL monitoring stations was considered relatively low. For example, a mean taxon richness of 23±6 taxa was reported by Reynoldson et al. (2001) for north-central British Columbia watercouses of similar stream order (i.e., second order) but at higher elevation (i.e., 1115 m above sea level [ASL] for BC streams versus 800 m to 870 m ASL for Minto Creek). Relatively low taxon richness in the Minto Creek watershed may reflect homogenous substrate conditions and/or the occurrence of intermittent flow. Specifically, sand is the

Table 1: Summary of Supporting Measures Collected during Minto Mine WUL Benthic Invertebrate Community Survey, September 2008

Observation	Station		
	W2 Effluent-Exposed	**W6 Reference**	**W7 Reference**
GPS Coordinates	62° 39' 04.0" N 137° 05' 45.5" W	62° 37' 55.7" N 137° 11' 34.7" W	62° 37' 40.4" N 137° 11' 34.0" W
Location Description	Lower Minto Creek, approximately 100 m upstream of confluence with Yukon River	South-flowing tributary to Minto Creek	North-flowing tributary to Minto Creek
Habitat Description	Substrate predominantly sandy with cobble observed at fast flowing areas; moderate flow at time of sampling.	Tributary dominated by sand substrate. Found only one sampling location containing cobbler at cascade area; low flow at time of sampling.	Tributary dominated by sand substrate. Few areas with cobble of marginal quality for sampling; low flow at time of sampling.
Temperature (°C)	5.82	3.03	4.17
Dissolved Oxygen (mg/L)	10.79	11.73	11.06
Dissolved Oxygen (% Saturation)	86	87	85
pH (units)	8.09	7.51	7.51
Specific Conductance (µS/cm)	263	143	133
Redox (mV)	122	97	90
Sampling Water Velocity (m/s)	0.50	0.20	0.24
Sampling Depth (cm)	21	15	18

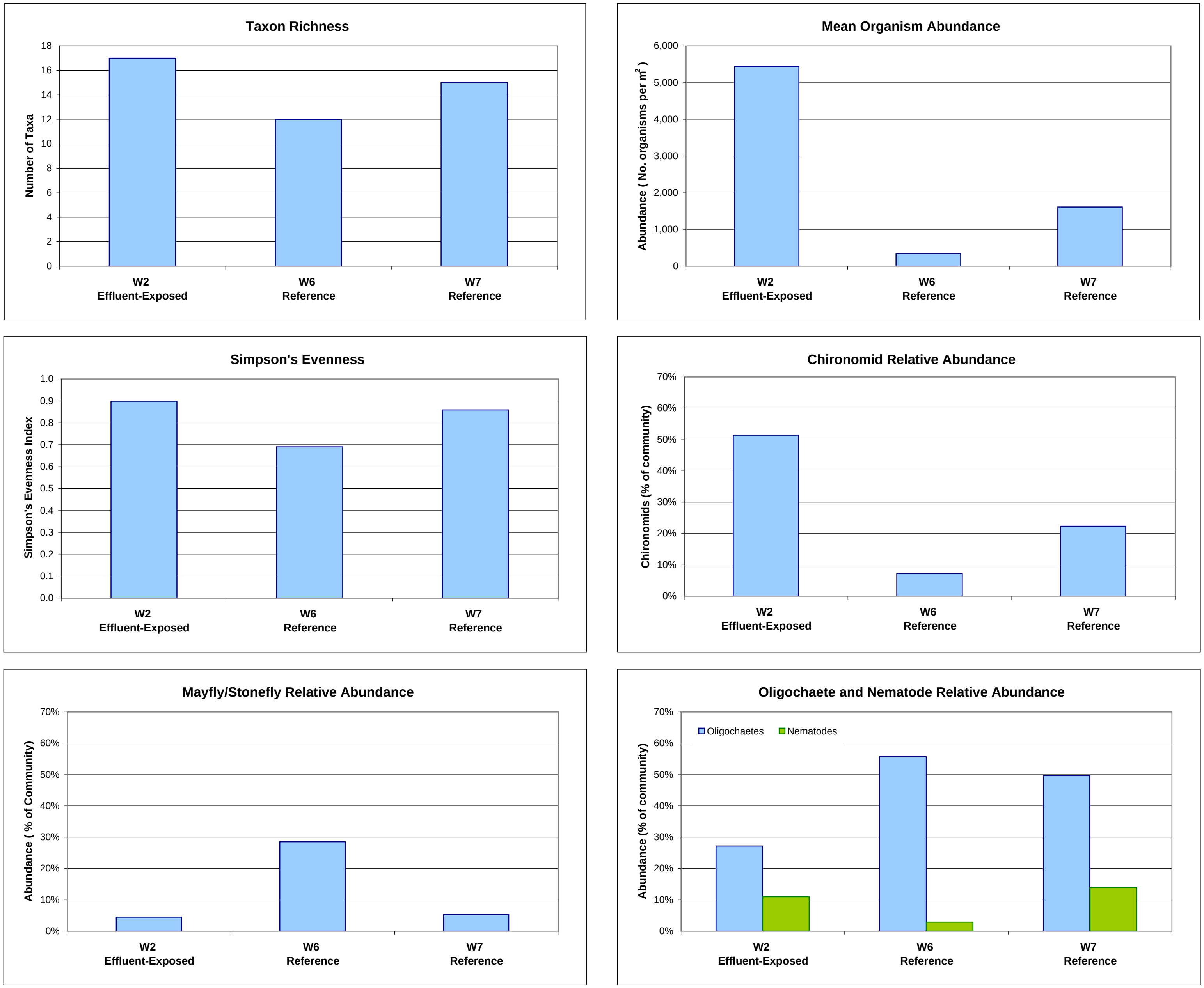

Figure 2: Benthic Invertebrate Community Index Results, Minto Mine WUL Benthic Invertebrate Community Survey, September 2008

dominant substrate for all WUL watercourses, with limited amounts of cobble and gravel observed only in areas with higher water velocity (Table 1). Benthic invertebrate richness in such environments can potentially be low as fewer niches are available for colonization. Habitats with low substrate diversity can often be dominated a few taxa that specialize in exploitation of particular substrate types, which theoretically results in reduced competition (and predation) from invertebrates associated with other substrate types (Beisel et al. 2000). Intermittent flow conditions may also limit taxon richness by favouring only those species with relatively short life-histories (Ward 1992).

Benthic invertebrate community evenness was moderate at Station W2 and north-flowing tributary Station W7 (i.e., > 0.85; Figure 2), which suggested relatively 'healthy' distribution of taxa at these stations. In contrast, a relatively low evenness was observed at Station W6, indicating that the benthic invertebrate community at this location was dominated by relatively few taxa. Because the dominant taxa at Station W6 included both 'tolerant' tubificid worms and 'sensitive' nemourid stoneflies, lower evenness at this station likely reflected habitat homogeneity and/or intermittent flow conditions as discussed above.

Dominant taxon groups collected from WUL monitoring stations generally included chironomids (non-biting midges), oligochaetes (aquatic worms) and nematans (Figure 2; Table A.1), all of which are generally considered tolerant to various environmental perturbations. Although densities of metal sensitive mayflies/stoneflies were similar among the effluent-exposed and reference stations (Table A.1), the relative proportion of this group was highest (i.e., 29% of total number of organisms) at south-flowing tributary Station W6 (Figure 2). The dominant taxon groups observed at WUL monitoring stations were considered representative of habitats showing unpredictable changes in environmental conditions (i.e., intermittent flow) and/or environments in which fine particulate matter (detritus) is the predominant food source. However, it was notable that chaoborid (phantom) midges were observed in low numbers at Stations W2 and W7 (Table A.1) and because these midges are typically observed only in lentic environments (i.e., wetlands, ponds and lakes; Borkent 1981), their presence suggests that food resources at these stations were likely influenced by lentic systems. For instance, the Main Water Storage Pond, located at the head of Minto Creek, may act as a key lentic source of detritus and/or planktonic organisms which likely influences the benthic invertebrate community characteristics of the main branch of this creek.

Overall, no clear mine-related influences were indicated at Minto Creek Station W2 based on comparisons of benthic invertebrate community metrics to the reference tributaries (Stations W6 and W7). This was supported by observations of highest benthic invertebrate taxon richness, abundance and Simpson's Evenness at Station W2 relative to the reference streams. However, the above comparisons were likely confounded by stream size differences between Minto Creek and the reference tributaries. For instance, Minto Creek generally exhibited relatively low taxon richness compared to other second order streams, a relatively high abundance of taxa considered tolerant of environmental disturbance and a relatively low proportion of metal sensitive (mayfly/stonefly) taxa compared to reference. These metrics suggested the potential for subtle mine effluent-related effects to the benthic invertebrate community of Minto Creek, but may have also simply reflected the observed habitat conditions (e.g., the predominance of sand substrate, the occurrence of intermittent flow conditions and/or lentic-derived flow). As such, the current WUL monitoring program design does not allow for clear determination of mine effluent-related impacts to the benthic invertebrate community of Minto Creek and therefore, consideration should be given to its redesign.

Temporal Comparison

Benthic invertebrate communities at WUL monitoring stations had lower taxon richness, lower total organism densities and lower relative abundance of sensitive mayfly/stonefly groups in 2008 compared to 1994 (pre-operational) at Stations W2 (Minto Creek main stem) and W7 (north-flowing tributary; Figure 3). In addition, the relative abundance of tolerant taxon groups, including chironomids and oligochaetes, was higher at these stations over this same time period (Figure 3). Because similar patterns in benthic invertebrate endpoints were observed between 1994 and 2008 at both effluent-exposed Minto Creek and the reference north-flowing tributary monitoring areas, the changes noted above were more likely associated with natural inter-annual variability in environmental conditions (e.g., flow, ice scour) and/or sampling differences (e.g., sampling methodology, analytical processing etc.) rather than with any mine effluent-related influences.

Although benthic invertebrate community data were not collected at the south-flowing tributary (Station W6) in 1994, comparison of metrics at this station to both the Minto Creek and north-flowing tributary data indicated data intermediate between the latter two areas (Figure 3). This suggested that habitat in this tributary may differ slightly from the other monitoring locations. This was supported by the 2008 benthic invertebrate community data which indicated the presence of phantom midges at Stations W2 and W7 but not at Station W6. As previously indicated, this suggested that the former stations may be influenced by lentic habitat discharge (e.g., mine Main Water Storage Pond) whereas Station W6 was not.

Collectively, temporal comparison of the available data did not show any clear changes in benthic invertebrate community characteristics of Minto Creek that could be attributed to mine-related influences over time (i.e., pre-operational to current conditions). As noted previously, the current WUL monitoring program design does not allow for clear determination of mine effluent-related impacts to the benthic invertebrate community of Minto Creek and therefore, the inability to track changes over time is not surprising.

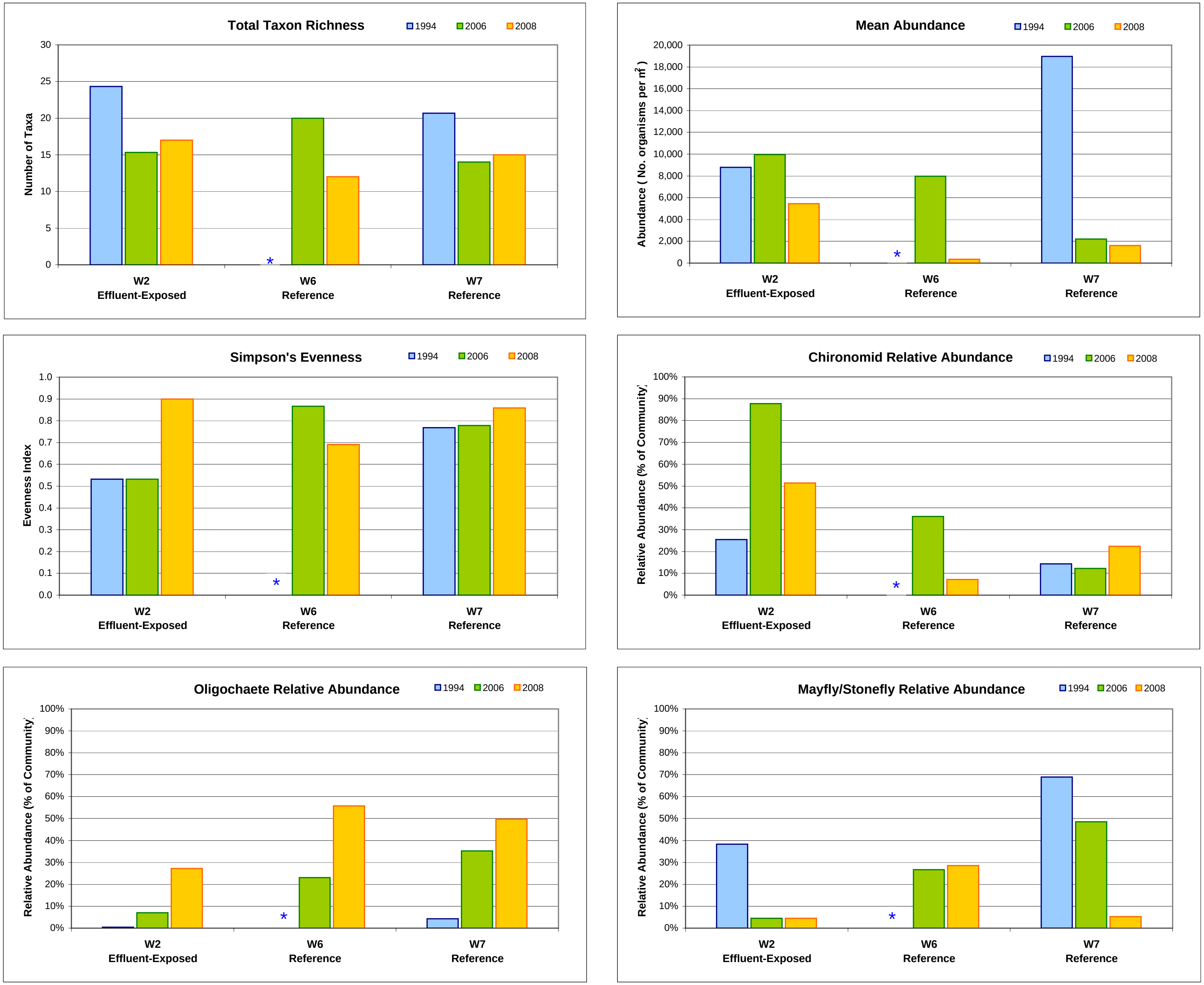

Figure 3: Benthic Invertebrate Taxon Richness, Density and Community Composition at Minto Mine WUL Monitoring Stations in 1994, 2006 and 2008
(Note*: no sampling conducted at Station W6 in 1994)

3.0 Conclusions

The principal conclusions from the 2008 WUL Benthic Invertebrate Community Survey were:

- Water quality at the WUL monitoring stations appeared acceptable based on comparison of *in situ* measures of dissolved oxygen and pH to national criteria for the protection of aquatic life. Slightly higher specific conductance values in Minto Creek (Station W2) compared to reference confirmed the presence of mine effluent in the former during the field collections.

- Due to fundamental differences in the physical characteristics of effluent-exposed and reference stations included in the WUL monitoring program, no definite determination of the potential effect of mine-effluent on benthic invertebrate communities was possible. Although highest benthic invertebrate taxon richness, abundance and Simpson's Evenness were observed in Minto Creek relative to the reference tributaries suggesting no effluent-related effects in Minto Creek, low taxon richness compared to other second order streams, a relatively high abundance of taxa considered tolerant of environmental disturbance and a relatively low proportion of metal sensitive (mayfly/stonefly) taxa in Minto Creek compared to reference may have been associated either with subtle mine-related effects and/or observed habitat conditions (e.g., the predominance of sand substrate, the occurrence of intermittent flow conditions and/or lentic-derived flow).

- Temporal comparisons of benthic invertebrate community data did not show any clear changes in Minto Creek between pre-operational and current mine conditions that could be attributed to mine effluent discharge. In part, this was likely the result of the inability of the current WUL benthic invertebrate community survey study design to effectively identify the occurrence of actual effluent-related effects to Minto Creek biota.

- Based on the results of the 2008 WUL Benthic Invertebrate Community Survey at Minto Mine, it is recommended that the current monitoring program be re-designed to meet the objective of determining potential mine-effluent related effect (i.e., by better standardization/control of habitat conditions), including possible harmonization with Environmental Effects Monitoring (Environment Canada 2002) conducted under the federal Metal Mining Effluent Regulations (Government of Canada 2002, 2006).

I trust this letter report of the Minto Mine 2008 WUL Benthic Invertebrate Community Survey provides you with a sufficient analysis of the available data. Should you require further information, please do not hesitate to either myself or Mr. Pierre Stecko by telephone (905-873-3371 ext. 26 and 250-595-1627, respectively).

Sincerely,

Minnow Environmental Inc.

Paul LePage, B.Sc.
Aquatic Biologist

cc: Pierre Stecko (Minnow)

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Table A.1: Benthic Invertebrates Collected at Minto Mine, September 2008

	Station W2	Station W6	Station W7
ROUNDWORMS			
P. Nemata	600	10	225
ANNELIDS			
P. Annelida			
WORMS			
Cl. Oligochaeta			
F. Enchytraeidae	1,405	0	200
F. Tubificidae			
Psammoryctides californianus	0	195	600
F. Lumbriculidae			
Stylodrilus	75	0	0
ARTHROPODS			
P. Arthropoda			
MITES			
Cl. Arachnida			
O. Acarina	40	0	20
HARPACTICOIDS			
O. Harpacticoida	0	10	0
SEED SHRIMPS			
Cl. Ostracoda	80	5	0
SPRINGTAILS			
Cl. Entognatha			
O. Collembola	80	5	0
INSECTS			
Cl. Insecta			
MAYFLIES			
O. Ephemeroptera			
F. Baetidae			
?Callibaetis	0	5	0
STONEFLIES			
O. Plecoptera			
F. Capniidae			
immature	0	5	80
F. Nemouridae			
Nemoura/Podomosta	45	10	5
immature	**200**	**80**	0
TRUE FLIES			
O. Diptera			
indeterminate	40	0	60
BITING-MIDGE			
PHANTOM MIDGE			
F. Chaoboridae			
Chaoborus americanus	0	0	20
Chaoborus flavicans	40	0	20
MIDGES			
F. Chironomidae			
chironomid pupae	**80**	0	0
S.F. Diamesinae			
Pseudokiefferiella	0	5	0
S.F. Orthocladiinae			
Chaetocladius	120	0	0
Diplocladius	0	5	20
Eukiefferiella	40	0	0
?Gymnometriocnemus	40	0	0
Hydrobaenus	40	5	200
Krenosmittia	0	5	20
Orthocladius	600	0	20
Paraphaenocladius	720	0	0
Tokunagaia	1,120	0	100
indeterminate	**40**	**5**	0
OTHER TRUE FLIES			
F. Culicidae			
Mansonia/Coquillettidia	0	0	20
F. Tipulidae			
Dicranota	40	0	0
Total Number of Organisms	5,445	350	1,610
Total Number of Taxa[a]	17	12	15
Simpson's Diversity	0.846	0.633	0.802
Simpson's Evenness	0.899	0.691	0.859
Key Taxa Groups (% Composition)			
Nemata	11.0%	2.9%	14.0%
Oligochaeta	27.2%	55.7%	49.7%
Mayflies/Stoneflies	4.5%	28.6%	5.3%
Chironomids	51.4%	7.1%	22.4%

[a] Bold entries excluded from taxa count