Metal Mining Effluent Regulations Environmental Effects Monitoring: Second Interpretive Report

Wolverine Mine, YT

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Project 4420-01.01

December 3, 2014

Executive Summary

This report provides the results of the second iteration of Environmental Effects Monitoring (EEM) for the Wolverine Mine, as required by the federal Metal Mining Effluent Regulations (MMER). The mandatory timelines under the MMER requires that this report be submitted for regulatory review by December 5, 2014.

Yukon Zinc Corporation (YZC) owns and operates the Wolverine Mine (the Mine), an underground zinc-silver-copper-lead-gold mine approximately 280km northeast of Whitehorse, YT. The Mine achieved full operational production of 1,700 tonnes milled per day in early 2013.

The Wolverine property covers 107km^2 and includes an underground mine complex, a processing plant, concentrate load-out, 246-person camp, sewage treatment plant, and offices. Ancillary structures or features includes a temporary waste rock and ore storage pad, tailings storage facility (TSF), 1.3km gravel airstrip, a 26km access road, a power plant, and fuel facilities.

The TSF remains well below capacity and despite having approval to do so, the Mine has not yet had to release any effluent from the TSF. It is anticipated that the initial effluent discharge will occur sometime in 2016.

The Mine became subject to the MMER in 2009, pursuant to the federal *Fisheries Act*. The MMER requires iterative cycles of EEM for the life of a mine project, with a particular focus on fish population and fish health studies, and water quality and benthic invertebrates. However, because there has not yet been any discharge of effluent, requirements for fisheries studies have not yet been triggered, and only the benthic invertebrate study was required in 2014.

This is the second Interpretive Report for the Mine. The first Interpretive Report in 2011 included a detailed Site Characterization and study on benthic invertebrates. The invertebrate study adopted a multiple control-impact (MC-I) design, with fieldwork carried out in September 2011. As there had not been any effluent discharge for the first Interpretive Report, the results were interpreted as ongoing baseline characterization. It was noted that despite the lack of discharge, statistically significant differences were found between the control sites and the impact sites, for numerous community characteristics (density, richness, evenness, and similarity indices).

A study design for the second interpretive report was submitted for regulatory approval in March 2014. The study design followed very closely the approach used for the 2011 study, with a focus on benthic invertebrates and ongoing verification of the site characterization from 2011. The second study design also committed to some exploratory fisheries work. This was not a requirement of the MMER but was recognized by YZC as being necessary due diligence for the eventual third iteration of EEM, once the TSF is discharging effluent.

As per the second study design, fieldwork was carried out in early September 2014. Benthic invertebrate samples were taken from two impact sites and two control sites. Habitat was characterized and compared to the details obtained in 2011. Intensive fish sampling was performed with three different methods at control and impact sites.

Physical habitat and general site characterization remains as previously reported for the Mine. The exposure area is defined as an 8km long stretch of Go Creek, a small watercourse with low abundance of bull trout, arctic grayling, and slimy sculpin. Go Creek is inferred to offer year-round habitat but likely includes large swings in seasonal abundance.

Invertebrate samples collected in September 2014 were submitted directly for laboratory analysis, and taxonomic results provided in late November 2014. Statistically significant differences between sites were calculated in some of the community indicators, when comparing exposure sites to reference sites. The most notable result was Simpson's Diversity index, which was significantly lower at exposure site W12, largely driven by a more even spread among the four most dominant taxa at this site. This is similar to findings in 2011, however in general all four sites are mainly dominated by Diptera (57 to 81% of total capture; mostly Chironomids), with the EPT orders accounting for the vast majority of the remaining specimen. Some differences observed between exposure and reference sites are statistically significant, but in an ecological context the differences are fairly small, and not unusual for highly dynamic benthic invertebrate populations. Importantly, the differences observed do not constitute a biological effect from the mine: the 2011 and 2014 results still form ongoing baseline characterization, as the mine has yet to discharge any effluent from the TSF. It is recommended that higher sampling intensity be explored prior to the next EEM cycle as a means of reducing intra-site variance. This can be achieved via *a priori* power analysis using the baseline data collected in 2011 and 2014, with the potential value added presented in the Third Study Design.

Acknowledgements

This work was carried out with the assistance of numerous individuals. Thanks to Robin McCall, Andrea Kenward, and Thomas Pearson at YZC for the invaluable support with site logistics and work planning. Rob Goldblatt and colleagues at Lorax Environmental Services Inc. were extremely helpful with work scoping and provided helpful thoughts during reporting. Our appreciation also extends to Sue Salter and Brie Matier at Cordillera Consulting for quick turnaround on benthic analysis under a heavy workload.

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ANOVA	-	analysis of variance
CCME	-	Canadian Council of Ministers of the Environment
EEM	-	Environmental Effects Monitoring
EPT	-	Ephemeroptera, Plecoptera, and Trichoptera
MMER	-	Metal Mining Effluent Regulations
PGL	-	Pottinger Gaherty Environmental Consultants Ltd.
QA/QC	-	quality assurance/quality control
TSF	-	tailings storage facility
YZC	-	Yukon Zinc Corporation

1.0 INTRODUCTION

Yukon Zinc Corporation (YZC) owns and operates the Wolverine Mine (the Mine), an underground zinc-silver-copper-lead-gold mine approximately 280km northeast of Whitehorse, YT (Figure 1).

The Mine received major permits in 2006 and 2007, leading to site construction through 2009 and 2010. The mill was commissioned in 2010/11, and commercial production started in March 2012. Full design capacity of 1,700 tonnes milled per day was reached in the first quarter of 2013. The current reclamation and closure plans identify an operational life through 2019, followed by a three-year closure period.

The Wolverine property covers 107km^2 and includes an underground mine complex, a processing plant, concentrate load-out, 246-person camp, sewage treatment plant, and offices. Ancillary structures or features includes a temporary waste rock and ore storage pad, tailings storage facility (TSF), 1.3km gravel airstrip, a 26km access road, a power plant, and fuel facilities.

The Mine complex saddles the headwaters for two watersheds. The main buildings and production zones are at the headwaters to Wolverine Creek, which drains to Wolverine Lake. A pipeline runs slurry from the process plant to the TSF, which is in the headwaters to Go Creek, which drains to Money Creek. The TSF has not yet discharged effluent, but when it eventually does so it will be to a discharge location on Go Creek (Figure 2). Ultimately, both Go Creek and Money Creek are part of the Frances Lake watershed (Figure 1).

All contact water or sewage treatment water is pumped to the TSF, which has a present design capacity of 1.5 million m^3. The TSF has not yet reached capacity and to date there has been no discharge of effluent from it[1]. At the end of 2013, the TSF was at 54% capacity and as of October 31, 2014, it was up to 926,860m^3, or 62% capacity. Effluent discharge from the TSF is expected to occur in 2016.

1.1 Metal Mining Effluent Regulations

Pursuant to the Federal *Fisheries Act* (RSC, 1985, c. F-14*)*, the *Metal Mining Effluent Regulations* (SOR/2002-222) (MMER) outline monitoring and reporting requirements for metals mines in Canada with an effluent flow rate exceeding 50m^3/day. *Section 7* of the *MMER* requires that Environmental Effects Monitoring (EEM) be undertaken, in accordance with the specific data collection and reporting requirements outlined in Schedule 5 of the *MMER*.

The Mine became subject to S.7 of the *MMER* on June 3, 2009. Subsequent development and execution of EEM study design iterations for the Mine has occurred as follows:

- June 2010: First Study Design, First Iteration (YZC, 2010a). The first study design under the EEM, YZC (2010a) outlined the intended monitoring approach, based on the production schedule and expected effluent discharge data understood at the time. The study design was reviewed by the authorizing agency (Environment Canada), with requested revisions provided to YZC in August 2010.

[1] Discharge of contact water to Go Creek occurred during advanced exploration and mine construction up to October 2009, in accordance with Yukon Type B Water Use Licence QZ01-051.

- October 2010: First Study Design, Second Iteration (YZC, 2010b). Based on feedback from Environment Canada, YZC revised the First Study Design to temporarily exempt the mine from effluent characterization, fish toxicity, or fish population studies. The exemptions were based on the absence of effluent discharge, and the provisions in the *MMER* for such exemptions under those circumstances. The revised study design thus focused on site characterization and benthic invertebrate components, which was accepted by Environment Canada.
- December 2011: First Interpretive Report (Lorax, 2011). The First Interpretive Report was submitted on December 5, 2011, based on the First Study Design (YZC, 2010b) and subsequent field data collected in September 2011. The report included details on water quality and stream characteristics, and benthic invertebrate data covering four categories of metrics (density, richness, evenness and diversity). Water quality data confirmed that exposure sites and reference sites had similar characteristics to each other, and to pre-production baseline values. Given the absence of effluent discharge, this was an expected result. Benthic invertebrate data revealed statistically significant differences in at least one of the four sites, for all four key indices. In the absence of effluent discharge or another clear anthropogenic factor, these differences were attributed to natural variance and formed a useful point of comparison for future EEM.
- March 2014: Second Study Design (Lorax, 2014). The Second Study Design was prepared in accordance with the *MMER* and in recognition of the fact that the mine was still not expected to discharge effluent until after 2014. Lorax (2014) committed YZC to a second biological monitoring program in 2014, which would characterize the following at two exposure sites and two reference sites:
  - Benthic invertebrate community;
  - Stream habitat;
  - Stream flow measurements; and
  - Water quality.

  Although not required as part of the EEM since there is still no effluent discharge, the Second Study Design also committed to some updated fisheries information, to assist with scoping a third EEM cycle, when effluent discharge from the TSF is expected.

1.1.1 Reporting Requirements For Second Interpretive Report

The legislative requirements for data collection in the second (and subsequent) EEM cycles are outlined in MMER Schedule 5, S.2:

> "*Environmental effects monitoring studies consist of the effluent and water quality monitoring studies set out in Part 1, and the biological monitoring studies set out in Part 2, of this Schedule*".

The EEM thus is a composite program, comprised of (a) an Effluent and Water Quality Monitoring component, and (b) a Biological Monitoring component.

Reporting requirements are separate for the Effluent and Water Quality Monitoring (Part 1) and the Biological Monitoring Studies (Part 2). Effluent and Water Quality Monitoring is reported annually (MMER Schedule 5, S.8), whereas Biological Monitoring Studies occur on cycles varying from 36 to 72 months (MMER Schedule 5, S. 22). The cycle duration depends on the results of previous studies. This document addresses only the Biological Monitoring Study as per the general requirements of the MMER, and the specific requirements of the Second Study Design (Lorax, 2014).

The data requirements for a second (or subsequent) Biological Monitoring Study are outlined in MMER Schedule 5, S. 9:

> *Biological Monitoring studies consist of:*
>
> *a) A site characterization;*
> *b) A study respecting the fish population, if the concentration of effluent in the exposure area is greater than 1% in the area located within 250m of a final discharge point;*
> *c) A study respecting fish tissue, if during effluent characterization conducted under paragraph 4(1)(d) a concentration of total mercury in the effluent is identified that is equal to or greater than 0.10 µg/L; and*
> *d) A study respecting benthic invertebrate community.*

The site characterization is required as part of the study design, not the interpretive report, and was thoroughly characterized in the Second Study Design (Lorax, 2014). Sub-sections (b) and (c) are exempted under the MMER since the mine has not been discharging effluent to the exposure area. However, there is no such exemption provision for invertebrate monitoring. Thus, due to the circumstances of the Mine, the scope of this second cycle of Biological Monitoring Study is limited to only the benthic invertebrate sampling. This was previously clarified in the Second Study Design (Lorax, 2014).

The reporting details for second and subsequent Biological Monitoring Studies are outlined in MMER Schedule 5, S. 21 and S. 22 (regarding content and timing, respectively). The Second Interpretive Report is due no later than 36 months after the day on which the previous report was required to be submitted (in this case, December 5, 2014). Given the present exemption for fish population studies, the Second Interpretive Report is required to include the following, pursuant to MMER Schedule 5, S.22(a):

- Description of any deviation from the study design that occurred while the biological monitoring studies were being conducted and any impact that the deviation had on the studies;
- The latitude and longitude of sampling areas in degrees, minutes and seconds and a description of the sampling areas sufficient to identify the location of the sampling areas;
- The dates and times when samples were collected;
- The sample sizes;
- The results of the data assessment in MMER Schedule 5, S. 16 (a)(iii), (c) and (d);
- Conclusions of the biological monitoring studies;
- A description of how the results will impact the study design for subsequent biological monitoring studies; and
- The date when the next biological monitoring study will be conducted.

The Second Study Design (Lorax, 2014) was developed with these requirements in mind, but also included two additional components not strictly required: water quality sampling and a fish population survey. The water quality aspect of the reporting is helpful for general biological context, and is easily included since the data are already collected for Water Licence monitoring requirements. The fish habitat and population assessment was included as a measure of due diligence, recognizing that detailed fisheries work had not been undertaken at the site since 2005.

Updated information will be useful for scoping subsequent study designs, when the anticipated effluent discharge triggers fish population study requirements under MMER, Schedule 5, S.9.

2.0 BENTHIC INVERTEBRATES

Benthic invertebrates are a common indicator of ecological health, and form the primary basis for this iteration of the EEM monitoring for the Mine.

2.1 Site Characterization

A Site Characterization is a mandatory component of the EEM monitoring cycle. As per Schedule 5, S. 11 of the MMER, Site Characterizations are required to include:

- Description of how effluent mixes within the exposure area;
- Description of the physical, chemical, and biological features of the study area;
- Description of the mine's production process;
- Summary of regulatory requirements related to effluent and environmental monitoring;
- Description of any other factors that are expected to contribute to any observed effect; and
- Any other relevant information.

A detailed Site Characterization has been provided in the First Study Design (YZC, 2010b), and updated in the Second Study Design (Lorax, 2014). A brief overview is provided here, with particular focus on outlining the exposure and reference areas.

Fisheries exposure to mining effects at this site will be limited to creek habitat. No lacustrine or wetland habitat is or will be impacted by effluent.

The exposure area is defined as the entirety of Go Creek from the future effluent discharge location to its confluence with Money Creek (Figure 3). Go Creek is a relatively small 2nd order drainage, with a total catchment of approximately 36km^2. The exposure area extends approximately 8km from the effluent discharge location to the confluence with Money Creek. Riffle-dominated morphology and rough channel substrate will likely lead to rapid mixing of effluent with creek water. Lorax (2014) estimated the effluent contributions as follows:

- Based on the maximum allowable effluent discharge rate, the proportion of Go Creek that will be comprised of TSF effluent at near-field exposure (200m downstream of discharge) will vary from 86% (during minimum natural creek flow in winter) to 3% when discharging during freshet conditions in May.
- Far field exposure sites at the downstream limit of Go Creek will be comprised of 2% to 13% effluent, depending on the ambient flow conditions.
- These calculations are based on the maximum allowable discharge rate, and actual values would often be considerably lower.

Two reference areas have been defined for benthic invertebrate monitoring in the study area: Pup Creek, and Bunker Creek.

Pup Creek is a tributary to Go Creek, entering shortly upstream of Go Creek's confluence with Money Creek. Pup Creek is a swift moving, riffle-dominated creek with cobble-gravel substrate. The lower section of Pup Creek is similar in morphology to the upper sections of Go Creek in the near-field exposure area.

Bunker Creek is a second reference area. Bunker Creek discharges to Money Creek approximately 8km northwest of where Go Creek enters Money Creek. Bunker Creek is a considerably larger system than Go Creek, but the middle section of Bunker Creek has a similar catchment area and morphology as the lower section of Go Creek. Thus, middle Bunker Creek is used as a reference analogue to the far-field exposure area of Go Creek.

Reference and exposure areas are identified in Figure 3.

2.2 Previous Studies

This report represents the second EEM iteration for benthic invertebrates at the Mine. Relevant *MMER* requirements for the Mine include a second invertebrate study within three years of the previous, and thus the 2014 results build upon a similar study undertaken in 2011 (Lorax, 2011). However, as the TSF has still not discharged effluent, both the 2011 and 2014 results should be viewed as detailed baseline analyses.

The First Interpretive Report (Lorax 2011) identified a number of statistically significant differences in the statistical indicators required under the MMER for benthic invertebrate monitoring.

Table 2-1: Summary of 2011 Tests for Statistically Significant Differences in Benthic Invertebrate Indicators

Indicator	Tests for Similarity of Means
Density	W12 < W16 = W13 = W76
Richness	W12 > W16 = W13 = W76
Evenness	W16 < W12 = W13 = W76
Bray-Curtis Dissimilarity	W16 = W12 > W13 = W76

The differences in evenness and Bray-Curtis indices for the near-field exposure site (W16) compared to its reference analogue (W13) were attributed to a much higher proportion of Chironomids at W16. This was inferred as a natural condition, since in 2011 there had been no effluent discharge to the exposure area. Bray-Curtis index was also significantly higher at the far-field exposure site versus the analogous reference site (W76) on Bunker Creek, for the same reason.

Although a naturally significant difference in indicator statistics between reference and control sites is not ideal for effects monitoring, it is not an unusual outcome. Invertebrate communities are highly variable over short spatial and temporal ranges. The collection of baseline data in 2014 is advantageous in that it provides a replicate of the 2011 indicator statistics. Collectively, the baseline data will form a point of comparison once effluent discharge has started, which may help in avoiding a false conclusion of effect, as opposed to natural differences.

2.3 Methods

The methods section outlines how the 2014 benthic invertebrate field study was undertaken, and how the data were handled to provide the eventual conclusions.

2.3.1 Dates of Work

Sampling dates for invertebrate work were September 5-6, 2014. Dates were chosen to align closely with dates for the previous iteration (September 2-5, 2011; Lorax, 2011).

2.3.2 Crew

All sampling was conducted by a three-person crew comprised of PGL representatives Mark Toohey (R.B.Tech.), Katharine Scotton (B.I.T.), and YZC technician Thomas Pearson.

2.3.3 Site Conditions

Site accessibility has not changed from the previous EEM iteration, and weather conditions were similar to previous work, as summarized below.

2.3.3.1 Weather

Weather on the two days of benthic invertebrate sampling was cloudy, with periodic precipitation. Although precipitation was heavy at times, total precipitation throughout the day was light to moderate.

2.3.3.2 Access

The crew stayed onsite at the mine camp for the duration of the work, with access to and from the camp by way of charter flight.

Site accessibility made use of pick-up truck, foot access, and 4x4 ATV.

Site W76 is located shortly upstream of the access road crossing over Bunker Creek, and can be accessed on foot, via a short walk from the road. Site W16 is just downstream of the TSF, and can also be accessed on foot from the main industrial complex at the mine. Sites W12 and W13 are approximately 3.5km from the access road, and to facilitate efficient work were accessed via 4x4 ATVs kept onsite by YZC.

2.3.4 Instrumentation and Field Equipment

Field data were collected using equipment and instruments as detailed below.

2.3.4.1 GPS

Unless otherwise indicated, waypoints and tracks were obtained in the field with a Garmin GPSMAP 62s. Coordinates (UTM, Zone 9, NAD83) were later converted to latitude/longitude (for compliance with MMER Schedule 5, S.22(a)) with an online applet[2].

2.3.4.2 Photos and Geotagging

All photos were taken with an Olympus Tough TG-830. Photos were geotagged (e.g., spatial coordinates embedded in the .EXIF metadata) with internal software for the camera.

2.3.4.3 Flow Measurements

All water velocity and depth measurements were taken with a Swoffer Model 2100 Current Velocity Meter. Velocity was measured at 60% of total depth to represent average channel velocity. The unit was run through diagnostic tests prior to the fieldwork according to the manufacturer's instructions, to ensure proper calibration.

2.3.4.4 Water Quality (In Situ)

Water temperature, pH, conductivity and dissolved oxygen data were recorded using a YSI ProPlus multi-meter rented from and field-calibrated by Hoskin Scientific Ltd. in Burnaby, BC.

2.3.4.5 Hess Sampler

YZC owns a Hess Sampler, kept on site and maintained by YZC staff. The benthic invertebrate sampler was found to be in generally good shape and it is PGL's understanding it is the same sampler that was used for the previous EEM iteration. The sampler has a sampling area of 0.086m^2 and mesh size of 243µm.

2.3.5 Data and Sample Collection

Data collection and sample handling were conducted as follows.

2.3.5.1 Hess Sampler

At each of the four sample sites, five replicate sampling stations (A through E) were established in similar substrate. At each replicate site, three Hess sets were collected as sub-samples, and pooled together to form a single sample. Thus, a total of 20 samples were collected: five replicates at four sites, with each replicate comprised of three pooled sub-samples. The locations of each of the replicate stations are summarized in Table 2-2.

[2] http://www.synnatschke.de/geo-tools/coordinate-converter.php ; last accessed 17 Oct 2014. Transformation uses Molodensky equation and fixed shift parameters specific to continental North America.

Table 2-2: Benthic Invertebrate Monitoring Locations, September 2014

Site	Replicate	UTM (09V, NAD83)	Lat/Long (DMS)
W12 (Go Creek)	A	443159 E, 6802216 N	Lat 61º 20' 59.35" Long 130º 3' 45.65"
	B	443160 E, 6802213 N	Lat 61º 20' 59.28" Long 130º 3' 45.58"
	C	443162 E, 6802213 N	Lat 61º 20' 59.28" Long 130º 3' 45.43"
	D	443164 E, 6802213 N	Lat 61º 20' 59.28" Long 130º 3' 45.43"
	E	443166 E, 6802213 N	Lat 61º 20' 59.28" Long 130º 3' 45.18"
W16 (Go Creek)	A	442530 E, 6807968 N	Lat 61º 24' 4.90" Long 130º 4' 34.36"
	B	442532 E, 6807969 N	Lat 61º 24' 4.93" Long 130º 4' 34.21"
	C	442528 E, 6807973 N	Lat 61º 24' 5.08" Long 130º 4' 34.50"
	D	442526 E, 6807976 N	Lat 61º 24' 5.15" Long 130º 4' 34.64"
	E	442519 E, 6807979 N	Lat 61º 24' 5.26" Long 130º 4' 35.11"
W13 (Pup Creek)	A	443184 E, 6802134 N	Lat 61º 20' 56.72" Long 130º 3' 43.88"
	B	443184 E, 6802138 N	Lat 61º 20' 56.87" Long 130º 3' 43.88"
	C	443189 E, 6802137 N	Lat 61º 20' 56.83" Long 130º 3' 43.56"
	D	443194 E, 6802138 N	Lat 61º 20' 56.87" Long 130º 3' 43.88"
	E	443195 E, 6802136 N	Lat 61º 20' 56.80" Long 130º 3' 43.13"
W76 (Bunker Creek)	A	450044 E, 6810208 N	Lat 61º 25' 21.04" Long 129º 56' 10.03"
	B	450040 E, 6810213 N	Lat 61º 25' 21.18" Long 129º 56' 10.32"
	C	450045 E, 6810212 N	Lat 61º 25' 21.14" Long 129º 56' 10.00"
	D	450044 E, 6810214 N	Lat 61º 25' 21.22" Long 129º 56' 10.07"
	E	450042 E, 6810214 N	Lat 61º 25' 21.22" Long 129º 56' 10.18"

Sampling was conducted as outlined in the previous EEM iteration (Lorax, 2011). The Hess sampler was pushed into the stream substrate, and then invertebrates were removed and washed off of all substrate cobble-size or larger, for five minutes. Specimens were washed into the cod-end of the sampler, for eventual transfer into a 0.5L wide-mouth plastic sample container. Samples were preserved in a 2:1 mix of ethanol:water, topped up to 3:1 upon delivery to the lab.

The Hess sampling procedures followed the Canadian Council of Ministers of the Environment (CCME) Protocols: Section 9.7 Protocol for Sampling Invertebrates with a Hess Sampler (CCME, 2011). Collection and preparation of benthic invertebrate samples also adopted relevant quality assurance/quality control (QA/QC) guidelines described in Section 4.5.5 to 4.5.7 of the Environment Canada 2012 Metal Mining Technical Guidance for Environmental Effects Monitoring (EC, 2012). In particular, relevant guidelines included:

- Samples to not take up more than 50% of sampling containers to leave room for preservative;

- Sampling containers to be sturdy, leak-proof and of a material that will not be affected by the preservative;
- Sample containers should be appropriately labelled;
- Detailed field notes should be maintained in a bound waterproof notebook; and
- Chain-of-custody forms and appropriate shipping procedures should be applied.

A number of the QA/QC requirements in Environment Canada guidelines (2012) are specific to sediment sampling, which was not within the scope of this EEM iteration.

There is a minor discrepancy between CCME and Environment Canada guidelines, specifically the use of 70% ethanol is recommended in the CCME guidelines, as opposed to 10% formalin in the Environment Canada guidelines. For this study, a 2:1 solution of 95% ethanol was used as a preservative, which was topped up to 3:1 solution by Cordillera Consulting upon arrival at the lab. Ethanol was chosen to maintain consistency with the 2011 Lorax EEM methodology, and because of the transportability of ethanol and short-term storage required prior to analysis.

2.3.5.2 Water Quality (Laboratory)

Laboratory-analyzed samples were collected by a YZC technician on September 1 and 2, 2014, at the same four sites used for the benthic invertebrate samples. YZC has standardized water quality sampling protocols, in accordance with MMER guidelines. Sampling vials, preservation, and holding times were in accordance with laboratory requirements, to the extent possible. Orthophosphate holding time was exceeded as the minimum shipping time available from site still resulted in the sample arriving at the lab on the same day as holding time expiry.

Analytical QA/QC protocols are included in the raw results (Appendix 2).

2.3.5.3 Flow Measurements

Flow measurements were taken at each of the four invertebrate sampling locations. In all cases, measurements were taken using the cross-sectional area method, with velocity and depth measured at 20 vertical stations along a horizontal cross section of the creek. Total discharge (flow) is calculated as the sum of average velocity multiplied by area, at each of the 20 vertical cells.

2.3.6 Analytical Methods

Analytical methods include those used to identify biological samples in the lab, to compile and summarize the data, and to conduct tests for statistical differences.

2.3.6.1 Taxonomy

Following sample collection on September 5 and 6, 2014, benthic invertebrate samples were labelled, packaged in a cooler, and transferred to YZC staff. The cooler and a completed Chain of Custody form were shipped to taxonomic specialists, Cordillera Consulting (Cordillera), on September 11, 2014, arriving at Cordillera on September 12, 2014. Sample jars arrived intact and an inventory of samples was provided to PGL and YZC by Cordillera on September 16, 2014.

Detailed taxonomic results, including all raw data, from Cordillera are included as Appendix 1.The lab report contains internal QA/QC protocols used for the specimen sorting and taxonomy, based on relevant guidance in Environment Canada (2012) and mirroring the same analysis undertaken for the First Interpretive Report (Lorax, 2011).

Samples were identified to the lowest level possible, given the condition and maturity of the specimen. Specimen were only counted and identified if heads were encountered; organism fragments were removed and not counted. Invertebrates were sorted into groups of:

- Chironomidae;
- Ephemeroptera;
- Plecoptera and Tricoptera;
- Diptera;
- Oligochaeta; and
- All others.

Further details are provided in Appendix 1.

2.3.6.2 Statistical Analysis

Methods for statistical analysis were comparable to the 2011 EEM methodology.

As outlined in the Second Study Design, the general statistical design of the benthic invertebrate samples uses a multiple control-impact (MC-I) design approach, consistent with regulatory guidance (Chapter 4 from Environment Canada, 2012)

Analysis requires a number of statistical "endpoints": quantitative measures of community structure. A number of these endpoints themselves are calculated as part of the laboratory summary work, and raw derivation of these values is available in Appendix 1.

Total invertebrate density and total family density are calculated as mean individuals per m^2, based on the sampling area of $0.086m^2$ of the Hess sampler and three Hess sets per sample for a total area of $0.258m^2$ per sample. Total invertebrate density includes all organisms, including unidentified ones. Family density calculates the same measure at the family level, and therefore requires organisms be identified to at least that level.

Other endpoints include:

- Family richness (number of families per sample replicate);
- Simpson's Diversity Index;
- Simpson's Evenness Index;
- Bray-Curtis dissimilarity index; and
- Family proportion.

Raw data were summarized in Microsoft Excel (Appendix 1). Endpoint (count) data for each index-replicate combination were then entered into a separate file for data analysis. Data entries were double checked for transcription errors, as per Section 4.7 of Environment Canada (2012).

Initial analysis was conducted using the Excel data "toolpack", using a one-way, or single-factor ANOVA. The ANOVA compares the mean and variance of five replicates at each of the four sites, to determine if endpoints are significantly different at one or more locations. In accordance with the EEM Second Study Design, the significance level (α) is 0.1, which allows for a 10% probability of false positive, or detecting an effect when one does not really exist.

For situations where the ANOVA determined there is a difference in the means among at least one of the four sample sites, a multiple comparison test (Tukey test) was used to determine which means are different from one another. This analysis indicates any significant difference between the exposure sites and reference sites.

2.4 Results and Discussion

Results of the benthic invertebrate sampling are presented and discussed below.

2.4.1 Habitat Conditions

Stream habitat characteristics were collected at all sites, as specified in the Second Study Design (Lorax, 2014), and in a format identical to Table 3-2 of the First Interpretive Report (Lorax ,2011). In general, all of the habitat information in 2011 remains an accurate characterization of current conditions (Table 2-3).

Table 2-3: Stream Habitat Characteristics

Site	W16	W12	W13	W76
Date	**5 Sept 2014**	**5 Sept 2014**	**5 Sept 2014**	**6 Sept 2014**
Measurement				
Bankfull Width (m)	2.7	4.1	2.5	4.3
Wetted Width (m)	2.3	3.9	1.75	4.1
Median Depth (m)	0.13	0.31	0.19	0.26
Habitat Type	Riffle/run	Riffle	Riffle/run	Riffle
Substrate Rel. Abund (%)				
Boulder	5	10	0	5
Cobble	20	30	15	25
Gravel	30	30	60	40
Sand	35	25	15	20
Silt	10	5	10	10
Clay	0	0	0	0
Substrate Embeddedness	75%	50%	25%	25%
Woody Debris Present?	None	Rare	None	Rare
Dams Present?	No	No	No	No

Site	W16	W12	W13	W76
Date	**5 Sept 2014**	**5 Sept 2014**	**5 Sept 2014**	**6 Sept 2014**
Measurement				
Stream Shading %	<25%	<25%	50%	25%
Aquatic Plant Abun. (%)				
Periphyton	35	80	30	60
Filamentous	35	10	10	30
Macrophytes	30	10	60	10
Gradient %	2.5	1	1	2.5
Comment	Overhanging banks	Overhanging banks	Overhanging banks	

Site W16 (upper Go Creek) appears to have undergone the only noticeable change. This site had a slightly higher abundance of sand at the cost of slightly less gravel, and a higher proportion of periphyton and filamentous vegetation versus a decrease in macrophytes, when compared to the 2011 results. However, in general, differences in habitat as compared to the same data collected during the 2011 EEM program are minor.

2.4.1.1 Water Quality

Water quality data includes *in situ* measurements of water temperature, dissolved oxygen, conductivity, and pH. Temperature data included both automated monitoring (one minute intervals) and spot-checks with the YSI multi-meter. The remaining *in situ* parameters were collected solely with the multi-meter. Thus results are described separately for water temperature, other *in situ* parameters, and laboratory parameters.

2.4.1.1.1 Water Temperature

To provide greater comparison among exposure and reference sites, YZC installed automated temperature loggers at all four benthic invertebrate monitoring locations in August 2014. The loggers recorded water temperature on one minute intervals starting in early August and extending to the sample collection dates in September.

One of the four loggers (at W16, the near-field exposure site on Go Creek) was damaged after deployment and no data were salvageable. It is fortunate that there is a second station on Go Creek (W12), however, it is approximately 7km downstream of W16 and likely has measurably warmer water most or all of the time. The spot-measurements at W16 and W12 on September 5 demonstrate a 3°C difference; though measurements were separated by seven hours (see Section 2.4.1.1.2).

The three stations for which data were obtained have overlapping collection periods extending from August 12 (12:10) to September 3 (13:15). Over the three week late-summer period leading up to the sampling, sites W12 and W76 had fairly similar temperatures, with W76 (Bunker Creek) being slightly warmer (Table 2-4). W13 on Pup Creek was considerably cooler than the other two

stations, and also portrayed lower variance – implying lower day-night fluctuations than the other stations. This is an expected result given the smaller watershed size, steep profile, more shading, and smaller overall exposure to solar warming.

Table 2-4: Water Temperature Logger (TidBit) Data, August 12 – September 3, 2014.

Site	Location	Median	Min	Max	Standard Deviation
W16	Go Creek (upper)	*No data – logger damaged upon retrieval*			
W12	Go Creek (lower)	8.27°C	4.45°C	12.58°C	1.36
W76	Bunker Creek	6.72°C	3.74°C	9.95°C	1.11
W13	Pup Creek	4.04°C	2.53°C	6.13°C	0.63

Overall, the desired level of comparability exists for water temperature when comparing the far-field exposure site (W12) to its reference analog (W76), though the small difference that is apparent may have some influence on overall productivity. Direct long-term comparison of the near-field reference site at W16 to its reference analogue (W13) is not possible, though the spot checks on September 5 indicate very similar temperature profile (Section 2.4.1.1.2).

2.4.1.1.2 *In Situ* Parameters

In situ data were collected at all invertebrate sampling sites. There was generally good similarity between sites, with the most notable difference being a temperature spread of more than 3°C (Table 2-5). This difference is likely attributable to stream size, relative location in the watershed, aspect, and time of day of sampling. All *in situ* parameters are within expected ranges and are suitable for aquatic life.

Table 2-5: *In Situ* Water Quality Measured at Benthic Invertebrate Sampling Sites, September 2014.

Site	Location	Date	Time	UTM (09V, NAD83)		Temp (°C)	Dissolved Oxygen		Cond. (µS/cm)	pH
				Easting	Northing		(mg/L)	% sat		
W16	Go Creek (upper)	Sep 5, 2014	08:15	442534	6807979	3.3	10.47	78.6	98.2	7.2
W13	Pup Creek	Sep 5, 2014	17:06	443186	6802138	3.8	10.46	79.5	80.1	7.9
W76	Bunker Creek	Sep 6, 2014	14:00	450054	6810200	5.3	10.56	83.4	137.1	8.0
W12	Go Creek (lower)	Sep 5, 2014	15:03	443152	6802216	6.4	9.89	80.5	108.1	7.8

2.4.1.1.3 Laboratory Parameters

Water quality results for MMER parameters of focus are listed in Table 2-6. Complete water quality results are provided in Appendix 2. All sites were shallow with turbulent water and close to fully saturated with oxygen. Water quality levels observed in September 2014 were comparable to those found in September 2011, including water hardness, sulphate (higher in Bunker Creek than

Go Creek), ammonia and nitrate (near or below detection limit). Metal levels were also consistent to the levels observed in September 2011, with only marginal differences in values.

Table 2-6: Summary of Laboratory Water Quality Analysis, September 1-2, 2014

Parameter	Units	W16	W12	W13	W76
Temperature - Field	C	3.3	6.4	3.8	8
pH - Field	pH	7.2	7.8	7.9	8
pH - Lab	pH	7.9	7.9	7.7	7.9
Dissolved oxygen - Field	mg/L	10.47	9.9	10.5	10.6
Conductivity - Field	µS/cm	98	108	80	137
Total hardness ($CaCO_3$)	mg/L	87.3	90.8	69.8	121
Alkalinity (Total as $CaCO_3$)	mg/L	69	68	59	91
Ammonia (N)	mg/L	0.017	0.018	0.019	0.014
Nitrate (N)	mg/L	0.042	<0.002	0.012	<0.002
Dissolved Sulphate (SO_4)	mg/L	12.9	14.6	5.15	16.9
Total Suspended Solids	mg/L	<4.0	<4.0	<4.0	<4.0
T - Aluminum (Al)	µg/L	9.31	18.6	5.25	7.51
D - Aluminum (Al)	µg/L	2.98	4.23	3.91	3.2
T - Arsenic (As)	µg/L	0.098	0.299	0.102	0.251
D - Arsenic (As)	µg/L	0.114	0.257	0.147	0.249
T - Cadmium (Cd)	µg/L	0.102	0.025	0.019	0.012
D - Cadmium (Cd)	µg/L	0.091	0.012	0.018	0.011
T - Copper (Cu)	µg/L	0.434	0.685	0.384	1.04
D - Copper (Cu)	µg/L	0.37	0.501	0.307	0.912
T - Iron (Fe)	µg/L	36.8	187	4	78.7
D - Iron (Fe)	µg/L	15.2	68.7	8.9	67.1
T - Lead (Pb)	µg/L	0.012	0.039	<0.005	0.008
D - Lead (Pb)	µg/L	0.011	0.018	0.01	0.01
T - Mercury (Hg)	µg/L	<0.01	<0.01	<0.01	<0.01
D - Mercury (Hg)	µg/L	0.01	<0.01	<0.01	<0.01
T - Molybdenum (Mo)	µg/L	0.697	0.522	0.357	0.454
D - Molybdenum (Mo)	µg/L	0.412	0.416	0.335	0.416
T - Nickel (Ni)	µg/L	0.176	0.332	0.362	0.786
D - Nickel (Ni)	µg/L	0.24	0.305	0.417	0.775
T - Zinc (Zn)	µg/L	4.32	0.79	0.33	0.32
D - Zinc (Zn)	µg/L	4.15	0.49	1.23	22.4

2.4.1.2 Discharge

Flows were measured at each of the four stations: two exposure sites on Go Creek (W16, W12), and reference sites on Pup Creek (W13) and Bunker Creek (W76). Flow and wetted width were <0.1m^3/s and 2.0m at W16 and W13, respectively, whereas the respective values at W12 and W76 were 0.19 – 0.45m^3/s and 3.45 – 4.1m (Table 2-7).

Table 2-7: Summary of flow Measurements at Invertebrate Monitoring Stations

Site	Creek	Class	Date Measured	Method	Wetted Width	Discharge
W16	Go Creek	Exposure	Sep 5, 2014	Cross-sectional area; propeller velocity meter	2.3m	0.057m^3/s
W12	Go Creek	Exposure	Sep 5, 2014	Cross-sectional area; propeller velocity meter	3.9m	0.190m^3/s
W13	Pup Creek	Reference	Sep 5, 2014	Cross-sectional area; propeller velocity meter	1.75m	0.035m^3/s
W76	Bunker Creek	Reference	Sep 5, 2014	Cross-sectional area; propeller velocity meter	4.1m	0.447m^3/s

W16 is the near-field exposure site in upper Go Creek, whereas W12 is approximately 7km downstream. Although there are no major tributaries that feed Go Creek, there are a number of seepage areas, small first-order drainages (ephemeral or permanent). It is therefore expected that the measured discharge and wetted width would be higher at W12 than W16.

Pup Creek has a smaller drainage area than Go Creek, and thus despite W13 being located near the mouth of the creek, it has a more similar catchment than W16, on upper Go Creek. Wetted width and flow values at W16 and W13 were very comparable, whereas W12 (lower Go Creek) and W76 (Bunker Creek) had comparable hydraulic parameters.

The values obtained at the four sites are somewhat different than those reported for the First Interpretive Report (Lorax, 2011), despite being obtained under similar conditions and dates. Wetted width recorded in 2014 is slightly higher than 2011, whereas measured discharge in 2014 was slightly lower than values reported from similar methods in 2011 (average 0.08m^3/s lower for W16 and W13, average 0.45m^3/s lower for W12 and W76). The reason for the discrepancy is unknown as the methods and sampling conditions were similar, though the values from 2011 were derived from fewer verticals (8 – 13 per station) than the present values (20 per station). However, comparison to other flow measurements taken at W12 from 2009 to 2012 shows that a value of 0.19m^3/s is consistent with other September measurements (see Figure 2.1, Lorax, 2014). Discrepancies in wetted width can likely be attributed to minor differences in the precise location of the measurement, as survey pins are not used and even homogenous channels portray considerable small-magnitude undulation along shorelines.

Ultimately, the intent of flow measurements in this context is not for the hydrological record but rather for evaluating comparability among and between sites. As with previous iterations, the data verify the hydraulic comparability of W16 (near-field exposure) to an analogue reference site (W13), and similarly that W12 (far-field exposure) and W76 (reference) are comparable.

2.4.2 Statistical Endpoints

Results were summarized for endpoints covering density, richness, evenness, and similarity of the benthic invertebrate community.

For each endpoint, summary statistics are presented and discussed. Analytical results describe and discuss which (if any) endpoints were significantly different among the four sampling locations.

2.4.2.1 Community Characterization

Benthic macroinvertebrates sampled in September 2014 were sorted and identified to the lowest practical taxonomic level by the analysing lab (Cordillera Consulting). Complete taxonomic results are provided in Appendix 1. Most EEM monitoring statistics are calculated at the family level of taxonomy. Any individuals that could only be identified to order level were assumed to belong to one family unless more than one family was identified in the samples.

The relative proportions of major orders are summarized in Table 2-8. This includes Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), collectively known as EPT. EPT are often the most dominant taxa of invertebrates, and are also generally intolerant of pollution, thus are important indicators of stream health. In addition to EPT, Diptera (true flies) made up over half of the total abundance at each of the four EEM monitoring sites (W16, W12, W13, and W76). The family Chironomidae (non-biting midges) in particular were responsible for the majority of invertebrates in the Diptera order (Table 2-9). The remaining orders contributed to less than 4% of the total abundance at each of the four sites. These results are very similar to the results from 2011 (Lorax, 2011, Table 3-5).

Table 2-8: Relative Proportions of Major Orders for Each EEM Site, September 2014

Order	W16	W12	W13	W76
Ephemeroptera	0.85%	4.55%	0.21%	7.51%
Plecoptera	13.18%	22.46%	27.65%	23.53%
Trichoptera	1.06%	6.59%	11.17%	2.85%
Diptera	81.30%	63.25%	57.86%	62.41%
Other	3.60%	3.15%	3.11%	3.70%
EPT Total	15.10%	33.60%	39.03%	33.89%

2.4.2.2 Density

Density was calculated for each family present at each EEM site, and is presented in Table 2-9. Families were grouped by order (Emphemeroptera, Plecoptera, etc.). Density calculations involved taking total abundance (per family), for individual replicates A through E at each site, and standardizing to a spatial metric by dividing by the sampling area (0.086 m^2 for each Hess sample x 3 = 0.258 m^2). Average density at a site was then calculated as the arithmetic mean of the five

replicate values. Individual invertebrates that were only identified to order were not included in these results, as they could not be assigned to any particular family. These individuals only accounted for 0 – 3.24% of the totals for each replicate, or 0.23 – 0.80% of each EEM site as a whole.

Table 2-9: Average Density of Families per Square Meter at EEM Sites, September 2014

Taxon	Mean Density (Individuals/m^2)			
	W16	W12	W13	W76
Order: Ephemeroptera				
Family: Ameletidae	0	1	0	0
Family: Baetidae	31	19	1	43
Family: Ephemerellidae	0	12	5	81
Family: Heptageniidae	12	22	4	181
Order: Plecoptera				
Family: Capniidae	16	107	316	188
Family: Chloroperlidae	95	84	177	467
Family: Leuctridae	0	0	9	10
Family: Nemouridae	317	99	521	205
Family: Perlodidae	12	12	23	6
Order: Trichoptera				
Family: Brachycenrtidae	0	24	0	71
Family: Glossosomatidae	0	1	0	4
Family: Hydropsychidae	3	11	0	19
Family: Limnephilidae	9	0	19	4
Family: Rhyacophilidae	26	33	11	12
Family: Uenoidae	12	9	547	0
Oder: Diptera				
Family: Ceratopogonidae	1	2	0	7
Family: Chironomidae	4498	643	3306	3109
Family: Empididae	133	50	18	40
Family: Psychodidae	92	169	6	12
Family: Simuliidae	19	3	2	0
Family: Tipulidae	12	6	6	3
Order: Trombidiformes				
Family: Arrenuridae	0	0	0	3
Family: Aturidae	0	1	0	0
Family: Feltriidae	0	1	2	0

Taxon	Mean Density (Individuals/m^2)			
	W16	W12	W13	W76
Family: Hygrobatidae	2	5	0	4
Family: Lebertiidae	113	14	70	25
Family: Sperchontidae	33	21	30	112
Order: Oribatei				
Family: Oribatidae	0	0	2	4
Order: Basommatophora				
Family: Lymnaeidae	2	0	0	0
Order: Tubificada				
Family: Enchytraeidae	0	0	0	8
Total Mean Density	*5436*	*1347*	*5074*	*4618*

Total density for each replicate (A – E) was calculated at each EEM monitoring site (Table 2-10). The descriptive summary statistics provide the mean, median, standard deviation, standard error, minimum value, and maximum value for each EEM monitoring site (Table 2-11).

Table 2-10: Total Invertebrate Density for Each Replicate of Each EEM Site, September 2014

Site	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
	n/m^2	n/m^2	n/m^2	n/m^2	n/m^2
W16	8554.26	2790.70	6848.84	8093.02	957.36
W12	2403.10	775.19	837.21	1000.00	1751.94
W13	8996.12	2189.92	2457.36	8620.16	3282.95
W76	7228.68	6655.04	1926.36	4639.53	2825.58

Table 2-11: Descriptive Statistics for Total Invertebrate Density for Each EEM Monitoring Site, September 2014

Site	Mean* (n/m^2)	SD	SE	Median (n/m^2)	Minimum (n/m^2)	Maximum (n/m^2)	95% CI (n/m^2)
W16	5448.84	3385.06	1513.84	6848.84	957.36	8554.26	(1246, 9652)
W12	1353.49	704.69	315.15	1000.00	775.19	2403.10	(479, 2228)
W13	5109.30	3403.11	1521.92	3282.95	2189.92	8996.12	(884, 9335)
W76	4655.04	2313.90	1034.81	4639.53	1926.36	7228.68	(1782, 7528)

*Mean total abundance in Table 2-11 has slight discrepancies from the similar value in Table 2-9, because Table 2-11 includes additional organisms that could not be identified to family level. Those organisms were excluded from family density analysis in Table 2-9.

An analysis of variance (ANOVA) was conducted to test whether there exists a statistically significant difference in mean density, when comparing between at least two of the four sites. For this test, the null hypothesis (H_o) is that there is no difference between the mean invertebrate densities at any of the four sites (W16, W12, W13 and W76). This hypothesis is rejected if the calculated F-value is greater than the F_{crit} value. F_{crit} is 2.46, where α = 0.1, df_{num} = 3 and df_{den} = 16. The ANOVA results are shown in Table 2-12.

Table 2-12: Results of ANOVA Testing For Difference in Mean Invertebrate Density Between The Four EEM Monitoring Sites, September 2014

Source of Variation	SS	df	MS	F	p-value	F_{crit}
Between Groups	53412513.52	3	17804171.17	2.47	0.097	2.46
Within Groups	115561901.3	16	7222618.83			
Total	168974414.8	19				

Note: Null hypothesis (H_o) is that there is no difference between mean invertebrate densities at any of the four sites.
Alternate hypothesis (H_a) is that there is a significant difference between mean invertebrate densities at any of the four sites.
Significance level (α) = 0.1
Since F > F crit, reject Ho

The ANOVA testing returned an F-value of 2.47, slightly greater than that of F_{crit} (2.46). Since F was greater than F_{crit}, and the p-value was very slightly lower than the pre-defined α=0.1the null hypothesis was rejected. This is, however, very weak evidence of a statistically significant difference. Regardless, to further investigate which of the sites may be different from each other, additional analyses were required. A Tukey multiple comparison test was used (Table 2-13), following the calculation protocols outlined by Environment Canada (2012). The formula used to calculate standard error (SE) was $SE = (MSE/n)^{0.5}$, where MSE is the within-group sum of squared errors from the ANOVA output (Table 2-12), and n=5 (number of replicates per sampling site). The ranked means to determine Tukey test order were W16 > W13 > W76 > W12. This does not imply that those rankings are statistically significant differences, merely that they are ranked according to calculated values.

Table 2-13: Tukey Multiple Comparison Test for Mean Invertebrate Density between the Four EEM Monitoring Sites, September 2014

Calculation	W16 vs W12	W16 vs W13	W16 vs W76	W13 vs W12	W13 vs W76	W76 vs W12
X_a-X_b	4095.35	339.53	793.80	3755.81	454.26	3301.55
q	3.41	0.28	0.66	3.12	0.38	2.75
$q_{crit} = q_{0.1,16,4}$= 3.52; SE = 0.854						
Conclusion: W16 = W13 = W76 = W12						

Despite a rejection of the null hypothesis (all sites are equal) in the ANOVA test, the Tukey fails to reject the null hypothesis for any of the pairwise comparisons, effectively concluding that all sites are equal for mean invertebrate density, since none of the q-values exceeded the q_{crit} value of 3.52. Site W12 (far-field Go Creek) is noticeably lower in mean density than the other three sites, and is the site that likely influenced the ANOVA results. It is evident that the ANOVA test results fall very slightly below the $\alpha = 0.1$ and the Tukey results fall very slightly above it – particularly when comparing W12 to W16 (Table 2-13). The difference is attributable to the slightly different way in which pooled variance is included in the two analyses, but the effective result is the same. It can be concluded that if the null hypothesis is true, the probability of observing results shown is approximately 10%. Based on the post-hoc Tukey tests, it can be concluded that the four EEM monitoring sites are equal for mean invertebrate density:

W16 = W13 = W76 = W12

In terms of monitoring mine effluent effects, the chosen reference sites at Pup Creek (W13) and Bunker Creek (W76) are comparable to the exposure sites on Go Creek (W16 and W12) for mean invertebrate density.

2.4.2.3 Family Richness

Richness measurements for species, families and EPT were provided in the lab output (Appendix 1). Richness is a measure of the number of different taxa present in a sample (or site), where "taxa" can be represented at various levels including species, family, EPT or other associations. Richness results for each EEM site are presented in Table 2-14.

Table 2-14: Mean and Total Richness Values for EEM Monitoring Sites, September 2014.

Site	W16	W12	W13	W76
Mean Species Richness*	23	35.6	22.6	29.6
Mean Family Richness*	12.6	17.2	12.4	15.6
Mean EPT Richness*	11	20.4	13	18.6
Total Family Richness**	20	24	20	24

**The average number of species / families / EPT species present at a site, based on five replicates.*
*** The total number of families counted at a given sampling site, pooling across five replicates.*

In general, the two far-field sites (exposure site W12 and its reference analogue, W76) were higher in species, family and EPT richness than the near-field sites (exposure site W16 and its reference analogue, W13).

While EEM monitoring, as specified by the MMER, does not include the use of EPT richness as an indicator, it has been included here to be consistent with the 2011 EEM First Interpretive Report (Lorax, 2011). EPT are considered to be good indicators of toxic effects, as they are widely held to be more sensitive to contaminants than other taxa. Mayflies (Ephemeroptera) have been shown to be the most sensitive taxa of freshwater macroinvertebrates in response to effluents (Pontasch and Cairns, 1991).

Total family richness was found to show a similar pattern to the average family richness, but with a more even result, where sites W16 and W13 were equal at 20, and sites W12 and W16 were equal at 24.

Further analysis on family richness was conducted as per the EEM Guidance Document (Environment Canada, 2012). Total family richness counts were provided for each of the five replicates (Table 2-15), and descriptive summary statistics were run to describe the mean, standard deviation, standard error, median, minimum value, and maximum value for each EEM monitoring site (Table 2-16).

Table 2-15: Family Richness for Each Replicate at the Four EEM Monitoring Sites, September 2014

Site	Family Richness (# families present per sample)				
	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W16	9	12	13	14	15
W12	17	14	18	17	20
W13	12	14	13	10	13
W76	15	18	16	14	15

Table 2-16: Descriptive Statistics for Family Richness (Number of Families per Sample) For Each EEM Monitoring Site, September 2014

Site	Mean	SD	SE	Median	Minimum	Maximum	95% CI
W16	12.6	2.30	1.03	13.00	9.00	15.00	(9.74, 15.46)
W12	17.2	2.17	0.97	17.00	14.00	20.00	(14.51, 19.89)
W13	12.4	1.52	0.68	13.00	10.00	14.00	(10.52, 14.28)
W76	15.6	1.52	0.68	15.00	14.00	18.00	(13.72, 17.48)

As shown in Tables 2-14 and 2-16, mean family richness at the analogous sites W12 and W76 were greater than the near-field analogues W16 and W13. An analysis of variance was run on the family richness to determine if there was a statistically significant difference in the means among sampling sites (Table 2-17).

Table 2-17: Results of ANOVA Testing for Difference between Mean Family Richness between the Four EEM Monitoring Sites, September 2014

Source of Variation	SS	df	MS	F	P-value	F_{crit}
Between Groups	82.55	3	27.52	7.54	0.002	2.46
Within Groups	58.4	16	3.65			
Total	140.95	19				

Notes: Null hypothesis (H_o) is that there is no difference between mean richness at any of the four sites.
Alternative hypothesis (H_a) is that there is a significant difference between mean richness at any of the four sites.
Significance level (α) = 0.1
Since $F > F_{crit}$, reject Ho

Since the calculated F-value was found to be more than three times higher than F_{crit}, (and associated p-value <0.0025) the null hypothesis was rejected in favour of the alternate hypothesis, that there is a significant difference between the mean family richness for at least one site when compared to the other three sites.

Since the ANOVA indicates at least one site is unequal to the rest, further analysis was required to identify the site or sites with statistically different mean family richness. A Tukey multiple comparison pairwise test was used as shown in Table 2-18. Calculation methods were identical to those described in Section 2.4.2.1. The ranked means were W12 > W76 > W16 > W13, to determine Tukey test order.

Table 2-18: Tukey Multiple Comparison Test for Mean Family Richness between Four EEM Sites, September 2014

Calculation	W12 vs W16	W12 vs W13	W12 vs W76	W76 vs W16	W76 vs W13	W16 vs W13
X_a-X_b	4.6	4.8	1.6	3	3.2	0.2
q	5.38	5.62	1.87	3.51	3.75	0.23
$q_{crit} = q_{0.1,16,4}$= 3.52; SE = 0.854						
Conclusion: W12 = W76, W16 = W13; W12 ≠ W16; W12 ≠ W13						

The results of the Tukey test indicate that W12 has a statistically significant (higher) mean family richness value than W16 and W13, but is equal to W76. However, W76 was found to be equal to W16 but not to W13. Logically, if W12 and W76 are considered equal, and W12 is unequal to W16 and W13, then W76 should also be unequal to W16 and W13. This inconsistency is a result of the way variance is perpetuated through the calculations. However, note that W76 was very nearly found to be significantly different from W16 (q=3.51, just below q_{crit} of 3.52).

To further explore whether W76 may be significantly different than W13 and W16, the analyses were re-run, excluding W12. An ANOVA was run once more with W12 omitted from the analysis, as shown in Table 2-19. As with the previous ANOVA, a statistical difference in the means was detected, where the F-value was found to be above the F_{crit} value.

Table 2-19: Results of ANOVA Testing for Difference Between Mean Family Richness between Three EEM Monitoring Sites, Excluding W12, September 2014

Source of Variation	SS	df	MS	F	p-value	F_{crit}
Between Groups	32.13	2	16.07	4.87	0.03	2.81
Within Groups	39.6	12	3.3			
Total	**71.73**	**14**				

Notes: Null hypothesis (H_o) is that there is no difference between mean richness at any of the three sites.
Alternate hypothesis (H_a) is that there is a significant difference between mean richness at any of the three sites.
Significance level (α) = 0.1
Since $F > F_{crit}$, reject H_o

A second Tukey multiple comparison test was conducted to determine the site (or sites) that were still not equal in mean family richness. Standard error (SE) was calculated using the same method described above, with MSE derived from Table 2-19. The ranked means of the second Tukey test were W76 > W16 > W13. Results of the test are shown in Table 2-20.

Table 2-20: Tukey Multiple Comparison Test for Mean Family Richness between Three EEM Sites, Excluding W12, September 2014

Calculation	W76 *vs* W16	W76 *vs* W13	W16 *vs* W13
X_a-X_b	3	3.2	0.2
q	3.69	3.94	0.25
$q_{crit} = q_{0.1,12,3} = 3.20$; SE = 0.812			
Conclusion: W76 ≠ W16 = W13			

The conclusion from the second Tukey test is that W76 (in addition to W12) also has a greater mean family richness value than W16 and W13. W16 and W13 are equal, and W12 and W76 are equal. This result is summarized in Table 2-21.

Table 2-21. Summary of Family Richness Values Compared to Near- and Far-Field Sites, September 2014

	Near-field		Far-field
Go Creek	W16	≠	W12
	=		=
Reference Site	W13	≠	W76

The final summary in Table 2-22 describes the near-field sites, W16 and W13 as being equal in family richness, and the far-field sites, W12 and W76 as being equal in family richness, however, the near-field sites do not equal the far-field sites, even within Go Creek. The far-field sites have significantly higher family richness than the near-field sites. Therefore, it can be concluded that W12 = W76 > W16 = W13.

The implications of these results are that the reference sites are comparable to Go Creek in terms of family richness for the chosen near- and far-field sites. Therefore, family richness would be a good indicator of impacts associated with discharged effluent in future monitoring.

2.4.2.4 Simpson's Diversity Index

Simpson's diversity index is a measure of diversity, or proportional representation, at a given site and provides more information about community composition than richness alone. In this case, standard EEM guidance (EC, 2012) is for diversity at the family level, and is calculated as the square of the proportion of family *i* relative to the total number of families (p_i). These values are then summed, and the total is equal to D, Simpson's diversity index (which is unitless). Therefore, the higher the D-value, the lower the diversity of the sample, or simply, the more probable that a higher percentage of individuals in the sample belong to the same taxa, rather than an even distribution.

Simpson's diversity index values for each replicate (A – E) of each EEM site were provided by Cordillera, and are shown in Table 2-22.

Table 2-22: Simpson's Diversity Index for each Replicate at Four EEM Monitoring Sites, September 2014

Site	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W16	0.38	0.28	0.28	0.40	0.10
W12	0.15	0.14	0.10	0.15	0.09
W13	0.27	0.20	0.13	0.22	0.12
W76	0.25	0.25	0.13	0.23	0.14

Descriptive statistics (mean, standard deviation, standard error, median, minimum, and maximum) for each EEM site were calculated, as shown in Table 2-24. The mean Simpson's diversity index (D) for the sites ranged between 0.13 (site W12) and 0.29 (site W16).

Table 2-23: Descriptive statistics for Simpson's Diversity Index (unitless) at each EEM Monitoring Site, September 2014

Site	Mean	SD	SE	Median	Minimum	Maximum	CI 95%
W16	0.29	0.12	0.05	0.28	0.10	0.40	(0.14, 0.43)
W12	0.13	0.03	0.01	0.14	0.09	0.15	(0.09, 0.16)
W13	0.19	0.06	0.03	0.20	0.12	0.27	(0.11, 0.27)
W76	0.20	0.06	0.03	0.23	0.13	0.25	(0.13, 0.28)

To determine statistical difference between the mean D values at each EEM site, an ANOVA was run with results provided in Table 2-24. The ANOVA results indicate that at least one of the EEM sites is more or less diverse than the other EEM sites. This is shown by the rejection of the null hypothesis (H_o), where the returned F-value (4.05) is greater than the F_{crit} value of 2.46 and the corresponding p-value is 0.03.

Table 2-24: Results of ANOVA Testing for Difference between Mean Diversity between the Four EEM Monitoring Sites, September 2014

Source of Variation	SS	df	MS	F	P-value	F_{crit}
Between Groups	0.067	3	0.02	4.05	0.03	2.46
Within Groups	0.088	16	0.01			
Total	**0.155**	**19**				

Notes: Null hypothesis (H_o) is that there is no difference between mean diversity (D) at any of the four sites.
Alternate hypothesis (H_a) is that there is a significant difference between mean diversity (D) at any of the four sites.
Significance level (α) = 0.1
Since $F > F_{crit}$, reject H_o

Further analysis to confirm which site(s) were unequal in diversity was conducted with the Tukey multiple pairwise comparison test (Table 2-25). The ranked means of the Tukey test prior to running the analysis were W16 > W76 > W13 > W12. The Tukey test shows W16 being significantly less diverse than site W12 (q-value of 4.89 > q_{crit} of 3.52), but that W16 is equal to W13 and W76. Effectively, the spread of the ranked means is small enough that adjacent values are not significantly different from each other, but the largest value (W16) is significantly different from the smallest value (W12). This presents a logical inconsistency, as W16 cannot be equal to W73 and unequal to W12, if W13 and W12 are equal to each other.

Table 2-25: Tukey Multiple Comparison Test for Mean Diversity between Four EEM Sites, September 2014

Calculation	W16 *vs* W12	W16 *vs* W13	W16 *vs* W76	W76 *vs* W12	W76 *vs* W13	W13 *vs* W12
X_a-X_b	0.16	0.10	0.09	0.08	0.01	0.06
q	4.89	3.00	2.58	2.31	0.43	1.88
$q_{crit} = q_{0.1,16,4} = 3.52$; SE=0.045						
W16 ≠ W12; all other pairwise comparisons equal.						

To clarity the inconsistency in results interpretation, an iterative ANOVA was re-run, omitting W12 (Table 2-26). With the influence of W12 omitted, there is no statistical evidence of a significantly different mean diversity at the remaining sites. Effectively, W16 = W13 = W76 ≠ W12.

Table 2-26: Results of ANOVA testing for difference between mean diversity between the three EEM monitoring sites (omitting W12), September 2014.

Source of Variation	SS	df	MS	F	P-value	Fcrit
Between Groups	0.029033	2	0.014517	2.06	0.170	2.81
Within Groups	0.084562	12	0.007047			
Total	**0.113595**	**14**				

Notes: Null hypothesis (H_o) is that there is no difference between mean diversity (D) at any of the three sites.
Alternate hypothesis (H_a) is that there is a significant difference between mean diversity (D) at any of the three sites.
Significance level (α) = 0.1
Since $F < F_{crit}$, do not reject H_o

A lower D-value for site W12 (far-field Go Creek) means that W12 has higher diversity, or is less dominated by a small number of taxa. Biologically, the difference is actually fairly minor. Site W12 portrays a more even spread across the four main taxa than the other three sites, but all four of the sites are dominated by Diptera (mainly Chironomidae), comprising 58 to 81% of the total sample, and the remaining catch at all four sites was overwhelmingly the EPT families. The primary difference in site W12 is that the 3rd and 4th-ranked taxa (Ephemeroptera and Trichoptera) are fairly close in proportion and collectively comprise 11.1% of the total catch, whereas the 3rd and 4th ranked taxa at the other three sites are either collectively below 10% of the total catch, and/or are considerably different from one another (Table 2-8).

Similar results were obtained in 2011, although those data indicated that W16 was significantly different than the other three sites. The biological conclusions, however, are very similar. It is evident from Table 2-23 that considerable intra-site variance exists at these sampling sites for the diversity endpoint: some sub-samples even within a very small sampling area contained very different proportional representation among taxa. This is not unusual for benthic invertebrate populations, but can be problematic for interpreting data in effects assessment. Higher sampling intensity may reduce the influence of intra-site variance on results – and power analysis in the Third Study Design should explore the benefit of this – but regardless the natural propensity for significant differences between sites must be accounted for in the effects assessment interpretation.

2.4.2.5 Bray-Curtis Dissimilarity Index

The Bray-Curtis Dissimilarity Index is a measure of the relationship between sites, and how many variables each site has in common. The index will summarize the overall difference in community structure between each site in comparison to a chosen reference site. The calculation used is the Bray-Curtis Dissimilarity, or BCD. The BCD is calculated as follows, and as according to EC (2012):

$$BCD = \frac{\sum_{i=1}^{n} |Y_{i1} - Y_{i2}|}{\sum_{i=1}^{n} (Y_{i1} + Y_{i2})}$$

where:

BCD = Bray-Curtis Dissimilarity between sites 1 and 2
Y_{i1} = count for taxon *i* at site 1
Y_{i2} = count for taxon *i* at site 2
n = total number of taxa present at the reference median site (site 2)

Taxon level is defined here as the family level, to be consistent with the other statistical endpoints.

The more similar a site is to the reference median site, the closer the BCD value will be to 0, and conversely, the more dissimilar a site is to the reference median site, the closer the BCD value will be to 1. Therefore, sites that share all the same taxa and proportions as the reference site will have a BCD value of 0, and sites that do not share any taxa with the reference site will have a BCD value of 1.

Prior to sampling in September 2014, no effluent had been discharged from the tailings pond at Wolverine Mine. Therefore the BCD Index has been presented here in a similar fashion as it was in the first EEM report (Lorax, 2011) to provide an assessment of the proposed reference sites for appropriateness. Because all four sampling sites are effectively baseline, the description of reference (W76, W13) and exposure sites (W12 and W16) is theoretical, in anticipation of eventual effluent discharge.

The two proposed reference sites are W13 (near-field) and W76 (far-field). As described in the EEM Guidance Document (EC, 2012), the median abundance at the reference site is to be calculated and used as site 2, to be compared to site 1. Therefore, Yi2 is the median abundance of family i at the chosen reference station, either W13 or W76. BCD values for both W13 and W76 as the reference station have been calculated, in addition to descriptive statistics for the BCD values, and further analysis for statistical difference in the mean BCD values.

Bray-Curtis Dissimilarity values were calculated and displayed showing numerator and denominator values for each EEM site and each replicate (A – E) (Table 2-27) as per the EEM Guidance Document. Descriptive statistics for the BCD results are shown in Table 2-28.

Table 2-27: Results of Bray-Curtis Dissimilarity calculations using W13 as the Median Reference Site for Family Abundance, September 2014

Site	Formula	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W16	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	1905	382	1399	1846	600
	$\sum(Y_{i1}+Y_{i2})$	2973	1482	2527	2850	1002
	BCD value	0.64	0.26	0.55	0.65	0.60

Site	Formula	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W12	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	522	700	609	615	465
	$\sum(Y_{i1}+Y_{i2})$	1382	964	975	1007	1183
	BCD value	0.38	0.73	0.62	0.61	0.39
W13	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	1708	246	234	1469	165
	$\sum(Y_{i1}+Y_{i2})$	3074	1330	1396	2973	1603
	BCD value	0.56	0.18	0.17	0.49	0.10
W76	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	1425	1277	742	850	456
	$\sum(Y_{i1}+Y_{i2})$	2581	2447	1250	1906	1454
	BCD value	0.55	0.52	0.59	0.45	0.31

Table 2-28: Descriptive Statistics for Bray-Curtis Dissimilarity at each EEM Site using W13 as a Reference, September 2014

Site	Mean	SD	SE	Median	Minimum	Maximum	CI 95%
W16	0.54	0.16	0.07	0.60	0.26	0.65	(0.20, 0.34)
W12	0.55	0.15	0.07	0.61	0.38	0.73	(0.36, 0.74)
W13	0.30	0.21	0.09	0.18	0.10	0.56	(0.04, 0.56)
W76	0.49	0.11	0.05	0.52	0.31	0.59	(0.35, 0.62)

Descriptive statistics in Table 2-28 show ranked mean BCD values as W12 > W16 > W76 > W13. Site W13 had the lowest BCD value (0.30), This is not unusual, as the W13 data are being compared to median values derived from the same sampling population. The remaining three sites were all similar in BCD values, hovering around the mid-point, ranging between 0.49 for W76 to 0.54 for W16. To test for statistically significant differences between the mean BCD values, an ANOVA was run for all four EEM sites (Table 2-29).

Table 2-29. Results of ANOVA Testing for Difference between Mean Bray-Curtis Dissimilarity Calculated using Site W13 as Median reference, September 2014

Source of Variation	SS	df	MS	F	P-value	F_{crit}
Between Groups	0.20	3	0.07	2.50	0.10	2.46
Within Groups	0.42	16	0.03			
Total	**0.62**	**19**				

Notes: Null hypothesis (H_o) is that there is no difference between mean BCD values at any of the four sites.
Alternate hypothesis (H_a) is that there is a significant difference between mean BCD values at any of the four sites.
Significance level (α) = 0.1
Since $F > F_{crit}$, reject H_o

ANOVA results show fairly weak but statistically significant evidence that at least one of the sites W12, W16 and/or W76 is significantly more dissimilar to the reference median than the chosen reference site, W13 (p=0.096; reject H_o). Note the p-value is effectively equal to the assigned *α of* 0.1. To further investigate which, if any, site-pair combinations portray statistically significant differences in their dissimilarity "distance" from the reference median, post-hoc Tukey pairwise comparisons were evaluated. None of the individual pairwise comparisons exceed q_{crit} (Table 2-30). The conflicting results arise due to minor differneces in how variance terms are pooled and propagated for ANOVA versus Tukey statistical tests; the ANOVA results fall very slightly below *α* and the Tukey tests slightly above it. Therefore, despite the ANOVA results, none of W12, W16 or W76 are considered to be significantly more dissimilar to the reference median than reference site W13. Of particular interest for EEM interpretation, this result does not show a false-positive "effect" for the two would-be exposure sites, W12 (q=3.38) or W16 (q=3.29). However, this should be interpreted with some caution. The ambiguous results between the ANOVA and the Tukey tests shows that, effectively, results are right at the cusp of statistical significance as per EEM guidance.

Table 2-30: Results of Bray-Curtis Dissimilarity calculations using W76 as the median reference site for family abundance, September 2014.

Calculation	W12 vs W16	W12 vs W76	W12 vs W13	W16 vs W76	W16 vs W13	W76 vs W13
X_a-X_b	0.01	0.06	0.25	0.05	0.24	0.18
q	0.09	0.84	3.38	0.75	3.29	2.54
$q_{crit} = q_{0.1,16,4}$= 3.52; SE=0.07						
W12 = W16 = W76 = W13						

The median family abundances for the far-field reference site at Bunker Creek, W76, was used as Y_{i2} to separately evaluate that site as a reference site. The results for each replicate (A – E) are shown in Table 2-31. Descriptive statistics for the BCD values are shown in Table 2-32.

Table 2-31: Results of Bray-Curtis Dissimilarity Calculations using W76 as the Median Reference Site for Family Abundance, September 2014

Site	Formula	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W16	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	1468	617	946	1347	985
	$\sum(Y_{i1}+Y_{i2})$	3384	1891	2926	3241	1415
	BCD value	0.43	0.33	0.32	0.42	0.70
W12	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	966	1089	987	961	828
	$\sum(Y_{i1}+Y_{i2})$	1794	1377	1389	1429	1614
	BCD value	0.54	0.79	0.71	0.67	0.51

Site	Formula	Replicate A	Replicate B	Replicate C	Replicate D	Replicate E
W13	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	1270	869	935	1029	870
	$\sum(Y_{i1}+Y_{i2})$	3238	1655	1755	3101	1972
	BCD value	0.39	0.53	0.53	0.33	0.44
W76	$\sum \lvert Y_{i1}-Y_{i2} \rvert$	683	558	860	102	477
	$\sum(Y_{i1}+Y_{i2})$	3007	2894	1674	2374	1893
	BCD value	0.23	0.19	0.51	0.04	0.25

Table 2-32: Descriptive Statistics for Bray-Curtis Dissimilarity at Each EEM Site using W76 as a Reference, September 2014

Site	Mean	SD	SE	Median	Minimum	Maximum	CI 95%
W16	0.44	0.15	0.07	0.42	0.32	0.70	(0.25, 0.63)
W12	0.65	0.12	0.05	0.67	0.51	0.79	(0.5, 0.79)
W13	0.44	0.09	0.04	0.44	0.33	0.53	(0.34, 0.55)
W76	0.25	0.17	0.08	0.23	0.04	0.51	(0.03, 0.46)

Descriptive statistics in Table 2-31 show ranked mean BCD values as W12 > W16 = W13 > W76. W76 is compared to a theoretical site derived from W76 sub-samples, and as expected it has a low dissimilarity value of 0.25. The remaining three sites, as compared to W76, have BCD values of 0.44 for both W16 and W13 (the near-field sites) and 0.65 for W12, the far-field Go Creek site. To determine if there was a statistically significant difference in the means, ANOVA was repeated with W76 as median reference.

Table 2-33: Results of ANOVA Testing for Difference between mean Bray-Curtis Dissimilarity Calculated using Site W76 as Median Reference, September 2014

Source of Variation	SS	df	MS	F	P-value	F_{crit}
Between Groups	0.40	3	0.13	7.24	<0.003	2.46
Within Groups	0.29	16	0.02			
Total	**0.69**	**19**				

Notes: Null hypothesis (H_o) is that there is no difference between mean BCD values at any of the four sites.
Alternative hypothesis (H_a) is that there is a significant difference between mean BCD values at any of the four sites.
Significance level (α) = 0.1
Since $F > F_{crit}$, reject H_o

The ANOVA analysis (Table 2-33) resulted in a rejection of H_o ($p<0.003$). When measuring the dissimilarity "distance" from the reference median, the difference in that distance is statistically significant between at least two of the four sites. A Tukey multiple comparison test was performed to determine which site(s) was significantly different (Table 2-34). Ranked means prior to the Tukey test were W12 > W13 > W16 > W76.

Table 2-34: Tukey Multiple Comparison Test for mean Bray-Curtis Dissimilarity Calculated using Site W76 as median reference, September 2014

Calculation	W12 vs W16	W12 vs W13	W12 vs W76	W13 vs W16	W13 vs W76	W16 vs W76
X_a-X_b	0.21	0.20	0.40	0.01	0.20	0.19
q	3.40	3.31	6.59	0.09	3.28	3.19
$q_{crit} = q_{0.1,16,4}$= 3.52; SE=0.06						
W12 ≠ W76; and, W76 = W13 = W16 or W12 = W13 = W76						

The Tukey multiple comparison test revealed that EEM site W12 (Go Creek far-field) had statistically different dissimilarity to W76. However, both W76 and W12 were statistically equivalent to the remaining two sites (Table 2-34). This ambiguous result demonstrates a gradient difference, in which the difference between adjacent ranked pairs is never large enough to be statistically significant, but comparing the largest value (W12) to the smallest value (W76) reveals a gap that is statistically significant.

The BCD values were found to be statistically equal among the four sites when W13 was used to derive the reference median. Effectively, W12, W16 and W76 are all equivalently similar to the reference median as W13 is, based on the observed data. Conversely, when compared to W76 as a reference site, W13 and W16 have equivalent dissimilarity "distance", but W12 is dissimilar from W76 in a magnitude that is significantly larger than W13 or W16. Conclusively, EEM site W13 makes a better reference site than W76 for the similarity index assessment. However, the first EEM report (Lorax, 2011) had a different result, where using either references site (W13 and W76) returned greater dissimilarity in the Go Creek sites (W16 and W12) than in the non-exposure sites at Pup Creek and Bunker Creek. Therefore, it can be also concluded that the community composition of the sites may change over time, and caution should be taken when comparing sites to determine mine related impacts. It is recommended that future EEM cycles and study designs carefully consider the 2011 and 2014 results before drawing firm conclusions.

3.0 FISH STUDY – EXPLORATORY WORK

Because there has not yet been any discharge from the TSF, neither a fish population study nor a fish tissue study are required under the MMER at this time. It is, however, anticipated that effluent discharge will occur prior to the third EEM reporting cycle, which would trigger *Section 9(b)* and *9(c)* under *MMER, Schedule 5*. Recognizing that the last detailed fisheries work was done in 2005, YZC opted to undertake detailed exploratory work in September 2014 to better inform future study designs. The general objective of the work was to gain a firm understanding of abundance and species composition in exposure and potential reference areas.

For brevity and because it is not a legislated reporting requirement under this second EEM cycle, only a summary of the findings of the 2014 work are presented here. Preliminary analyses suggest that traditional approaches outlined in the MMER Technical Guidance Document (Environment Canada, 2012) may not be applicable to this scenario. In any case, the information collected in 2014 will be used to inform the EEM Third Study Design to be prepared in collaboration with Environment Canada.

3.1.1 Exposure Area

The methods in the exposure area were based on the objective to estimate total abundance in Go Creek, by species.

Go Creek was divided into two sections based on previous assessments. Jacques Whitford (2005) characterized Lower Go Creek (as far upstream as W80) as moderate habitat, whereas Middle and Upper Go Creek were considered poor value habitat. A stratified sampling approach was used in the 2014 field surveys, with three sites in Lower Go Creek and four in Middle/Upper Go Creek (but extending only as far upstream as the discharge point, unless a permanent fish barrier was noted). At each site, multiple-pass removal electrofishing was applied in fully-enclosed sampling zones, approximately 50m^2 each. Each enclosure site was subjected to complete depletion passes, meaning passes continued until zero fish were captured. Each enclosure was then subjected to an additional fishing method (snorkel or gee-trap) to evaluate capture efficiency.

Despite a total of 4198 seconds of electrofishing effort and 44 minutes of snorkel surveys, applied over an area of 339m^2 in the Middle/Upper Go Creek sections, only one fish (a single bull trout, 114mm fork length) was captured. That finding in itself is a departure from the historical baseline data, which up to 2005 had not captured any fish in these two sections. The effort in 2014 more than doubles the cumulative effort applied to this section of Go Creek between 1996 and 2005, but does not change the ultimate conclusion. While technically fish-bearing, Middle and Upper Go Creek provide extremely low abundance.

In Lower Go Creek, capture results were very similar to the upper sections. A total of 3527 seconds of electrofishing effort and 36 minutes of snorkel surveys, applied over an area of 264m^2, resulted in only one slimy sculpin and two bull trout observations.

The capture of only three bull trout and one slimy sculpin despite extensive sampling effort at seven sites in Go Creek suggests very low abundance in the exposure area. Further, the capture of one fish >300mm fork length underscores the likely seasonality of fish presence in Go Creek, as it is extremely unlikely a bull trout can rear to that size residing solely in Go Creek. Site fidelity has direct ties to exposure, and warrants further consideration in development of a fish study, once the TSF is discharging.

3.1.2 Reference Area

Two potential reference areas were explored for suitability, considering the fish species and habitat present in Go Creek. Lower Pup Creek was explored, as was the middle section of Bunker Creek. Enclosure electrofishing was not used. Rather, a combination of open electrofishing, minnow-trapping, and snorkel surveys were used to determine if species presence and relative abundance was roughly comparable to Go Creek.

Bunker Creek was sampled shortly downstream of the access road bridge crossing. While this area is technically exposed to anthropogenic effects, it was targeted because previous work suggested a beaver dam upstream of the bridge would prevent upstream fish movement, and extensive work in 2005 had failed to show any fish in the upper section. Upon field investigation in 2014, there was no dam observed immediately upstream of the bridge, though there was a moderate sized dam just downstream of the bridge. It is inferred that at present, habitat in Middle Bunker Creek (below the bridge) and Upper Bunker Creek (upstream of the bridge, at least as far as the 200m viewed) are contiguous. Notwithstanding potential sedimentation or hydrocarbon runoff effects of a bridge, the habitat appeared similar.

Fish abundance in this middle section of Bunker Creek is evidently low. No fish were caught or seen in 2014, including extensive snorkel surveys and minnow-trapping. The only previous documentation of fish in this area was two bull trout captured in October 2004. Fish habitat in Bunker Creek is generally more complex than Lower Go Creek, but overall it would be suitable as a reference area if fish populations were similar. However, prior to use as a reference site for long term monitoring, additional work would be necessary to confirm that bull trout still reside in that section of creek, as was the case in 2004.

Pup Creek is smaller than Go Creek, but the downstream limit of Pup Creek provide very similar fish habitat to the near-field exposure area in the upstream sections of Go Creek. The September 2014 electrofishing and minnow-trapping efforts in Pup Creek near its confluence with Go Creek yielded 16 bull trout (82 – 109mm fork length).

4.0 CONCLUSIONS

This Second Interpretive Report was prepared based on the general legislative requirements for Biological Monitoring studies under the MMER, and the specific requirements outlined in the Second Study Design. The predominant focus of this study is the benthic invertebrate sub-component required under MMER Schedule 5, S. 9.

Because there has not yet been any effluent discharge from the TSF, nor any other anthropogenic impacts on aquatic habitat identified from mine operations, the results of benthic invertebrate analyses provide an updated assessment of baseline conditions.

- Invertebrate density: There is rather weak evidence of a statistically significant difference in invertebrate density for at least one site, with results influenced by lower observed density at W12 (far-field exposure) than at the other three sites. Follow-up pairwise comparison testing failed to define any specific instances where mean density was lower between two sites. The same general conclusion was reported in Lorax (2011), with a higher level of statistical significance. Interpretation of future monitoring results should consider this evidently consistent trend of lower baseline density at W12.
- Family Richness: The near-field exposure site was not significantly different than the analogue reference site, and the far-field exposure site was not significantly different than the analogue far-field reference site. However, in tandem, the “near field” sites were significantly different than the “far field sites”. This is not unusual, as the habitat differences between near-field and far-field sites in Go Creek (W16 and W12) are likely to have some effect on community composition.
- Diversity: Site W16 (near-field exposure on Go Creek) had the lowest diversity (highest D-rank), driven by the dominance of Diptera (81% of overall observations, mostly chironomids). The difference between site W16, W13 and W76 (three sites with lowest diversity, and

collectively equal) and W12 (highest diversity) were statistically significant. Effectively, site W12 showed a more even spread across the four most dominant taxa, but all four sites were overwhelmingly dominated by dipterans, with Plecoptera, Trichoptera and Ephemeroptera accounting for most of the remaining majority. The overall result is similar to 2011, although for the 2011 data W16 was significantly different than all of the other three sites. Given the within-site variance observed in 2014 and 2011, it would not be unexpected to this baseline result naturally fluctuate over time.

- Similarity: The Bray-Curtis Dissimilarity index analyses show that if site W13 is used to derive the reference median, then all sites have statistically equivalent similarity to the median reference. As opposed to the 2011 results, no false-positive "effect" is identified in this assessment, though the results fall right on the cusp of the defined significance level under MMER (α=0.1). This will be helpful for eventual effects monitoring, but the natural tendency for significant differences (as demonstrated in the 2011 results) is important context for interpreting sample results.

Exploratory fisheries work was also performed as part of this study. Intensive sampling in the exposure area (Go Creek) reaffirmed that this habitat has very low abundance of potential sentinel species, and abundance is very likely below the thresholds recommended in the Environment Canada 2012 guidelines for typical study designs. Furthermore, potential reference areas with analogous habitat, species, and abundance may be absent in this study area. YZC will explore a site-specific approach to the fish population study that will be required once the TSF is discharging effluent. Options will be presented to and discussed with regulatory agencies in lead up to the Third Study Design, prior to 2017.

This Second Interpretive Report is required to address eight specific elements, as outlined in Section 1.1.1. A brief summary of each is provided below.

1) Description of any deviation from the study design that occurred while the biological monitoring studies were being conducted and any impact that the deviation had on the studies;
   - *Status: There were no logical challenges encountered that required deviation from the study design, and work was carried out as described in the approved study design.*
2) The latitude and longitude of sampling areas in degrees, minutes and seconds and a description of the sampling areas sufficient to identify the location of the sampling areas;
   - *Status: This information is presented in Section 2.3.5.1.*
3) The dates and times when samples were collected
   - *Status: Table 2-5, and Section 2.3.1 provide this information.*
4) The sample sizes
   - *Status: Section 2.3.5.1 provides this information.*
5) The results of the data assessment in MMER Schedule 5, S. 16 (a)(iii), (c) and (d)
   - *Status: Required results are presented in Section 2.4.*
6) Conclusions of the biological monitoring studies
   - *Status: The primary conclusion of this study is that there has been no effluent-related impact on fish, fish tissue, or benthos because there has been no effluent discharge. Natural baseline differences in some of the benthic invertebrate endpoints were also*

noted which should be taken into consideration for eventual interpretation of effects monitoring data. The natural variation between eventual exposure and reference sites is not unusual, and the sites chosen are likely as similar as can be found within the local study area.

7) A description of how the results will impact the study design for subsequent biological monitoring studies;

   - *Status: the first two Interpretive Reports provide strong quantitative baseline data for future benthic invertebrate studies. The identification of natural variability between exposure and reference sites will be relevant context to avoid false-positives in the effects assessment. The baseline data obtained for the first two Interpretive Reports should be used to run a priori power analysis on sample sizes necessary for the third and subsequent study designs. Power analysis making use of existing site-specific baseline estimates of natural variance will be more accurate and useful than generic power analysis for the EEM Guidance Document (EC, 2012).*
   - *Exploratory fisheries work conducted in 2014 also demonstrate that the exposure area (Go Creek) has very low fish abundance. A fish toxicity and population study will be necessary for the third and subsequent study designs, presuming the TSF begins to discharge effluent in the meantime. The species composition and abundance data collected in 2014 will provide a recent point of reference for designing a competent site-specific monitoring program.*

8) The date when the next biological monitoring study will be conducted.

   - *Status: The first two reporting cycles for Biological Monitoring studies require 36 month intervals, and as such this Second Interpretive Report was due by December 5, 2014, or 36 months following the due date of the First Interpretive Report. Third and subsequent iterations of Biological Monitoring studies are required on 72 month intervals, in cases where the first two studies failed to detect any effect on fish or fish tissue or benthos. Technically, that is the case for the Mine, as the first two study designs were undertaken prior to any effluent discharge and consequently there were no effluent-related effects. However, this appears to miss the intent of the regulations, and we recommend that the 36 month reporting cycle be maintained at least until two study iterations have occurred, post-effluent discharge. Thus the Third Interpretive Report should be submitted no later than December 5, 2017.*

This report was prepared to satisfy the information requirements for a Biological Monitoring Study as per the *Metals Mining Effluent Regulations*. In the absence of any discharge from the TSF, nor any known evidence of other mine-related impacts to the aquatic environment, the results are interpreted as ongoing baseline data collection. The results do, however, provide valuable context and data for scoping future study designs as the Environmental Effects Monitoring cycle continues.

Respectfully submitted,

POTTINGER GAHERTY ENVIRONMENTAL CONSULTANTS LTD.
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KKS/TVG/SPW/slr
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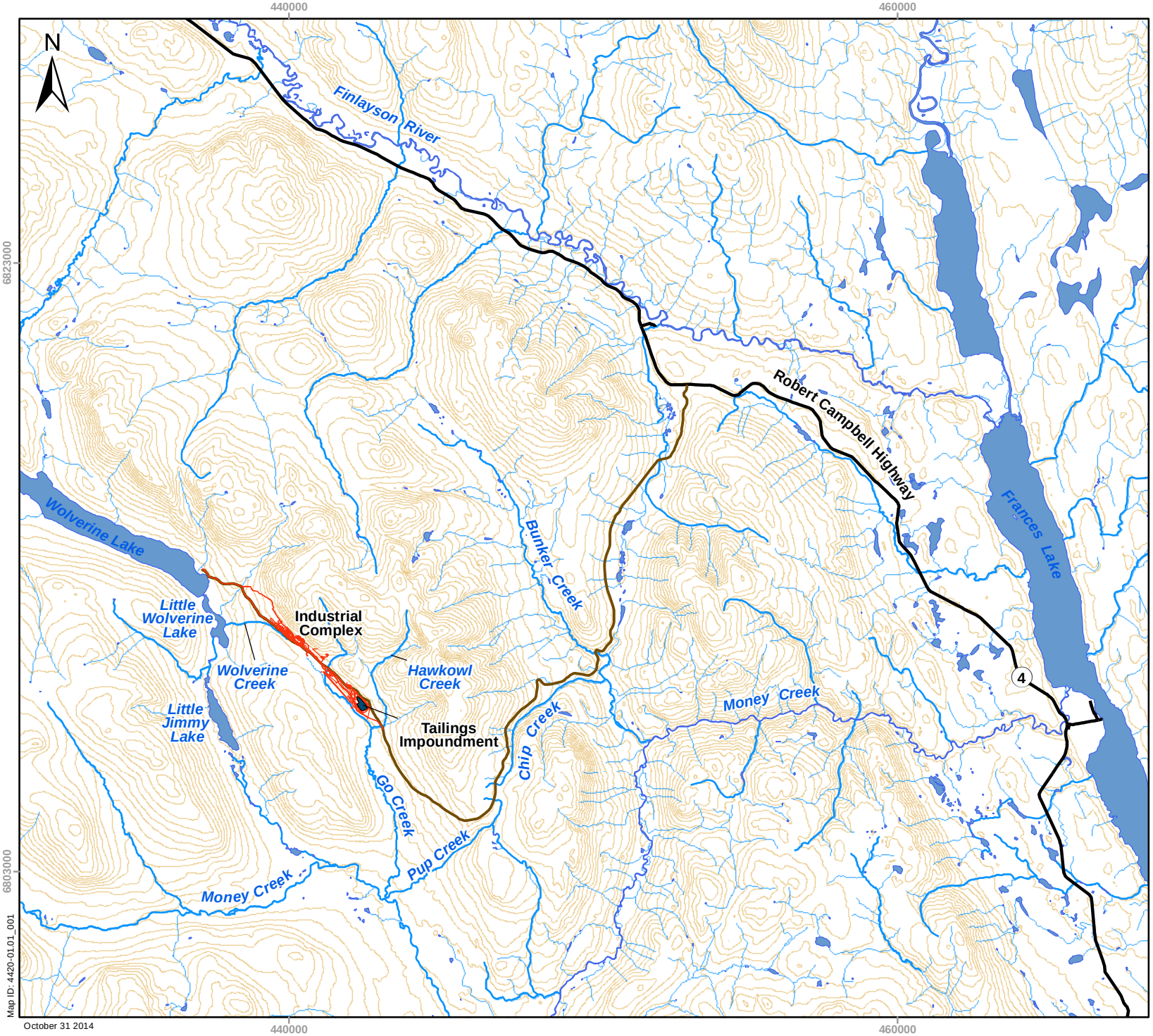
Figures



Site Location

- Mine Access Road
- Site Arrangement
- 10 m Contour
- 40 m Contours
- Tailings Impoundment

1:175,000

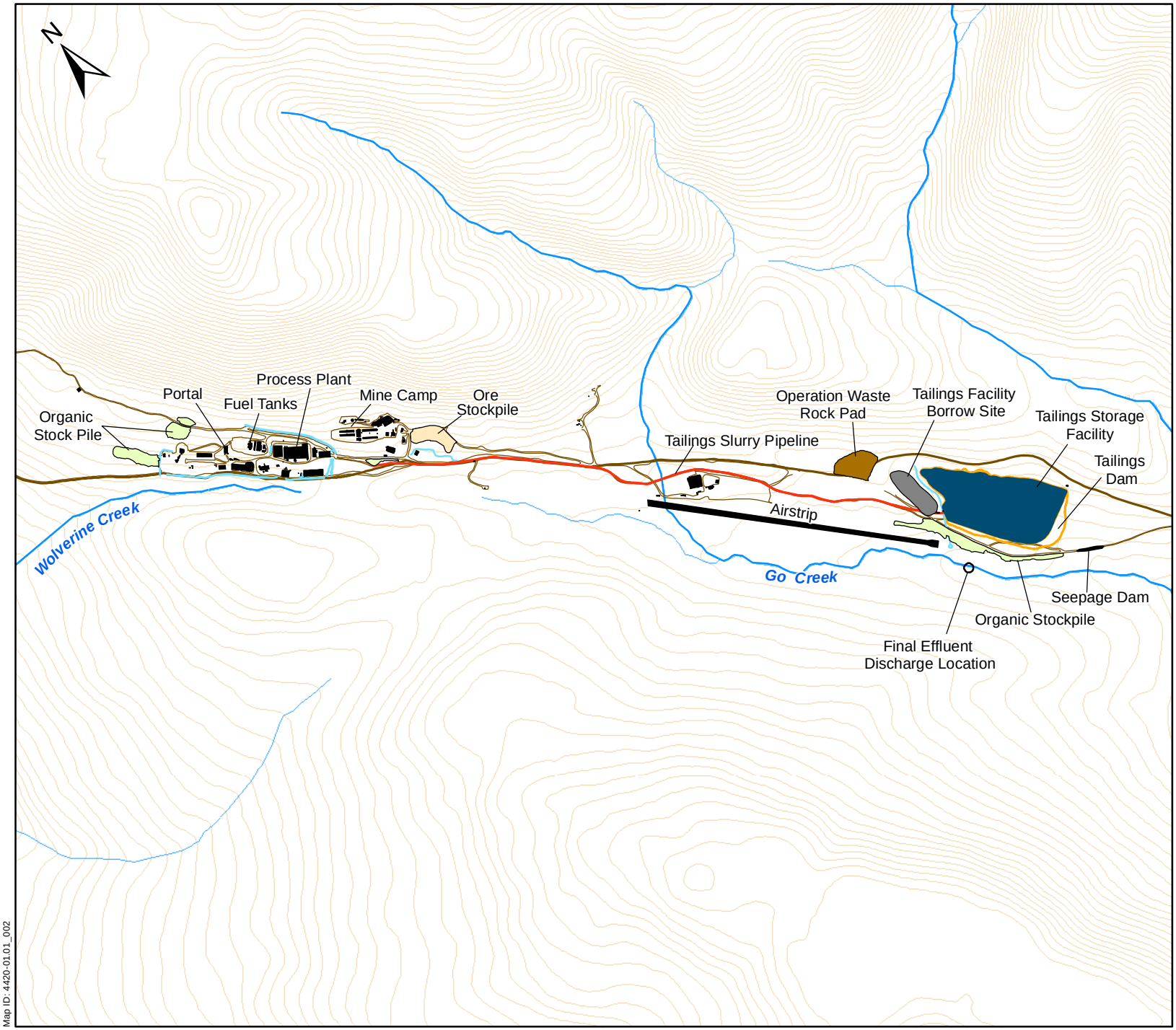
0 2.5 5

Kilometres

Coordinate System: NAD 1983 UTM Zone 9N

PGL Pottinger Gaherty Environmental Consultants Ltd.

Figure 1



Mine Site Layout

- 10 m Contour
- Mine Access Road
- Ditch
- Tailings Dam
- Tailings Slurry Pipeline
- Roads
- Ore Stockpile
- Tailings Facility Borrow Site
- Organic Stockpile
- Tailings Storage Facility
- Operations Waste Rock Pad

1:25,000

0 500 1,000

Metres

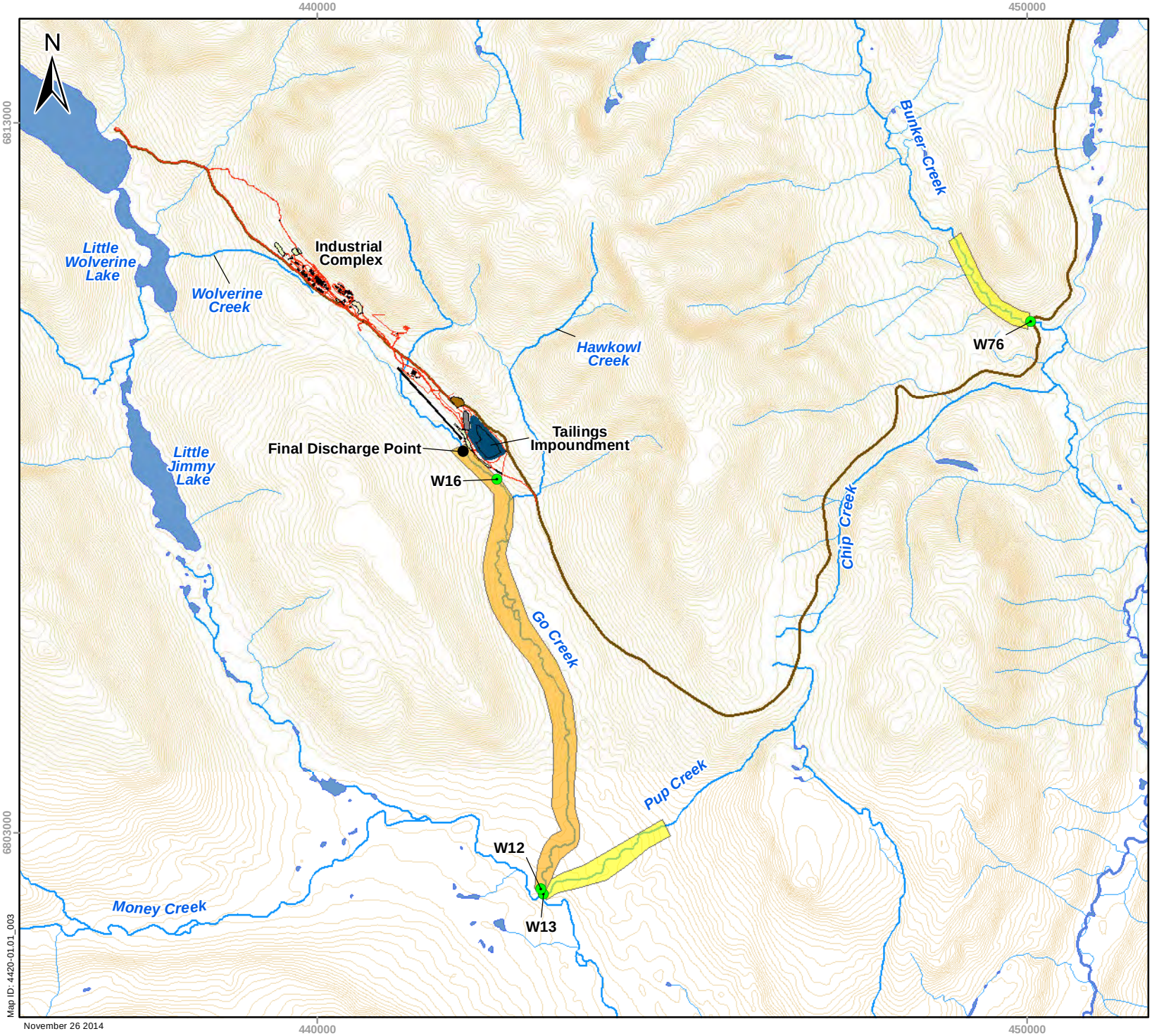
Coordinate System: NAD 1983 UTM Zone 9N

Map ID: 4420-01.01_002

October 31 2014

PGL Pottinger Gaherty Environmental Consultants Ltd.

Figure 2



Benthic Invertebrate Sampling Locations

- Sampling Site
- Mine Access Road
- Site Arrangement
- 10 m Contour
- Tailings Impoundment
- Exposure Area
- Reference Area

1:75,000

0 1,000 2,000

Metres

Coordinate System: NAD 1983 UTM Zone 9N

PGL Pottinger Gaherty Environmental Consultants Ltd.

Figure 3

Appendix 1

Invertebrate Taxonomic Analysis

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Phylum: Arthropoda	0		0		0		0		0		0		0		0		0		0	
Subphylum: Hexapoda	0		0		0		0		0		0		0		0		0		0	
| Class: Insecta	0		0		0		0		0		0		0		0		0		0	
| Order: Ephemeroptera	0		0		0		0		0		0		0		0		0		0	
| Family: Ameletidae	0		0		0		0		0		0		0		0		0		0	
Ameletus	0		1		0		0		0		0		0		0		0		0	
| Family: Baetidae	1		0	3	6		0		0		0		0	8	0	10	16		18	4
Acentrella sp.	0		0		0		0		0		0		0		0		0		0	7
Baetis	0		6	4	1		1		0		0	13	6	12	1		0		0	
Baetis bicaudatus	0		1	1	1		0		0		0		0		0		0		0	
| Family: Ephemerellidae	5		0	3	4	7	0		0		0		0		0	40	11	14	11	2
Drunella coloradensis	0		0		1		0		0		0		0		0		0		0	
Drunella doddsii	0		0		0		0		0		0		0		0		5		0	2
Drunella sp.	0		0		0		0		0		0		0		0		16		0	2
Ephemerella verruca	0		1	1	0		0		0		0		0		0		0	2	0	
| Family: Heptageniidae	2		1	15	7		0		0	5	0		0	8	0	25	53	49	21	22
Cinygmula sp.	0	1	0		0		0		0		0		0		0	10	0		11	
Epeorus deceptivus	0		0		0		0		0		0		0		0		5		0	
Epeorus longimanus	0		0		0		0		0		0		0	4	0		5		0	2
Epeorus sp.	0		0	2	1		0		0		0		0	4	0		11	5	0	2
Rhithrogena	0		0		0		0		0		0		0		0	10	0	2	0	
	0		0		0		0		0		0		0		0		0		0	
| Order: Plecoptera	0		0		4		1		0	5	0		0		0		0		0	4
| Family: Capniidae	55	17	7	6	36	47	8	60	89	137	13		6		1	75	63	17	25	33
Capnura sp.	16		0		1	40	0		0	26	0		0		0	15	5	5	4	
| Family: Chloroperlidae	10	2	10	4	7		11	12	11	13	13	18	28		12	15	53	42	21	33
Kathroperla sp.	5	3	6	8	7		1		0		0		0		1	10	21	23	0	
Paraperla sp.	0	2	3	9	14	27	1		0		0		0		0		0		0	
Plumiperla sp.	0		0		0		0		0		0		6		0	10	0		32	
Suwallia	3		0		0		1	4	61	34	0	2	6		0	25	37	91	11	39
Sweltsa sp.	10	4	1		0		11	14	22	5	7	4	0		25	40	32	15	36	17
| Family: Leuctridae	0		0		0	7	0	4	0		0		0		0		11		0	
Despaxia augusta	0		0		0		1		0		0		0		0		0	2	0	
| Family: Nemouridae	6	2	13	20	26	60	105	138	6	47	13	42	33	32	6	15	11	37	21	11
Nemoura	0		1		0		0		0		0		0		0		0		0	
Zapada	1		0	2	4		1	8	11	37	7	13	11	12	7		11		0	
Zapada cinctipes	0		0		6		0		0		0		0		0		0		0	
Zapada columbiana	0		1		0		0		0		0		0		0		0		0	
Zapada oregonensis group	13	4	4	5	20		5	26	178	50	67	56	56	36	18	35	42	15	46	20
| Family: Perlodidae	0	2	4	3	1	7	9		0	11	0	7	0	4	0		5	3	0	
Diura sp.	0		1		0		0		0		0		0		0		0		0	
Kogotus sp.	1		0		0		0		0		0		0		0		0		0	
Megarcys sp.	0		0		0		0		0	3	0		0	4	0		0		0	
Skwala	0		0	3	0		0		0		0		0		0		0		0	

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
	0		0		0		0		0		0		0		0		0		0	
| **Order: Trichoptera**	0		0	4	0		0		6	5	0		6		0		0		0	9
| **Family: Brachycentridae**	0		0		4		0		0		0		0		0		0		0	
Brachycentrus americanus	0		0		1		0		0		0		0		0		0		0	
Micrasema	0	1	5	4	16		0		0		0		0		0	5	26	5	39	17
| **Family: Glossosomatidae**	0		0		1		0		0		0		0		0		5		0	
| **Family: Hydropsychidae**	0		0	4	6		0		0		0		0		0		0		0	7
Arctopsyche sp.	0		0	4	0		0		0		0		0	4	0	5	0	3	7	2
| **Family: Limnephilidae**	0		0		0		0		0		0		0	4	0		5		0	
Desmona sp.	0		0		0		1		0		0		0		0		0		0	
Ecclisomyia sp.	0		0		0	7	4	4	6	3	0		6		1		0		0	
| **Family: Rhyacophilidae**	1		0	6	0		0		0		0		0		0		0		0	
Rhyacophila	1	2	4	5	7		3		6		0		6	12	1		5		0	
Rhyacophila betteni group	0	2	0		0		0		0		0		0		0		0		0	
Rhyacophila hyalinata group	0		0		0		0		0		0		0		0		0		0	2
Rhyacophila verrula group	0		0		0		1		0	3	0		0		0		0		0	
Rhyacophila viquaea	4		0		1		0		0		0		0		0		0		0	
Rhyacophila vofixa group	1	2	3	1	3		1		0		0	4	6	4	1	5	0	2	0	2
| **Family: Uenoidae**	0		0		4		0		0		0		6		0		0		0	
Neothremma sp.	0		1	1	6	247	85	48	283	42	0		0	8	1		0		0	
	0		0		0		0		0		0		0		0		0		0	
| **Order: Diptera**	1		0		0		0	4	11		0		0		8	35	0		0	
| **Family: Ceratopogonidae**	0		0		0		0		0		0		0		0		0		0	
Probezzia	2		0		0		0		0		0		0		1	5	0	2	0	2
| **Family: Chironomidae**	7		0		1	27	15		28	18	20	4	6		4	5	5		0	
| **Subfamily: Chironominae**	0		0		0		0		0		0		0		0		0		0	
| **Tribe: Tanytarsini**	0		0		0		0		0		0		0		0		0		0	
Micropsectra	0		0		0		0		0		0		0		0		0	3	25	2
Stempellina sp.	9		0		0		0		0		0		0		0		0		0	
Tanytarsus	4		0		3		0		0		7		67		10	60	21		0	
| **Subfamily: Diamesinae**	0		0		0		0		0		0		0		0		0		0	
| **Tribe: Diamesini**	0		0		0		0		0		0		0		0		0		0	
Diamesa	26	13	52	88	104	833	33	80	683	118	1127	351	667		0		0		0	
Pagastia	8	6	33	33	43	820	211	138	694	195	740	127	628	600	13	840	768	129	518	222
Pseudodiamesa sp.	40	8	4		0	13	0	10	0		0		17		64		0		0	
| **Subfamily: Orthocladiinae**	0		0		0		0		0		0		0		0		0		0	
Brillia sp.	1		2		0		0		0		13		0		0		0		0	
Eukiefferiella	3		0		0		0		0		0		0	1176	5	390	368		232	126
Limnophyes sp.	0		0		0		0		0		0		0		2	10	0		0	
Metriocnemus sp.	0		0		0	13	0		6		0		0		0		0		0	
Nanocladius	0	1	0		0		0		0		0		0		1		0		0	
Orthocladius complex	176	50	24	4	21	107	15	50	83	58	0	42	22	40	18	90	21	3	36	76
Rheocricotopus	14	2	0		7	13	0		0		7		0	24	0	5	0		18	11
Tvetenia	1		0	2	36		0		0		0		0		0		11		11	4
| **Tribe: Corynoneurini**	0		0		0		0		0		0		0		0		0		0	
Corynoneura	1		0		1		0		0		0		0		0		0		0	
| **Subfamily: Tanypodinae**	0		0		0		0		0		0		0		0		0		0	
| **Tribe: Pentaneuriini**	0		0		0		0		0		0		0		0		0		0	
Thienemannimyia group	0	1	0		0		0	4	0		0		0		0		0		0	
| **Family: Empididae**	1		1		6		0		0		0		0		0		0		0	
Chelifera/ Metachela	22	14	8	8	4	13	0		0	3	60	9	61	20	22	20	11	8	0	11
Hemerodromia sp.	0		0		0		0		6		0		0		0		0		0	
Oreogeton sp.	0		0		0		1		0		0		0		0		0		0	2
| **Family: Psychodidae**	0		0		0		0		0		0		0		0		0		0	

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Pericoma/Telmatoscopus sp.	145	49	4	1	19		0		0	8	53	9	11	44	2	10	0		0	
Psychoda sp.	0		0		0		0		0		0		0		0		0	2	0	4
| Family: Simuliidae	0		0	1	0		0	2	0		0	2	6	16	0		0		0	
Prosimulium	0		2		1		1		0		0		0		0		0		0	
| Family: Tipulidae	1		0		1		0		0		7		0		0		0		0	
Dicranota	0		0		1		0	2	6		0		0		3		0		4	
Hexatoma sp.	2	1	0		0		0		0		0		0		1		0		0	
Ormosia sp.	1		0		0		0		0		0		0	4	1		0		0	
Tipula	1		0		0		0		0		0		0		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
| Order: Lepidoptera	0		0		0		0		0		0	2	0		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
Subphylum: Chelicerata	0		0		0		0		0		0		0		0		0		0	
| Class: Arachnida	0		0		0		0		0		0		0		0		0		0	
| Order: Trombidiformes	0		0		0		0		0		0		0		0		0		0	
| Family: Arrenuridae	0		0		0		0		0		0		0		0		0		0	
Arrenurus sp.	0		0		0		0		0		0		0		0		0		4	
| Family: Aturidae	0		0		0		0		0		0		0		0		0		0	
Aturus	1		0		0		0		0		0		0		0		0		0	
| Family: Feltriidae	0		0		0		0		0		0		0		0		0		0	
Feltria sp.	1		0		0		0	2	0		0		0		0		0		0	
| Family: Hygrobatidae	0		0		0		0		0		0		0		0		0		0	
Atractides	0		1	1	3		0		0		0		0		0		0		0	
Hygrobates	0	1	0		0		0		0		0		0		2		5		0	
| Family: Lebertiidae	0		0		0		0		0		0		0		0		0		0	
Lebertia	8	3	4	2	1	13	17	16	28	16	40	9	78	8	11	10	11		7	4
| Family: Sperchontidae	0		0		0		0		0		0		0		0		0		0	
Sperchon	9	7	7		4	7	21	6	0	5	13	4	22		4	35	37	15	32	26
	0		0		0		0		0		0		0		0		0		0	
| Order: Oribatei	0		0		0		0		0		0		0		0		0		0	
| Family: Oribatidae	0		0		0		0		0		0		0		0		0		0	
Oribatida	0		0		0		0	2	0		0		0		0		5		0	
	0		0		0		0		0		0		0		0		0		0	
Phylum: Mollusca	0		0		0		0		0		0		0		0		0		0	
| Class: Gastropoda	0		0		0		0		0		0		0		0		0		0	
| Order: Basommatophora	0		0		0		0		0		0		0		0		0		0	
| Family: Lymnaeidae	0		0		0		0		0		0		0		0		0		0	
Stagnicola	0		0		0		0		0		0	2	0		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
Phylum: Annelida	0		0		0		0		0		0		0		0		0		0	
Subphylum: Clitellata	0		0		0		0		0		0		0		0		0		0	
| Class: Oligochaeta	0		0		0	13	0		0		0		0		0		0		0	
| Order: Tubificida	0		0		0		0		0		0		0		0		0		0	
| Family: Enchytraeidae	0		0		0		0		0		0		0		0		0		0	
Enchytraeus	0		0		0		0		0		0		0		0		0		7	
All others	0		0		0		0		0		0		0		0		0	3	0	
Totals:	**620**	**200**	**216**	**258**	**452**	**2321**	**565**	**634**	**2224**	**847**	**2207**	**720**	**1767**	**2088**	**247**	**1865**	**1717**	**497**	**1197**	**729**

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Taxa present but not included:																				
Phylum: Arthropoda	0		0		0		0		0		0		0		0		0		0	
| Class: Entognatha	0		0		0		0		0		0		0		0		0		0	
| Order: Collembola	0		0		0		0		0		0		6		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
Subphylum: Crustacea	0		0		0		0		0		0		0		0		0		0	
| Class: Ostracoda	40	20	0	1	1		0		6	13	13		22		3		0		0	
	0		0		0		0		0		0		0		0		0		0	
Phylum: Nemata	5		5	4	14	13	7		28	5	27		6	36	1		16	11	7	4
Phylum: Platyhelminthes	0		0		0		0		0		0		0		0		0		0	
| Class: Turbellaria	0		0		0	7	0		0		0		0		1		0		0	
Totals:	**45**	**20**	**5**	**5**	**15**	**20**	**7**	**0**	**34**	**18**	**40**	**0**	**34**	**36**	**5**	**0**	**16**	**11**	**7**	**4**

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site:	W12	W12	W12	W12	W12	W13	W13
Sample:	A	B	C	D	E	A	B
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638
EMS:							
Richness Measures							
Species Richness	42	26	32	33	45	20	27
EPT Richness	17	13	20	24	28	9	19
Ephemeroptera Richness	3	1	5	7	7	1	1
Plecoptera Richness	10	8	11	9	11	6	12
Trichoptera Richness	4	4	4	8	10	2	6
Chironomidae Richness	12	7	5	4	8	7	4
Oligochaeta Richness						1	
Non-Chiro. Non-Olig. Richness							
Abundance Measures							
Corrected Abundance	620	200	216	258	452	2321	565
EPT Abundance	135	44	74	118	200	447	254
Dominance Measures							
1st Dominant Taxon	Orthocladius complex	Orthocladius complex	Diamesa	Diamesa	Diamesa	Diamesa	Pagastia
1st Dominant Abundance	176	50	52	88	104	833	211
2nd Dominant Taxon	Pericoma/Telmatoscopus sp	Pericoma/Telmatoscop	Pagastia	Pagastia	Pagastia	Pagastia	Nemouridae
2nd Dominant Abundance	145	49	33	33	43	820	105
3rd Dominant Taxon	Capniidae	Capniidae	Orthocladius complex	Nemouridae	Capniidae	Neothremma sp.	Neothremma sp.
3rd Dominant Abundance	55	17	24	20	36	247	85
% 1 Dominant Taxon	28.39%	25.00%	24.07%	34.11%	23.01%	35.89%	37.35%
% 2 Dominant Taxa	23.39%	24.50%	15.28%	12.79%	9.51%	35.33%	18.58%
% 3 Dominant Taxa	8.87%	8.50%	11.11%	7.75%	7.96%	10.64%	15.04%
Community Composition							
% Ephemeroptera	1.29%	0.50%	4.63%	11.24%	5.09%	0.30%	0.18%
% Plecoptera	19.35%	18.00%	23.61%	23.26%	28.10%	8.06%	27.79%
% Trichoptera	1.13%	3.50%	6.02%	11.24%	11.06%	10.90%	16.99%
% EPT	21.77%	22.00%	34.26%	45.74%	44.25%	19.26%	44.96%
% Diptera	75.16%	72.50%	60.19%	53.10%	55.31%	79.28%	48.85%
% Oligochaeta						0.56%	
% Baetidae	0.16%		3.24%	3.10%	1.77%		0.18%
% Chironomidae	46.77%	40.50%	53.24%	49.22%	48.01%	78.72%	48.32%
% Odonata							

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site:	W13	W13	W13	W16	W16	W16	W16
Sample:	C	D	E	A	B	C	D
CC#:	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645
EMS:							
Richness Measures							
Species Richness	22	20	24	17	20	24	24
EPT Richness	10	11	16	6	9	13	15
Ephemeroptera Richness			1		1	1	5
Plecoptera Richness	8	7	11	6	7	7	5
Trichoptera Richness	2	4	4		1	5	5
Chironomidae Richness	5	5	4	6	4	6	4
Oligochaeta Richness							
Non-Chiro. Non-Olig. Richness							
Abundance Measures							
Corrected Abundance	634	2224	847	2207	720	1767	2088
EPT Abundance	318	678	426	120	159	179	156
Dominance Measures							
1st Dominant Taxon	Nemouridae	Pagastia	Pagastia	Diamesa	Diamesa	Diamesa	Eukiefferiella
1st Dominant Abundance	138	694	195	1127	351	667	1176
2nd Dominant Taxon	Pagastia	Diamesa	Capniidae	Pagastia	Pagastia	Pagastia	Pagastia
2nd Dominant Abundance	138	683	137	740	127	628	600
3rd Dominant Taxon	Diamesa	Neothremma sp.	Diamesa	Zapada oregonensis gr	Zapada oregonensis gr	Lebertia	Pericoma/Telmatoscop
3rd Dominant Abundance	80	283	118	67	56	78	44
% 1 Dominant Taxon	21.77%	31.21%	23.02%	51.06%	48.75%	37.75%	56.32%
% 2 Dominant Taxa	21.77%	30.71%	16.17%	33.53%	17.64%	35.54%	28.74%
% 3 Dominant Taxa	12.62%	12.72%	13.93%	3.04%	7.78%	4.41%	2.11%
Community Composition							
% Ephemeroptera			0.59%		1.81%	0.34%	1.72%
% Plecoptera	41.96%	17.00%	43.45%	5.44%	19.72%	8.21%	4.21%
% Trichoptera	8.20%	13.49%	6.26%		0.56%	1.58%	1.53%
% EPT	50.16%	30.49%	50.30%	5.44%	22.08%	10.13%	7.47%
% Diptera	45.74%	68.21%	47.23%	92.12%	75.56%	83.93%	92.15%
% Oligochaeta							
% Baetidae					1.81%	0.34%	0.96%
% Chironomidae	44.48%	67.18%	45.93%	86.68%	72.78%	79.57%	88.12%
% Odonata							

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site:	W16	W76	W76	W76	W76	W76
Sample:	E	A	B	C	D	E
CC#:	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:						
Richness Measures						
Species Richness	30	30	34	26	25	33
EPT Richness	12	17	23	18	14	21
Ephemeroptera Richness	1	5	8	5	4	8
Plecoptera Richness	7	9	11	10	8	7
Trichoptera Richness	4	3	4	3	2	6
Chironomidae Richness	8	7	6	3	6	6
Oligochaeta Richness					1	
Non-Chiro. Non-Olig. Richness						
Abundance Measures						
Corrected Abundance	247	1865	1717	497	1197	729
EPT Abundance	75	350	453	329	303	239
Dominance Measures						
1st Dominant Taxon	Pseudodiamesa sp.	Pagastia	Pagastia	Pagastia	Pagastia	Pagastia
1st Dominant Abundance	64	840	768	129	518	222
2nd Dominant Taxon	Sweltsa sp.	Eukiefferiella	Eukiefferiella	Suwallia	Eukiefferiella	Eukiefferiella
2nd Dominant Abundance	25	390	368	91	232	126
3rd Dominant Taxon	Chelifera/ Metachela	Orthocladius complex	Capniidae	Heptageniidae	Zapada oregonensis gr	Orthocladius complex
3rd Dominant Abundance	22	90	63	49	46	76
% 1 Dominant Taxon	25.91%	45.04%	44.73%	25.96%	43.27%	30.45%
% 2 Dominant Taxa	10.12%	20.91%	21.43%	18.31%	19.38%	17.28%
% 3 Dominant Taxa	8.91%	4.83%	3.67%	9.86%	3.84%	10.43%
Community Composition						
% Ephemeroptera	0.40%	5.09%	7.05%	14.29%	5.10%	6.04%
% Plecoptera	28.34%	12.87%	16.89%	50.10%	16.37%	21.40%
% Trichoptera	1.62%	0.80%	2.45%	1.81%	3.84%	5.35%
% EPT	30.36%	18.77%	26.38%	66.20%	25.31%	32.78%
% Diptera	62.75%	78.82%	70.18%	29.38%	70.43%	63.24%
% Oligochaeta					0.58%	
% Baetidae	0.40%	0.54%	0.93%		1.50%	1.51%
% Chironomidae	47.37%	75.07%	69.60%	27.16%	70.09%	60.49%
% Odonata						

Site:	W12	W12	W12	W12	W13	W13	
Sample:	A	B	C	D	E	A	B
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638
EMS:							
Functional Group Composition							
% Predators	11.45%	22.00%	19.91%	17.05%	11.73%	2.89%	11.68%
% Shredder-Herbivores	5.97%	3.00%	9.72%	10.47%	12.61%	4.31%	20.00%
% Collector-Gatherers	65.81%	63.50%	58.33%	53.10%	51.33%	77.51%	46.02%
% Scrapers		0.50%	0.46%	1.16%	1.55%	10.64%	15.04%
% MH		0.50%	2.31%	1.55%	3.54%		0.18%
% CF	0.65%		0.93%	1.94%	2.21%		0.18%
% OM	2.90%	1.00%			1.77%	0.86%	0.71%
% PA							
% Piercer-Herbivore							
% Gatherer							
% Unclassified	13.23%	9.50%	8.33%	14.73%	15.27%	3.79%	6.19%
Functional Group Richness							
Predators Richness	15	13	12	10	13	5	10
Shredder-Herbivores Richness	5	2	5	3	5	2	5
Collector-Gatherers Richness	10	6	9	9	9	6	4
Scrapers Richness		1	1	2	2	1	1
MH Richness		1	1	1	1		1
CF Richness	1		1	2	3		1
OM Richness	3	1			2	2	1
PA Richness							
Piercer-Herbivore Richness							
Gatherer Richness							
Unclassified	8	2	3	6	10	4	4
Diversity/Evenness Measures							
Shannon-Weiner H' (log 10)	1.08	1.05	1.19	1.14	1.29	0.75	0.90
Shannon-Weiner H' (log 2)	3.58	3.50	3.95	3.77	4.29	2.49	2.99
Shannon-Weiner H' (log e)	2.48	2.43	2.74	2.61	2.97	1.72	2.07
Simpson's Index (D)	0.15	0.14	0.10	0.15	0.09	0.27	0.20
Simpson's Index of Diversity (1 - D)	0.85	0.86	0.90	0.85	0.91	0.73	0.80
Simpson's Reciprocal Index (1/D)	6.56	7.12	9.65	6.83	11.51	3.72	4.91
Biotic Indices							
Hilsenhoff Biotic Index	4.15	4.17	3.26	2.62	2.84	2.70	1.64

Site:	W13	W13	W13	W16	W16	W16	W16
Sample:	C	D	E	A	B	C	D
CC#:	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645
EMS:							
Functional Group Composition							
% Predators	7.89%	5.80%	9.09%	5.44%	5.42%	10.47%	2.68%
% Shredder-Herbivores	27.13%	8.77%	18.89%	4.53%	15.42%	5.66%	3.83%
% Collector-Gatherers	43.85%	65.92%	44.75%	87.00%	75.28%	76.46%	33.91%
% Scrapers	7.57%	12.72%	4.96%		0.28%		0.77%
% MH			0.35%				
% CF	0.32%			0.32%	0.28%	4.13%	0.77%
% OM	0.63%	0.27%	0.35%	0.32%		0.34%	57.47%
% PA							
% Piercer-Herbivore							
% Gatherer							
% Unclassified	12.62%	6.52%	21.61%	2.40%	3.33%	2.94%	0.57%
Functional Group Richness							
Predators Richness	8	6	7	4	7	7	7
Shredder-Herbivores Richness	3	3	4	4	3	3	3
Collector-Gatherers Richness	4	4	4	3	5	6	6
Scrapers Richness	1	1	1		1		3
MH Richness			1				
CF Richness	1			1	1	2	1
OM Richness	1	1	1	1		1	2
PA Richness							
Piercer-Herbivore Richness							
Gatherer Richness							
Unclassified	4	5	6	4	3	5	2
Diversity/Evenness Measures							
Shannon-Weiner H' (log 10)	1.01	0.82	1.08	0.59	0.79	0.78	0.60
Shannon-Weiner H' (log 2)	3.35	2.72	3.60	1.96	2.62	2.59	1.99
Shannon-Weiner H' (log e)	2.32	1.89	2.49	1.36	1.81	1.79	1.38
Simpson's Index (D)	0.13	0.22	0.12	0.38	0.28	0.28	0.40
Simpson's Index of Diversity (1 - D)	0.87	0.78	0.88	0.62	0.72	0.72	0.60
Simpson's Reciprocal Index (1/D)	7.46	4.58	8.53	2.66	3.54	3.63	2.49
Biotic Indices							
Hilsenhoff Biotic Index	1.94	2.48	2.01	3.53	3.62	3.43	5.30

Site:	W16	W76	W76	W76	W76	W76
Sample:	E	A	B	C	D	E
CC#:	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:						
Functional Group Composition						
% Predators	29.15%	8.85%	9.84%	32.60%	11.11%	14.68%
% Shredder-Herbivores	12.55%	3.49%	4.02%	11.87%	5.93%	4.25%
% Collector-Gatherers	41.30%	51.47%	48.75%	27.97%	51.38%	44.31%
% Scrapers	0.40%	1.07%	1.22%	1.41%	0.92%	0.55%
% MH		0.27%	1.51%	1.01%	3.26%	2.33%
% CF	4.05%	3.22%	1.22%			0.96%
% OM	2.43%	21.18%	21.43%		20.89%	18.79%
% PA						
% Piercer-Herbivore						
% Gatherer						
% Unclassified	10.12%	10.46%	12.00%	25.15%	6.52%	14.13%
Functional Group Richness						
Predators Richness	11	10	10	9	8	10
Shredder-Herbivores Richness	3	3	4	4	3	2
Collector-Gatherers Richness	8	5	6	5	6	9
Scrapers Richness	1	2	3	2	1	2
MH Richness		1	1	1	1	1
CF Richness	1	1	1			1
OM Richness	2	2	1		2	2
PA Richness						
Piercer-Herbivore Richness						
Gatherer Richness						
Unclassified	4	6	8	5	4	6
Diversity/Evenness Measures						
Shannon-Weiner H' (log 10)	1.16	0.90	0.92	1.07	0.93	1.08
Shannon-Weiner H' (log 2)	3.87	2.97	3.05	3.55	3.09	3.59
Shannon-Weiner H' (log e)	2.68	2.06	2.11	2.46	2.14	2.49
Simpson's Index (D)	0.10	0.25	0.25	0.13	0.23	0.14
Simpson's Index of Diversity (1 - D)	0.90	0.75	0.75	0.87	0.77	0.86
Simpson's Reciprocal Index (1/D)	9.53	3.94	3.97	7.74	4.30	6.92
Biotic Indices						
Hilsenhoff Biotic Index	4.15	3.10	2.82	1.05	3.07	3.22

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Sieve Size:	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
SubSample %:	100	100	100	100	70	15	75	50	18	38	15	45	18	25	100	20	19	65	28	46
Phylum: Arthropoda	0		0		0		0		0		0		0		0		0		0	
Subphylum: Hexapoda	0		0		0		0		0		0		0		0		0		0	
| Class: Insecta	0		0		0		0		0		0		0		0		0		0	
| Order: Ephemeroptera	0		0		0		0		0		0		0		0		0		0	
| Family: Ameletidae	0		0		0		0		0		0		0		0		0		0	
Ameletus	0		1		0		0		0		0		0		0		0		0	
| Family: Baetidae	1		0	3	4		0		0		0		0	2	0	2	3		5	2
Acentrella sp.	0		0		0		0		0		0		0		0		0		0	3
Baetis	0		6	4	1		1		0		0	6	1	3	1		0		0	
Baetis bicaudatus	0		1	1	1		0		0		0		0		0		0		0	
| Family: Ephemerellidae	5		0	3	3	1	0		0		0		0		0	8	2	9	3	1
Drunella coloradensis	0		0		1		0		0		0		0		0		0		0	
Drunella doddsii	0		0		0		0		0		0		0		0		1		0	1
Drunella sp.	0		0		0		0		0		0		0		0		3		0	1
Ephemerella verruca	0		1	1	0		0		0		0		0		0		0	1	0	
| Family: Heptageniidae	2		1	15	5		0		0	2	0		0	2	0	5	10	32	6	10
Cinygmula sp.	0	1	0		0		0		0		0		0		0	2	0		3	
Epeorus deceptivus	0		0		0		0		0		0		0		0		1		0	
Epeorus longimanus	0		0		0		0		0		0		0	1	0		1		0	1
Epeorus sp.	0		0	2	1		0		0		0		0	1	0		2	3	0	1
Rhithrogena	0		0		0		0		0		0		0		0	2	0	1	0	
	0		0		0		0		0		0		0		0		0		0	
| Order: Plecoptera	0		0		3		1		0	2	0		0		0		0		0	2
| Family: Capniidae	55	17	7	6	25	7	6	30	16	52	2		1		1	15	12	11	7	15
Capnura sp.	16		0		1	6	0		0	10	0		0		0	3	1	3	1	
| Family: Chloroperlidae	10	2	10	4	5		8	6	2	5	2	8	5		12	3	10	27	6	15
Kathroperla sp.	5	3	6	8	5		1		0		0		0		1	2	4	15	0	
Paraperla sp.	0	2	3	9	10	4	1		0		0		0		0		0		0	
Plumiperla sp.	0		0		0		0		0		0		1		0	2	0		9	
Suwallia	3		0		0		1	2	11	13	0	1	1		0	5	7	59	3	18
Sweltsa sp.	10	4	1		0		8	7	4	2	1	2	0		25	8	6	10	10	8
| Family: Leuctridae	0		0		0	1	0	2	0		0		0		0		2		0	
Despaxia augusta	0		0		0		1		0		0		0		0		0	1	0	
| Family: Nemouridae	6	2	13	20	18	9	79	69	1	18	2	19	6	8	6	3	2	24	6	5
Nemoura	0		1		0		0		0		0		0		0		0		0	
Zapada	1		0	2	3		1	4	2	14	1	6	2	3	7		2		0	
Zapada cinctipes	0		0		4		0		0		0		0		0		0		0	
Zapada columbiana	0		1		0		0		0		0		0		0		0		0	
Zapada oregonensis group	13	4	4	5	14		4	13	32	19	10	25	10	9	18	7	8	10	13	9

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Sieve Size:	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
SubSample %:	100	100	100	100	70	15	75	50	18	38	15	45	18	25	100	20	19	65	28	46
| **Family: Perlodidae**	0	2	4	3	1	1	7		0	4	0	3	0	1	0		1	2	0	
Diura sp.	0		1		0		0		0		0		0		0		0		0	
Kogotus sp.	1		0		0		0		0		0		0		0		0		0	
Megarcys sp.	0		0		0		0		0	1	0		0	1	0		0		0	
Skwala	0		0	3	0		0		0		0		0		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
| **Order: Trichoptera**	0		0	4	0		0		1	2	0		1		0		0		0	4
| **Family: Brachycentridae**	0		0		3		0		0		0		0		0		0		0	
Brachycentrus americanus	0		0		1		0		0		0		0		0		0		0	
Micrasema	0	1	5	4	11		0		0		0		0		0	1	5	3	11	8
| **Family: Glossosomatidae**	0		0		1		0		0		0		0		0		1		0	
| **Family: Hydropsychidae**	0		0	4	4		0		0		0		0		0		0		0	3
Arctopsyche sp.	0		0	4	0		0		0		0		0	1	0	1	0	2	2	1
| **Family: Limnephilidae**	0		0		0		0		0		0		0	1	0		1		0	
Desmona sp.	0		0		0		1		0		0		0		0		0		0	
Ecclisomyia sp.	0		0		0	1	3	2	1	1	0		1		1		0		0	
| **Family: Rhyacophilidae**	1		0	6	0		0		0		0		0		0		0		0	
Rhyacophila	1	2	4	5	5		2		1		0		1	3	1		1		0	
Rhyacophila betteni group	0	2	0		0		0		0		0		0		0		0		0	
Rhyacophila hyalinata group	0		0		0		0		0		0		0		0		0		0	1
Rhyacophila verrula group	0		0		0		1		0	1	0		0		0		0		0	
Rhyacophila viquaea	4		0		1		0		0		0		0		0		0		0	
Rhyacophila vofixa group	1	2	3	1	2		1		0		0	2	1	1	1	1	0	1	0	1
| **Family: Uenoidae**	0		0		3		0		0		0		1		0		0		0	
Neothremma sp.	0		1	1	4	37	64	24	51	16	0		0	2	1		0		0	
	0		0		0		0		0		0		0		0		0		0	
| **Order: Diptera**	1		0		0		0	2	2		0		0		8	7	0		0	
| **Family: Ceratopogonidae**	0		0		0		0		0		0		0		0		0		0	
Probezzia	2		0		0		0		0		0		0		1	1	0	1	0	1
| **Family: Chironomidae**	7		0		1	4	11		5	7	3	2	1		4	1	1		0	
| **Subfamily: Chironominae**	0		0		0		0		0		0		0		0		0		0	
| **Tribe: Tanytarsini**	0		0		0		0		0		0		0		0		0		0	
Micropsectra	0		0		0		0		0		0		0		0		0	2	7	1
Stempellina sp.	9		0		0		0		0		0		0		0		0		0	
Tanytarsus	4		0		2		0		0		1		12		10	12	4		0	
| **Subfamily: Diamesinae**	0		0		0		0		0		0		0		0		0		0	
| **Tribe: Diamesini**	0		0		0		0		0		0		0		0		0		0	
Diamesa	26	13	52	88	73	125	25	40	123	45	169	158	120		0		0		0	
Pagastia	8	6	33	33	30	123	158	69	125	74	111	57	113	150	13	168	146	84	145	102
Pseudodiamesa sp.	40	8	4		0	2	0	5	0		0		3		64		0		0	
| **Subfamily: Orthocladiinae**	0		0		0		0		0		0		0		0		0		0	
Brillia sp.	1		2		0		0		0		2		0		0		0		0	
Eukiefferiella	3		0		0		0		0		0		0	294	5	78	70		65	58
Limnophyes sp.	0		0		0		0		0		0		0		2	2	0		0	
Metriocnemus sp.	0		0		0	2	0		1		0		0		0		0		0	
Nanocladius	0	1	0		0		0		0		0		0		1		0		0	
Orthocladius complex	176	50	24	4	15	16	11	25	15	22	0	19	4	10	18	18	4	2	10	35
Rheocricotopus	14	2	0		5	2	0		0		1		0	6	0	1	0		5	5
Tvetenia	1		0	2	25		0		0		0		0		0		2		3	2

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76	
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651	
EMS:																					
Sieve Size:	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	
SubSample %:	100	100	100	100	70	15	75	50	18	38	15	45	18	25	100	20	19	65	28	46	
| Tribe: Corynoneurini	0		0		0		0		0		0		0		0		0		0		
Corynoneura	1		0		1		0		0		0		0		0		0		0		
| Subfamily: Tanypodinae	0		0		0		0		0		0		0		0		0		0		
| Tribe: Pentaneuriini	0		0		0		0		0		0		0		0		0		0		
Thienemannimyia group	0	1	0		0		0	2	0		0		0		0		0		0		
| Family: Empididae	1		1		4		0		0		0		0		0		0		0		
Chelifera/ Metachela	22	14	8	8	3	2	0		0	1	9	4	11	5	22	4	2	5	0	5	
Hemerodromia sp.	0		0		0		0		1		0		0		0		0		0		
Oreogeton sp.	0		0		0		1		0		0		0		0		0		0	1	
| Family: Psychodidae	0		0		0		0		0		0		0		0		0		0		
Pericoma/Telmatoscopus sp.	145	49	4	1	13		0		0	3	8	4	2	11	2	2	0		0		
Psychoda sp.	0		0		0		0		0		0		0		0		0	1	0	2	
| Family: Simuliidae	0		0	1	0		0	1	0		0	1	1	4	0		0		0		
Prosimulium	0		2		1		1		0		0		0		0		0		0		
| Family: Tipulidae	1		0		1		0		0		1		0		0		0		0		
Dicranota	0		0		1		0	1	1		0		0		3		0		1		
Hexatoma sp.	2	1	0		0		0		0		0		0		1		0		0		
Ormosia sp.	1		0		0		0		0		0		0	1	1		0		0		
Tipula	1		0		0		0		0		0		0		0		0		0		
	0		0		0		0		0		0		0		0		0		0		
| Order: Lepidoptera	0		0		0		0		0		0	1	0		0		0		0		
	0		0		0		0		0		0		0		0		0		0		
Subphylum: Chelicerata	0		0		0		0		0		0		0		0		0		0		
| Class: Arachnida	0		0		0		0		0		0		0		0		0		0		
| Order: Trombidiformes	0		0		0		0		0		0		0		0		0		0		
| Family: Arrenuridae	0		0		0		0		0		0		0		0		0		0		
Arrenurus sp.	0		0		0		0		0		0		0		0		0		1		
| Family: Aturidae	0		0		0		0		0		0		0		0		0		0		
Aturus	1		0		0		0		0		0		0		0		0		0		
| Family: Feltriidae	0		0		0		0		0		0		0		0		0		0		
Feltria sp.	1		0		0		0	1	0		0		0		0		0		0		
| Family: Hygrobatidae	0		0		0		0		0		0		0		0		0		0		
Atractides	0		1	1	2		0		0		0		0		0		0		0		
Hygrobates	0	1	0		0		0		0		0		0		2		1		0		
| Family: Lebertiidae	0		0		0		0		0		0		0		0		0		0		
Lebertia	8	3	4	2	1	2	13	8	5	6	6	4	14	2	11	2	2		2	2	
| Family: Sperchontidae	0		0		0		0		0		0		0		0		0		0		
Sperchon	9	7	7		3	1	16	3	0	2	2	2	4		4	7	7	10	9	12	
	0		0		0		0		0		0		0		0		0		0		
| Order: Oribatei	0		0		0		0		0		0		0		0		0		0		
| Family: Oribatidae	0		0		0		0		0		0		0		0		0		0		
Oribatida	0		0		0		0	1	0		0		0		0		1		0		
	0		0		0		0		0		0		0		0		0		0		
Phylum: Mollusca	0		0		0		0		0		0		0		0		0		0		
| Class: Gastropoda	0		0		0		0		0		0		0		0		0		0		
| Order: Basommatophora	0		0		0		0		0		0		0		0		0		0		
| Family: Lymnaeidae	0		0		0		0		0		0		0		0		0		0		
Stagnicola	0		0		0		0		0		0	1	0		0		0		0		
	0		0		0		0		0		0		0		0		0		0		

Site:	W12	W12	W12	W12	W12	W13	W13	W13	W13	W13	W16	W16	W16	W16	W16	W76	W76	W76	W76	W76
Sample:	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
CC#:	CC150632	CC150633	CC150634	CC150635	CC150636	CC150637	CC150638	CC150639	CC150640	CC150641	CC150642	CC150643	CC150644	CC150645	CC150646	CC150647	CC150648	CC150649	CC150650	CC150651
EMS:																				
Sieve Size:	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
SubSample %:	100	100	100	100	70	15	75	50	18	38	15	45	18	25	100	20	19	65	28	46
Phylum: Annelida	0		0		0		0		0		0		0		0		0		0	
Subphylum: Clitellata	0		0		0		0		0		0		0		0		0		0	
| Class: Oligochaeta	0		0		0	2	0		0		0		0		0		0		0	
| Order: Tubificida	0		0		0		0		0		0		0		0		0		0	
| Family: Enchytraeidae	0		0		0		0		0		0		0		0		0		0	
Enchytraeus	0		0		0		0		0		0		0		0		0		2	
All others	0		0		0		0		0		0		0		0		0	2	0	
Totals:	**620**	**200**	**216**	**258**	**321**	**348**	**427**	**317**	**400**	**322**	**331**	**325**	**317**	**522**	**247**	**373**	**326**	**321**	**335**	**336**

Taxa present but not included:

Phylum: Arthropoda	0		0		0		0		0		0		0		0		0		0	
| Class: Entognatha	0		0		0		0		0		0		0		0		0		0	
| Order: Collembola	0		0		0		0		0		0		1		0		0		0	
	0		0		0		0		0		0		0		0		0		0	
Subphylum: Crustacea	0		0		0		0		0		0		0		0		0		0	
| Class: Ostracoda	40	20	0	1	1		0		1	5	2		4		3		0		0	
	0		0		0		0		0		0		0		0		0		0	
Phylum: Nemata	5		5	4	10	2	5		5	2	4		1	9	1		3	7	2	2
Phylum: Platyhelminthes	0		0		0		0		0		0		0		0		0		0	
| Class: Turbellaria	0		0		0	1	0		0		0		0		1		0		0	
Totals:	**45**	**20**	**5**	**5**	**11**	**3**	**5**	**0**	**6**	**7**	**6**	**0**	**6**	**9**	**5**	**0**	**3**	**7**	**2**	**2**

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Site - W12 Sample - A, CC# - CC150632, Percent sampled = 100, Sieve size = 500

Rhyacophilidae	Juvenile/Dam	1	
Rhyacophila vofixa group	Larvae	1	
Rhyacophila viquaea	Larvae	4	
Ephemerellidae	Juvenile/Dam	5	
Baetidae	Juvenile/Dam	1	body only
Zapada	Larvae	1	
Zapada oregonensis group	Larvae	13	
Chloroperlidae	Juvenile/Dam	10	
Sweltsa sp.	Larvae	10	
Suwallia	Larvae	3	
Kathroperla sp.	Larvae	5	
Kogotus sp.	Larvae	1	
Capniidae	Juvenile/Dam	55	
Capnura sp.	Larvae	16	
Chelifera/ Metachela	Larvae	22	
Diptera	Juvenile/Dam	1	
Hexatoma sp.	Larvae	2	
Tipula	Larvae	1	
Ormosia sp.	Larvae	1	
Probezzia	Larvae	2	
Aturus	Larvae	1	
Feltria sp.	Larvae	1	
Sperchon	Larvae	9	
Lebertia	Larvae	8	
Tipulidae	Juvenile/Dam	1	
Pericoma/Telmatoscopus sp.	Larvae	145	
Chironomidae	Pupa	7	
Empididae	Pupa	1	
Pagastia	Larvae	8	
Pseudodiamesa sp.	Larvae	40	
Corynoneura	Larvae	1	
Brillia sp.	Larvae	1	
Diamesa	Larvae	26	
Stempellina sp.	Larvae	9	
Rheocricotopus	Larvae	14	
Eukiefferiella	Larvae	3	
Tvetenia	Larvae	1	
Tanytarsus	Larvae	4	
Orthocladius complex	Larvae	176	
Heptageniidae	Juvenile/Dam	2	
Nemouridae	Juvenile/Dam	6	
Rhyacophila	Larvae	1	
	Total:	**620**	

Site - W12 Sample - B, CC# - CC150633, Percent sampled = 100, Sieve size = 500		
Perlodidae	Juvenile/Dam	2
Cinygmula sp.	Larvae	1
Capniidae	Juvenile/Dam	17
Chloroperlidae	Juvenile/Dam	2
Nemouridae	Juvenile/Dam	2
Rhyacophila	Larvae	2
Rhyacophila vofixa group	Larvae	2
Micrasema	Larvae	1
Zapada oregonensis group	Larvae	4
Sweltsa sp.	Larvae	4
Rhyacophila betteni group	Larvae	2
Chelifera/ Metachela	Larvae	14
Hexatoma sp.	Larvae	1
Sperchon	Adult	7
Lebertia	Adult	3
Hygrobates	Adult	1
Rheocricotopus	Larvae	2
Diamesa	Larvae	13
Nanocladius	Larvae	1
Thienemannimyia group	Larvae	1
Pagastia	Larvae	6
Pseudodiamesa sp.	Larvae	8
Orthocladius complex	Larvae	50
Pericoma/Telmatoscopus sp.	Larvae	49
Kathroperla sp.	Larvae	3
Paraperla sp.	Larvae	2
Total:		**200**

Site - W12 Sample - C, CC# - CC150634, Percent sampled = 100, Sieve size = 500		
Paraperla sp.	Larvae	3
Pericoma/Telmatoscopus sp.	Larvae	4
Chelifera/ Metachela	Larvae	8
Empididae	Pupa	1
Prosimulium	Larvae	2
Diamesa	Larvae	52
Lebertia	Adult	4
Sperchon	Adult	7
Atractides	Adult	1
Pagastia	Larvae	33
Pseudodiamesa sp.	Larvae	4
Orthocladius complex	Larvae	24
Brillia sp.	Larvae	2
Neothremma sp.	Larvae	1
Micrasema	Larvae	5
Rhyacophila vofixa group	Larvae	3
Ephemerella verruca	Larvae	1
Heptageniidae	Juvenile/Dam	1
Baetis bicaudatus	Larvae	1
Capniidae	Juvenile/Dam	7
Ameletus	Larvae	1
Nemouridae	Juvenile/Dam	13
Nemoura	Larvae	1
Chloroperlidae	Juvenile/Dam	10
Zapada oregonensis group	Larvae	4
Zapada columbiana	Larvae	1
Kathroperla sp.	Larvae	6
Sweltsa sp.	Larvae	1
Diura sp.	Larvae	1
Baetis	Larvae	6
Perlodidae	Juvenile/Dam	4
Rhyacophila	Larvae	4
Total:		**216**

Site - W12 Sample - D, CC# - CC150635, Percent sampled = 100, Sieve size = 500		
Trichoptera	Juvenile/Dam	4
Baetidae	Juvenile/Dam	3
Ephemerellidae	Juvenile/Dam	3
Heptageniidae	Juvenile/Dam	15
Capniidae	Juvenile/Dam	6
Chloroperlidae	Juvenile/Dam	4
Nemouridae	Juvenile/Dam	20
Perlodidae	Juvenile/Dam	3
Hydropsychidae	Juvenile/Dam	4
Rhyacophilidae	Juvenile/Dam	6
Epeorus sp.	Larvae	2
Skwala	Larvae	3
Zapada	Larvae	2
Zapada oregonensis group	Larvae	5
Baetis	Larvae	4
Baetis bicaudatus	Larvae	1
Ephemerella verruca	Larvae	1
Neothremma sp.	Larvae	1
Rhyacophila	Larvae	5
Arctopsyche sp.	Larvae	4
Rhyacophila vofixa group	Larvae	1
Micrasema	Larvae	4
Chelifera/ Metachela	Larvae	8
Pericoma/Telmatoscopus sp.	Larvae	1
Simuliidae	Juvenile/Dam	1
Lebertia	Adult	2
Atractides	Adult	1
Orthocladius complex	Larvae	4
Tvetenia	Larvae	2
Diamesa	Larvae	88
Pagastia	Larvae	33
Kathroperla sp.	Larvae	8
Paraperla sp.	Larvae	9
	Total:	**258**

Site - W12 Sample - E, CC# - CC150636, Percent sampled = 70, Sieve size = 500		
Pericoma/Telmatoscopus sp.	Larvae	13
Chelifera/ Metachela	Larvae	3
Dicranota	Larvae	1
Prosimulium	Larvae	1
Tipulidae	Larvae	1
Lebertia	Adult	1
Sperchon	Adult	3
Atractides	Adult	2
Chironomidae	Pupa	1
Diamesa	Larvae	73
Pagastia	Larvae	30
Corynoneura	Larvae	1
Tvetenia	Larvae	25
Rheocricotopus	Larvae	5
Tanytarsus	Larvae	2
Orthocladius complex	Larvae	15
Baetis	None	1
Baetis bicaudatus	None	1
Epeorus sp.	None	1
Drunella coloradensis	None	1
Micrasema	None	11
Hydropsychidae	None	4
Glossosomatidae	None	1
Brachycentrus americanus	None	1
Rhyacophila vofixa group	None	2
Uenoidae	None	3
Brachycentridae	None	3
Neothremma sp.	None	4
Rhyacophila viquaea	None	1
Nemouridae	None	18
Capniidae	None	25
Zapada	None	3
Zapada cinctipes	None	4
Zapada oregonensis group	None	14
Perlodidae	None	1
Chloroperlidae	None	5
Capnura sp.	None	1
Kathroperla sp.	None	5
Paraperla sp.	None	10
Ephemerellidae	None	3
Plecoptera	None	3
Rhyacophila	None	5
Baetidae	None	4
Heptageniidae	None	5
Empididae	None	4
Total:		**321**

Site - W13 Sample - A, CC# - CC150637, Percent sampled = 15, Sieve size = 500		
Oligochaeta	None	2
Ephemerellidae	None	1
Capniidae	None	7
Paraperla sp.	None	4
Nemouridae	None	9
Perlodidae	None	1
Neothremma sp.	None	37
Lebertia	Adult	2
Sperchon	Adult	1
Chelifera/ Metachela	Larvae	2
Chironomidae	Pupa	4
Diamesa	Larvae	125
Metriocnemus sp.	Larvae	2
Pseudodiamesa sp.	Larvae	2
Pagastia	Larvae	123
Orthocladius complex	Larvae	16
Rheocricotopus	Larvae	2
Capnura sp.	None	6
Leuctridae	None	1
Ecclisomyia sp.	None	1
	Total:	**348**

Site - W13 Sample - B, CC# - CC150638, Percent sampled = 75, Sieve size = 500		
Ecclisomyia sp.	None	3
Rhyacophila	None	2
Rhyacophila vofixa group	None	1
Rhyacophila verrula group	None	1
Desmona sp.	None	1
Nemouridae	None	79
Zapada	None	1
Zapada oregonensis group	None	4
Capniidae	None	6
Chloroperlidae	None	8
Perlodidae	None	7
Sweltsa sp.	None	8
Kathroperla sp.	None	1
Paraperla sp.	None	1
Suwallia	None	1
Despaxia augusta	None	1
Oreogeton sp.	Larvae	1
Prosimulium	Larvae	1
Sperchon	Adult	16
Lebertia	Adult	13
Chironomidae	Pupa	11
Diamesa	Larvae	25
Orthocladius complex	Larvae	11
Pagastia	Larvae	158
Baetis	None	1
Plecoptera	None	1
Neothremma sp.	None	64
	Total:	**427**

Site - W13 Sample - C, CC# - CC150639, Percent sampled = 50, Sieve size = 500		
Nemouridae	None	69
Neothremma sp.	None	24
Diptera	None	2
Lebertia	Adult	8
Sperchon	Adult	3
Feltria sp.	Adult	1
Oribatida	Adult	1
Simuliidae	Pupa	1
Dicranota	Larvae	1
Pseudodiamesa sp.	Larvae	5
Thienemannimyia group	Larvae	2
Diamesa	Larvae	40
Pagastia	Larvae	69
Orthocladius complex	Larvae	25
Ecclisomyia sp.	None	2
Zapada	None	4
Zapada oregonensis group	None	13
Capniidae	None	30
Leuctridae	None	2
Chloroperlidae	None	6
Suwallia	None	2
Sweltsa sp.	None	7
	Total:	**317**

Site - W13 Sample - D, CC# - CC150640, Percent sampled = 18, Sieve size = 500		
Nemouridae	None	1
Neothremma sp.	None	51
Ecclisomyia sp.	None	1
Rhyacophila	None	1
Zapada oregonensis group	None	32
Zapada	None	2
Sweltsa sp.	None	4
Suwallia	None	11
Chloroperlidae	None	2
Lebertia	Adult	5
Hemerodromia sp.	Larvae	1
Dicranota	Larvae	1
Chironomidae	Pupa	5
Metriocnemus sp.	Larvae	1
Diamesa	Larvae	123
Orthocladius complex	Larvae	15
Pagastia	Larvae	125
Capniidae	None	16
Trichoptera	None	1
Diptera	None	2
	Total:	**400**

Site - W13 Sample - E, CC# - CC150641, Percent sampled = 38, Sieve size = 500		
Plecoptera	None	2
Trichoptera	None	2
Heptageniidae	None	2
Capniidae	None	52
Chloroperlidae	None	5
Nemouridae	None	18
Perlodidae	None	4
Neothremma sp.	None	16
Chelifera/ Metachela	Larvae	1
Pericoma/Telmatoscopus sp.	None	3
Chironomidae	Pupa	7
Diamesa	Larvae	45
Orthocladius complex	Larvae	22
Pagastia	Larvae	74
Lebertia	Larvae	6
Sperchon	Larvae	2
Megarcys sp.	None	1
Ecclisomyia sp.	None	1
Rhyacophila verrula group	None	1
Zapada	None	14
Zapada oregonensis group	None	19
Sweltsa sp.	None	2
Suwallia	None	13
Capnura sp.	None	10
	Total:	**322**

Site - W16 Sample - A, CC# - CC150642, Percent sampled = 15, Sieve size = 500		
Sweltsa sp.	None	1
Zapada oregonensis group	None	10
Zapada	None	1
Chelifera/ Metachela	Larvae	9
Pericoma/Telmatoscopus sp.	Larvae	8
Tipulidae	Juvenile/Dam	1
Sperchon	Adult	2
Lebertia	Adult	6
Chironomidae	Pupa	3
Diamesa	Larvae	169
Tanytarsus	Larvae	1
Rheocricotopus	Larvae	1
Brillia sp.	Larvae	2
Pagastia	Larvae	111
Capniidae	None	2
Chloroperlidae	None	2
Nemouridae	None	2
Total:		**331**

Site - W16 Sample - B, CC# - CC150643, Percent sampled = 45, Sieve size = 500		
Nemouridae	None	19
Rhyacophila vofixa group	None	2
Stagnicola	None	1
Pericoma/Telmatoscopus sp.	Larvae	4
Chelifera/ Metachela	Larvae	4
Lepidoptera	Larvae	1
Simuliidae	Juvenile/Dam	1
Lebertia	Adult	4
Sperchon	Adult	2
Chironomidae	Pupa	2
Diamesa	Larvae	158
Pagastia	Larvae	57
Orthocladius complex	Larvae	19
Zapada	None	6
Zapada oregonensis group	None	25
Baetis	None	6
Chloroperlidae	None	8
Suwallia	None	1
Sweltsa sp.	None	2
Perlodidae	None	3
Total:		**325**

Site - W16 Sample - C, CC# - CC150644, Percent sampled = 18, Sieve size = 500		
Trichoptera	None	1
Uenoidae	None	1
Rhyacophila	None	1
Rhyacophila vofixa group	None	1
Zapada oregonensis group	None	10
Nemouridae	None	6
Zapada	None	2
Chloroperlidae	None	5
Suwallia	None	1
Plumiperla sp.	None	1
Chelifera/ Metachela	Larvae	11
Pericoma/Telmatoscopus sp.	Larvae	2
Simuliidae	Juvenile/Dam	1
Lebertia	Adult	14
Sperchon	Adult	4
Chironomidae	Pupa	1
Diamesa	Larvae	120
Tanytarsus	Larvae	12
Pseudodiamesa sp.	Larvae	3
Orthocladius complex	Larvae	4
Pagastia	Larvae	113
Baetis	None	1
Capniidae	None	1
Ecclisomyia sp.	None	1
Total:		**317**

Site - W16 Sample - D, CC# - CC150645, Percent sampled = 25, Sieve size = 500		
Baetidae	None	2
Perlodidae	None	1
Neothremma sp.	None	2
Simuliidae	Juvenile/Dam	4
Pagastia	Larvae	150
Rheocricotopus	Larvae	6
Eukiefferiella	Larvae	294
Orthocladius complex	Larvae	10
Lebertia	Adult	2
Pericoma/Telmatoscopus sp.	Larvae	11
Chelifera/ Metachela	Larvae	5
Ormosia sp.	Larvae	1
Baetis	None	3
Epeorus sp.	None	1
Heptageniidae	None	2
Epeorus longimanus	None	1
Nemouridae	None	8
Zapada	None	3
Zapada oregonensis group	None	9
Megarcys sp.	None	1
Rhyacophila	None	3
Rhyacophila vofixa group	None	1
Limnephilidae	None	1
Arctopsyche sp.	None	1
Total:		**522**

Site - W16 Sample - E, CC# - CC150646, Percent sampled = 100, Sieve size = 500			
Zapada	None	7	
Zapada oregonensis group	None	18	
Rhyacophila vofixa group	None	1	
Kathroperla sp.	None	1	
Sweltsa sp.	None	25	
Diptera	Juvenile/Dam	6	
Pericoma/Telmatoscopus sp.	Larvae	2	
Dicranota	Larvae	3	
Hexatoma sp.	Larvae	1	
Ormosia sp.	Larvae	1	
Probezzia	Larvae	1	
Baetis	None	1	
Capniidae	None	1	
Chloroperlidae	None	12	
Nemouridae	None	6	
Ecclisomyia sp.	None	1	
Neothremma sp.	None	1	
Rhyacophila	None	1	
Chironomidae	Pupa	4	
Tanytarsus	Larvae	10	
Diptera	Pupa	2	Cyclorrhaphous-Brachycera
Chelifera/ Metachela	Larvae	22	
Lebertia	Adult	11	
Sperchon	Adult	4	
Hygrobates	Adult	2	
Eukiefferiella	Larvae	5	
Pagastia	Larvae	13	
Pseudodiamesa sp.	Larvae	64	
Orthocladius complex	Larvae	18	
Limnophyes sp.	Larvae	2	
Nanocladius	Larvae	1	
	Total:	**247**	

Site - W76 Sample - A, CC# - CC150647, Percent sampled = 20, Sieve size = 500		
Chelifera/ Metachela	Larvae	4
Probezzia	Larvae	1
Pericoma/Telmatoscopus sp.	Larvae	2
Sperchon	Adult	7
Lebertia	Adult	2
Tanytarsus	Larvae	12
Chironomidae	Pupa	1
Rheocricotopus	Larvae	1
Eukiefferiella	Larvae	78
Orthocladius complex	Larvae	18
Limnophyes sp.	Larvae	2
Pagastia	Larvae	168
Ephemerellidae	None	8
Zapada oregonensis group	None	7
Rhyacophila vofixa group	None	1
Diptera	None	7
Nemouridae	None	3
Capniidae	None	15
Capnura sp.	None	3
Sweltsa sp.	None	8
Suwallia	None	5
Chloroperlidae	None	3
Kathroperla sp.	None	2
Plumiperla sp.	None	2
Baetidae	None	2
Heptageniidae	None	5
Cinygmula sp.	None	2
Rhithrogena	None	2
Arctopsyche sp.	None	1
Micrasema	None	1
Total:		**373**

Site - W76 Sample - B, CC# - CC150648, Percent sampled = 19, Sieve size = 500		
Epeorus deceptivus	None	1
Epeorus sp.	None	2
Drunella sp.	None	3
Epeorus longimanus	None	1
Drunella doddsii	None	1
Suwallia	None	7
Sweltsa sp.	None	6
Kathroperla sp.	None	4
Capnura sp.	None	1
Limnephilidae	None	1
Rhyacophila	None	1
Zapada	None	2
Zapada oregonensis group	None	8
Micrasema	None	5
Baetidae	None	3
Ephemerellidae	None	2
Heptageniidae	None	10
Capniidae	None	12
Leuctridae	None	2
Chloroperlidae	None	10
Nemouridae	None	2
Perlodidae	None	1
Glossosomatidae	None	1
Chelifera/ Metachela	Larvae	2
Sperchon	Adult	7
Oribatida	Adult	1
Hygrobates	Adult	1
Lebertia	Adult	2
Chironomidae	Pupa	1
Eukiefferiella	Larvae	70
Tanytarsus	Larvae	4
Orthocladius complex	Larvae	4
Tvetenia	Larvae	2
Pagastia	Larvae	146
Total:		**326**

Site - W76 Sample - C, CC# - CC150649, Percent sampled = 65, Sieve size = 500		
Chelifera/ Metachela	None	5
Probezzia	None	1
Psychoda sp.	None	1
Sperchon	None	10
Pagastia	None	84
Micropsectra	None	2
Orthocladius complex	None	2
All others	None	2
Heptageniidae	None	32
Perlodidae	None	2
Micrasema	None	3
Arctopsyche sp.	None	2
Rhyacophila vofixa group	None	1
Rhithrogena	None	1
Epeorus sp.	None	3
Ephemerellidae	None	9
Ephemerella verruca	None	1
Nemouridae	None	24
Zapada oregonensis group	None	10
Capniidae	None	11
Capnura sp.	None	3
Despaxia augusta	None	1
Kathroperla sp.	None	15
Chloroperlidae	None	27
Sweltsa sp.	None	10
Suwallia	None	59
	Total:	**321**

Site - W76 Sample - D, CC# - CC150650, Percent sampled = 28, Sieve size = 500		
Cinygmula sp.	None	3
Arctopsyche sp.	None	2
Nemouridae	None	6
Capniidae	None	7
Capnura sp.	None	1
Chloroperlidae	None	6
Sweltsa sp.	None	10
Suwallia	None	3
Plumiperla sp.	None	9
Ephemerellidae	None	3
Zapada oregonensis group	None	13
Micrasema	None	11
Baetidae	None	5
Heptageniidae	None	6
Tvetenia	None	3
Pagastia	None	145
Eukiefferiella	None	65
Rheocricotopus	None	5
Orthocladius complex	None	10
Micropsectra	None	7
Enchytraeus	None	2
Dicranota	None	1
Lebertia	None	2
Sperchon	None	9
Arrenurus sp.	None	1
	Total:	**335**

Site - W76 Sample - E, CC# - CC150651, Percent sampled = 46, Sieve size = 500		
Plecoptera	None	2
Trichoptera	None	4
Baetidae	None	2
Ephemerellidae	None	1
Heptageniidae	None	10
Capniidae	None	15
Zapada oregonensis group	None	9
Chloroperlidae	None	15
Nemouridae	None	5
Hydropsychidae	None	3
Rhyacophila vofixa group	None	1
Epeorus sp.	None	1
Epeorus longimanus	None	1
Sweltsa sp.	None	8
Suwallia	None	18
Drunella doddsii	None	1
Drunella sp.	None	1
Acentrella sp.	None	3
Rhyacophila hyalinata group	None	1
Micrasema	None	8
Arctopsyche sp.	None	1
Pagastia	None	102
Orthocladius complex	None	35
Eukiefferiella	None	58
Rheocricotopus	None	5
Tvetenia	None	2
Micropsectra	None	1
Oreogeton sp.	None	1
Chelifera/ Metachela	None	5
Psychoda sp.	None	2
Probezzia	None	1
Sperchon	None	12
Lebertia	None	2
	Total:	**336**

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

Client	Project	Site	Sample	EMS	CC#	500 micron fraction % Sampled	# Invertebrates
Yukon Zinc	Wolverine Mine (4420-01-01)	W12	A		CC150632	100%	665
Yukon Zinc	Wolverine Mine (4420-01-01)	W12	B		CC150633	100%	220
Yukon Zinc	Wolverine Mine (4420-01-01)	W12	C		CC150634	100%	221
Yukon Zinc	Wolverine Mine (4420-01-01)	W12	D		CC150635	100%	263
Yukon Zinc	Wolverine Mine (4420-01-01)	W12	E		CC150636	70%	332
Yukon Zinc	Wolverine Mine (4420-01-01)	W13	A		CC150637	15%	351
Yukon Zinc	Wolverine Mine (4420-01-01)	W13	B		CC150638	75%	432
Yukon Zinc	Wolverine Mine (4420-01-01)	W13	C		CC150639	50%	317
Yukon Zinc	Wolverine Mine (4420-01-01)	W13	D		CC150640	18%	406
Yukon Zinc	Wolverine Mine (4420-01-01)	W13	E		CC150641	38%	329
Yukon Zinc	Wolverine Mine (4420-01-01)	W16	A		CC150642	15%	337
Yukon Zinc	Wolverine Mine (4420-01-01)	W16	B		CC150643	45%	325
Yukon Zinc	Wolverine Mine (4420-01-01)	W16	C		CC150644	18%	323
Yukon Zinc	Wolverine Mine (4420-01-01)	W16	D		CC150645	25%	531
Yukon Zinc	Wolverine Mine (4420-01-01)	W16	E		CC150646	100%	252
Yukon Zinc	Wolverine Mine (4420-01-01)	W76	A		CC150647	20%	373
Yukon Zinc	Wolverine Mine (4420-01-01)	W76	B		CC150648	19%	329
Yukon Zinc	Wolverine Mine (4420-01-01)	W76	C		CC150649	65%	328
Yukon Zinc	Wolverine Mine (4420-01-01)	W76	D		CC150650	28%	337
Yukon Zinc	Wolverine Mine (4420-01-01)	W76	E		CC150651	46%	338

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
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250-494-7553

	Functional Feeding Groups	ITIS Number	Tolerance	
Phylum: Arthropoda	Unclassified	82696		
Subphylum: Hexapoda	Unclassified	563886		
| Class: Insecta	Unclassified	99208		
| Order: Ephemeroptera	Unclassified	100502		
| Family: Ameletidae	Unclassified	568544		
Ameletus	Collector-Gatherer	100996		
| Family: Baetidae	Collector-Gatherer	100755		4
Acentrella sp.	Collector-Gatherer	100801		4
Baetis	Collector-Gatherer	100800		5
Baetis bicaudatus	Collector-Gatherer	100823		4
| Family: Ephemerellidae	Unclassified	101232		
Drunella coloradensis	Predator	101389		
Drunella doddsii	Collector-Gatherer	101365		
Drunella sp.	Collector-Gatherer	101365		
Ephemerella verruca	Collector-Gatherer	101309		1
| Family: Heptageniidae	Unclassified	100504		
Cinygmula sp.	Scraper	100557		4
Epeorus deceptivus	Scraper	100632		
Epeorus longimanus	Scraper	100637		
Epeorus sp.	Scraper	100626		
Rhithrogena	Scraper	100572		
| Order: Plecoptera	Unclassified	102467		
| Family: Capniidae	Unclassified	102643		
Capnura sp.	Shredder-Herbivore	102690		
| Family: Chloroperlidae	Unclassified	103202		
Kathroperla sp.	Predator	103236		
Paraperla sp.	Predator	103233		
Plumiperla sp.	Predator	103305		1
Suwallia	Predator	103254		1
Sweltsa sp.	Predator	103273		1
| Family: Leuctridae	Unclassified	102840		
Despaxia augusta	Shredder-Herbivore	102842		

	Functional Feeding Groups	ITIS Number	Tolerance
| Family: Nemouridae	Shredder-Herbivore	102517	
Nemoura	Shredder-Herbivore	102526	1
Zapada	Shredder-Herbivore	102591	2
Zapada cinctipes	Shredder-Herbivore	102594	2
Zapada columbiana	Shredder-Herbivore	102596	2
Zapada oregonensis group	Shredder-Herbivore	102597	2
| Family: Perlodidae	Predator	102994	2
Diura sp.	Predator	103094	2
Kogotus sp.	Predator	103149	
Megarcys sp.	Predator	103110	2
Skwala	Predator	103102	2
| Order: Trichoptera	Unclassified	115095	
| Family: Brachycentridae	Unclassified	116905	
Brachycentrus americanus	Omnivore	116912	1
Micrasema	Macrophyte-Herbiv	116958	1
| Family: Glossosomatidae	Unclassified	117120	
| Family: Hydropsychidae	Collector-Filterer	115398	4
Arctopsyche sp.	Predator	115529	1
| Family: Limnephilidae	Unclassified	115933	
Desmona sp.	Shredder-Herbivore	116023	1
Ecclisomyia sp.	Omnivore	116025	2
| Family: Rhyacophilidae	Unclassified	115096	
Rhyacophila	Predator	115097	
Rhyacophila betteni group	Predator	115097	1
Rhyacophila hyalinata group	Predator	115097	1
Rhyacophila verrula group	Macrophyte-Herbiv	115097	
Rhyacophila viquaea	Predator	115215	
Rhyacophila vofixa group	Predator	115097	
| Family: Uenoidae	Unclassified	568757	
Neothremma sp.	Scraper	116388	
| Order: Diptera	Unclassified	118831	
| Family: Ceratopogonidae	Unclassified	127076	6
Probezzia	Predator	127729	6
| Family: Chironomidae	Unclassified	127917	6
| Subfamily: Chironominae	Collector-Gatherer	129228	7
| Tribe: Tanytarsini	Collector-Gatherer	129872	7
Micropsectra	Collector-Gatherer	129890	7
Stempellina sp.	Collector-Gatherer	129962	2
Tanytarsus	Collector-Filterer	129978	6
| Subfamily: Diamesinae	Collector-Gatherer	128341	5
| Tribe: Diamesini	Unclassified	128351	5
Diamesa	Collector-Gatherer	128355	5
Pagastia	Collector-Gatherer	128401	1
Pseudodiamesa sp.	Collector-Gatherer	128416	6

	Functional Feeding Groups	ITIS Number	Tolerance
| Subfamily: Orthocladiinae	Unclassified	128457	5
Brillia sp.	Shredder-Herbivore	128477	5
Eukiefferiella	Omnivore	128689	8
Limnophyes sp.	Collector-Gatherer	128776	8
Metriocnemus sp.	Collector-Gatherer	128821	
Nanocladius	Collector-Gatherer	128844	3
Orthocladius complex	Collector-Gatherer	128874	6
Rheocricotopus	Omnivore	129086	6
Tvetenia	Collector-Gatherer	129197	5
| Tribe: Corynoneurini	Collector-Gatherer	127917	7
Corynoneura	Collector-Gatherer	128563	7
| Subfamily: Tanypodinae	Predator	127917	6
| Tribe: Pentaneuriini	Predator	127917	6
Thienemannimyia group	Predator	127917	6
| Family: Empididae	Predator	135830	6
Chelifera/ Metachela	Predator	135830	6
Hemerodromia sp.	Predator	136327	6
Oreogeton sp.	Predator	136377	6
| Family: Psychodidae	Unclassified	125351	4
Pericoma/Telmatoscopus sp.	Collector-Gatherer	125514	4
Psychoda sp.	Collector-Gatherer	125468	10
| Family: Simuliidae	Collector-Filterer	126640	6
Prosimulium	Collector-Filterer	126703	3
| Family: Tipulidae	Unclassified	118840	
Dicranota	Predator	121027	3
Hexatoma sp.	Predator	120094	2
Ormosia sp.	Collector-Gatherer	120830	3
Tipula	Omnivore	119037	4
| Order: Lepidoptera	Unclassified	117232	
Subphylum: Chelicerata	Unclassified	82697	5
| Class: Arachnida	Predator	82708	5
| Order: Trombidiformes	Predator	82769	5
| Family: Arrenuridae	Predator	82862	5
Arrenurus sp.	Predator	82864	5
| Family: Aturidae	Predator	82973	5
Aturus	Predator	82974	5
| Family: Feltriidae	Predator	83313	5
Feltria sp.	Predator	83314	5
| Family: Hygrobatidae	Unclassified	83281	8
Atractides	Predator	83282	8
Hygrobates	Predator	83297	8
| Family: Lebertiidae	Predator	83033	8
Lebertia	Predator	83034	8
| Family: Sperchontidae	Unclassified	895710	8
Sperchon	Predator	83006	8

	Functional Feeding Groups	ITIS Number	Tolerance
| Order: Oribatei	Predator	83544	5
| Family: Oribatidae	Predator		5
Oribatida	Predator	733326	5
Phylum: Mollusca	Unclassified	69458	10
| Class: Gastropoda	Unclassified	69459	10
| Order: Basommatophora	Unclassified	76437	10
| Family: Lymnaeidae	Scraper	76483	10
Stagnicola	Scraper	76534	10
Phylum: Annelida	Unclassified	64357	5
Subphylum: Clitellata	Unclassified	568832	5
| Class: Oligochaeta	Collector-Gatherer	68422	5
| Order: Tubificida	Unclassified	68498	10
| Family: Enchytraeidae	Collector-Gatherer	68510	10
Enchytraeus	Collector-Gatherer	68531	10
All others	Unclassified		

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
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Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Ecoscape Code A	Ecoscape Code B	ITIS Code	Functional Feeding Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae						115096		Juvenile/Damaged	Rhyacophilidae	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	Larvae	Rhyacophila vofixa group	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila viquaea			115215	P	Larvae	Rhyacophila viquaea	W12	A	CC150632	4	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		Juvenile/Damaged	Ephemerellidae	W12	A	CC150632	5	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	Juvenile/Damaged	Baetidae	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	Larvae	Zapada	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	Larvae	Zapada oregonensis group	W12	A	CC150632	13	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		Juvenile/Damaged	Chloroperlidae	W12	A	CC150632	10	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	Larvae	Sweltsa sp.	W12	A	CC150632	10	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	Larvae	Suwallia	W12	A	CC150632	3	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	Larvae	Kathroperla sp.	W12	A	CC150632	5	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae			Kogotus sp.			103149	P	Larvae	Kogotus sp.	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		Juvenile/Damaged	Capniidae	W12	A	CC150632	55	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	Larvae	Capnura sp.	W12	A	CC150632	16	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W12	A	CC150632	22	100	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		Juvenile/Damaged	Diptera	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Hexatoma sp.			120094	P	Larvae	Hexatoma sp.	W12	A	CC150632	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Tipula		L157	119037	OM	Larvae	Tipula	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Ormosia sp.			120830	CG	Larvae	Ormosia sp.	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Ceratopogonidae			Probezzia	B191	L127	127729	P	Larvae	Probezzia	W12	A	CC150632	2	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Aturidae			Aturus	B040	L206	82974	P	Larvae	Aturus	W12	A	CC150632	1	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Feltriidae			Feltria sp.	B110	L228	83314	P	Larvae	Feltria sp.	W12	A	CC150632	1	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Larvae	Sperchon	W12	A	CC150632	9	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Larvae	Lebertia	W12	A	CC150632	8	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae						118840		Juvenile/Damaged	Tipulidae	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W12	A	CC150632	145	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	l213	127917		Pupa	Chironomidae	W12	A	CC150632	7	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae				B103	L202	135830	P	Pupa	Empididae	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W12	A	CC150632	8	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W12	A	CC150632	40	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae	Corynoneurini	Corynoneura	B023	L029	128563	CG	Larvae	Corynoneura	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Brillia sp.	B022		128477	SH	Larvae	Brillia sp.	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W12	A	CC150632	26	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Stempellina sp.	B015		129962	CG	Larvae	Stempellina sp.	W12	A	CC150632	9	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W12	A	CC150632	14	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	Larvae	Eukiefferiella	W12	A	CC150632	3	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	Larvae	Tvetenia	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W12	A	CC150632	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W12	A	CC150632	176	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		Juvenile/Damaged	Heptageniidae	W12	A	CC150632	2	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	Juvenile/Damaged	Nemouridae	W12	A	CC150632	6	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	Larvae	Rhyacophila	W12	A	CC150632	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	Juvenile/Damaged	Perlodidae	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Cinygmula sp.	B071		100557	SC	Larvae	Cinygmula sp.	W12	B	CC150633	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		Juvenile/Damaged	Capniidae	W12	B	CC150633	17	100	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		Juvenile/Damaged	Chloroperlidae	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	Juvenile/Damaged	Nemouridae	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	Larvae	Rhyacophila	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	Larvae	Rhyacophila vofixa group	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	Larvae	Micrasema	W12	B	CC150633	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	Larvae	Zapada oregonensis group	W12	B	CC150633	4	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	Larvae	Sweltsa sp.	W12	B	CC150633	4	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila betteni group	B085		115097	P	Larvae	Rhyacophila betteni group	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W12	B	CC150633	14	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Hexatoma sp.			120094	P	Larvae	Hexatoma sp.	W12	B	CC150633	1	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W12	B	CC150633	7	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W12	B	CC150633	3	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Hygrobates	B112	L071	83297	P	Adult	Hygrobates	W12	B	CC150633	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W12	B	CC150633	13	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Nanocladius	B202	L094	128844	CG	Larvae	Nanocladius	W12	B	CC150633	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Tanypodinae	Pentaneuriini	Thienemannimyia group	B010	L156	127917	P	Larvae	Thienemannimyia group	W12	B	CC150633	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W12	B	CC150633	6	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W12	B	CC150633	8	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W12	B	CC150633	50	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W12	B	CC150633	49	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	Larvae	Kathroperla sp.	W12	B	CC150633	3	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	Larvae	Paraperla sp.	W12	B	CC150633	2	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	Larvae	Paraperla sp.	W12	C	CC150634	3	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W12	C	CC150634	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W12	C	CC150634	8	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae				B103	L202	135830	P	Pupa	Empididae	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae			Prosimulium	B107	L183	126703	CF	Larvae	Prosimulium	W12	C	CC150634	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae			Prosimulium	B107	L183	126703	CF	Larvae	Prosimulium	W12	C	CC150634	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W12	C	CC150634	52	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W12	C	CC150634	4	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W12	C	CC150634	7	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Atractides		L009	83282	P	Adult	Atractides	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W12	C	CC150634	33	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W12	C	CC150634	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W12	C	CC150634	24	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Brillia sp.	B022		128477	SH	Larvae	Brillia sp.	W12	C	CC150634	2	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	Larvae	Neothremma sp.	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	Larvae	Micrasema	W12	C	CC150634	5	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	Larvae	Rhyacophila vofixa group	W12	C	CC150634	3	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerella verruca			101309	CG	Larvae	Ephemerella verruca	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		Juvenile/Damaged	Heptageniidae	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis bicaudatus	B064	L187	100823	CG	Larvae	Baetis bicaudatus	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		Juvenile/Damaged	Capniidae	W12	C	CC150634	7	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ameletidae			Ameletus	B063		100996	CG	Larvae	Ameletus	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	Juvenile/Damaged	Nemouridae	W12	C	CC150634	13	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Nemoura			102526	SH	Larvae	Nemoura	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		Juvenile/Damaged	Chloroperlidae	W12	C	CC150634	10	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	Larvae	Zapada oregonensis group	W12	C	CC150634	4	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada columbiana			102596	SH	Larvae	Zapada columbiana	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	Larvae	Kathroperla sp.	W12	C	CC150634	6	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	Larvae	Sweltsa sp.	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae			Diura sp.			103094	P	Larvae	Diura sp.	W12	C	CC150634	1	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	Larvae	Baetis	W12	C	CC150634	6	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	Juvenile/Damaged	Perlodidae	W12	C	CC150634	4	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	Larvae	Rhyacophila	W12	C	CC150634	4	100	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera					B086	L161	115095		Juvenile/Damaged	Trichoptera	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	Juvenile/Damaged	Baetidae	W12	D	CC150635	3	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		Juvenile/Damaged	Ephemerellidae	W12	D	CC150635	3	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		Juvenile/Damaged	Heptageniidae	W12	D	CC150635	15	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		Juvenile/Damaged	Capniidae	W12	D	CC150635	6	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		Juvenile/Damaged	Chloroperlidae	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	Juvenile/Damaged	Nemouridae	W12	D	CC150635	20	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	Juvenile/Damaged	Perlodidae	W12	D	CC150635	3	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae				B185	L069	115398	CF	Juvenile/Damaged	Hydropsychidae	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae						115096		Juvenile/Damaged	Rhyacophilidae	W12	D	CC150635	6	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	Larvae	Epeorus sp.	W12	D	CC150635	2	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae			Skwala		L141	103102	P	Larvae	Skwala	W12	D	CC150635	3	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	Larvae	Zapada	W12	D	CC150635	2	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	Larvae	Zapada oregonensis group	W12	D	CC150635	5	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	Larvae	Baetis	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis bicaudatus	B064	L187	100823	CG	Larvae	Baetis bicaudatus	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerella verruca			101309	CG	Larvae	Ephemerella verruca	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	Larvae	Neothremma sp.	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	Larvae	Rhyacophila	W12	D	CC150635	5	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	Larvae	Arctopsyche sp.	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	Larvae	Rhyacophila vofixa group	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	Larvae	Micrasema	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W12	D	CC150635	8	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae				B106	L139	126640	CF	Juvenile/Damaged	Simuliidae	W12	D	CC150635	1	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W12	D	CC150635	2	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Atractides		L009	83282	P	Adult	Atractides	W12	D	CC150635	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W12	D	CC150635	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	Larvae	Tvetenia	W12	D	CC150635	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W12	D	CC150635	88	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W12	D	CC150635	33	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	Larvae	Kathroperla sp.	W12	D	CC150635	8	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	Larvae	Paraperla sp.	W12	D	CC150635	9	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W12	E	CC150636	13	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Dicranota	B194	L239	121027	P	Larvae	Dicranota	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae			Prosimulium	B107	L183	126703	CF	Larvae	Prosimulium	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae						118840		Larvae	Tipulidae	W12	E	CC150636	1	70	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W12	E	CC150636	1	70	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W12	E	CC150636	3	70	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Atractides		L009	83282	P	Adult	Atractides	W12	E	CC150636	2	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W12	E	CC150636	73	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W12	E	CC150636	30	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae	Corynoneurini	Corynoneura	B023	L029	128563	CG	Larvae	Corynoneura	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	Larvae	Tvetenia	W12	E	CC150636	25	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W12	E	CC150636	5	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W12	E	CC150636	2	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W12	E	CC150636	15	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis bicaudatus	B064	L187	100823	CG	None	Baetis bicaudatus	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	None	Epeorus sp.	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Drunella coloradensis			101389	P	None	Drunella coloradensis	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W12	E	CC150636	11	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae				B185	L069	115398	CF	None	Hydropsychidae	W12	E	CC150636	4	70	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera	Glossosomatidae						117120		None	Glossosomatidae	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Brachycentrus americanus			116912	OM	None	Brachycentrus americanus	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W12	E	CC150636	2	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae						568757		None	Uenoidae	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae				B163		116905		None	Brachycentridae	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W12	E	CC150636	4	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila viquaea			115215	P	None	Rhyacophila viquaea	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W12	E	CC150636	18	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W12	E	CC150636	25	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada cinctipes			102594	SH	None	Zapada cinctipes	W12	E	CC150636	4	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W12	E	CC150636	14	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W12	E	CC150636	5	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W12	E	CC150636	1	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W12	E	CC150636	5	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	None	Paraperla sp.	W12	E	CC150636	10	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Plecoptera					B003	L120	102467		None	Plecoptera	W12	E	CC150636	3	70	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W12	E	CC150636	5	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W12	E	CC150636	4	70	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W12	E	CC150636	5	70	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae				B103	L202	135830	P	None	Empididae	W12	E	CC150636	4	70	500					
Annelida	Clitellata	Oligochaeta						B047	L217	68422	CG	None	Oligochaeta	W13	A	CC150637	2	15	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W13	A	CC150637	1	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W13	A	CC150637	7	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	None	Paraperla sp.	W13	A	CC150637	4	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	A	CC150637	9	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	None	Paraperla sp.	W13	A	CC150637	4	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	A	CC150637	9	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W13	A	CC150637	1	15	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W13	A	CC150637	37	15	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W13	A	CC150637	2	15	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W13	A	CC150637	1	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W13	A	CC150637	2	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W13	A	CC150637	4	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	A	CC150637	125	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Metriocnemus sp.	B095		128821	CG	Larvae	Metriocnemus sp.	W13	A	CC150637	2	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W13	A	CC150637	2	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W13	A	CC150637	123	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W13	A	CC150637	16	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W13	A	CC150637	2	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W13	A	CC150637	6	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Leuctridae				B005		102840		None	Leuctridae	W13	A	CC150637	1	15	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W13	A	CC150637	1	15	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W13	B	CC150638	3	75	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W13	B	CC150638	2	75	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila verrula group	B085		115097	MH	None	Rhyacophila verrula group	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Desmona sp.			116023	SH	None	Desmona sp.	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	B	CC150638	79	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W13	B	CC150638	4	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W13	B	CC150638	6	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W13	B	CC150638	8	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W13	B	CC150638	7	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W13	B	CC150638	8	75	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Paraperla sp.			103233	P	None	Paraperla sp.	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Leuctridae			Despaxia augusta			102842	SH	None	Despaxia augusta	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Oreogeton sp.	B105		136377	P	Larvae	Oreogeton sp.	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae			Prosimulium	B107	L183	126703	CF	Larvae	Prosimulium	W13	B	CC150638	1	75	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W13	B	CC150638	16	75	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W13	B	CC150638	13	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W13	B	CC150638	11	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	B	CC150638	25	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W13	B	CC150638	11	75	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W13	B	CC150638	158	75	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera					B003	L120	102467		None	Plecoptera	W13	B	CC150638	1	75	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W13	B	CC150638	64	75	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	C	CC150639	69	50	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W13	C	CC150639	24	50	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		None	Diptera	W13	C	CC150639	2	50	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W13	C	CC150639	8	50	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W13	C	CC150639	3	50	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Feltriidae			Feltria sp.	B110	L228	83314	P	Adult	Feltria sp.	W13	C	CC150639	1	50	500					
Arthropoda	Chelicerata	Arachnida	Oribatei	Oribatidae			Oribatida		L101	733326	P	Adult	Oribatida	W13	C	CC150639	1	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae				B106	L139	126640	CF	Pupa	Simuliidae	W13	C	CC150639	1	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Dicranota	B194	L239	121027	P	Larvae	Dicranota	W13	C	CC150639	1	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W13	C	CC150639	5	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Tanypodinae	Pentaneuriini	Thienemannimyia group	B010	L156	127917	P	Larvae	Thienemannimyia group	W13	C	CC150639	2	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	C	CC150639	40	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W13	C	CC150639	69	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	C	CC150639	69	50	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W13	C	CC150639	25	50	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W13	C	CC150639	2	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W13	C	CC150639	4	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W13	C	CC150639	13	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W13	C	CC150639	30	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Leuctridae				B005		102840		None	Leuctridae	W13	C	CC150639	2	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W13	C	CC150639	6	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W13	C	CC150639	2	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W13	C	CC150639	7	50	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W13	D	CC150640	51	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W13	D	CC150640	32	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W13	D	CC150640	2	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W13	D	CC150640	4	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W13	D	CC150640	11	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W13	D	CC150640	2	18	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W13	D	CC150640	5	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Hemerodromia sp.		L182	136327	P	Larvae	Hemerodromia sp.	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Dicranota	B194	L239	121027	P	Larvae	Dicranota	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W13	D	CC150640	5	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Metriocnemus sp.	B095		128821	CG	Larvae	Metriocnemus sp.	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	D	CC150640	123	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W13	D	CC150640	15	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W13	D	CC150640	125	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W13	D	CC150640	16	18	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera					B086	L161	115095		None	Trichoptera	W13	D	CC150640	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		None	Diptera	W13	D	CC150640	2	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera					B003	L120	102467		None	Plecoptera	W13	E	CC150641	2	38	500					
Arthropoda	Hexapoda	Insecta	Trichoptera					B086	L161	115095		None	Trichoptera	W13	E	CC150641	2	38	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W13	E	CC150641	2	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W13	E	CC150641	52	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W13	E	CC150641	5	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W13	E	CC150641	18	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W13	E	CC150641	4	38	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W13	E	CC150641	16	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W13	E	CC150641	1	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	None	Pericoma/Telmatoscopus sp.	W13	E	CC150641	3	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W13	E	CC150641	7	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W13	E	CC150641	45	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W13	E	CC150641	22	38	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W13	E	CC150641	74	38	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Larvae	Lebertia	W13	E	CC150641	6	38	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Larvae	Sperchon	W13	E	CC150641	2	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae			Megarcys sp.			103110	P	None	Megarcys sp.	W13	E	CC150641	1	38	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W13	E	CC150641	1	38	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila verrula group	B085		115097	MH	None	Rhyacophila verrula group	W13	E	CC150641	1	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W13	E	CC150641	14	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W13	E	CC150641	19	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W13	E	CC150641	2	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W13	E	CC150641	13	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W13	E	CC150641	10	38	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W16	A	CC150642	1	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	A	CC150642	10	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W16	A	CC150642	1	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	A	CC150642	10	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W16	A	CC150642	1	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W16	A	CC150642	9	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W16	A	CC150642	8	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae						118840		Juvenile/Damaged	Tipulidae	W16	A	CC150642	1	15	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W16	A	CC150642	2	15	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W16	A	CC150642	6	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W16	A	CC150642	3	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W16	A	CC150642	169	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W16	A	CC150642	1	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W16	A	CC150642	1	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Brillia sp.	B022		128477	SH	Larvae	Brillia sp.	W16	A	CC150642	2	15	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W16	A	CC150642	111	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W16	A	CC150642	2	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W16	A	CC150642	2	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W16	A	CC150642	2	15	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W16	B	CC150643	19	45	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W16	B	CC150643	2	45	500					
Mollusca		Gastropoda	Basommatophora	Lymnaeidae			Stagnicola		L146	76534	SC	None	Stagnicola	W16	B	CC150643	1	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W16	B	CC150643	4	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W16	B	CC150643	4	45	500					
Arthropoda	Hexapoda	Insecta	Lepidoptera					B157		117232		Larvae	Lepidoptera	W16	B	CC150643	1	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae				B106	L139	126640	CF	Juvenile/Damaged	Simuliidae	W16	B	CC150643	1	45	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W16	B	CC150643	4	45	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W16	B	CC150643	2	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W16	B	CC150643	2	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W16	B	CC150643	158	45	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W16	B	CC150643	57	45	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W16	B	CC150643	19	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W16	B	CC150643	6	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	B	CC150643	25	45	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W16	B	CC150643	6	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W16	B	CC150643	8	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W16	B	CC150643	1	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W16	B	CC150643	2	45	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W16	B	CC150643	3	45	500					
Arthropoda	Hexapoda	Insecta	Trichoptera					B086	L161	115095		None	Trichoptera	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae						568757		None	Uenoidae	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	C	CC150644	10	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W16	C	CC150644	6	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W16	C	CC150644	2	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W16	C	CC150644	5	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Plumiperla sp.			103305	P	None	Plumiperla sp.	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W16	C	CC150644	11	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W16	C	CC150644	2	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae				B106	L139	126640	CF	Juvenile/Damaged	Simuliidae	W16	C	CC150644	1	18	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W16	C	CC150644	14	18	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W16	C	CC150644	4	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Diamesa	B018	L034	128355	CG	Larvae	Diamesa	W16	C	CC150644	120	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W16	C	CC150644	12	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W16	C	CC150644	3	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W16	C	CC150644	4	18	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W16	C	CC150644	113	18	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W16	C	CC150644	1	18	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W16	D	CC150645	2	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W16	D	CC150645	2	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Simuliidae				B106	L139	126640	CF	Juvenile/Damaged	Simuliidae	W16	D	CC150645	4	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W16	D	CC150645	150	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W16	D	CC150645	6	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	Larvae	Eukiefferiella	W16	D	CC150645	294	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W16	D	CC150645	10	25	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W16	D	CC150645	2	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W16	D	CC150645	11	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W16	D	CC150645	5	25	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Ormosia sp.			120830	CG	Larvae	Ormosia sp.	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W16	D	CC150645	3	25	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	None	Epeorus sp.	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W16	D	CC150645	2	25	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus longimanus			100637	SC	None	Epeorus longimanus	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W16	D	CC150645	8	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W16	D	CC150645	3	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	D	CC150645	9	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae			Megarcys sp.			103110	P	None	Megarcys sp.	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W16	D	CC150645	3	25	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae				B186	L212	115933		None	Limnephilidae	W16	D	CC150645	1	25	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	None	Arctopsyche sp.	W16	D	CC150645	1	25	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W16	E	CC150646	7	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W16	E	CC150646	18	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W16	E	CC150646	25	100	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		Juvenile/Damaged	Diptera	W16	E	CC150646	6	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W16	E	CC150646	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Dicranota	B194	L239	121027	P	Larvae	Dicranota	W16	E	CC150646	3	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Hexatoma sp.			120094	P	Larvae	Hexatoma sp.	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Ormosia sp.			120830	CG	Larvae	Ormosia sp.	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Ceratopogonidae			Probezzia	B191	L127	127729	P	Larvae	Probezzia	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Baetis	B065	L013	100800	CG	None	Baetis	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W16	E	CC150646	12	100	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W16	E	CC150646	6	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae			Ecclisomyia sp.	B128		116025	OM	None	Ecclisomyia sp.	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Uenoidae			Neothremma sp.			116388	SC	None	Neothremma sp.	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W16	E	CC150646	4	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W16	E	CC150646	10	100	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		Pupa	Diptera	W16	E	CC150646	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W16	E	CC150646	22	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W16	E	CC150646	11	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W16	E	CC150646	4	100	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Hygrobates	B112	L071	83297	P	Adult	Hygrobates	W16	E	CC150646	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	Larvae	Eukiefferiella	W16	E	CC150646	5	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W16	E	CC150646	13	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pseudodiamesa sp.			128416	CG	Larvae	Pseudodiamesa sp.	W16	E	CC150646	64	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W16	E	CC150646	18	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Limnophyes sp.			128776	CG	Larvae	Limnophyes sp.	W16	E	CC150646	2	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Nanocladius	B202	L094	128844	CG	Larvae	Nanocladius	W16	E	CC150646	1	100	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W76	A	CC150647	4	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Ceratopogonidae			Probezzia	B191	L127	127729	P	Larvae	Probezzia	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Pericoma/Telmatoscopus sp.			125514	CG	Larvae	Pericoma/Telmatoscopus sp.	W76	A	CC150647	2	20	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W76	A	CC150647	7	20	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W76	A	CC150647	12	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	Larvae	Rheocricotopus	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	Larvae	Eukiefferiella	W76	A	CC150647	78	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W76	A	CC150647	18	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Limnophyes sp.			128776	CG	Larvae	Limnophyes sp.	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W76	A	CC150647	168	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W76	A	CC150647	8	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W76	A	CC150647	7	20	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Diptera					B008	L220	118831		None	Diptera	W76	A	CC150647	7	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W76	A	CC150647	3	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W76	A	CC150647	15	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W76	A	CC150647	3	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W76	A	CC150647	8	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W76	A	CC150647	5	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W76	A	CC150647	3	20	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W76	A	CC150647	2	20	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Plumiperla sp.			103305	P	None	Plumiperla sp.	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W76	A	CC150647	5	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Cinygmula sp.	B071		100557	SC	None	Cinygmula sp.	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Rhithrogena	B073	L137	100572	SC	None	Rhithrogena	W76	A	CC150647	2	20	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	None	Arctopsyche sp.	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W76	A	CC150647	1	20	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus deceptivus			100632	SC	None	Epeorus deceptivus	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	None	Epeorus sp.	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Drunella sp.	B069		101365	CG	None	Drunella sp.	W76	B	CC150648	3	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus longimanus			100637	SC	None	Epeorus longimanus	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Drunella doddsii	B069	L196	101365	CG	None	Drunella doddsii	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W76	B	CC150648	7	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W76	B	CC150648	6	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W76	B	CC150648	4	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Limnephilidae				B186	L212	115933		None	Limnephilidae	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila	B085	L234	115097	P	None	Rhyacophila	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada	B078	L174	102591	SH	None	Zapada	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W76	B	CC150648	8	19	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W76	B	CC150648	5	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W76	B	CC150648	3	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W76	B	CC150648	10	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W76	B	CC150648	12	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Leuctridae				B005		102840		None	Leuctridae	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W76	B	CC150648	10	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Glossosomatidae						117120		None	Glossosomatidae	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	Larvae	Chelifera/ Metachela	W76	B	CC150648	2	19	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	Adult	Sperchon	W76	B	CC150648	7	19	500					
Arthropoda	Chelicerata	Arachnida	Oribatei	Oribatidae			Oribatida		L101	733326	P	Adult	Oribatida	W76	B	CC150648	1	19	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Hygrobatidae			Hygrobates	B112	L071	83297	P	Adult	Hygrobates	W76	B	CC150648	1	19	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	Adult	Lebertia	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae				B010	I213	127917		Pupa	Chironomidae	W76	B	CC150648	1	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	Larvae	Eukiefferiella	W76	B	CC150648	70	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Tanytarsus	B017	L153	129978	CF	Larvae	Tanytarsus	W76	B	CC150648	4	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	Larvae	Orthocladius complex	W76	B	CC150648	4	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	Larvae	Tvetenia	W76	B	CC150648	2	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	Larvae	Pagastia	W76	B	CC150648	146	19	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	None	Chelifera/ Metachela	W76	C	CC150649	5	65	500					
Arthropoda	Hexapoda	Insecta	Diptera	Ceratopogonidae			Probezzia	B191	L127	127729	P	None	Probezzia	W76	C	CC150649	1	65	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Psychoda sp.			125468	CG	None	Psychoda sp.	W76	C	CC150649	1	65	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	None	Sperchon	W76	C	CC150649	10	65	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	None	Pagastia	W76	C	CC150649	84	65	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Micropsectra	B013	L236	129890	CG	None	Micropsectra	W76	C	CC150649	2	65	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	None	Orthocladius complex	W76	C	CC150649	2	65	500					
												None	All others	W76	C	CC150649	2	65	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W76	C	CC150649	32	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Perlodidae				B079	L115	102994	P	None	Perlodidae	W76	C	CC150649	2	65	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W76	C	CC150649	3	65	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	None	Arctopsyche sp.	W76	C	CC150649	2	65	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W76	C	CC150649	1	65	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Rhithrogena	B073	L137	100572	SC	None	Rhithrogena	W76	C	CC150649	1	65	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	None	Epeorus sp.	W76	C	CC150649	3	65	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W76	C	CC150649	9	65	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Ephemerella verruca			101309	CG	None	Ephemerella verruca	W76	C	CC150649	1	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W76	C	CC150649	24	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W76	C	CC150649	10	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W76	C	CC150649	11	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W76	C	CC150649	3	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Leuctridae			Despaxia augusta			102842	SH	None	Despaxia augusta	W76	C	CC150649	1	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Kathroperla sp.			103236	P	None	Kathroperla sp.	W76	C	CC150649	15	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W76	C	CC150649	27	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W76	C	CC150649	10	65	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W76	C	CC150649	59	65	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Cinygmula sp.	B071		100557	SC	None	Cinygmula sp.	W76	D	CC150650	3	28	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	None	Arctopsyche sp.	W76	D	CC150650	2	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W76	D	CC150650	6	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W76	D	CC150650	7	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae			Capnura sp.			102690	SH	None	Capnura sp.	W76	D	CC150650	1	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W76	D	CC150650	6	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W76	D	CC150650	10	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W76	D	CC150650	3	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Plumiperla sp.			103305	P	None	Plumiperla sp.	W76	D	CC150650	9	28	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W76	D	CC150650	3	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W76	D	CC150650	13	28	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W76	D	CC150650	11	28	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W76	D	CC150650	5	28	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W76	D	CC150650	6	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	None	Tvetenia	W76	D	CC150650	3	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	None	Pagastia	W76	D	CC150650	145	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	None	Eukiefferiella	W76	D	CC150650	65	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	None	Rheocricotopus	W76	D	CC150650	5	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	None	Orthocladius complex	W76	D	CC150650	10	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Micropsectra	B013	L236	129890	CG	None	Micropsectra	W76	D	CC150650	7	28	500					
Annelida	Clitellata	Oligochaeta	Tubificida	Enchytraeidae			Enchytraeus	B050	L192	68531	CG	None	Enchytraeus	W76	D	CC150650	2	28	500					
Arthropoda	Hexapoda	Insecta	Diptera	Tipulidae			Dicranota	B194	L239	121027	P	None	Dicranota	W76	D	CC150650	1	28	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	None	Lebertia	W76	D	CC150650	2	28	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	None	Sperchon	W76	D	CC150650	9	28	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Arrenuridae			Arrenurus sp.			82864	P	None	Arrenurus sp.	W76	D	CC150650	1	28	500					
Arthropoda	Hexapoda	Insecta	Plecoptera					B003	L120	102467		None	Plecoptera	W76	E	CC150651	2	46	500					
Arthropoda	Hexapoda	Insecta	Trichoptera					B086	L161	115095		None	Trichoptera	W76	E	CC150651	4	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae				B159	L180	100755	CG	None	Baetidae	W76	E	CC150651	2	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae				B002	L045	101232		None	Ephemerellidae	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae				B124	L063	100504		None	Heptageniidae	W76	E	CC150651	10	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Capniidae				B004		102643		None	Capniidae	W76	E	CC150651	15	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae			Zapada oregonensis group	B162		102597	SH	None	Zapada oregonensis group	W76	E	CC150651	9	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae				B160		103202		None	Chloroperlidae	W76	E	CC150651	15	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Nemouridae				B161	L210	102517	SH	None	Nemouridae	W76	E	CC150651	5	46	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae				B185	L069	115398	CF	None	Hydropsychidae	W76	E	CC150651	3	46	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila vofixa group	B085		115097	P	None	Rhyacophila vofixa group	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus sp.	B072		100626	SC	None	Epeorus sp.	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Heptageniidae			Epeorus longimanus			100637	SC	None	Epeorus longimanus	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Sweltsa sp.			103273	P	None	Sweltsa sp.	W76	E	CC150651	8	46	500					
Arthropoda	Hexapoda	Insecta	Plecoptera	Chloroperlidae			Suwallia	B074	L173	103254	P	None	Suwallia	W76	E	CC150651	18	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Drunella doddsii	B069	L196	101365	CG	None	Drunella doddsii	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Ephemerellidae			Drunella sp.	B069		101365	CG	None	Drunella sp.	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Ephemeroptera	Baetidae			Acentrella sp.	B197	L004	100801	CG	None	Acentrella sp.	W76	E	CC150651	3	46	500					

Phylum	Sub Phylum	Class	Order	Family	Subfamily	Tribe	Taxonomy	Code A	Code B	ITIS Code	Group	Maturity	Name	Site	Sample	CC#	Count	Percent Sampled	Seive Size	Season	Reach	Site	Transect	Parent
Arthropoda	Hexapoda	Insecta	Trichoptera	Rhyacophilidae			Rhyacophila hyalinata group	B085		115097	P	None	Rhyacophila hyalinata group	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Brachycentridae			Micrasema	B173	L232	116958	MH	None	Micrasema	W76	E	CC150651	8	46	500					
Arthropoda	Hexapoda	Insecta	Trichoptera	Hydropsychidae			Arctopsyche sp.	B083		115529	P	None	Arctopsyche sp.	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Diamesinae	Diamesini	Pagastia	B019	L107	128401	CG	None	Pagastia	W76	E	CC150651	102	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Orthocladius complex	B026	L105	128874	CG	None	Orthocladius complex	W76	E	CC150651	35	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Eukiefferiella	B024	L053	128689	OM	None	Eukiefferiella	W76	E	CC150651	58	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Rheocricotopus	B099	L135	129086	OM	None	Rheocricotopus	W76	E	CC150651	5	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Orthocladiinae		Tvetenia	B166	L167	129197	CG	None	Tvetenia	W76	E	CC150651	2	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Chironomidae	Chironominae	Tanytarsini	Micropsectra	B013	L236	129890	CG	None	Micropsectra	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Oreogeton sp.	B105		136377	P	None	Oreogeton sp.	W76	E	CC150651	1	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Empididae			Chelifera/ Metachela	B103		135830	P	None	Chelifera/ Metachela	W76	E	CC150651	5	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Psychodidae			Psychoda sp.			125468	CG	None	Psychoda sp.	W76	E	CC150651	2	46	500					
Arthropoda	Hexapoda	Insecta	Diptera	Ceratopogonidae			Probezzia	B191	L127	127729	P	None	Probezzia	W76	E	CC150651	1	46	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Sperchontidae			Sperchon	B042	L144	83006	P	None	Sperchon	W76	E	CC150651	12	46	500					
Arthropoda	Chelicerata	Arachnida	Trombidiformes	Lebertiidae			Lebertia	B041	L074	83034	P	None	Lebertia	W76	E	CC150651	2	46	500					

Cordillera Consulting

Project: Wolverine Mine (4420-01-01)
Yukon Zinc Corporation, Robin McCall
Taxonomist: Sue Salter
suesalter@shaw.ca
250-494-7553

		Total from Sample
CC150635		
Diptera	1	
Chironomidae	1	
Plecoptera	1	
Total:	**3**	**258**

CC150645		
Diptera	1	
Chironomidae	12	
Total:	**13**	**522**

CC150649		
Chironomidae	1	
Plecoptera	2	
Total:	**3**	**321**

Percent Efficiency

99%

98%

99%

Appendix 2

Certificate of Analysis for Water Quality

Maxxam
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Your P.O. #: 108376
Your C.O.C. #: 08396702

Attention:Robin McCall

YUKON ZINC CORPORATION
PO Box 57
Whitehorse, YT
CANADA Y1A 5X9

Report Date: 2014/09/17
Report #: R1644713
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B480018
Received: 2014/09/10, 10:05

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Acidity pH 4.5 & pH 8.3 (as CaCO3)	4	N/A	2014/09/11	BBY6SOP-00037	SM 22 2310 B m
Alkalinity - Water	2	2014/09/11	2014/09/12	BBY6SOP-00026	SM 22 2320 B m
Alkalinity - Water	2	2014/09/12	2014/09/12	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	4	N/A	2014/09/11	BBY6SOP-00011	SM 22 4500-Cl- G m
Cyanide SAD (strong acid dissociable)	1	N/A	2014/09/15	BBY6SOP-00004	SM 22 4500-CN O m
Cyanide WAD (weak acid dissociable)	1	N/A	2014/09/15	BBY6SOP-00005	SM 22 4500-CN O
Carbon (DOC) - field filtered/preserved (1)	3	N/A	2014/09/11	BBY6SOP-00003	SM 22 5310 C m
Conductance - water	4	N/A	2014/09/12	BBY6SOP-00026	SM 22 2510 B m
Fluoride - Mining Clients	1	N/A	2014/09/12	BBY6SOP-00048	SM 22 4500-F C m
Fluoride - Mining Clients	3	N/A	2014/09/15	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO3)	4	N/A	2014/09/17	BBY7SOP-00002	EPA 6020a R1 m
Hardness (calculated as CaCO3)	4	N/A	2014/09/16	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAF	4	N/A	2014/09/16	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAF	4	2014/09/15	2014/09/16	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Bromide as Bromine (Br) by ICPMS	4	N/A	2014/09/13	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	4	N/A	2014/09/16	BBY7SOP-00002	EPA 6020A R1 m
Elements by ICPMS Low Level (dissolved)	4	N/A	2014/09/16	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	4	N/A	2014/09/17	BBY7SOP-00002	EPA 6020A R1 m
Elements by ICPMS Low Level (total)	4	N/A	2014/09/16	BBY7SOP-00002	EPA 6020A R1 m
Ammonia-N (Preserved)	4	N/A	2014/09/11	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate+Nitrite (N) (low level)	4	N/A	2014/09/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) (low level)	4	N/A	2014/09/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	4	N/A	2014/09/12	BBY6SOP-00010	SM 22 4500-NO3- I m
Filter and HNO3 Preserve for Metals	4	N/A	2014/09/16	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	4	N/A	2014/09/12	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (low level)	4	N/A	2014/09/12	BBY6SOP-00013	SM 22 4500-P E m
Sulphate by Automated Colourimetry	3	N/A	2014/09/11	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate by Automated Colourimetry	1	N/A	2014/09/12	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Filt. Residue)	4	2014/09/11	2014/09/12	BBY6SOP-00033	SM 22 2540 C m
Phosphorus-P (Total, dissolved) - FF/FP	3	2014/09/12	2014/09/12	BBY6SOP-00013	SM 22 4500-P E m

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Your P.O. #: 108376
Your C.O.C. #: 08396702

Attention:Robin McCall

YUKON ZINC CORPORATION
PO Box 57
Whitehorse, YT
CANADA Y1A 5X9

Report Date: 2014/09/17
Report #: R1644713
Version: 1

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B480018
Received: 2014/09/10, 10:05

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phosphorus-P (Tot, diss.) - unfiltered	1	2014/09/12	2014/09/12	BBY6SOP-00013	SM 22 4500-P E m
Total Phosphorus	4	N/A	2014/09/12	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	1	N/A	2014/09/12	BBY6SOP-00034	SM 22 2540 D
Total Suspended Solids	3	N/A	2014/09/13	BBY6SOP-00034	SM 22 2540 D
Turbidity	4	N/A	2014/09/11	BBY6SOP-00027	SM 22 2130 B m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) DOC present in the sample should be considered as non-purgeable DOC.
(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Graham Rudkin, Project Manager, Environmental
Email: GRudkin@maxxam.ca
Phone# (604)638-5926 Ext:5926

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This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		KO2719		KO2720		KO2721		KO2722		
Sampling Date		2014/09/05 10:30		2014/09/07 11:00		2014/09/07 11:15		2014/09/07 17:15		
COC Number		08396702		08396702		08396702		08396702		
	Units	W16	QC Batch	W12	QC Batch	W13	QC Batch	W76	RDL	QC Batch
Misc. Inorganics										
Acidity (pH 8.3)	mg/L	<0.50	7634484	<0.50	7634484	<0.50	7634484	<0.50	0.50	7634484
Fluoride (F)	mg/L	0.034	7636326	0.046	7635722	0.043	7636326	0.045	0.010	7636326
Calculated Parameters										
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	ONSITE	FIELD	ONSITE	FIELD	N/A	ONSITE
Nitrate (N)	mg/L	0.0418	7632254	<0.0020	7632254	0.0116	7632254	<0.0020	0.0020	7632254
Misc. Inorganics										
Strong Acid Dissoc. Cyanide (CN)	mg/L	0.00078	7635651						0.00050	
Weak Acid Dissoc. Cyanide (CN)	mg/L	0.00125	7635654						0.00050	
Dissolved Organic Carbon (C)	mg/L	1.82	7634660	1.93	7634660	1.43	7634660		0.50	7634660
Alkalinity (Total as CaCO3)	mg/L	68.6	7634759	67.5	7634772	58.8	7635743	90.9	0.50	7635743
Anions										
Orthophosphate (P)	mg/L	0.0011 (1)	7635585	0.0021 (2)	7635585	<0.0010 (2)	7635585	<0.0010 (2)	0.0010	7635585
Dissolved Sulphate (SO4)	mg/L	12.9	7634827	14.6	7634827	5.15	7634827	16.9	0.50	7636323
Dissolved Chloride (Cl)	mg/L	<0.50	7634826	<0.50	7634826	<0.50	7634826	<0.50	0.50	7634826
Nutrients										
Total Ammonia (N)	mg/L	0.017	7634656	0.018	7634656	0.019	7634652	0.014	0.0050	7634656
Dissolved Phosphorus (P)	mg/L	<0.0050	7635524	<0.0050	7635524	<0.0050	7635524	<0.0050 (2)	0.0050	7635562
Nitrate plus Nitrite (N)	mg/L	0.0513 (1)	7634722	<0.0020 (2)	7634722	0.0116 (2)	7634722	<0.0020 (2)	0.0020	7634722
Nitrite (N)	mg/L	0.0095 (1)	7634725	<0.0020 (2)	7634725	<0.0020 (2)	7634725	<0.0020 (2)	0.0020	7634725
Total Phosphorus (P)	mg/L	0.0093	7635546	0.0076	7635546	<0.0050	7635546	0.0098	0.0050	7635546
Physical Properties										
Conductivity	uS/cm	167	7634766	160	7634775	124	7635747	209	1.0	7635747
pH	pH	7.88	7634762	7.89	7634774	7.68	7635746	7.93	N/A	7635746
Physical Properties										
Total Suspended Solids	mg/L	<4.0	7633585	<4.0	7635225	<4.0	7635225	<4.0	4.0	7635225
Total Dissolved Solids	mg/L	104	7633593	102	7633593	80	7633593	122	10	7633593
Turbidity	NTU	0.14 (1)	7634009	0.47 (2)	7634009	0.83 (2)	7634009	0.25 (2)	0.10	7634009

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Sample arrived to laboratory past recommended hold time.
(2) Sample analysed past hold time: sample was received on the hold time expiry date which did not allow sufficient time for preparation and analysis.

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		KO2719	KO2720	KO2721	KO2722		
Sampling Date		2014/09/05 10:30	2014/09/07 11:00	2014/09/07 11:15	2014/09/07 17:15		
COC Number		08396702	08396702	08396702	08396702		
	Units	W16	W12	W13	W76	RDL	QC Batch
Elements							
Dissolved Mercury (Hg)	ug/L	0.011	<0.010	<0.010	<0.010	0.010	7639306
Total Mercury (Hg)	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	7639019
RDL = Reportable Detection Limit							

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Maxxam Job #: B480018
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YUKON ZINC CORPORATION
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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		KO2719	KO2720	KO2721	KO2722		
Sampling Date		2014/09/05 10:30	2014/09/07 11:00	2014/09/07 11:15	2014/09/07 17:15		
COC Number		08396702	08396702	08396702	08396702		
	Units	W16	W12	W13	W76	RDL	QC Batch
ANIONS							
Bromide (Br)	mg/L	<0.010	<0.010	<0.010	<0.010	0.010	7636833
RDL = Reportable Detection Limit							

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
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LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		KO2719	KO2720	KO2721		KO2722		
Sampling Date		2014/09/05 10:30	2014/09/07 11:00	2014/09/07 11:15		2014/09/07 17:15		
COC Number		08396702	08396702	08396702		08396702		
	Units	W16	W12	W13	QC Batch	W76	RDL	QC Batch
Misc. Inorganics								
Dissolved Hardness (CaCO3)	mg/L	84.3	87.2	72.5	7632127	123	0.50	7633263
Dissolved Metals by ICPMS								
Dissolved Aluminum (Al)	mg/L	0.00298	0.00423	0.00391	7640198	0.00320	0.00050	7640198
Dissolved Antimony (Sb)	mg/L	0.000038	0.000045	0.000031	7640198	0.000098	0.000020	7640198
Dissolved Arsenic (As)	mg/L	0.000114	0.000257	0.000147 (1)	7640198	0.000249	0.000020	7640198
Dissolved Barium (Ba)	mg/L	0.0651	0.0660	0.0704	7640198	0.0655	0.000020	7640198
Dissolved Beryllium (Be)	mg/L	<0.000010	<0.000010	<0.000010	7640198	<0.000010	0.000010	7640198
Dissolved Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	7640198	<0.0000050	0.0000050	7640198
Dissolved Boron (B)	mg/L	<0.020	<0.020	<0.020	7640198	<0.020	0.020	7640198
Dissolved Cadmium (Cd)	mg/L	0.0000910	0.0000120	0.0000180	7640198	0.0000110	0.0000050	7640198
Dissolved Chromium (Cr)	mg/L	0.00014	0.00011	0.00019	7640198	0.00026	0.00010	7640198
Dissolved Cobalt (Co)	mg/L	0.0000280	0.0000270	0.0000300 (1)	7640198	0.0000580 (1)	0.0000050	7640198
Dissolved Copper (Cu)	mg/L	0.000370	0.000501	0.000307	7640198	0.000912	0.000050	7640198
Dissolved Iron (Fe)	mg/L	0.0152	0.0687	0.0089 (1)	7640198	0.0671	0.0010	7640198
Dissolved Lead (Pb)	mg/L	0.0000110	0.0000180	0.0000100	7640198	0.0000100	0.0000050	7640198
Dissolved Lithium (Li)	mg/L	<0.00050	<0.00050	<0.00050	7640198	0.00060	0.00050	7640198
Dissolved Manganese (Mn)	mg/L	0.0287	0.0137	0.000527 (1)	7640198	0.00656	0.000050	7640198
Dissolved Molybdenum (Mo)	mg/L	0.000412	0.000416	0.000335	7640198	0.000416	0.000050	7640198
Dissolved Nickel (Ni)	mg/L	0.000240 (1)	0.000305	0.000417	7640198	0.000775	0.000020	7640198
Dissolved Phosphorus (P)	mg/L	0.0031	0.0062	0.0031	7640198	0.0042	0.0020	7640198
Dissolved Selenium (Se)	mg/L	0.00131	0.000701	0.000340	7640198	0.000531	0.000040	7640198
Dissolved Silicon (Si)	mg/L	3.56	4.07	5.36	7640198	4.96	0.10	7640198
Dissolved Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.0000050	7640198	<0.0000050	0.0000050	7640198
Dissolved Strontium (Sr)	mg/L	0.0484	0.0507	0.0295	7640198	0.105	0.000050	7640198
Dissolved Thallium (Tl)	mg/L	<0.0000020	<0.0000020	<0.0000020	7640198	<0.0000020	0.0000020	7640198
Dissolved Tin (Sn)	mg/L	<0.00020	<0.00020	<0.00020	7640198	<0.00020	0.00020	7640198
Dissolved Titanium (Ti)	mg/L	<0.00050	<0.00050	<0.00050	7640198	<0.00050	0.00050	7640198
Dissolved Uranium (U)	mg/L	0.000130	0.000287	0.000177	7640198	0.000336	0.0000020	7640198
Dissolved Vanadium (V)	mg/L	<0.00020	<0.00020	0.00023	7640198	<0.00020	0.00020	7640198
Dissolved Zinc (Zn)	mg/L	0.00415	0.00049	0.00123 (1)	7640198	0.0224 (1)	0.00010	7640198
Dissolved Zirconium (Zr)	mg/L	<0.00010	<0.00010	<0.00010	7640198	<0.00010	0.00010	7640198
Dissolved Calcium (Ca)	mg/L	28.4	27.0	22.6	7632891	34.0	0.050	7632891
Dissolved Magnesium (Mg)	mg/L	3.21	4.82	3.91	7632891	9.16	0.050	7632891
Dissolved Potassium (K)	mg/L	0.606	0.718	0.630	7632891	0.327	0.050	7632891
Dissolved Sodium (Na)	mg/L	1.46	1.18	1.34	7632891	1.10	0.050	7632891

RDL = Reportable Detection Limit

(1) Dissolved greater than total. Reanalysis yields similar results.

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

LOW LEVEL DISSOLVED METALS IN WATER (WATER)

Maxxam ID		KO2719	KO2720	KO2721		KO2722		
Sampling Date		2014/09/05 10:30	2014/09/07 11:00	2014/09/07 11:15		2014/09/07 17:15		
COC Number		08396702	08396702	08396702		08396702		
	Units	**W16**	**W12**	**W13**	**QC Batch**	**W76**	**RDL**	**QC Batch**
Dissolved Sulphur (S)	mg/L	4.6	5.6	<3.0	7632891	5.9	3.0	7632891
RDL = Reportable Detection Limit								

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YUKON ZINC CORPORATION
Your P.O. #: 108376

LOW LEVEL TOTAL METALS IN WATER (WATER)

Maxxam ID		KO2719	KO2720	KO2721	KO2722		
Sampling Date		2014/09/05 10:30	2014/09/07 11:00	2014/09/07 11:15	2014/09/07 17:15		
COC Number		08396702	08396702	08396702	08396702		
	Units	W16	W12	W13	W76	RDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	87.3	90.8	69.8	121	0.50	7632436
Total Metals by ICPMS							
Total Aluminum (Al)	mg/L	0.00931	0.0186	0.00525	0.00751	0.00050	7640660
Total Antimony (Sb)	mg/L	0.000038	0.000046	0.000031	0.000099	0.000020	7640660
Total Arsenic (As)	mg/L	0.000098	0.000299	0.000102	0.000251	0.000020	7640660
Total Barium (Ba)	mg/L	0.0658	0.0684	0.0699	0.0669	0.000020	7640660
Total Beryllium (Be)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	7640660
Total Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000050	7640660
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	7640660
Total Cadmium (Cd)	mg/L	0.000102	0.0000250	0.0000190	0.0000120	0.0000050	7640660
Total Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00010	0.00020	0.00010	7640660
Total Cobalt (Co)	mg/L	0.0000340	0.0000710	0.0000170	0.0000230	0.0000050	7640660
Total Copper (Cu)	mg/L	0.000434	0.000685	0.000384	0.00104	0.000050	7640660
Total Iron (Fe)	mg/L	0.0368	0.187	0.0040	0.0787	0.0010	7640660
Total Lead (Pb)	mg/L	0.0000120	0.0000390	<0.0000050	0.0000080	0.0000050	7640660
Total Lithium (Li)	mg/L	<0.00050	<0.00050	<0.00050	0.00060	0.00050	7640660
Total Manganese (Mn)	mg/L	0.0330	0.0433	0.000275	0.0221	0.000050	7640660
Total Molybdenum (Mo)	mg/L	0.000697	0.000522	0.000357	0.000454	0.000050	7640660
Total Nickel (Ni)	mg/L	0.000176	0.000332	0.000362	0.000786	0.000020	7640660
Total Phosphorus (P)	mg/L	0.0060	0.0111	0.0032	0.0057	0.0020	7640660
Total Selenium (Se)	mg/L	0.00140	0.000782	0.000355	0.000496	0.000040	7640660
Total Silicon (Si)	mg/L	3.76	4.27	5.41	4.91	0.10	7640660
Total Silver (Ag)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000050	7640660
Total Strontium (Sr)	mg/L	0.0483	0.0511	0.0292	0.104	0.000050	7640660
Total Thallium (Tl)	mg/L	<0.0000020	<0.0000020	<0.0000020	<0.0000020	0.0000020	7640660
Total Tin (Sn)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	7640660
Total Titanium (Ti)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00050	7640660
Total Uranium (U)	mg/L	0.000133	0.000302	0.000180	0.000339	0.0000020	7640660
Total Vanadium (V)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	7640660
Total Zinc (Zn)	mg/L	0.00432	0.00079	0.00033	0.00032	0.00010	7640660
Total Zirconium (Zr)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	7640660
Total Calcium (Ca)	mg/L	29.5	28.4	21.6	33.5	0.050	7632892
Total Magnesium (Mg)	mg/L	3.33	4.85	3.85	9.16	0.050	7632892
Total Potassium (K)	mg/L	0.609	0.725	0.647	0.330	0.050	7632892
Total Sodium (Na)	mg/L	1.44	1.19	1.32	1.15	0.050	7632892
Total Sulphur (S)	mg/L	5.1	6.2	<3.0	6.7	3.0	7632892

RDL = Reportable Detection Limit

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.3°C

Results relate only to the items tested.

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Maxxam Job #: B480018
Report Date: 2014/09/17

QUALITY ASSURANCE REPORT

YUKON ZINC CORPORATION
Your P.O. #: 108376

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7633585	Total Suspended Solids	2014/09/12	102	80 - 120	108	80 - 120	<4.0	mg/L	NC	20
7633593	Total Dissolved Solids	2014/09/11			86	80 - 120	<10	mg/L		
7634009	Turbidity	2014/09/11			100	80 - 120	<0.10	NTU	NC	20
7634484	Acidity (pH 8.3)	2014/09/11			96	80 - 120	<0.50	mg/L		
7634652	Total Ammonia (N)	2014/09/11	119	80 - 120	107	80 - 120	<0.0050	mg/L	NC	20
7634656	Total Ammonia (N)	2014/09/11	NC	80 - 120	108	80 - 120	0.0079 ,RDL=0.0050	mg/L	NC	20
7634660	Dissolved Organic Carbon (C)	2014/09/11	91	80 - 120	102	80 - 120	<0.50	mg/L	NC	20
7634722	Nitrate plus Nitrite (N)	2014/09/11	NC	80 - 120	108	80 - 120	<0.0020	mg/L	1.4	25
7634725	Nitrite (N)	2014/09/11	107	80 - 120	104	80 - 120	<0.0020	mg/L	4.6	25
7634759	Alkalinity (Total as CaCO3)	2014/09/11	95	80 - 120	98	80 - 120	<0.50	mg/L	NC	20
7634762	pH	2014/09/11			101	97 - 103			1.0	N/A
7634766	Conductivity	2014/09/11			100	80 - 120	<1.0	uS/cm	NC	20
7634772	Alkalinity (Total as CaCO3)	2014/09/12	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.37	20
7634774	pH	2014/09/12			101	97 - 103			0.88	N/A
7634775	Conductivity	2014/09/12			99	80 - 120	<1.0	uS/cm	0.45	20
7634826	Dissolved Chloride (Cl)	2014/09/11	98	80 - 120	98	80 - 120	<0.50	mg/L	NC	20
7634827	Dissolved Sulphate (SO4)	2014/09/11			94	80 - 120	<0.50	mg/L	0.34	20
7635225	Total Suspended Solids	2014/09/13	108	80 - 120	101	80 - 120	<4.0	mg/L	NC	20
7635524	Dissolved Phosphorus (P)	2014/09/12	88	80 - 120	91	80 - 120	<0.0050	mg/L	NC	20
7635546	Total Phosphorus (P)	2014/09/12	NC	80 - 120	91	80 - 120	<0.0050	mg/L	0.40	20
7635562	Dissolved Phosphorus (P)	2014/09/12	87	80 - 120	92	80 - 120	<0.0050	mg/L	NC	20
7635585	Orthophosphate (P)	2014/09/12	98	80 - 120	103	80 - 120	<0.0010	mg/L	NC	20
7635651	Strong Acid Dissoc. Cyanide (CN)	2014/09/15	100	80 - 120	101	80 - 120	<0.00050	mg/L	NC	20
7635654	Weak Acid Dissoc. Cyanide (CN)	2014/09/15	105	80 - 120	105	80 - 120	0.00072 ,RDL=0.00050	mg/L	NC	20
7635722	Fluoride (F)	2014/09/12	101	80 - 120	98	80 - 120	<0.010	mg/L	NC	20
7635743	Alkalinity (Total as CaCO3)	2014/09/12	NC	80 - 120	96	80 - 120	0.52 ,RDL=0.50	mg/L	0.83	20
7635746	pH	2014/09/12			101	97 - 103			0.48	N/A
7635747	Conductivity	2014/09/12			99	80 - 120	1.8 ,RDL=1.0	uS/cm	0.49	20
7636323	Dissolved Sulphate (SO4)	2014/09/12	NC	80 - 120	97	80 - 120	<0.50	mg/L	4.8	20
7636326	Fluoride (F)	2014/09/15	99	80 - 120	94	80 - 120	<0.010	mg/L	1.1	20
7636833	Bromide (Br)	2014/09/13	NC	78 - 120	101	80 - 120	<0.010	mg/L	1.9	20

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QUALITY ASSURANCE REPORT(CONT'D)

YUKON ZINC CORPORATION
Your P.O. #: 108376

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7639019	Total Mercury (Hg)	2014/09/16	92	80 - 120	101	80 - 120	<0.010	ug/L	NC	20
7639306	Dissolved Mercury (Hg)	2014/09/16	85	80 - 120	116	80 - 120	<0.010	ug/L	NC	20
7640198	Dissolved Aluminum (Al)	2014/09/16	108	80 - 120	111	80 - 120	<0.00050	mg/L		
7640198	Dissolved Antimony (Sb)	2014/09/16	98	80 - 120	98	80 - 120	<0.000020	mg/L		
7640198	Dissolved Arsenic (As)	2014/09/16	105	80 - 120	107	80 - 120	0.000037 ,RDL=0.000020	mg/L		
7640198	Dissolved Barium (Ba)	2014/09/16	97	80 - 120	100	80 - 120	<0.000020	mg/L	NC	20
7640198	Dissolved Beryllium (Be)	2014/09/16	101	80 - 120	101	80 - 120	<0.000010	mg/L		
7640198	Dissolved Bismuth (Bi)	2014/09/16	96	80 - 120	99	80 - 120	<0.0000050	mg/L		
7640198	Dissolved Boron (B)	2014/09/16					<0.020	mg/L		
7640198	Dissolved Cadmium (Cd)	2014/09/16	101	80 - 120	99	80 - 120	<0.0000050	mg/L		
7640198	Dissolved Chromium (Cr)	2014/09/16	95	80 - 120	95	80 - 120	<0.00010	mg/L		
7640198	Dissolved Cobalt (Co)	2014/09/16	93	80 - 120	92	80 - 120	<0.0000050	mg/L		
7640198	Dissolved Copper (Cu)	2014/09/16	93	80 - 120	94	80 - 120	<0.000050	mg/L		
7640198	Dissolved Iron (Fe)	2014/09/16	113	80 - 120	105	80 - 120	<0.0010	mg/L		
7640198	Dissolved Lead (Pb)	2014/09/16	96	80 - 120	97	80 - 120	<0.0000050	mg/L		
7640198	Dissolved Lithium (Li)	2014/09/16	95	80 - 120	97	80 - 120	<0.00050	mg/L		
7640198	Dissolved Manganese (Mn)	2014/09/16	95	80 - 120	98	80 - 120	<0.000050	mg/L		
7640198	Dissolved Molybdenum (Mo)	2014/09/16	90	80 - 120	94	80 - 120	<0.000050	mg/L		
7640198	Dissolved Nickel (Ni)	2014/09/16	94	80 - 120	95	80 - 120	<0.000020	mg/L	12	20
7640198	Dissolved Phosphorus (P)	2014/09/16					<0.0020	mg/L		
7640198	Dissolved Selenium (Se)	2014/09/16	100	80 - 120	100	80 - 120	<0.000040	mg/L		
7640198	Dissolved Silicon (Si)	2014/09/16					<0.10	mg/L		
7640198	Dissolved Silver (Ag)	2014/09/16	98	80 - 120	96	80 - 120	<0.0000050	mg/L		
7640198	Dissolved Strontium (Sr)	2014/09/16	96	80 - 120	96	80 - 120	0.000060 ,RDL=0.000050	mg/L		
7640198	Dissolved Thallium (Tl)	2014/09/16	99	80 - 120	99	80 - 120	<0.0000020	mg/L		
7640198	Dissolved Tin (Sn)	2014/09/16	94	80 - 120	96	80 - 120	<0.00020	mg/L		
7640198	Dissolved Titanium (Ti)	2014/09/16	103	80 - 120	104	80 - 120	<0.00050	mg/L		
7640198	Dissolved Uranium (U)	2014/09/16	94	80 - 120	97	80 - 120	<0.0000020	mg/L		
7640198	Dissolved Vanadium (V)	2014/09/16	97	80 - 120	95	80 - 120	<0.00020	mg/L		
7640198	Dissolved Zinc (Zn)	2014/09/16	106	80 - 120	100	80 - 120	<0.00010	mg/L		
7640198	Dissolved Zirconium (Zr)	2014/09/16					<0.00010	mg/L		

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QUALITY ASSURANCE REPORT(CONT'D)

YUKON ZINC CORPORATION
Your P.O. #: 108376

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7640660	Total Aluminum (Al)	2014/09/16	NC	80 - 120	108	80 - 120	<0.00050	mg/L		
7640660	Total Antimony (Sb)	2014/09/16	101	80 - 120	97	80 - 120	<0.000020	mg/L		
7640660	Total Arsenic (As)	2014/09/16	112	80 - 120	104	80 - 120	<0.000020	mg/L		
7640660	Total Barium (Ba)	2014/09/16	NC	80 - 120	95	80 - 120	<0.000020	mg/L		
7640660	Total Beryllium (Be)	2014/09/16	103	80 - 120	95	80 - 120	<0.000010	mg/L		
7640660	Total Bismuth (Bi)	2014/09/16	92	80 - 120	94	80 - 120	<0.0000050	mg/L	NC	20
7640660	Total Boron (B)	2014/09/16					<0.020	mg/L		
7640660	Total Cadmium (Cd)	2014/09/16	98	80 - 120	96	80 - 120	<0.0000050	mg/L		
7640660	Total Chromium (Cr)	2014/09/16	94	80 - 120	93	80 - 120	<0.00010	mg/L		
7640660	Total Cobalt (Co)	2014/09/16	90	80 - 120	91	80 - 120	<0.0000050	mg/L		
7640660	Total Copper (Cu)	2014/09/16	88	80 - 120	91	80 - 120	<0.000050	mg/L		
7640660	Total Iron (Fe)	2014/09/16	NC	80 - 120	111	80 - 120	<0.0010	mg/L		
7640660	Total Lead (Pb)	2014/09/16	95	80 - 120	95	80 - 120	<0.0000050	mg/L		
7640660	Total Lithium (Li)	2014/09/16	NC	80 - 120	90	80 - 120	<0.00050	mg/L		
7640660	Total Manganese (Mn)	2014/09/16	NC	80 - 120	95	80 - 120	<0.000050	mg/L		
7640660	Total Molybdenum (Mo)	2014/09/16	NC	80 - 120	90	80 - 120	<0.000050	mg/L		
7640660	Total Nickel (Ni)	2014/09/16	89	80 - 120	93	80 - 120	<0.000020	mg/L		
7640660	Total Phosphorus (P)	2014/09/16					<0.0020	mg/L		
7640660	Total Selenium (Se)	2014/09/16	102	80 - 120	98	80 - 120	<0.000040	mg/L		
7640660	Total Silicon (Si)	2014/09/16					<0.10	mg/L		
7640660	Total Silver (Ag)	2014/09/16	98	80 - 120	86	80 - 120	<0.0000050	mg/L		
7640660	Total Strontium (Sr)	2014/09/16	NC	80 - 120	96	80 - 120	<0.000050	mg/L		
7640660	Total Thallium (Tl)	2014/09/16	98	80 - 120	97	80 - 120	<0.0000020	mg/L		
7640660	Total Tin (Sn)	2014/09/16	94	80 - 120	92	80 - 120	<0.00020	mg/L		
7640660	Total Titanium (Ti)	2014/09/16	98	80 - 120	100	80 - 120	<0.00050	mg/L		
7640660	Total Uranium (U)	2014/09/16	101	80 - 120	94	80 - 120	<0.0000020	mg/L		
7640660	Total Vanadium (V)	2014/09/16	NC	80 - 120	93	80 - 120	<0.00020	mg/L		
7640660	Total Zinc (Zn)	2014/09/16	90	80 - 120	93	80 - 120	<0.00010	mg/L		
7640660	Total Zirconium (Zr)	2014/09/16					<0.00010	mg/L		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B480018
Report Date: 2014/09/17

YUKON ZINC CORPORATION
Your P.O. #: 108376

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CHAIN-OF CUSTODY RECORD AND ANALYSIS REQUEST

08396702

PAGE 1 OF 1

LAB USE ONLY: MAXXAM JOB # B480018

ANALYSIS REQUEST

LAB USE ONLY: COC #

COMPANY NAME: Yukon Zinc Corporation	CLIENT PROJECT NO.:
COMPANY ADDRESS: #410-700 West Pender Vancouver, BC V6C 1G8	TEL.: 604-638-0921 Ex.5022 E-MAIL: YZC Group FAX: 604-682-5404
SAMPLER NAME (PRINT): Thomas Pearson	PROJECT MANAGER: Robin McCall
	LABORATORY CONTACT: Graham Rudkin

	FIELD SAMPLE ID	MAXXAM LAB # (LAB USE ONLY)	MATRIX: GROUNDWATER	SURFACE WATER	DRINKING WATER	SOIL	OTHER	SAMPLING: DATE (dd/mm/yy)	TIME	# CONTAINERS	Package A including:	EC, Alk, Acidity, pH, turbidity, temperature	Total/Diss. Phosphate, SO4, PO4	Ammonia, N02, N03, F, Cl, Br	DOC	Cyanide (Total and WAD)	LL Total Metals (inc. P, Hg)	LL Dissolved Metals (inc. P, Hg)	Hardness	TDS, TSS	Total Mercury	Dissolved Mercury	TOC
1	W16	K02719		X				5-Sep-14	10:30	9	X	X	X	X	X	X	X	X	X	X	X	X	
2	W12	K02720		X				7-Sep-14	11:00	8	X	X	X	X	X		X	X	X	X	X	X	
3	W13	K02721		X				7-Sep-14	11:15	8	X	X	X	X	X		X	X	X	X	X	X	
4	W76	K02722		X				7-Sep-14	17:15	7	X	X	X	X			X	X	X	X	X	X	
5																							
6																							
7																							
8																							
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B480018

TAT (Turnaround Time)
LESS THAN 5 DAY TAT MUST HAVE PRIOR APPROVAL
* Some exceptions apply - please contact laboratory

STANDARD	5 BUSINESS DAYS	X
RUSH	3 BUSINESS DAYS	
RUSH	2 BUSINESS DAYS	
URGENT	1 BUSINESS DAY	

OTHER BUSINESS DAYS

CUSTODY RECORD

PO NUMBER OR QUOTE NUMBER: 108376

SPECIAL DETECTION LIMITS / CONTAMINANT TYPE:

ACCOUNTING CONTACT:

SPECIAL REPORTING OR BILLING INSTRUCTIONS:

CCME
CSR
AB TIER 1
OTHER

JARS USED:

LAB USE ONLY: ARRIVAL TEMPERATURE °C: 6,6,4 CS:NA; DUE DATE:; LOG IN CHECK:

RELINQUISHED BY SAMPLER: Thomas Pearson	DATE: DD/MM/YY 09/09/2014	TIME: 7:30	RECEIVED BY:
RELINQUISHED BY: Robin McCall	DATE: DD/MM/YY 09/09/2014	TIME: 7:30	RECEIVED BY:
RELINQUISHED BY:	DATE: DD/MM/YY	TIME:	RECEIVED BY LABORATORY: Laurel Berthier 2014/09/10 10:05

COCFORM - BC - 20070822