DRAFT REPORT

Natural Attenuation Study 2010/2011 Interim Project Update and Data Compilation

United Keno Hill Mines Elsa, YT

Prepared for:

Access Consulting Group
Whitehorse, YT

Prepared by:

Interralogic, Inc.
4715 Innovation Drive, Suite 110
Fort Collins, CO 80525
(970) 225-8222

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1 PROJECT OVERVIEW

Reclamation and closure studies of historical United Keno Hill Mines (UKHM) facilities in the Keno Hills Silver District (District) are ongoing. Detailed descriptions of the District are provided in ERDC (2006) and Access (2010). The District contains over 65 silver ore deposits and prospects that were first mined in 1913. Most mining operations took place on the north-facing slopes of Galena Hill and also in areas to the east on Keno Hill (Figure 1). Both the Galena Hill and Keno Hill mines are within the South McQuesten River watershed. Many of the smaller watercourses, including those draining the northwest side of Galena Hill, terminate in wetlands in the South McQuesten River valley. Elevated metal concentrations occur in surface waters and sediments of many of the drainages associated with past mining operations (Kwong et al. 1994; 1997).

There are ten adits in the District that are known point sources of metal loads to the surface environment. These are listed below.

- Silver King 100
- Galkeno 300
- Galkeno 900
- No Cash 500 (Bermingham Ruby)
- Onek 400
- Sadie Ladue 600
- Keno 700
- Husky SW

The average adit outflows and zinc concentrations of the ten known point source adits in the district are given in Table 1, and their locations are shown on Figure 1. Six of these adits, Silver King 100, No Cash 500, Bermingham, Ruby, Husky SW, and Sadie Ladue 600, are located upstream of areas with the potential to naturally attenuate chemical mass in the adit discharge. The No Cash 500 and Husky SW adits drain into wetlands where the metal loads are attenuated by natural biogeochemical processes. The Silver King 100 and Sadie Ladue 600 adits are also upgradient of potential natural attenuation areas. The mechanisms of natural attenuation have been evaluated and described by Interralogic (2010) specifically for the No Cash 500 adit discharge, which is the second largest zinc source in the District (Table 1). For the purpose of this investigation, the Ruby and Bermingham adits are included under the No Cash 500 description because they drain into No Cash Creek (NCC). The remaining adits are not candidates for natural attenuation because of overly-elevated zinc concentrations, unfavorable hydrologic flow characteristics, and/or adit discharge does not flow through wetlands where attenuation processes are most effective. The Galkeno 300, Galkeno 900, and Silver King 100 adit discharges are currently collected and actively treated to reduce metal loads. According to the most recent water treatment records, the water treatment systems remove about 93 percent of the total zinc load in the District.

Zinc is the predominant metal of concern in the adit discharges of this area; although, low to moderate concentrations of cadmium and variable concentrations of manganese and iron are also present in some adit discharges..

The purpose of this report is to provide an interim update of the progress of the natural attenuation investigations completed during the 2010/11 fiscal year. The investigations were designed to gather additional information on attenuation processes at the No Cash 500, Husky SW, Sadie Ladue 600, and Silver King 100 adit discharge drainages that can be used to:

- Characterize the geochemical and hydrologic processes responsible for the zinc (and other metals) attenuation observed in these areas
- Develop a robust understanding of the efficacy of natural attenuation processes during all seasons
- Predict the future sustainability of the natural attenuation areas in terms of managing water quality
- Develop site-specific designs to optimize natural flows and geochemical conditions thereby maximizing natural attenuation effectiveness, ensuring sustainability of the systems, and reducing the chances of upsetting the conditions created.

Table 1. Average adit flows and zinc concentrations at the discharging adits*

Parameter	Galkeno 300	**No Cash 500**	Galkeno 900	**Silver King 100**	**Sadie Ladue 600**	Keno 700	**Husky SW**	Onek 400
Average Adit Flow (2004 – 2010) (L/s)	9.2	**5.5**	3.1	**5.6**	**7.6**	3.4	**0.4**	2.3
Zinc Concentration (mg/L)	125	**13**	6	**1.65**	**0.9**	3.5	**1.3**	85
Zinc Load (kg/yr)	47,000	**2,870**	680	**340**	**340**	330	**138**	(a)
Percent of Total Zinc Load	90.9%	**5.6%**	1.3%	**0.7%**	**0.7%**	0.6%	**0.3%**	(a)

(*)Compiled from flow rates and zinc concentrations measured by Alexco personnel on behalf of ERDC. Gray shading indicates adits with water treatment systems; BOLD indicates potential natural attenuation site).
(a) Uncertain due to wide variation in seasonal flow rate.

2 THE NO CASH 500 NATURAL ATTENUATION AREA

2.1 HYDROLOGIC AND GEOCHEMICAL CONDITIONS OF NO CASH CREEK

This section summarizes conditions along the NCC drainage based on Interralogic (2010). The NCC drainage is located on the northwest side of Galena Hill, in the Keno Hill Silver District (District) (Figure 1). No Cash Creek, the only major waterway in the No Cash drainage, is natural stream that receives water from the 500-level adits of the historic No Cash, Ruby, and Bermingham mines. Water from the 500-level adit is discharged directly from the adit, and through a culvert from the adit, onto the surrounding waste rock. It flows across a waste rock bench and cascades down the side of the waste rock and enters NCC about 0.5 km downstream of the natural headwater source of NCC (Figure 2). Measured flow rates at the surface water monitoring location KV21, where NCC passes the Silver Trail Highway, have ranged from 3 to 15 L/s, based on sampling conducted during July of 2007, 2008, and 2009 (Access, 2009).

After the adit flow enters NCC, it runs in a northwesterly direction, crossing the Silver Trail Highway in a culvert, through boreal forest on Galena Hill. It then intersects the No Cash Diversion Ditch which runs through a poorly drained valley containing extensive areas of heavily-vegetated peat bog/marsh. A series of other seeps and disconnected streams drain Galena Hill parallel to NCC, creating a large peat bog in the areas east and north of stream channel (Figure 2). No Cash Creek is not a direct tributary of any other streams but instead terminates in a small pond in a low lying boggy area of the valley approximately 2 km south of the South McQuesten River.

There is no known direct connection between NCC and the South McQuesten River. Much of the NCC drainage and surrounding wetland area is underlain by discontinuous permafrost of variable extent and thickness. There are seeps along the south and east sides of the river that may be down gradient of the terminus of NCC, but whether the creek is gaining or losing inflow to groundwater has not been established.

Adit water from the No Cash mine contains elevated levels of metals, namely cadmium, manganese, and zinc, as well as sulfate (Kwong et al. 1994; 1997; MERG 2000; ERDC 2006; Access, 2009). The sources of these constituents is expected to be primarily from the oxidative dissolution of metal sulfide minerals with possible lesser contributions from metal carbonate and silicate minerals associated with ore deposits. When these processes occur, the dissolved products are released to groundwater in the underground workings connected to the No Cash adit. The oxidative dissolution of sulfide minerals has not resulted in acid mine drainage from the No Cash adit due to high levels of carbonate (mostly calcite) in the major lithologic units that host the mineralization (Kwong et al. 1994; 1997).

Major lithologic units in this mine include the Keno Hill quartzite (Mississippian Era), and Earn Group metavolcanics and metasediments (Devonian-Mississippian Eras). Kwong et al. (1994) reports net neutralization potentials (NNP) ranging from 105 to 934 kg CaCO3/tonne for these rock types. Rock types with NNPs in that range have a very low probability of generating acid rock drainage; except possibly in localized areas of high sulfide mineral content. Water flowing directly from the adit and upper No Cash Creek have pH values between 7 and 8.3, and alkalinity measurements of 85 to 286 mg/L. These high alkalinities are indicative of a strong influence of carbonate mineralogy on water chemistry (Kwong et al.1994; 1997; MERG 2000; Access 2009).

2.2 SUMMARY OF NO CASH CREEK ACTIVITIES

The following tasks were designed to increase the level of understanding of the natural attenuation processes taking place in the No Cash drainage, and to evaluate the conditions and performance of the natural attenuation system during the winter and freshet seasons (ACG Project Work Plan, October, 2010). The design of this project was based on a review of historical data and publications including, but not limited to, the investigation conducted in 2009 and reported in Interralogic (2010), and peer review comments provided by Dr. Kwong (personal communication, 2010), who has done extensive geochemical and natural attenuation research in the District. A list of project tasks and their current levels of completion are presented below.

- Task 1 – Geochemistry of Natural Attenuation
    - Peat and soil sampling and geochemical analysis (completed but additional sampling required)
    - Soil water sampling and analysis (completed but additional sampling required)
    - Sediment sampling and geochemical analysis(completed but additional sampling required)
    - Water sampling and analysis (incomplete; additional fall sampling round required)
    - Winter and freshet water sampling in NCC Pond (completed)
- Task 2 – NCC Surface Water Pathway Evaluation
    - Summer survey (not completed – scheduled for 2011)
    - Winter survey (partially completed – analysis scheduled for 2011)
    - Freshet survey (partially completed – analysis scheduled for 2011)
- Task 3 – NCC Groundwater Pathway Evaluation
    - Well Installation (completed)
    - Well monitoring (partially completed – ongoing in 2011)
- Task 4 – NCC Surface Peat and Vegetation Sampling
    - Peat thickness (not completed – scheduled for summer 2011)
    - Peat chemistry with depth (not completed – scheduled for summer 2011)

    - Vegetation sampling (completed – reporting provided under separate cover)
- Task 5 – Silver King Pilot Test
    - Trench construction (mostly completed)
    - Infiltration test (postponed until approval received)

The initial field tasks for this project included work that was designed to be completed in late summer; however, due to project approval delays, work was not initiated until October, 2010. The project delays precluded the completion of some of the soil and engineering surveys, and sampling tasks, as the ground was covered with snow and/or frozen. Planned work that was not completed during 2010/11 has been included in the workplan for 2011/12.

Tasks completed and summarized in this document include:

- Stream bank, peat, soil, and stream sediment sampling at 35 locations along the No Cash drainage
- Stream water sampling at 13 locations along NCC
- Soil water sampling at 9 locations along the banks of NCC
- Drilling and installation of 4 groundwater monitoring wells in the lower No Cash drainage

Water samples collected during these field programs have been analyzed and the results will be presented in this document. Mineralogical analyses of solids is underway and results received to date have also been included in this update. Results from the 2010/11 field sampling programs that were not available at the time of reporting will be included in the report for the 2011/12 activities. The ice build-up survey, ice coring, and winter survey were conducted in the first week of March, 2011, and freshet sampling and surveys were scheduled for April/May 2011. An additional field program is scheduled for late summer to conduct peat surveys and fill data gaps identified through the course of the study.

2.3 SUMMARY OF INTERIM RESULTS FOR NO CASH CREEK

2.3.1 NO CASH CREEK DRAINAGE OVERVIEW AND OBSERVATIONS

The NCC drainage was inspected during the October 2010, November 2010, and March 2011 field programs. There is about 260 m of relief along the drainage, most of which occurs in the first (southern) 1,000 m from the adit. Four hydrologic/geomorphic reaches were identified based on slope, and vegetation characteristics, and are shown on Figure 2. Reaches identified in the No Cash Creek drainage are the adit/waste rock reach, the cascading reach, the transitional reach, and the peat bog reach. The No Cash natural attenuation system is defined as a 3.4 km length of drainage from the adit to the "terminal pond" area.

The adit/waste rock reach consists of the adit structure, the drain pipe from which the water flows and the immediate receiving area. This reach includes a waste rock pile at angle of repose, with two large bench areas. Discharge from the adit flows directly onto and across the top of the waste rock for about 10 m, cascades off of the top waste rock area bench, approximately 30 m, onto a lower bench of the waste rock. It then flows across the bench spilling another few meters into a steep, forested area where it joins NCC. Additional water flows from a drain pipe that protrudes from the upper waste rock pile during non-winter months. During a winter survey in March of 2011, the pipe was completely frozen and no flow was present. Liquid water was eventually located about 10 m southeast of the pipe outlet after penetrating the ice sheet in various areas around the adit.

There is significant aeration of the water within the adit, as it discharges from the adit structure, through the pipe, and down the waste rock face. Significant amounts of reddish and brownish precipitate composed of iron, and manganese oxyhydroxides, with elevated zinc and other concentrated metals are present along the discharge area. Additional mineralogical data are presented in the following sections.

The cascading reach runs for approximately 750 m from the base of the waste rock dump, including flow through a culvert under the Silver Trail Highway. This reach is characterized by a steep (about 20 percent slope) stream channel with cobbles, and boulders. There are abundant trees and pockets of dense vegetation. The upper section of this reach shows some reddish precipitate similar to that found in the adit/waste rock reach. Liquid water was heard and/or directly observed flowing beneath the ice along most of this reach during the winter sampling round.

The transition reach is not as steep as the cascading reach and has fewer cascading areas, boulders, and cobbles present. The slope in this section decreases to about 2 percent and the stream begins to show signs of meandering and braiding as the slope becomes less steep. Abundant trees and undergrowth are present in the upper section of this reach; some peat is present in the lower section. Occasional areas of reddish stream sediment were observed in this reach. During the winter sampling session, liquid water was encountered in this reach; however, it was common to dig "dry" holes before excavating one that was capable of being sampled.

The peat bog reach is flat and irregular, with willows and sparse tree growth. The slope decreases to about 10 percent. The few Black Spruce trees present are apparently stressed or dead. The stream branches numerous times and the main channel is often not clearly identifiable, with multiple parallel/braided stream channels of similar size present in the same section/reach. The channels are commonly one to two meters across and about 0.5 m deep. A surface water diversion that collects water from Galena hill, south of the Valley Tailings Facility (VTF) intersects NCC approximately 1.75 kilometers from the adit. The peat bog reach ends where a small ephemeral pond has developed with no apparent surficial outlet. Occasional reddish, muddy, sediment was observed in this reach, including near the sample location NC-5, below the confluence with the diversion ditch. During the winter sampling round, liquid water was not encountered at most of the sampling locations. Multiple holes were dug at each location through the ice until either water or soils were encountered.

2.3.2 NO CASH WATER CHEMISTRY

Water samples were collected in October, 2010 from the No Cash Adit and along NCC to the terminal pond. A list of analytes is provided in Table 2. Field parameters such as pH, temperature, and conductivity were measured at all locations. Alkalinity titrations were conducted and sulphide concentration measurements were attempted in the field, however, colorimetric interferences (i.e., highly turbid and colored water) made such measurements unreliable because color changes could not be observed.

Table 2: Full Suite Analyte List

Other Parameters	
pH	**pH Units**
Conductivity	µS/cm
Bicarbonate (HCO_3)	mg$CaCO_3$/L
Carbonate (CO_3)	mg$CaCO_3$/L
Hydroxide (OH)	mg$CaCO_3$/L
Alkalinity (PP as $CaCO_3$)	mg$CaCO_3$/L
Alkalinity (Total as $CaCO_3$)	mg$CaCO_3$/L
Ammonia (N)	mg/L
Nitrate plus Nitrite (N)	mg/L
Nitrite (N)	mg/L
Nitrate (N)	mg/L
Nitrogen (N)	mg/L
Fluoride (F)	mg/L
Dissolved Chloride (Cl)	mg/L
Dissolved Sulfate (SO_4)	mg/L
Dissolved Organic Carbon (C)	mg/L
Total Organic Carbon (C)	mg/L
Total Dissolved Solids	mg/L
Total Suspended Solids	mg/L
Field Paramaters	
pH	**pH Units**
Conductivity	µS/cm
Alkalinity*	mg$CaCO_3$/L
Sulfide*	mg/L
Temperature	degrees C
ORP	mV

Table 2: Full Suite Analyte List (continued)

Total and Dissolved Metals	
Aluminum (Al)	µg/L
Arsenic (As)	µg/L
Barium (Ba)	µg/L
Boron (B)	µg/L
Beryllium (Be)	µg/L
Bismuth (Bi)	µg/L
Cadmium (Cd)	µg/L
Cobalt (Co)	µg/L
Chromium (Cr)	µg/L
Copper (Cu)	µg/L
Iron (Fe)	µg/L
Lithium (Li)	µg/L
Manganese (Mn)	µg/L
Molybdenum (Mo)	µg/L
Mercury (Hg) (total only)	µg/L
Nickel (Ni)	µg/L
Lead (Pb)	µg/L
Antimony (Sb)	µg/L
Selenium (Se)	µg/L
Silicon (Si)	µg/L
Silver (Ag)	µg/L
Tin (Sn)	µg/L
Strontium (Sr)	µg/L
Titanium (Ti)	µg/L
Thallium (Tl)	µg/L
Uranium (U)	µg/L
Vanadium (V)	µg/L
Zinc (Zn)	µg/L
Zirconium (Zr)	µg/L
Calcium (Ca)	mg/L
Potassium (K)	mg/L
Magnesium (Mg)	mg/L
Sodium (Na)	mg/L
Sulfur (S)	mg/L
Hardness ($CaCO_3$)	mg/L

*Colorimetric field alkalinity and sulfide measurements were attempted on pore water samples but was unsuccessful due to interferences from turbid water.

A full set of October analytical results is provided in Appendix A1. Appendix A2 contains figures that show the key analyte concentrations along NCC graphed with the historical results from Interralogic (2010), Kwong, et al. (1994), and MERG (2000).

Results are generally consistent with previous investigations and have the following trends:

- Metal concentrations, including zinc, manganese, and cadmium, decrease significantly along the flow path, with the highest level of attenuation occurring in the cascading reach immediately downstream of the adit (Appendix A.2.1 Figures).
- Additional attenuation occurs in the transition and peat bog reaches of the flow path with a total attenuation factor of about 100 for zinc, between 100 and 1000 for cadmium, and 20 to 100 for manganese (Appendix A.2.1 Figures).
- These trends have been consistently observed over a long period of record (Kwong, et al. (1994), MERG (2000)).

Appendix A3 contains a table of water quality data for nine pore water samples extracted from peat or mixed peat/sediment samples. In general, these samples were highly turbid and brown to black in color, with abundant organic matter and sediment. Laboratory analytical results show that total metals are generally elevated and significantly higher than dissolved metals.

2.3.3 NO CASH CREEK SEDIMENT AND PEAT CHARACTERISTICS

Thirty five stream channel sediment, alluvium, and peat samples were collected along NCC with as many as possible at the same locations that water samples were collected. Sample locations are shown in Figure 2 with a stream profiles to indicate sample locations with respect to stream reaches. Alluvium and peat were collected from the bank of NCC. In some cases peat and alluvium were mixed with vegetation and root mats. Samples of precipitate were collected from the stream bed sediments.

A full set of sediment and peat results for No Cash Creek is provided in Appendix B including:

- Whole rock chemistry (aqua regia digestion)
- Acid base accounting parameters (sulphur species, carbonate neutralizing potential (NP), paste pH)

- X-ray diffraction (XRD) analysis
- Optical microscopy
- Scanning electron microscopy, and electron microprobe analysis

Additional analyses are in progress, including non-carbonate NP, paste pH, Fizz Rating, and additional detailed mineralogy work. The results of these tests will be provided in the 2011/2010 report. The purpose of these analyses is to characterize materials with respect to the processes causing natural attenuation of zinc and other metals along the flow path. This characterization includes evaluating the elemental content of solids, determining the quantity and nature of mineral phases present, and relating those mineral phases to the chemistry of water samples collected concurrently with solid samples.

Whole rock chemistry data for NCC are provided in Appendix B1. These laboratory analytical results show that zinc, manganese, iron, and aluminum concentrations are consistently elevated, with zinc and manganese exceeding the method limit of 10,000 ppm in many samples. Metal concentrations are generally higher in samples collected near the adit and decrease with distance from it.

Acid base accounting data for NCC are provided in Appendix B2. These results indicate carbonate neutralizing potential (NP) is greater than acid potential (AP), resulting in an NP:AP of greater than one for all samples, with a majority of samples greater than four. Sulphide sulfur content is generally low, with an average of 0.14 percent and ranging from below detection at 0.01 percent to 0.97 percent (AP of 0.6 to 30.3 T/kT as $CaCO_3$). NP averages 39.9 T/kT as $CaCO_3$ and ranges from 7.7 to 239 T/kT as $CaCO_3$.

XRD results are provided in Appendix B3. The predominant minerals present in most samples included quartz, feldspars, muscovite/illite, clinochlore, and some amphibole. The iron minerals pyrite, goethite, hematite, and siderite were also common in some samples. Carbonate minerals (other than siderite), calcite and dolomite were common but in concentrations generally below 2 percent. Other minerals, although less common, were present in multiple samples, including rutile and sphalerite.

Detailed elemental chemistry and mineralogy analyses including optical petrography, SEM, and EMP, are ongoing. Appendix B4 is an interim report describing the methods and results of the first phase of samples. An additional set of samples is being analyzed at this time. Preliminary results for samples in all four natural attenuation areas, based on elemental mapping and detailed chemistry, indicate that the majority of zinc is associated with an amorphous, and/or very fine grained manganese mineral phase. Manganese and zinc coatings were observed on rock and plant fragments, as well as free-standing agglomerations. Iron-rich coatings were also observed on some plant fragments. A consistent ratio of approximately three to one of manganese to zinc suggests a mineral phase is being formed. This will be evaluated further in the next phase of sample analyses.

2.4 NO CASH MONITORING WELL INSTALLATIONS

Four monitoring wells were installed in the No Cash bog area in November of 2010 for the purpose of characterizing and monitoring hydrogeologic conditions. They were installed at four locations (Figure 2) selected to monitor groundwater conditions in the No Cash bog area. Monitoring well locations included an upgradient well (NC-MW-1), a mid-reach well (NC-MW-2), and two downgradient wells near the terminal pond area (NC-MW-3 and NC-MW-4). Appendix B5 contains borehole and well construction logs that give borehole stratigraphy and well construction details for each well.

Table 3: No Cash Borehole and Monitoring Well Summary

Well I.D.	Boring Depth	Top of Screen	Bottom of Screen	General Stratigraphy
	mbgs	*mbgs*	*mbgs*	
NC-MW-1	4.6	1.2	3.2	Thin (< 1m) peat, massive ice (0.3m) over till
NC-MW-2	15.5	0.9	3.4	Thin (< 1m) peat, massive ice (0.3m) over till
NC-MW-3	21.6	14.3	20.5	Thick (~4m) organic layer (peat) over till
NC-MW-4	21.3	11.9	21.1	Thick (~4m) organic layer (peat) over till
mbgs - meters below ground surface				

Observations during drilling of NC-MW-1 indicated, from ground surface, about 0.3 m of frozen black organic material, 1.5 m of reddish frozen peat, 0.3 m of massive ice and about 1.3 m of frozen, ice-rich gray silt. Due to equipment failure, the boring was not advanced further, and the well was completed at a total depth of 3.3 m.

At location NC-MW-2, two borings were drilled. The first was drilled to a depth of 16.7 m using air rotary methods. The second, was constructed to a depth of 3.5 m using direct push methods because no liquid or frozen water was encountered at depth. Conditions at this location were similar to those encountered at NC-MW-1, with reddish peat at the surface, underlain by ice-rich silt and massive ice to about 5 m below ground surface where silt and gravelly till became dry down to the final depth. Boulders became more common 11 m below ground surface.

NC-MW-3 and -4 were completed at the terminal pond area of No Cash, in the peat bog; both to a depth of 21.3 m. Both locations were in stands of spruce with abundant organic ground cover. Subsurface conditions were similar at these locations including a surficial layer of organics and peat underlain by till deposits of silt, clay, gravel, and cobbles. No permafrost was encountered, but groundwater was observed in both wells.

NC-MW-1 and -2 were dry after drilling. Subsequent water level measurements in all wells resulted in dry readings in November, December, and March.

3 THE HUSKY SOUTHWEST NATURAL ATTENUATION AREA

3.1 HUSKY SW SITE LAYOUT AND CONDITIONS

The Husky SW adit and drainage site conditions are similar to those of the No Cash drainage, where natural attenuation is a promising closure option. The Husky SW mine site comprises a group of historical structures, a waste rock pile, a low-grade stockpile, and fill material. Seepage from the adit is conveyed beneath the fill material to a dilapidated crib structure from which water flows into a narrow surface drainage. From this point, the discharge flows northward down Galena Hill toward Flat Creek similar to that of NCC except: 1) the high-energy, cascading reach present at No Cash does not exist downstream of the Husky SW area and, 2) the Husky SW drainage connects with Flat Creek, whereas NCC ends at a terminal pond. However, the extensive forested slope and peat bog area along Husky Creek is similar to the No Cash bog area.

3.2 SUMMARY OF ACTIVITIES

Natural attenuation evaluations have not been conducted in this area previously; however, six water samples were collected in 2007 as part of an Adit Discharge Survey (Access 2008). Results of the initial study were inconclusive as to the water quality trends due to the mixing of surface melt water with adit discharge along the drainage. The current study was intended to gather a set of data to determine if natural attenuation appears to be influencing zinc and other metal concentrations along the drainage in a similar manner as observed in the No Cash system.

Water and solid samples were collected at 12 stations starting at the crib structure near the Husky SW adit, continuing along the creek alignment(s) to the confluence with Flat Creek (Figure 3). Solid samples, including bank sediment, peat, and stream sediment/precipitate, were collected at each station where present. Pore water samples were also collected in whenever possible.

3.3 SUMMARY OF INTERIM RESULTS FOR HUSKY SW

3.3.1 HUSKY SW SITE OVERVIEW AND OBSERVATIONS

Figure 1 shows the location of the Husky SW natural attenuation area. Figure 3 shows the Husky SW site in plan view as well as a stream profile from the Husky SW adit to the confluence with Flat Creek. The distance from the adit to the confluence is approximately 1.4 kilometers. The average rate of flow from the adit is 0.4 L/s. Flow from the adit is collected in a pipe which conveys the water beneath fill material and road bed to a crib structure approximately 30 m northwest of the adit. The crib structure is located in a small, narrow drainage with dense willows.

Along the entire 1.4 kilometer reach of Husky Creek there is approximately 60 m of relief, most of which is present in the upstream (southern) half of the stream (Figure 3). There is no adit/waste rock reach, nor cascading reach similar to that observed at the No Cash area. Rather, the Husky SW adit drains directly to a sloped “transition” reach that then levels out approximately 700 m from the adit and enters the peat bog reach.

The transition reach of Husky SW Creek has a slope of approximately 7 percent and meanders through willow thickets similar to those seen in the No Cash transition reach. Bordering the willow areas are stands of conifers; many of which are stressed or stunted. Significant red precipitate was observed during the October/November sampling events. No flowing water, either above or below ice, was observed at the crib structure in the winter sampling event.

The peat bog reach at Husky SW is similar to the No Cash peat bog reach, consisting of relatively flat but irregular topography (slope of about 1 percent), intermittent and braided channels, and occasional small ponds. In some areas, a single main stream is not visible. Unlike NCC, which flows into a "terminal" pond, the Husky SW creek flows directly into Flat Creek.

3.3.2 HUSKY SW WATER CHEMISTRY

Twelve water samples were collected along Husky Creek between the Husky SW crib structure and the confluence with Flat Creek. Field parameters were measured at each location. Alkalinity titrations were conducted and sulphide concentrations were measured in the field when possible. In some cases, colorimetric interferences precluded these analyses. A full set of analytical results is provided in Appendix C1. Figures in Appendix C2 show key analyte concentrations synoptically, downstream.

Husky Creek has sections that split and braid. During sampling, the main stream of this creek was not always apparent, and in some cases samples were collected from parallel drainages. The difficulty in tracing the main drainage resulted in sporadic increases and decreases in metal concentrations in lab results. The graphs in Appendix C2 suggest a continuous flow path exists between subsequent samples down the flow path due to the line drawn between data points. In the case of Husky SW, however, this may be inaccurate since multiple flow paths exist on the hillside below the mine area. Locations HSW-7 and -8, in particular, show higher concentrations of many metals than upstream and downstream samples. This pattern suggests an additional source of metals compared to the other locations. An attempt will be made to survey these flow paths during subsequent field activities in order to evaluate the observed differences in chemistry values.

Appendix C3 contains a table of water quality data for the nine pore water samples extracted from peat or mixed peat/sediment samples. These samples were highly turbid and contained abundant organic matter, and sediment. Total metals are generally elevated, and are significantly higher than dissolved metals. This relationship suggests that the metals were present predominantly as particulate, sorbed, or colloidal fractions.

3.3.3 SEDIMENT AND PEAT CHARACTERISTICS OF HUSKY SW

Eighteen stream channel sediment, alluvium, and peat samples were collected along the Husky SW system. These samples were collected at the same locations that water samples were collected, whenever possible. Sample locations are shown in Figure 3 along with a stream profile to indicate sample location with respect to stream reach. Alluvium and peat were collected from the banks of Husky SW creek, and in some cases the peat and alluvium were mixed with vegetation and root mat. Sediment samples were collected from the surface of the stream bed and represent stream precipitates and alluvial sediment. A full set of laboratory results is provided in Appendix D. Additional analyses are in progress, including non-carbonate NP, paste pH, Fizz Rating, and detailed mineralogy work. These data will be provided in the final submittal and included in interpretation.

Whole rock chemistry data for the Husky SW samples are provided in Appendix D1. Zinc, manganese, iron, and aluminum concentrations are consistently elevated, but not as high as the solids analyzed in NCC. This was expected because the starting concentrations at the Husky SW adit are much lower than at the No Cash adit. Metal concentrations are generally higher from sample locations near the adit and decrease with distance from the adit.

Acid base accounting results for Husky SW are provided in Appendix D2. The carbonate NP of these samples is greater than acid potential (AP) resulting in an NP:AP of greater than four for all samples, except one sample which was greater than one. Sulphide sulfur content is generally lower than that of the NCC solids, with an average of 0.04 percent, and ranging from below detection at 0.01 percent to 0.09 percent (AP of 0.3 to 4.1 T/kT as $CaCO_3$). NP averages 22 T/kT as $CaCO_3$ and ranges from 6.8 to 118 T/kT as $CaCO_3$.

XRD results are provided in Appendix D3. The predominant minerals present in most samples included quartz, feldspars, muscovite/illite, clinochlore, and some amphibole. The iron minerals pyrite, goethite, and hematite were also common in some samples. The carbonate minerals, calcite and dolomite, were common but in concentrations generally below two percent.

Detailed elemental chemistry and mineralogy are ongoing, including optical petrography, SEM, and EMP analysis. Appendix B4 is an interim report describing methods and results of the first phase of samples. A summary of these data is provided in the NCC Section above.

4 THE SILVER KING NATURAL ATTENUATION AREA

4.1 SILVER KING SITE LAYOUT AND CONDITIONS

Silver King mine is located west of Elsa about 4 km where the Silver Trail Highway crosses Galena Creek. The mine workings straddle the highway, with the open pit, adit, vents and other structures on the south side of the highway; and waste rock, various historical structures, lime treatment system/ponds, and the adit outflow on the north side of the highway.

The Silver King adit and drainage has site conditions that are similar to those at the No Cash drainage where natural attenuation has been shown to be a promising closure option. In 2007, nine samples were collected along the treatment system decant discharge stream downslope of adit location (Access, 2008). Laboratory results from these samples suggested that natural attenuation was occurring along the flow path, but also indicated areas of complex flow paths and geochemistry were present near the confluence of Galena Creek and Flat Creek.

4.2 SUMMARY OF ACTIVITIES FOR THE SILVER KING AREA

Limited water sampling was conducted downstream of the decant discharge in 2007 (Access, 2008). Formal natural attenuation evaluations have not previously been conducted in this area. This initial study was intended to gather baseline data associated with Galena Creek and the treated decant water flow path. Seasonal synoptic sampling of Galena Creek is being conducted to evaluate the progression of chemical changes along the creek flow path. There have been elevated concentrations of metals noted in Galena Creek near the historic mine area.

Water and solid samples were collected at stations in three areas; immediately downslope from the decant pipe, along Galena Creek, and from tributaries to Galena Creek between the decant pipe and the main stem of Galena Creek (Figure 4). Solids samples, including bank sediment, peat, and stream sediment/precipitate, were collected at each station. Pore water samples were also collected in cases where water soil was available.

4.3 SUMMARY OF INTERIM RESULTS FOR THE SILVER KING AREA

4.3.1 SILVER KING SITE OVERVIEW AND OBSERVATIONS

Figure 1 indicates the location of the Silver King natural attenuation area. Figure 4 shows the Silver King drainage in plan and profile view from the Silver King adit to the confluence with Flat Creek. The distance from the adit to the confluence of Galena Creek and Flat Creek is approximately 2 kilometers. Average flow from the adit is 5 L/s. Flow from the adit is collected in a pipe which conveys it to the lime treatment system and settling ponds. Treated water is decanted from a settling pond and discharged to the wooded hillside immediately north of the pond. The treated decant discharge disperses but has been observed to enter the Flat Creek drainage (Access, 2009). However, during the Fall 2010 sampling campaign, multiple parallel and braided channels associated with Galena and Flat Creek were observed but a direct connection of decant water, Galena Creek, and Flat Creek was not noted. Upwelling water was also observed along two separate channels near Flat Creek, suggesting potential freeze-up/permafrost-related confined groundwater interflow was discharging to surface in these areas.

Galena Creek trends parallel to the decant water discharge area, then curves to the west, where multiple small tributaries join it (Figure 4). These small tributaries likely convey some or all of the decant discharge from the Silver King settling pond to Galena Creek. For this reason, locations in the tributary area were included in the sampling program and are denoted with a “trib” in the location name.

Along the 2 kilometer reach, there is approximately 65 m of relief, most of which is present in the initial (southern) two-thirds of the distance to Flat Creek (Figure 4). There is no adit/waste rock reach, or a cascading reach similar to that observed at the No Cash area. Rather, like the

Husky SW area, the Silver King treated decant water drains directly to a sloped "transition" reach that then levels out approximately 1,100 m from the adit and enters the peat bog reach.

Similar to the transition reach at NCC, the transition reach at Silver King meanders through thickets of willow. Bordering the willow areas are stands of stressed/dead Black Spruce. The slope of this transition area is about 6 percent. Multiple, parallel, braided, and discontinuous channels were observed in this area. In some cases, flowing water in a channel that was sampled one day, was not present in the same channel the following day. This dynamic system likely is responsible for some of the inconsistent water quality observations in this area.

The peat bog reach at Silver King is similar to the Husky SW and No Cash bog reaches, consisting of relatively flat but irregular topography (slope of about 0.7 percent), intermittent and braided channels, and occasional small ponds. In some areas, a single, main stream is difficult to locate and follow.

4.3.2 SILVER KING WATER CHEMISTRY

Twenty water samples were collected along two profiles; the Galena Creek profile which follows Galena Creek on a westerly then easterly arc toward Flat Creek, and the Silver King profile which follows the fall line north directly toward Flat creek. The Silver King profile includes the decant water discharge area and tributaries to Galena Creek. Field parameters were measured at all locations. Alkalinity titrations were conducted and sulphide concentration measurements were attempted in the field when possible, however, colorimetric interferences rendered results unusable.

A full set of analytical results for all Silver King samples is provided in Appendix E1, and those for Galena Creek in Appendix E4. Appendix E2 and E5 are graphs of key analyte concentrations for the Silver King and Galena Creek sample locations. Results indicate:

- Decant water zinc concentrations decline with increasing distance from the discharge pipe by a factor of about 4 within 100 m of the pipe.
- Tributaries located downstream of the discharge pipe (and mine area in general) showed highly variable chemistry including some areas that were elevated compared to initial

concentrations at the pipe discharge. This was also observed at the Husky SW site where multiple flow paths preclude an assumption of a single, continuous flow path.

- Concentrations of zinc along Galena Creek increase between GC-1 and -2 but then decrease gradually with distance from the mine area.

Appendix E3 contains a table of water quality data for 4 pore water samples extracted from peat or mixed peat/sediment samples. In general, these samples were highly turbid, with abundant organic matter and sediment. Total metals are generally elevated and significantly higher than dissolved metals, suggesting that metals were present predominantly as particulate, sorbed, or colloidal fractions.

4.3.3 SILVER KING SEDIMENT AND PEAT CHARACTERISTICS

Eight stream channel sediment, alluvium, and peat samples were collected along the Silver King system with as many as possible gathered at the same locations that water samples were collected. Sample locations are shown in Figure 4 along on a stream profile to indicate sample location with respect to the stream reach. Alluvium and peat were collected along the drainage in the bank material adjacent to the creek. In some cases peat and alluvium were mixed with vegetation and root mat. Sediment samples were collected from the stream bed and represent stream precipitates and alluvial sediment. A full set of laboratory results is provided in Appendix F. Additional analyses are in progress including non-carbonate NP, paste pH, Fizz Rating, and detailed mineralogy work. These data will be provided in the final submittal and interpretation.

Whole rock chemistry laboratory results (provided in Appendix F1) show consistently elevated zinc, manganese, iron, and aluminum concentrations at this site. Metal concentrations are generally higher at locations near the adit and decrease with distance from the adit. Sediment samples near the adit have the highest metal concentrations of all samples.

Acid base accounting data (provided in Appendix F2) reveal that in most cases, carbonate NP is greater than AP, resulting in an NP:AP of greater than one for all samples and greater than 4 for all but one sample. Sulfide sulfur content is generally low, with an average of 0.05 percent and ranging from below detection at 0.01 percent to 0.17 percent (AP of 0.3 to 5.3 T/kT as $CaCO_3$). NP averages 20.1 T/kT as $CaCO_3$ and ranges from 14 to 29 T/kT as $CaCO_3$.

XRD results are provided in Appendix F3. The predominant minerals present in most samples included quartz, feldspars, muscovite/illite, clinochlore, and some amphibole. The iron minerals pyrite, goethite, hematite, and siderite were not detected in these samples. Carbonate minerals, calcite and dolomite were common in concentrations generally below two percent.

Detailed elemental chemistry and mineralogy analyses are ongoing, including optical petrography, SEM, and EMP. Appendix B4 contains is an interim report describing the methods and results of the first phase of sampling. A summary of these data is provided in the No Cash Section above.

5 THE SADIE LADUE NATURAL ATTENUATION AREA

5.1 SADIE LADUE SITE LAYOUT AND CONDITIONS

The Sadie Ladue adit and drainage was included in the natural attenuation study for initial evaluation because site conditions may be amenable to natural attenuation as a potential closure option. In 2007, Access Consulting collected three water samples on the Sadie Ladue site (Access, 2008). The lab results for these samples were inconclusive with regards to the natural attenuation of zinc in the Sadie Ladue drainage; however, samples were not collected along the entire drainage.

The 600 level of the Sadie Ladue adit drains water from the mine workings and open pits above. There are inactive open pits along the ridge above the 600 level adit, as well as historical structures and tailings deposits from the mill that operated here in the early 1900s. The adit opening is covered with rock debris but water still flows freely from the adit and cascades down the steep hillside toward the waste rock pile and load-out structure. This flow continues around the side of the load-out area and onto a flat area downhill of the load-out area. Some of the mine water is conveyed through a pipe from the inside of the adit to a small wooden caisson downhill of the adit and then transferred to a steel pipe that presumably conveys it to the base of the load-out structure. From this point, the water flows from a crib structure onto a flat area downhill of the load-out structure to join the surface adit flow. The combined surface and piped water then flows downhill about 4 km to unnamed lake.

5.2 SUMMARY OF ACTIVITIES AT SADIE LADUE

This initial study was intended to gather a set of data to determine if natural attenuation appears to be influencing zinc and other metals concentrations along the Sadie Ladue drainage in a similar manner as observed in the NCC system. Water and solid samples were collected at stations from the collapsed adit, and along the creek alignment to the terminus at an unnamed lake (Figure 5). Solid samples, including bank sediment, peat, and stream sediment/precipitate, were collected at each station. Pore water samples were collected in locations where soil water was available.

5.3 SUMMARY OF INTERIM RESULTS FOR THE SADIE LADUE SITE

5.3.1 SADIE LADUE SITE OVERVIEW AND OBSERVATIONS

Figure 1 shows the location of the Sadie Ladue natural attenuation area. Figure 5 shows the drainage in plan view as well as a stream profile from the Sadie Ladue adit to the terminus at the unnamed lake. The distance from the adit to the lake is approximately 3.9 kilometers. Flow from the adit averages 7.6 L/s. Flow from the mine discharges in two ways; directly from the collapsed adit and through a subsurface pipe that conveys water to the foot of the waste rock pile and crib structure approximate 40 m northwest of the adit. Both flows join below the waste rock pile in a flat marshy area before entering a steep, cascading reach of the creek.

There is approximately 400 m of relief along this drainage, most of which is present in the initial (southern) 2400 m of the stream (Figure 5). Tailings were observed in the banks of the creek; several meters thick in some areas. The tailings were eroded in most areas and revegetated in some areas.

The adit/waste rock reach of the Sadie Ladue includes adit water as well as seepage from the waste rock material. There is a flat, marshy area about 100 m long downstream of the waste rock where surface water from the adit mixes with pipe discharge from the mine and seepage from the waste rock pile. The combination of these waters then enters a cascading section about 400 m long. At that point, the slope levels out into a “transitional” reach near the surface water sample point SL-9. At marker 1,350 m, the slope again steepens into alternating cascading and transitional reaches until marker 2,400 m where the slope flattens and the stream enters a peat bog reach. Finally, the stream reaches the former edge of the unnamed lake where it crosses a tailings delta to finally reach the unnamed lake. Tailings now fill a portion of unnamed lake, forming a partially revegetated tailings delta. The stream channel is well established through the delta to the unnamed lake.

Red precipitate was observed during the October/November sampling events near the collapsed adit and downstream of the waste rock pile where the pipe and waste rock seepage converge. Similar to the adit/waste rock reach and cascading reach at NCC, the conditions at Sadie Ladue have a distinct quiescent area before entering a higher energy environment. The vegetation is generally dominated by willows immediately adjacent to the stream with Black Spruce dominating in steeper reaches. The slope of the first cascading area is about 25 percent. A 600 m, 10 percent slope, transitional reach followed the first cascading reach. The next reach, with an overall slope of 18 percent, has steep cascading sections with interspersed flat/transitional sections.

The peat bog reach at Sadie Ladue is different than any of the previously described peat bog reaches. In this case, the peat bog reach is very low energy. While the other sites north of Galena Hill are characterized by braided, meandering streams with standing water and peat bog, the peat bog reach of Sadie Ladue for the most part has a well-defined, tailings-lined channel cut into the ground. There are broad grassy areas adjacent to the creek but no extensive peat bogs like those found at the No Cash site and along Flat Creek.

5.3.2 SADIE LADUE WATER CHEMISTRY

Twelve water samples were collected from the Sadie Ladue drainage (including one tributary) between the adit and the unnamed lake. Field parameters were measured at all locations, and alkalinity titrations and sulfide concentration measurements were conducted in the field when possible. In some cases, colorimetric interferences precluded these analyses in the field.

A full set of analytical results for the Sadie Ladue drainage is provided in Appendix G1. Figures in Appendix G2 show key analyte concentrations synoptically as you travel downstream. Results indicate trends that are different than those observed at the Galena Hill sites. These are listed below.

- Initial increases in zinc and cadmium concentrations immediately downstream of the adit.
- Negligible decreases in zinc and cadmium concentrations down the flow path. Sample locations SL-11 and SL-15 are off the main channel (SL-11) or from the unnamed lake (SL-15).
- Sporadic increases of major metals such as aluminum and iron at downstream stations.

One key difference between this drainage area and those studied on Galena Hill is the presence of significant tailings deposited along the drainage and into the unnamed lake. The presence of these dispersed tailings could be responsible for maintaining the elevated metals concentrations observed in the water samples.

Appendix G3 contains a table of water quality data for five pore water samples extracted from peat or mixed peat/sediment samples. In general, these samples were highly turbid, with abundant organic matter and sediment. Total metals are generally elevated and significantly higher than dissolved metals. Silver concentrations were slightly elevated compared to adit areas on Galena Hill. This could be due to influence of dispersed tailings in the drainage.

5.3.3 SADIE LADUE SEDIMENT AND PEAT CHARACTERISTICS

A total of twenty-two stream channel sediment, alluvium, and peat samples were collected along the Sadie Ladue system with as many as possible at the same locations that water samples were collected. In two cases, samples were dominated by tailings material deposited along the stream. Sample locations are shown in Figure 5 along with a stream profile to indicate sample location with respect to stream reach. Alluvium, peat and in some cases, historical tailings, were collected along the drainage in the creek banks. As with other sites, peat and alluvium may have been mixed with vegetation and root mat. Sediment samples were collected from the stream bed and represent stream precipitates and alluvial sediment.

A full set of results for the Sadie Ladue drainage is provided in Appendix H. Additional analyses including non-carbonate NP, paste pH, Fizz Rating, and detailed mineralogy work are in progress. These data will be described in the 2011/2012 natural attenuation report.

Whole rock chemistry data are provided in Appendix H1. These data show consistently elevated zinc, manganese, iron, and aluminum concentrations with zinc and manganese exceeding the method limit of 10,000 ppm in many samples. There is less correlation with distance from the adit in the Sadie Ladue samples; high concentrations of manganese, zinc, and cadmium are present along the entire reach of the creek. These consistently higher concentrations of metals could also be related to the presence of dispersed tailings along the full reach of the drainage.

Acid base accounting data (provided in Appendix H2) indicate that carbonate neutralizing potential (NP) is greater than acid potential (AP), resulting in an NP:AP greater than one for all samples, and greater than 4 for all but one sample. Sulfide sulfur content is generally low, with an average of 0.13 percent and ranging from below detection at 0.01 percent to 0.42 percent (AP of 0.6 to 13.1 T/kT as $CaCO_3$). NP is higher in this area than for those areas on Galena Hill with and average of 143 T/kT as $CaCO_3$ and ranging from 3.2 to 343 T/kT as $CaCO_3$.

XRD results are provided in Appendix H3. The predominant minerals in most samples included quartz, feldspars, muscovite/illite, clinochlore, and some amphibole. Siderite was common in most samples and many at high concentrations. Carbonate minerals, calcite and dolomite were commonly found in concentrations generally below 2 percent; although some had higher concentrations (up to 8 percent dolomite). Sphalerite was also common in the Sadie Ladue samples.

Detailed elemental chemistry and mineralogy including optical petrography, SEM, and EMP analysis are ongoing. Appendix B4 is an interim report describing methods and results of the first phase of samples. A summary of these data is provided in the No Cash Section above.

5.4 ONGOING AND PLANNED ACTIVITIES

Additional data collection and analysis are scheduled for 2011 and 2012. This work will advance the understanding of natural attenuation processes in the four study areas by: investigating the hydrologic and geochemical processes of metal attenuation, looking at the long term sustainability of these natural attenuation systems, evaluating the consistency of natural attenuation seasonally, identifying ways to engineer these areas to maximize the effectiveness of metal attenuation and identifying cost-effective opportunities to pre- and post-treat affected water. Planned work includes:

- Water sampling during freshet conditions
- Regular seasonal sampling
- Detailed mineralogic and petrographic analysis of solids to determine key geochemical processes at work in the natural attenuation areas
- Surveys and profiles of peat to estimate peat thicknesses.
- Conduct initial engineering surveys and begin conceptual design of engineered natural attenuation systems
- Select pilot studies to test physical and geochemical conditions at selected sites
- Detailed physical and hydrologic surveys
- Ongoing monitoring of groundwater conditions at No Cash Wells
- Baseline vegetation and soil surveys in selected areas

5.5 REFERENCES

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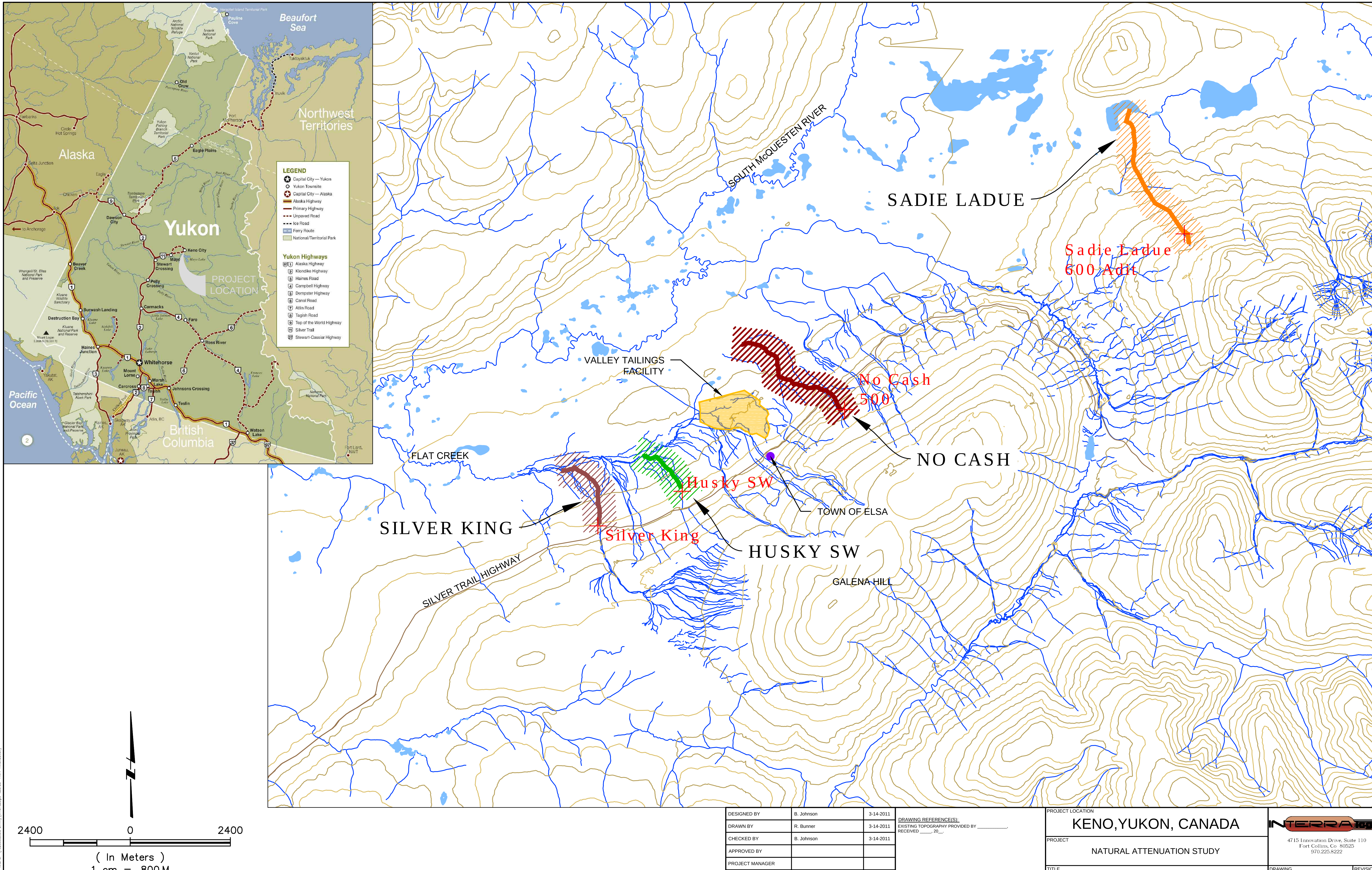

DESIGNED BY	B. Johnson	3-14-2011
DRAWN BY	R. Bunner	3-14-2011
CHECKED BY	B. Johnson	3-14-2011
APPROVED BY		
PROJECT MANAGER		
CLIENT APPROVAL		
CLIENT REFERENCE NO.		

DRAWING REFERENCE(S):
EXISTING TOPOGRAPHY PROVIDED BY ____________, RECEIVED _____, 20__.

DATUM: NAD83 SCALE: NTS

PROJECT LOCATION
KENO,YUKON, CANADA

PROJECT
NATURAL ATTENUATION STUDY

TITLE
FIGURE 1
SITE MAP & ATTENUATION AREA LOCATIONS

INTERRAlogic
4715 Innovation Drive, Suite 110
Fort Collins, Co 80525
970.225.8222

DRAWING 1 of 5 REVISION
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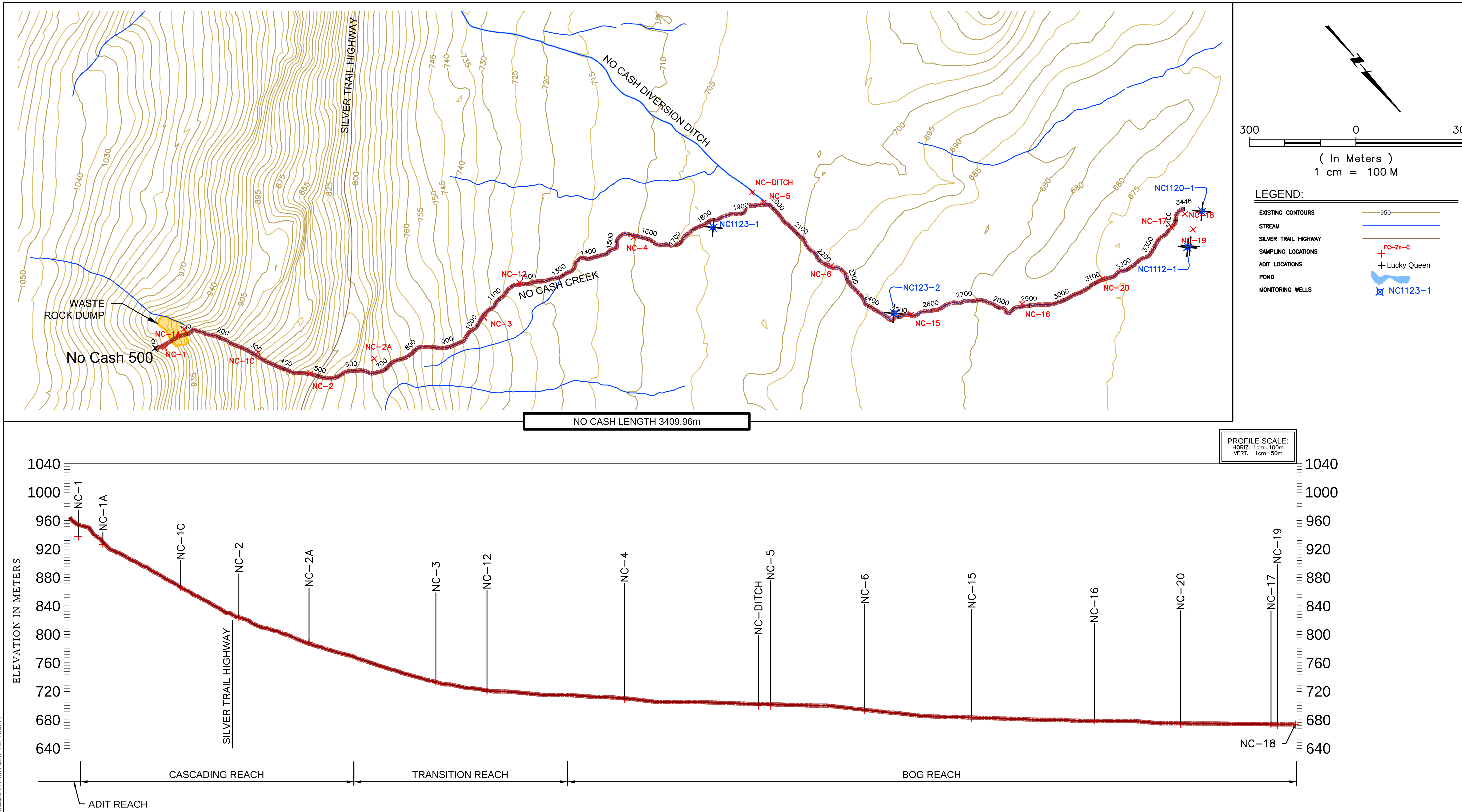

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DRAWING REFERENCE(S):
EXISTING TOPOGRAPHY PROVIDED BY ____________,
RECEIVED _____, 20__.

DATUM: NAD83
SCALE: 1 cm = 80 m

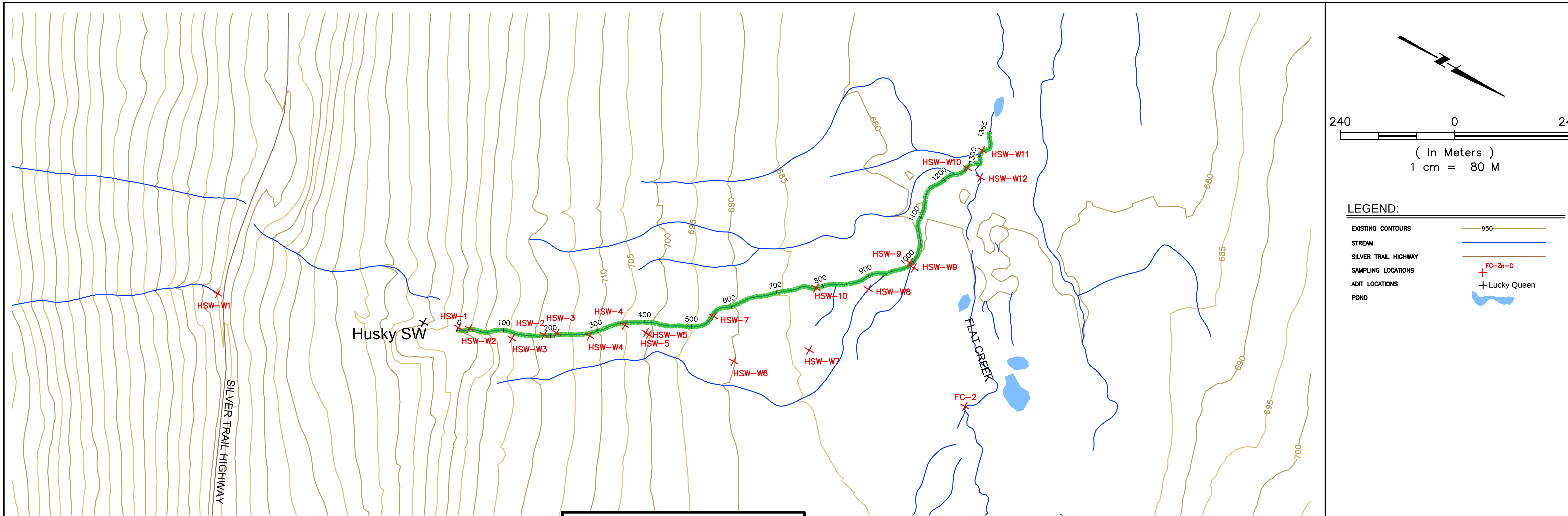
PROJECT LOCATION
KENO,YUKON, CANADA

PROJECT
NATURAL ATTENUATION STUDY

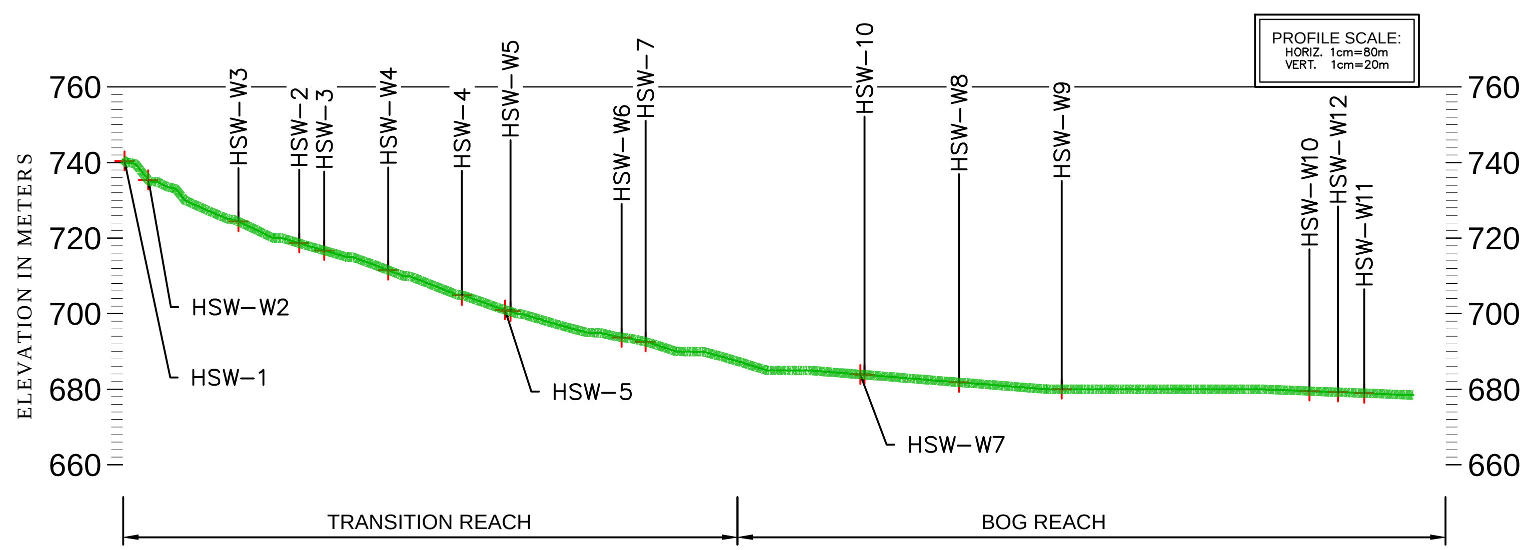
TITLE
FIGURE 2
NO CASH PLAN & PROFILE

4715 Innovation Drive, Suite 110
Fort Collins, Co 80525
970.225.8222

DRAWING 2 OF 5
REVISION
FILE NAME PLAN AND PROFILES_Acad2012



HUSKY SW LENGTH 2365.36m



DESIGNED BY	B. Johnson	3-14-2011	DRAWING REFERENCE(S): EXISTING TOPOGRAPHY PROVIDED BY ____________, RECEIVED _____, 20__.	PROJECT LOCATION: KENO,YUKON, CANADA
DRAWN BY	R. Bunner	3-14-2011		PROJECT: NATURAL ATTENUATION STUDY
CHECKED BY	B. Johnson	3-14-2011		TITLE: FIGURE 3 HUSKY SW PLAN & PROFILE
APPROVED BY				DRAWING: 3 of 5
PROJECT MANAGER				REVISION
CLIENT APPROVAL			DATUM: NAD83	SCALE: 1 cm = 80 m
CLIENT REFERENCE NO.				FILE NAME: PLAN AND PROFILES_Acad2012

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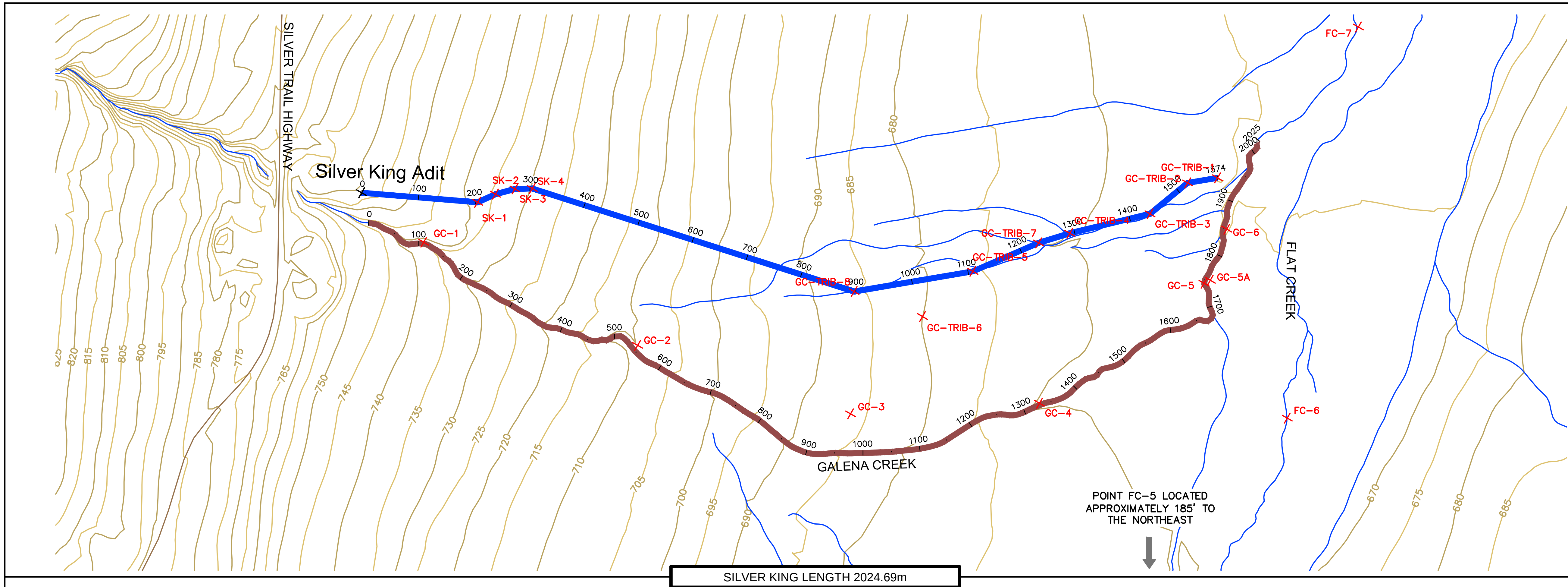

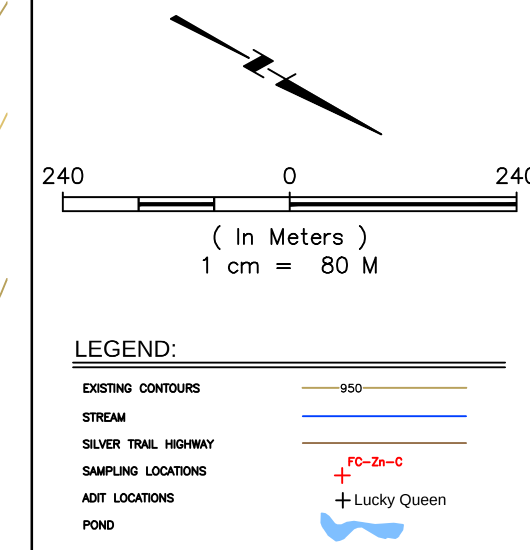

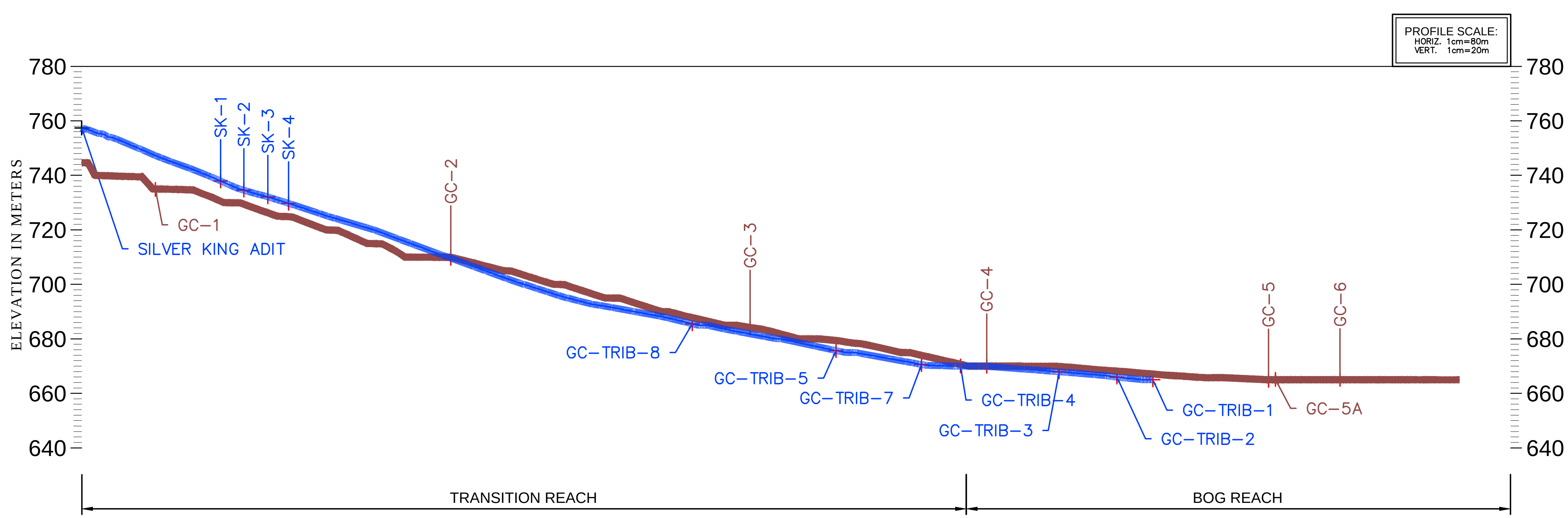

DESIGNED BY	B. Johnson	3-14-2011
DRAWN BY	R. Bunner	3-14-2011
CHECKED BY	B. Johnson	3-14-2011
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PROJECT MANAGER		
CLIENT APPROVAL		
CLIENT REFERENCE NO.		

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DATUM: NAD83

SCALE: 1 cm = 80 m

PROJECT LOCATION
KENO,YUKON, CANADA

PROJECT
NATURAL ATTENUATION STUDY

TITLE
FIGURE 4
SILVER KING PLAN & PROFILE

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DRAWING 4 of 5

REVISION

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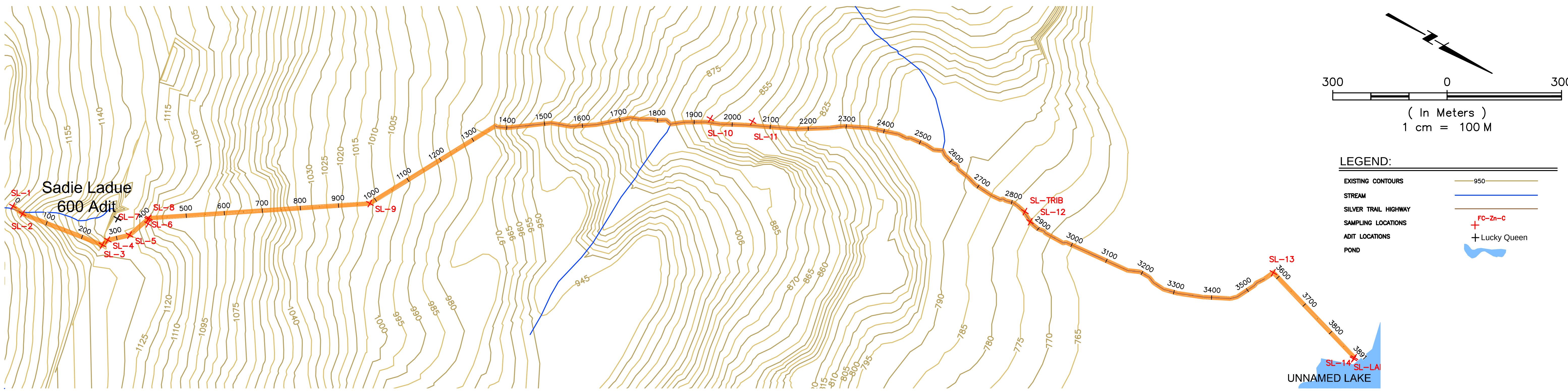
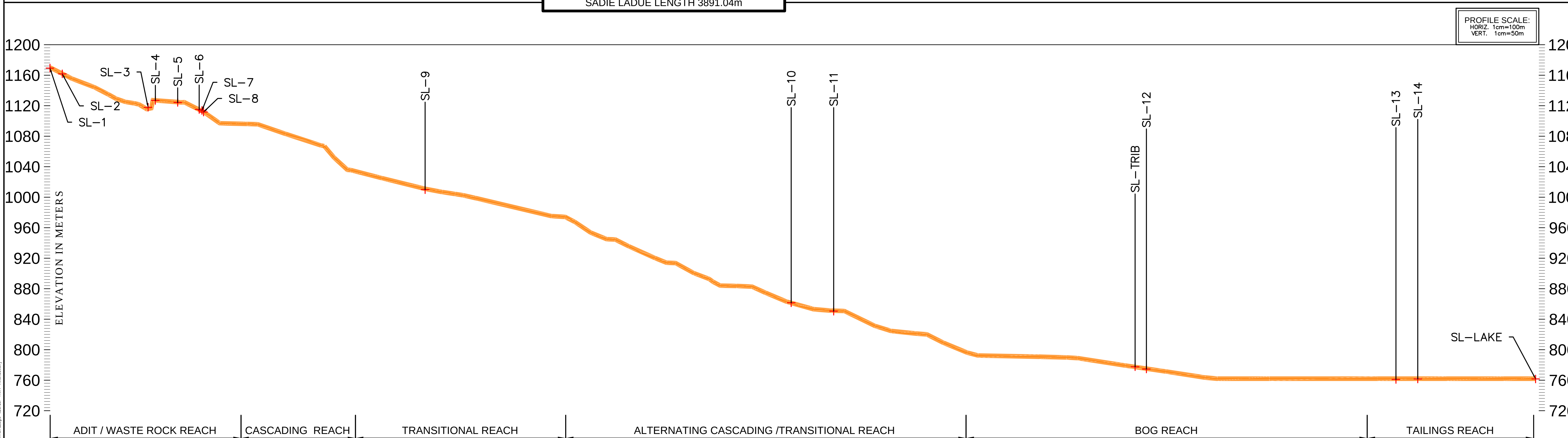


SADIE LADUE LENGTH 3891.04m



DESIGNED BY	B. Johnson	3-14-2011
DRAWN BY	R. Bunner	3-14-2011
CHECKED BY	B. Johnson	3-14-2011
APPROVED BY		
PROJECT MANAGER		
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CLIENT REFERENCE NO.		

DRAWING REFERENCE(S):
EXISTING TOPOGRAPHY PROVIDED BY ____________, RECEIVED ______, 20__.

DATUM: NAD83 SCALE: 1 cm = 80 m

PROJECT LOCATION
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PROJECT
NATURAL ATTENUATION STUDY

TITLE
FIGURE 5
SADIE LADUE PLAN & PROFILE

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DRAWING 5 OF 5 REVISION

FILE NAME PLAN AND PROFILES_Acad2012

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SEPTEMBER 2011

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A NO CASH WATER CHEMISTRY DATA

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Dissolved Metals		NC-1	NC-2	NC-3	NC-12	NC-4	NC-DITCH	NC-5	NC-6	NC-15	NC-16	NC-17	NC-18	NC-19	NC-20
Aluminum (Al)	µg/L	5	5.3	4.3	2.8	6.2	18.4	6.6	5.6	5.9	7.5	9	5.6	3.7	5.3
Arsenic (As)	µg/L	3.5	1.29	0.62	0.83	0.51	2.28	0.52	1.14	0.73	0.58	0.38	0.37	0.4	0.48
Barium (Ba)	µg/L	3.2	24.3	30.5	45.6	40.5	79.9	40.1	46.9	45.8	46.4	45.5	47.5	49.1	47.9
Boron (B)	µg/L	<300	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Beryllium (Be)	µg/L	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bismuth (Bi)	µg/L	<0.03	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cadmium (Cd)	µg/L	91.3	15	6.64	3.23	1.84	0.079	0.338	0.184	0.093	0.079	0.036	0.046	0.036	0.038
Cobalt (Co)	µg/L	9.27	0.884	0.154	0.263	0.278	1.3	0.234	0.67	0.549	0.511	0.217	0.155	0.228	0.447
Chromium (Cr)	µg/L	<0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Copper (Cu)	µg/L	1.4	1.04	0.77	0.81	0.64	1.84	0.61	0.65	0.62	0.94	0.6	0.65	0.58	0.57
Iron (Fe)	µg/L	14	14	5	187	68	1550	254	331	128	223	71	67	96	97
Lithium (Li)	µg/L	27	16.6	14.7	12.6	11.7	1.3	10	9.7	9.6	8.7	8.7	8.6	8.3	8.8
Manganese (Mn)	µg/L	12000	1260	214	96.4	242	1400	322	549	613	620	376	270	442	642
Molybdenum (Mo)	µg/L	1	0.38	0.44	0.52	0.49	0.63	0.4	0.42	0.4	0.4	0.38	0.37	0.36	0.41
Nickel (Ni)	µg/L	69.2	11.6	4.43	2.32	2.35	2.27	1.87	1.81	1.84	1.72	1.25	1.09	1.25	1.6
Lead (Pb)	µg/L	0.08	0.268	0.073	0.047	0.084	0.131	0.059	0.046	0.09	0.056	0.042	0.057	0.04	0.031
Antimony (Sb)	µg/L	1.5	1.53	1.2	0.83	0.77	0.16	0.51	0.42	0.37	0.32	0.24	0.23	0.23	0.3
Selenium (Se)	µg/L	0.7	0.69	0.65	0.5	0.39	0.11	0.29	0.23	0.2	0.17	0.17	0.15	0.15	0.18
Silicon (Si)	µg/L	2310	3120	3070	3060	3050	3140	2940	2970	2980	2990	2980	2990	2880	3050
Silver (Ag)	µg/L	<0.03	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (Sn)	µg/L	0.09	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	230	285	361	391	378	123	329	322	321	316	311	307	305	319
Titanium (Ti)	µg/L	<3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium (Tl)	µg/L	0.56	0.058	0.027	0.011	0.008	0.003	0.004	0.005	0.004	0.004	0.002	<0.002	<0.002	0.003
Uranium (U)	µg/L	8.64	4.83	5.4	5.67	4.65	0.433	3.59	3.02	2.86	2.64	2.41	2.4	2.43	2.66
Vanadium (V)	µg/L	<1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

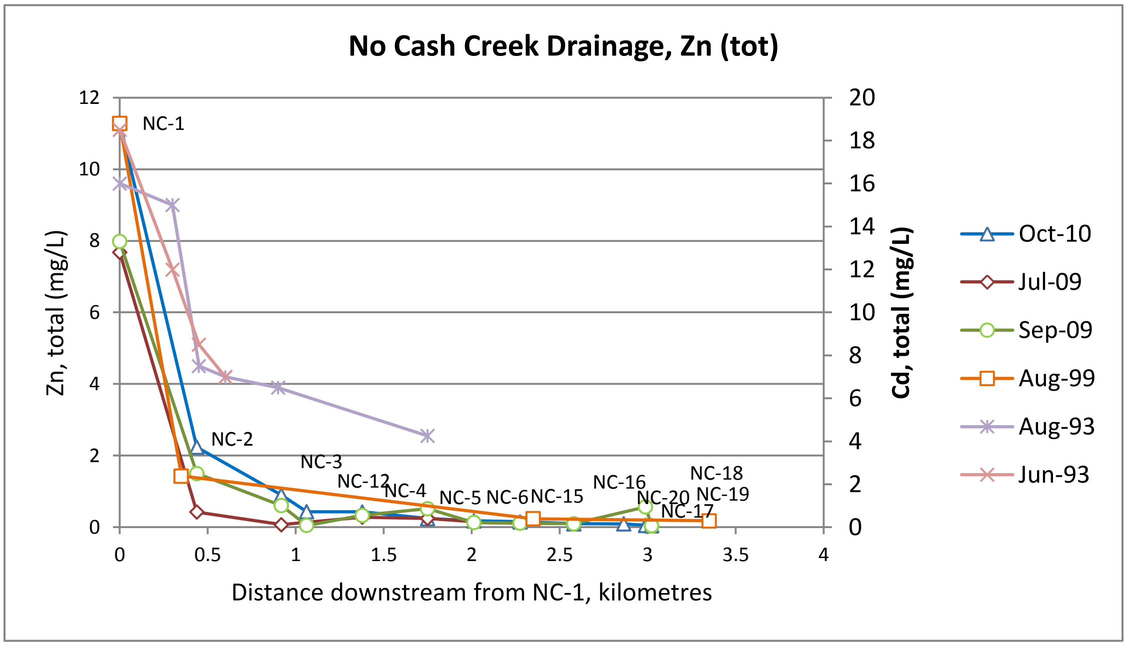
Dissolved Metals		NC-1	NC-2	NC-3	NC-12	NC-4	NC-DITCH	NC-5	NC-6	NC-15	NC-16	NC-17	NC-18	NC-19	NC-20
Zinc (Zn)	µg/L	10700	2050	901	420	417	24	229	166	138	91.4	50.6	41.2	43.6	79
Zirconium (Zr)	µg/L	<0.5	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Ca)	mg/L	183	172	171	165	163	56	140	136	135	132	131	129	127	133
Potassium (K)	mg/L	0.5	0.58	0.64	0.55	0.52	0.24	0.46	0.46	0.47	0.5	0.54	0.59	0.6	0.51
Magnesium (Mg)	mg/L	22.3	25.4	28.3	28.3	29.6	13.6	26.7	25.8	26	25.5	24.7	24.1	26	25.6
Sodium (Na)	mg/L	0.9	1.27	1.59	1.66	1.72	0.7	1.54	1.52	1.52	1.54	1.49	1.43	1.55	1.53
Sulfur (S)	mg/L	153	132	127	126	125	11	105	99	105	104	97	93	101	102
Hardness (CaCO3) from dissolved metal scan	mg/L	547	534	542	529	528	196	459	445	443	435	428	422	425	437
Total Metals		**NC-1**	**NC-2**	**NC-3**	**NC-12**	**NC-4**	**NC-DITCH**	**NC-5**	**NC-6**	**NC-15**	**NC-16**	**NC-17**	**NC-18**	**NC-19**	**NC-20**
Aluminum (Al)	µg/L	52	95	16.2	83.4	31.6	18.7	10.3	4.6	4.8	7.3	10.2	8.6	6.7	6.7
Arsenic (As)	µg/L	10.5	2.5	0.94	1.34	0.68	2.55	0.67	1.54	0.93	0.73	0.5	0.47	0.56	0.62
Barium (Ba)	µg/L	3.3	26.3	31	47.4	40.6	79.4	42	45.4	44.8	45.3	44.9	46.3	48.9	49.6
Beryllium (Be)	µg/L	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Bismuth (Bi)	µg/L	<0.03	<0.03	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (B)	µg/L	<300	<300	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	µg/L	93.6	16.3	6.79	3.01	2.26	0.092	0.873	0.566	0.447	0.299	0.169	0.137	0.157	0.264
Cobalt (Co)	µg/L	9.96	1.08	0.175	0.522	0.313	1.4	0.316	0.729	0.621	0.492	0.255	0.151	0.228	0.38
Chromium (Cr)	µg/L	0.6	<0.5	0.4	0.5	0.4	0.5	0.5	0.3	0.3	0.4	0.4	0.4	0.4	0.3
Copper (Cu)	µg/L	10	2.7	0.95	2.08	0.97	2.45	0.75	0.73	0.71	0.64	0.65	0.62	0.61	0.7
Iron (Fe)	µg/L	1420	372	60	399	216	1860	393	594	425	453	278	249	314	407
Mercury (Hg)	µg/L	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (Li)	µg/L	28	17	13.7	11.8	11	1.2	8.9	9.4	8.8	8.9	8.5	8.6	8.8	9.1
Manganese (Mn)	µg/L	12400	1230	221	104	244	1480	358	573	618	585	388	277	446	624
Molybdenum (Mo)	µg/L	0.5	0.4	0.41	0.54	0.5	0.63	0.41	0.42	0.4	0.39	0.39	0.39	0.36	0.42
Nickel (Ni)	µg/L	73.8	12	4.76	2.86	2.62	2.52	2.06	2.05	1.9	1.59	1.37	1.18	1.29	1.61
Lead (Pb)	µg/L	6.04	2.62	0.433	0.382	0.766	0.229	0.162	0.067	0.071	0.064	0.08	0.074	0.098	0.056
Antimony (Sb)	µg/L	1.6	1.4	1.22	0.82	0.75	0.17	0.52	0.42	0.39	0.31	0.25	0.23	0.25	0.3
Selenium (Se)	µg/L	0.7	0.6	0.61	0.48	0.38	0.1	0.26	0.23	0.2	0.19	0.15	0.16	0.16	0.16
Silicon (Si)	µg/L	2540	3170	3450	3430	3310	3240	3240	3300	3240	2920	3080	3180	3070	3120
Silver (Ag)	µg/L	0.13	0.04	0.008	<0.005	0.009	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (Sn)	µg/L	<0.05	<0.05	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	240	268	347	371	355	124	309	307	305	296	295	294	293	308
Titanium (Ti)	µg/L	<3	5	0.7	3.2	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

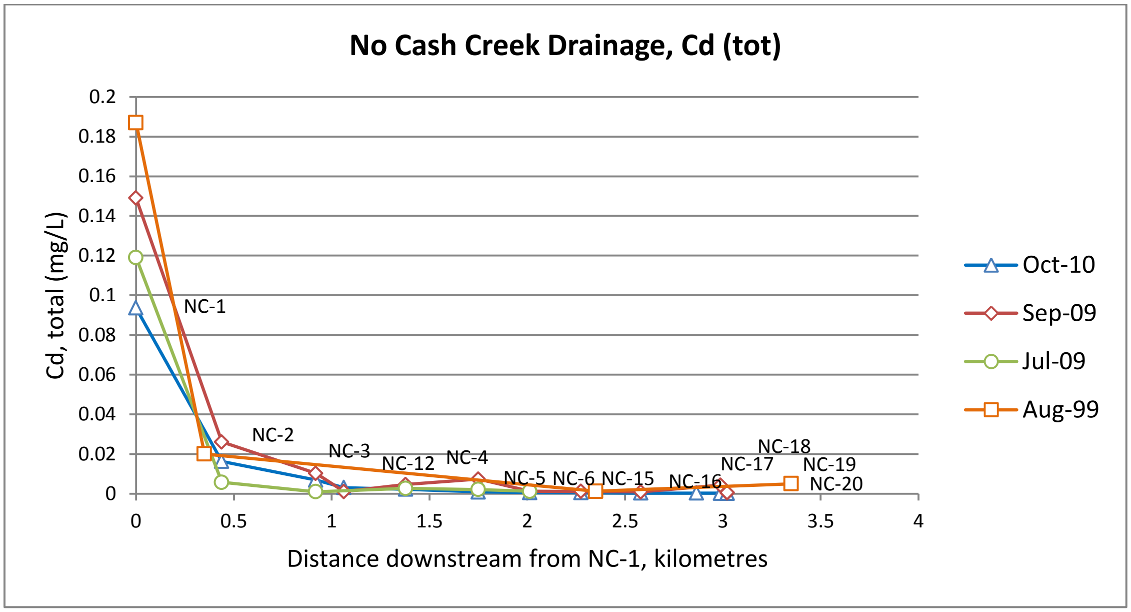
Dissolved Metals		NC-1	NC-2	NC-3	NC-12	NC-4	NC-DITCH	NC-5	NC-6	NC-15	NC-16	NC-17	NC-18	NC-19	NC-20
Thallium (Tl)	µg/L	0.52	0.05	0.026	0.011	0.008	0.003	0.002	0.006	0.003	0.002	<0.002	<0.002	<0.002	0.003
Uranium (U)	µg/L	8.49	4.59	5.11	5.48	4.55	0.446	3.42	2.93	2.72	2.55	2.34	2.35	2.41	2.53
Vanadium (V)	µg/L	<1	<1	<0.2	0.3	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc (Zn)	µg/L	11300	2240	900	434	430	9.2	241	178	153	98.4	56.7	46.7	48.1	93
Zirconium (Zr)	µg/L	<0.5	<0.5	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (Ca)	mg/L	200	164	173	169	164	57.1	142	146	140	127	130	136	131	135
Potassium (K)	mg/L	0.5	0.6	0.65	0.56	0.51	0.25	0.45	0.51	0.48	0.46	0.54	0.64	0.57	0.49
Magnesium (Mg)	mg/L	25.4	26	28.4	30.5	29.4	14.7	27.1	28	27.4	25	26.1	26.2	25.8	26.5
Sodium (Na)	mg/L	1	1.2	1.68	1.89	1.83	0.78	1.65	1.74	1.68	1.58	1.65	1.65	1.63	1.65
Sulfur (S)	mg/L	170	119	138	132	125	10	110	112	108	99	104	99	99	101
Hardness (CaCO3) from total metal scan	mg/L	603	516	549	549	531	203	465	480	463	420	433	447	433	447

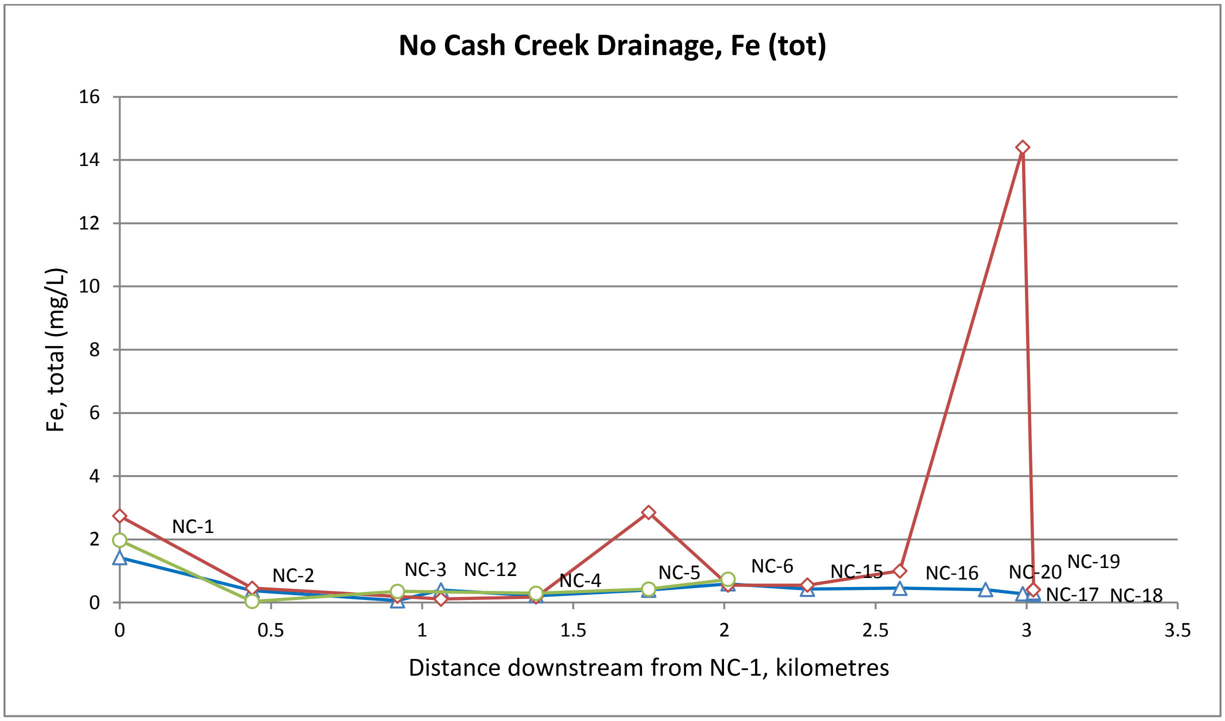
Other Paramaters		NC-1	NC-2	NC-3	NC-12	NC-4	NC-DITCH	NC-5	NC-6	NC-15	NC-16	NC-17	NC-18	NC-19	NC-20
pH	pH Units	7.94	8.13	8.06	7.92	8.13	7.81	8	8.03	8.09	8.02	8.08	8.12	8.02	8.04
Conductivity	µS/cm	1070	879	896	891	874	355	794	801	793	780	766	757	764	775
Bicarbonate (HCO3)	mgCaCO3/L	170	180	190	190	190	180	190	190	190	190	180	180	180	190
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (PP as CaCO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	140	140	160	160	150	150	150	150	160	160	150	150	150	150
Ammonia (N)	mg/L	0.038	<0.005	<0.005	0.015	0.007	0.059	0.019	0.097	0.075	0.081	0.036	0.019	0.032	0.075
Nitrate plus Nitrite (N)	mg/L	<0.02	0.11	0.12	0.1	0.07	0.06	0.05	0.05	0.06	0.08	0.11	0.12	0.1	0.09
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate (N)	mg/L	<0.02	0.11	0.12	0.1	0.07	0.06	0.05	0.05	0.06	0.08	0.11	0.12	0.1	0.09
Nitrogen (N)	mg/L	0.08	0.19	0.21	0.2	0.2	0.5	0.27	0.37	0.34	0.35	0.39	0.33	0.36	0.39
Fluoride (F)	mg/L	0.33	0.22	0.19	0.16	0.1	0.06	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.11
Dissolved Chloride (Cl)	mg/L	<0.5	<0.5	<0.5	<0.5	0.5	4.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Sulfate (SO4)	mg/L	490	340	360	350	340	32	280	290	290	280	280	270	280	280
Dissolved Organic Carbon (C)	mg/L	0.7	1.6	2.4	2.5	3	13.8	4.7	5.1	4.3	4.8	5.1	5.2	5.2	5.3
Total Organic Carbon (C)	mg/L	0.7	1.8	1.7	2.4	3.2	14.1	5.2	5.8	4.8	4.9	5.2	5.3	5.5	5.2
Total Dissolved Solids	mg/L	820	660	680	650	640	220	550	580	580	560	540	550	560	580
Total Suspended Solids	mg/L	4	23	1	15	7	1	1	1	1	1	2	<1	<1	1

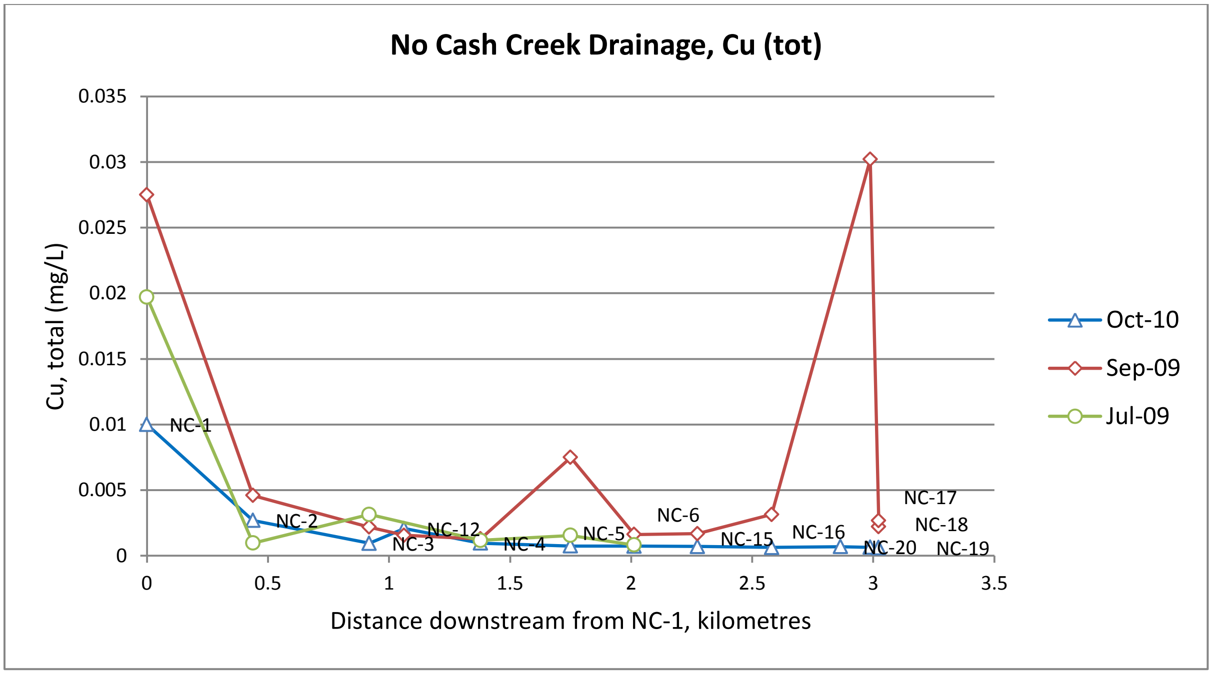
A.2 NO CASH - GRAPHS OF KEY CONSTITUENTS WITH HISTORICAL DATA

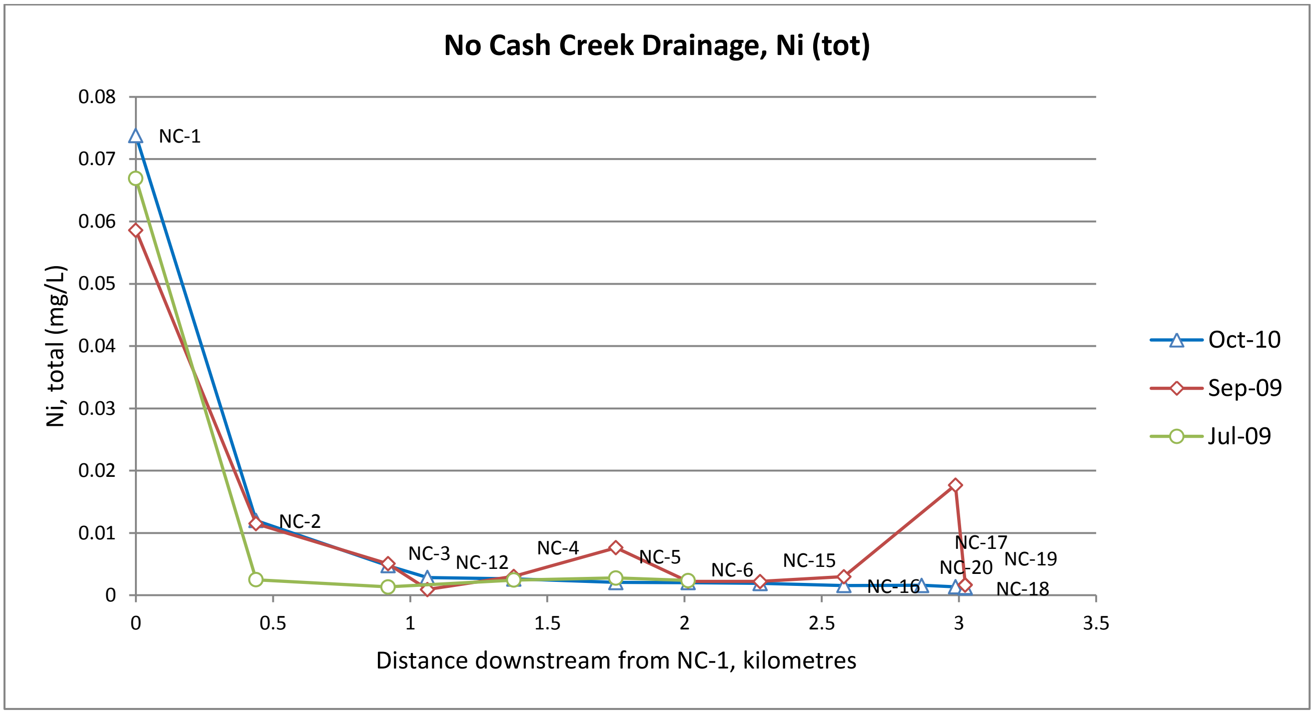
A.2.1 NO CASH – METALS GRAPHS

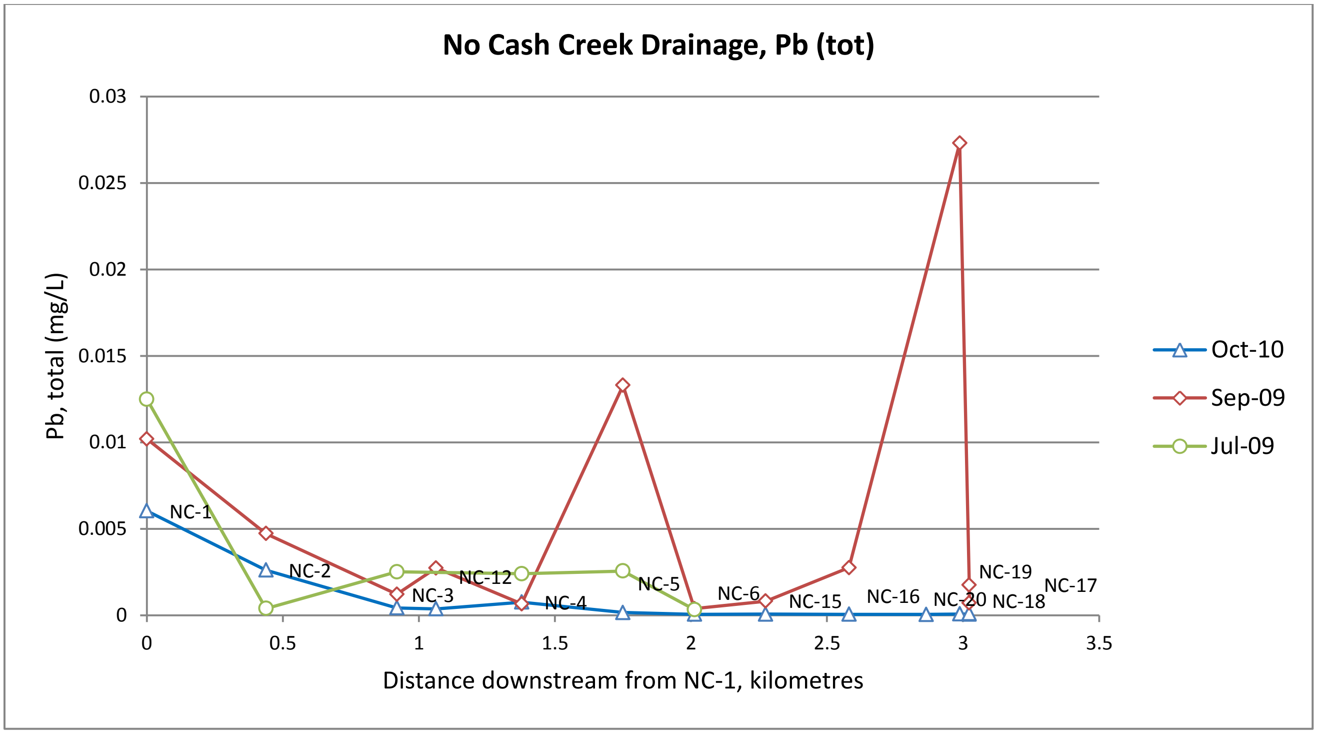


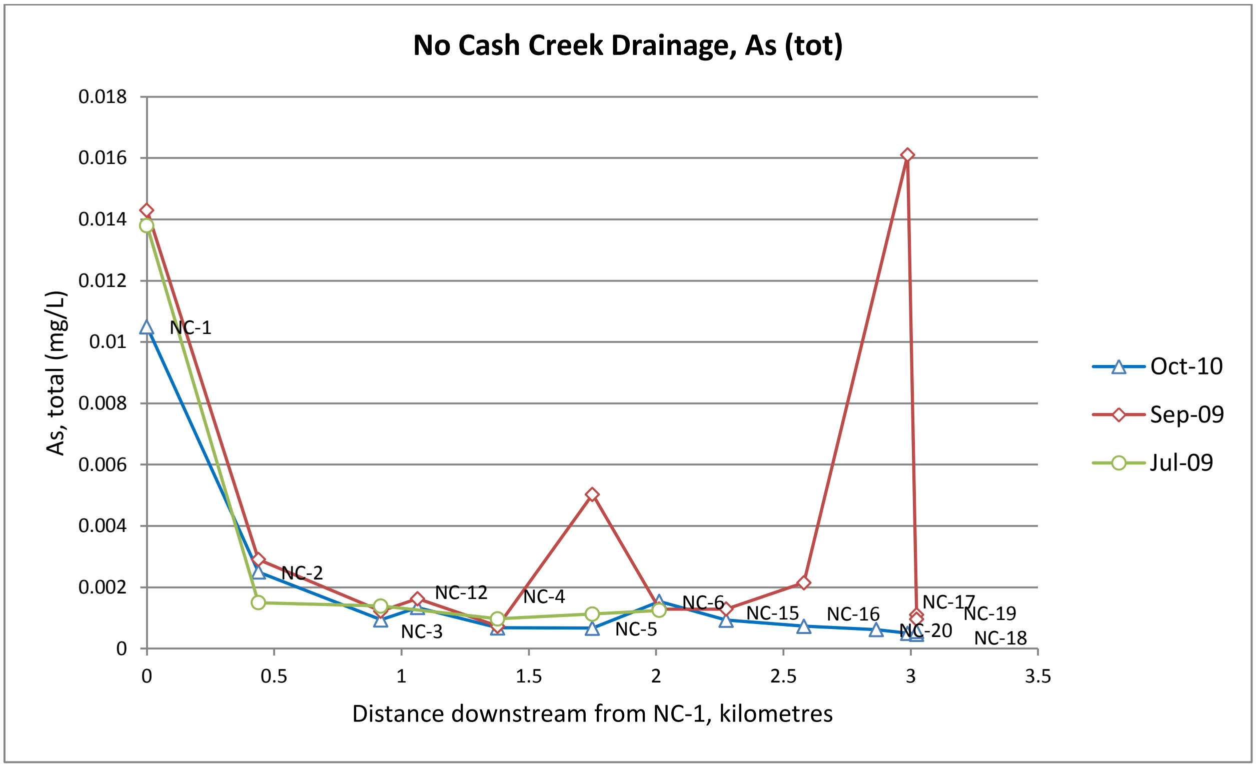


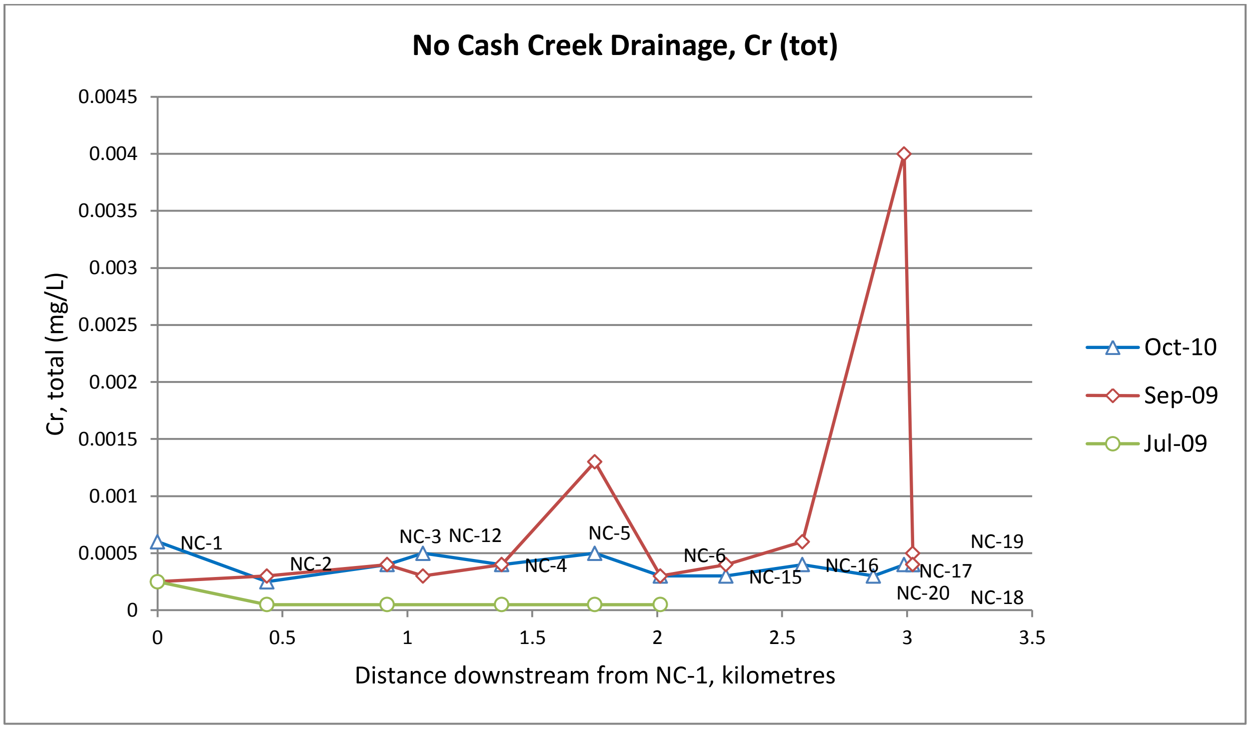

No Cash Creek Drainage, Fe (tot)
Fe, total (mg/L)
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-20
NC-19
NC-17
NC-18

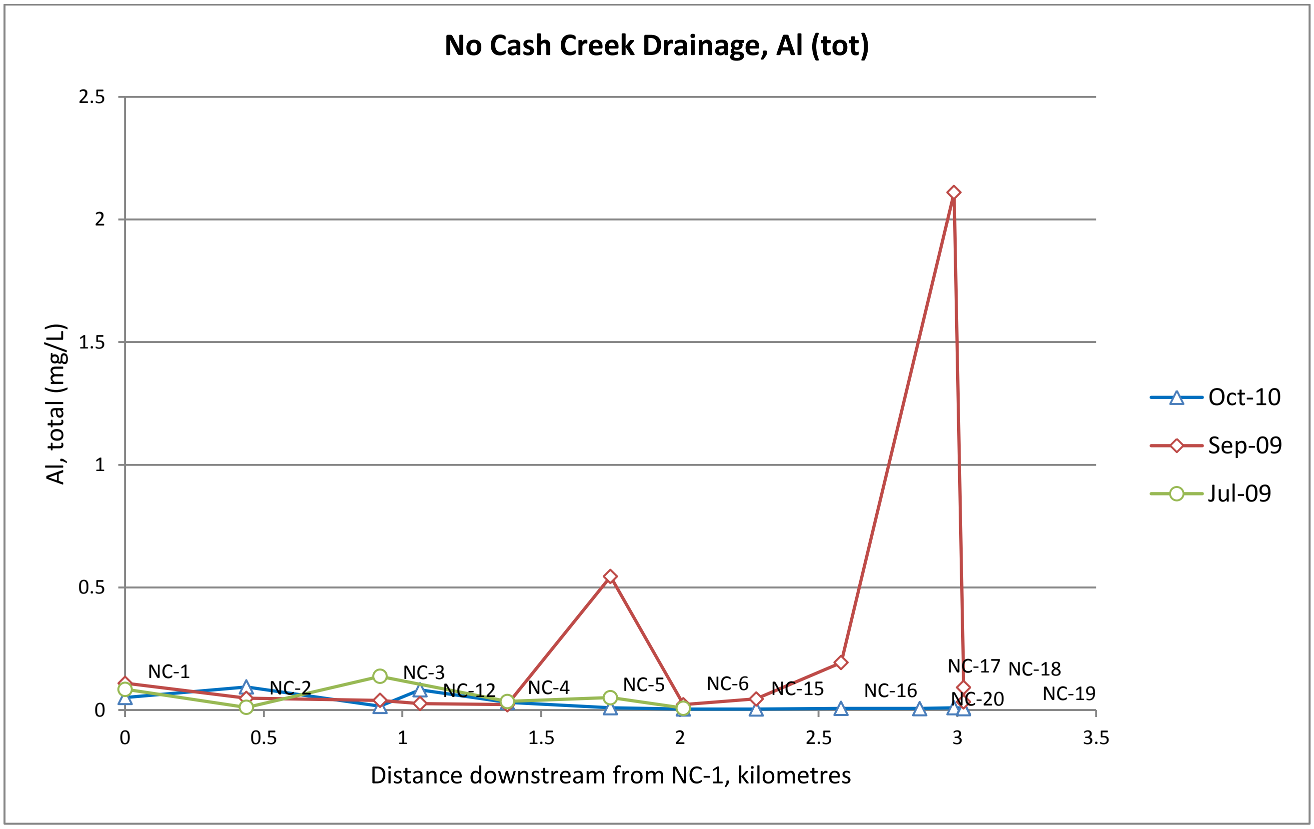

No Cash Creek Drainage, Cu (tot)
Cu, total (mg/L)
Distance downstream from NC-1, kilometres
Oct-10
Sep-09
Jul-09
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-18
NC-20
NC-19


No Cash Creek Drainage, Ni (tot)
Ni, total (mg/L)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-20
NC-19
NC-18
Oct-10
Sep-09
Jul-09

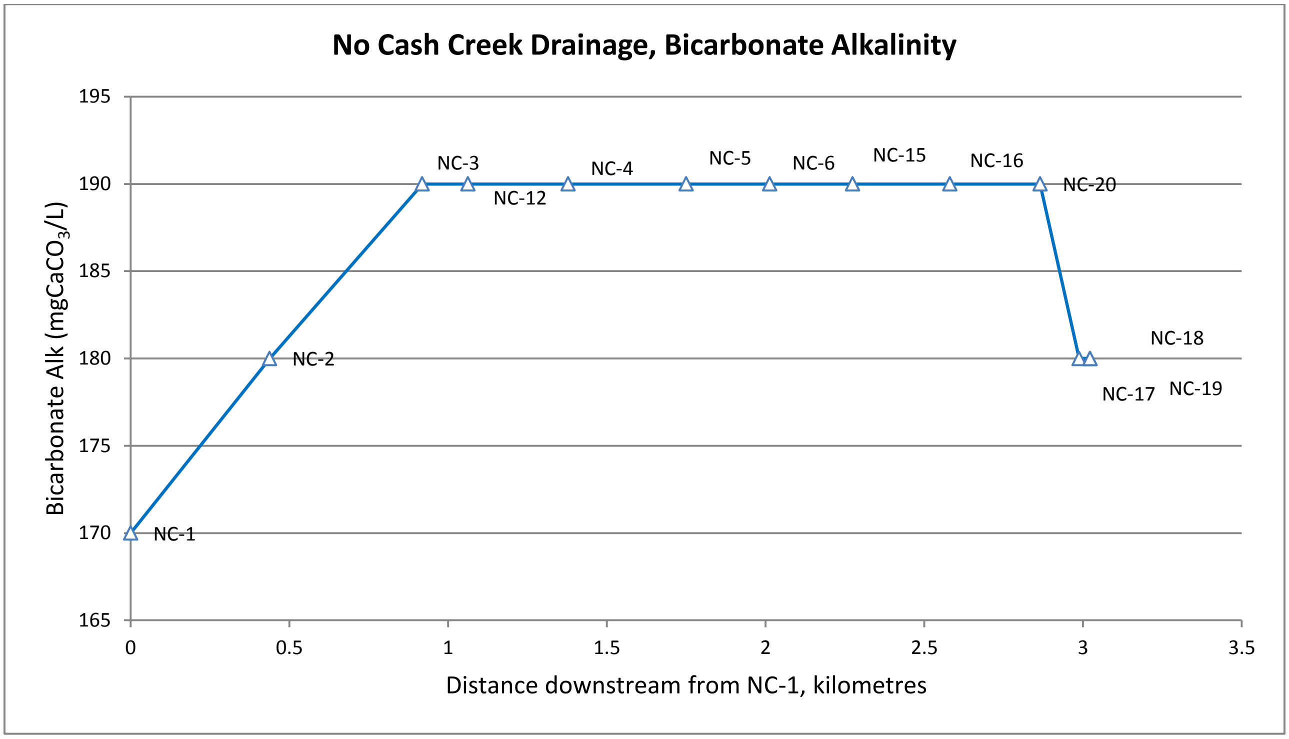

No Cash Creek Drainage, Pb (tot)
Pb, total (mg/L)
0.03
0.025
0.02
0.015
0.01
0.005
0
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-20
NC-19
NC-18
NC-17
Oct-10
Sep-09
Jul-09

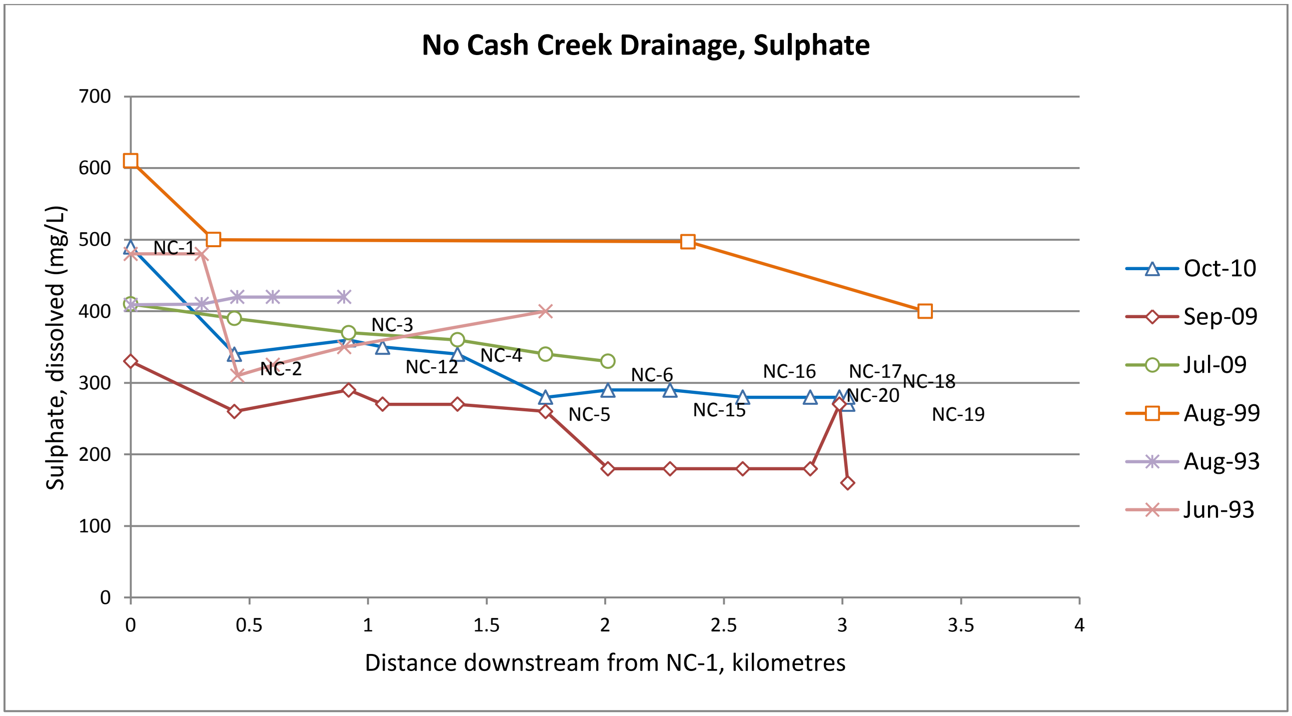

No Cash Creek Drainage, As (tot)
As, total (mg/L)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-20
NC-17
NC-19
NC-18
Oct-10
Sep-09
Jul-09

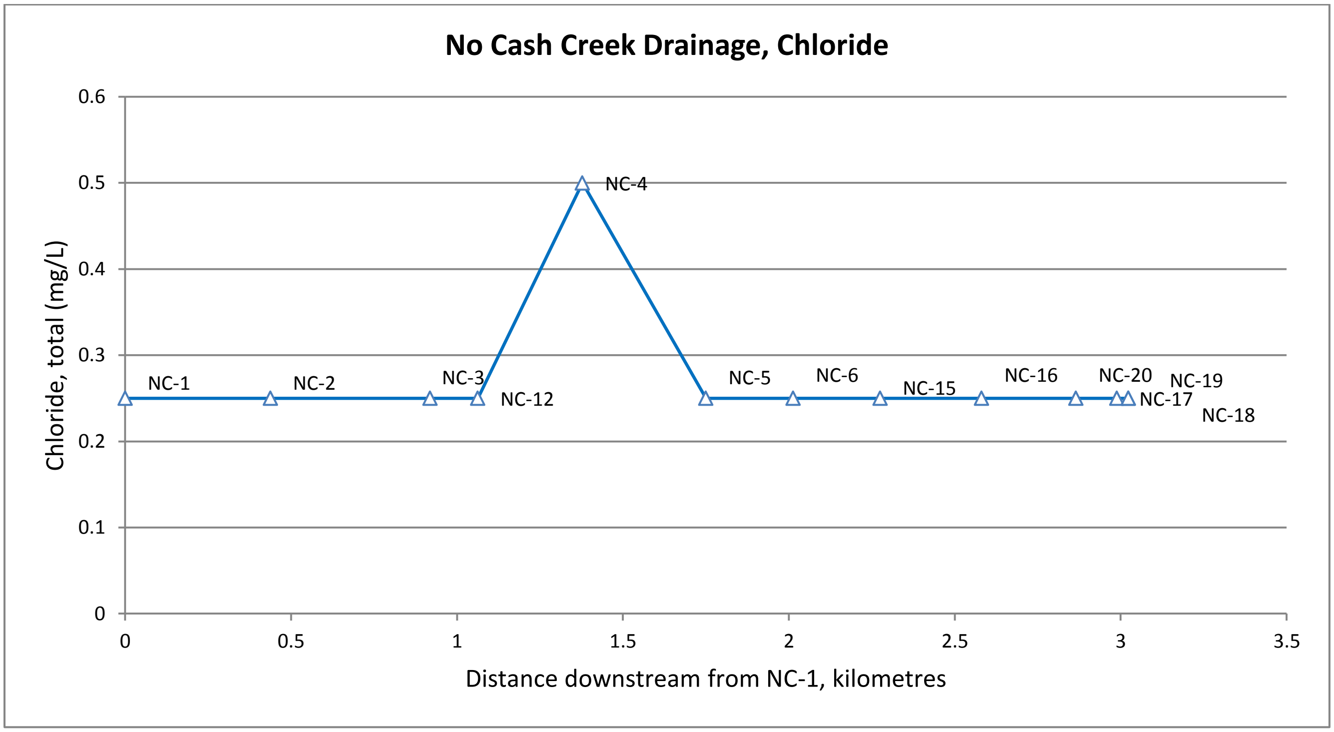

No Cash Creek Drainage, Cr (tot)
Cr, total (mg/L)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-20
NC-19
NC-18
Oct-10
Sep-09
Jul-09

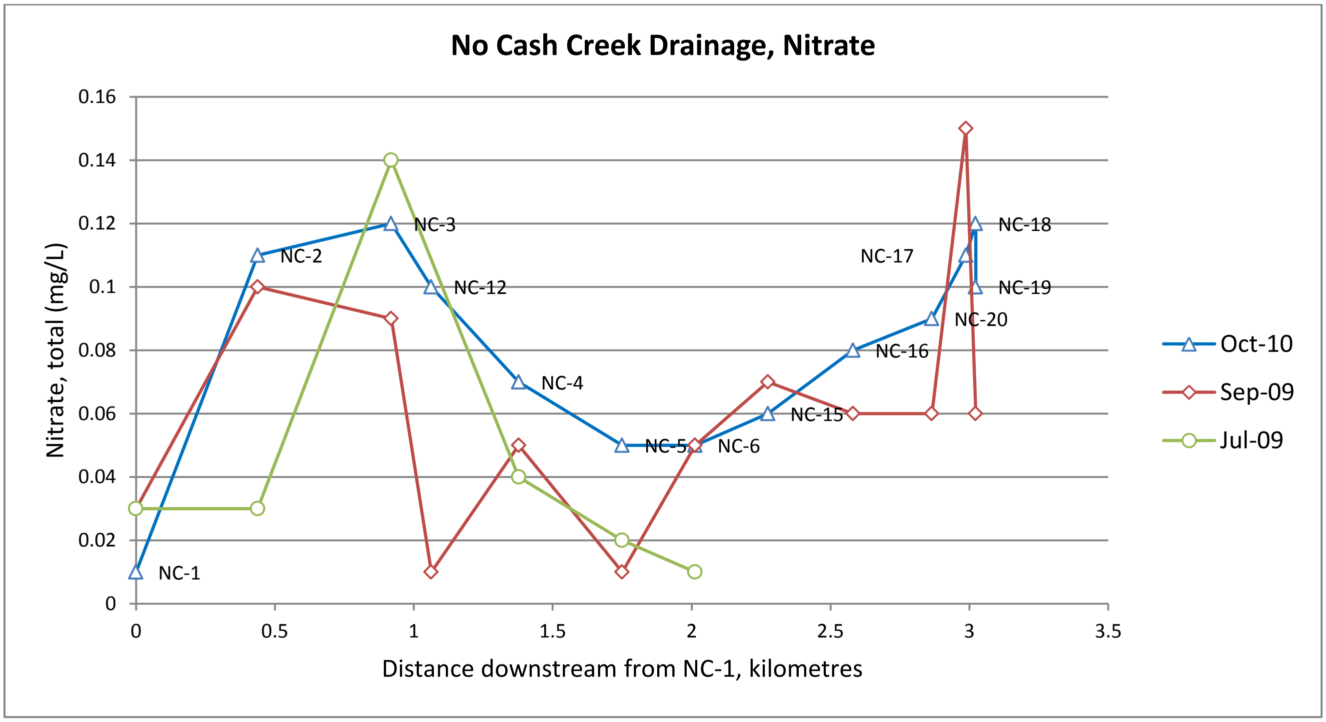

No Cash Creek Drainage, Al (tot)
Al, total (mg/L)
0
0.5
1
1.5
2
2.5
Distance downstream from NC-1, kilometres
0
0.5
1
1.5
2
2.5
3
3.5
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-18
NC-20
NC-19
Oct-10
Sep-09
Jul-09

A.2.2 NO CASH – ANIONS GRAPHS

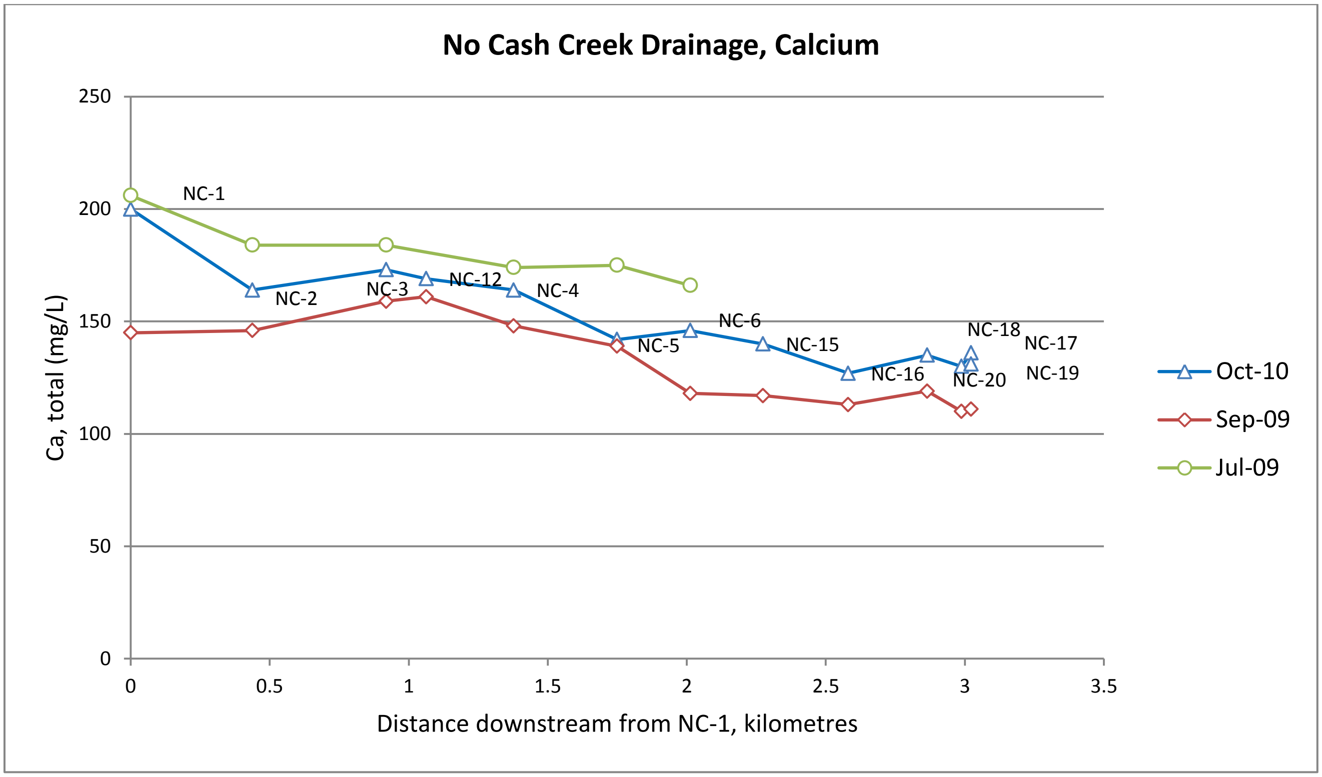


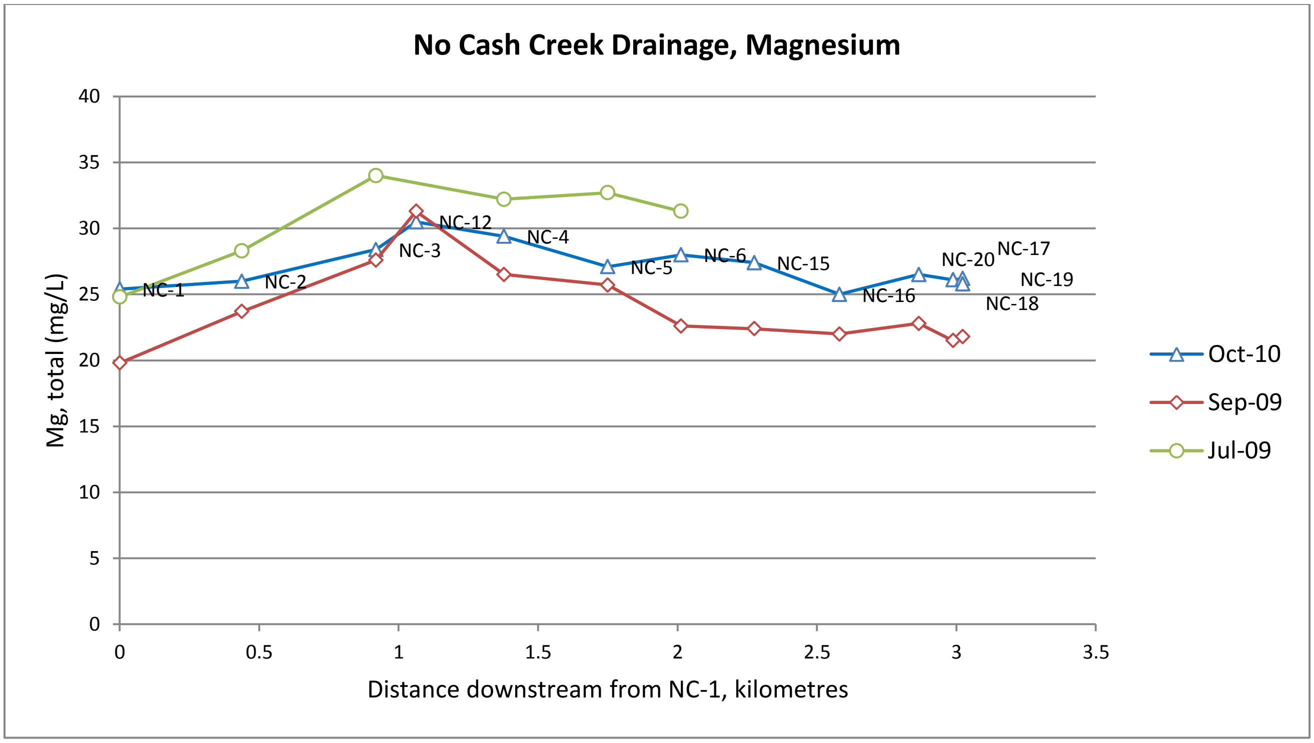


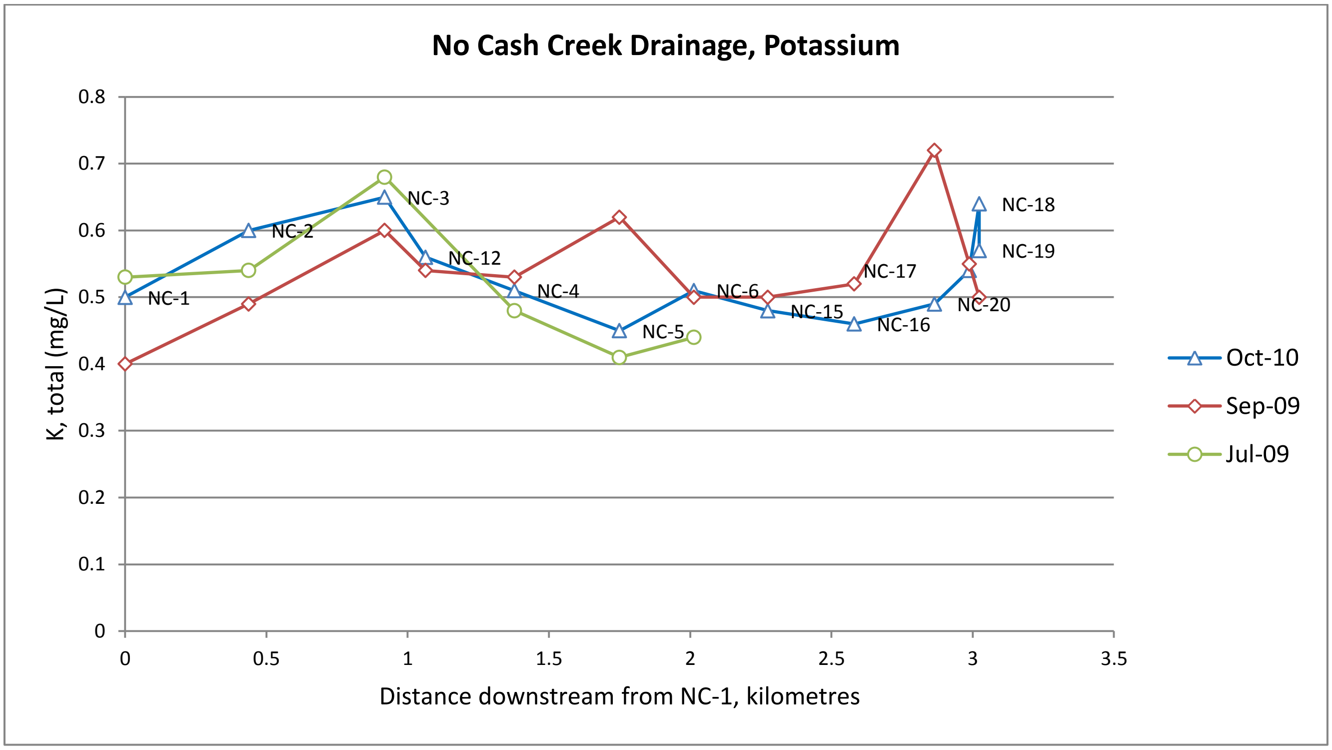

No Cash Creek Drainage, Chloride
Chloride, total (mg/L)
Distance downstream from NC-1, kilometres
0
0.1
0.2
0.3
0.4
0.5
0.6
0
0.5
1
1.5
2
2.5
3
3.5
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-20
NC-19
NC-17
NC-18

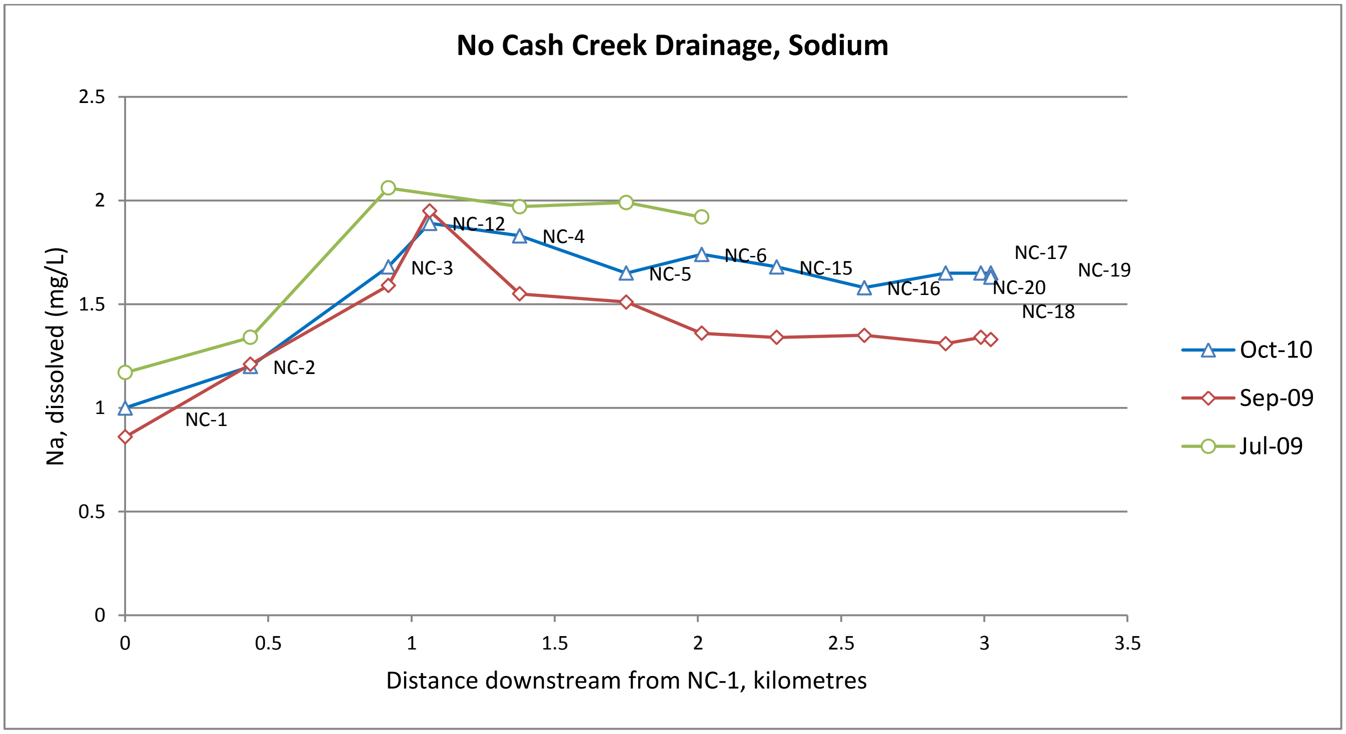

No Cash Creek Drainage, Nitrate
Nitrate, total (mg/L)
Distance downstream from NC-1, kilometres
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0
0.5
1
1.5
2
2.5
3
3.5
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-18
NC-19
NC-20
Oct-10
Sep-09
Jul-09

A.2.3 NO CASH – CATIONS GRAPHS

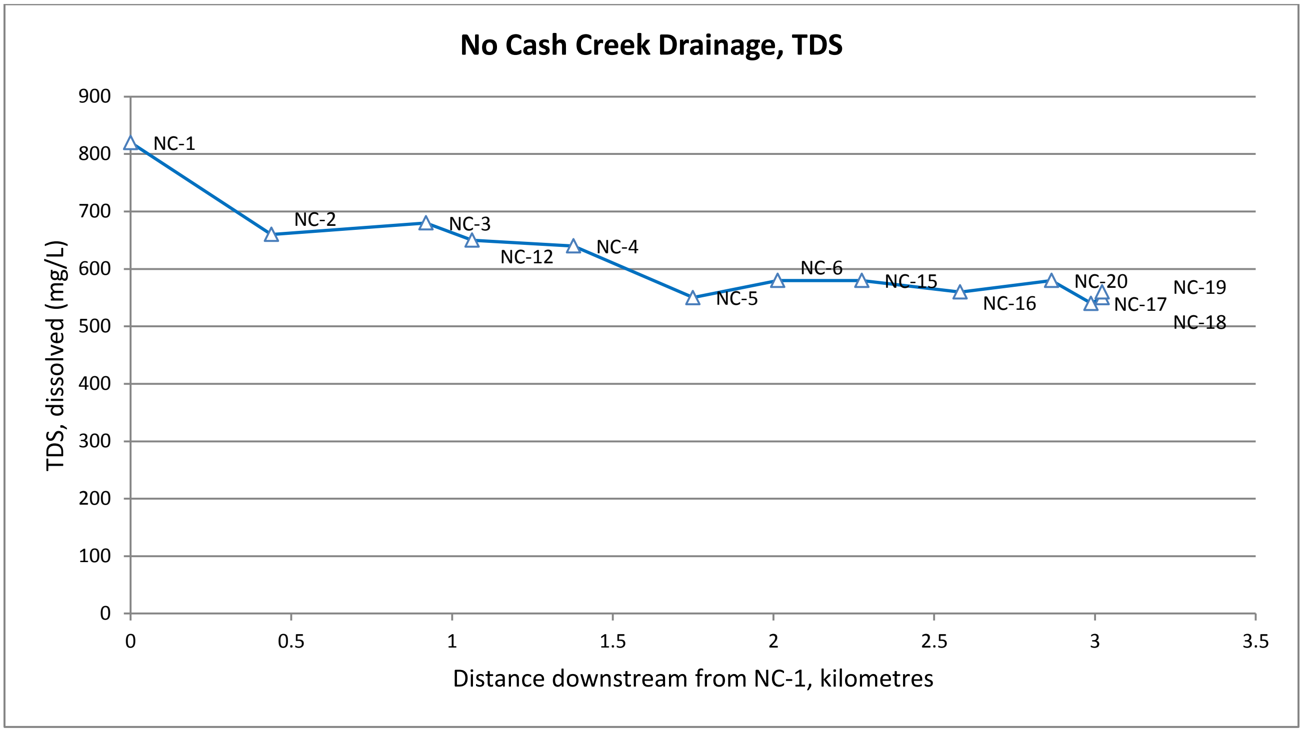


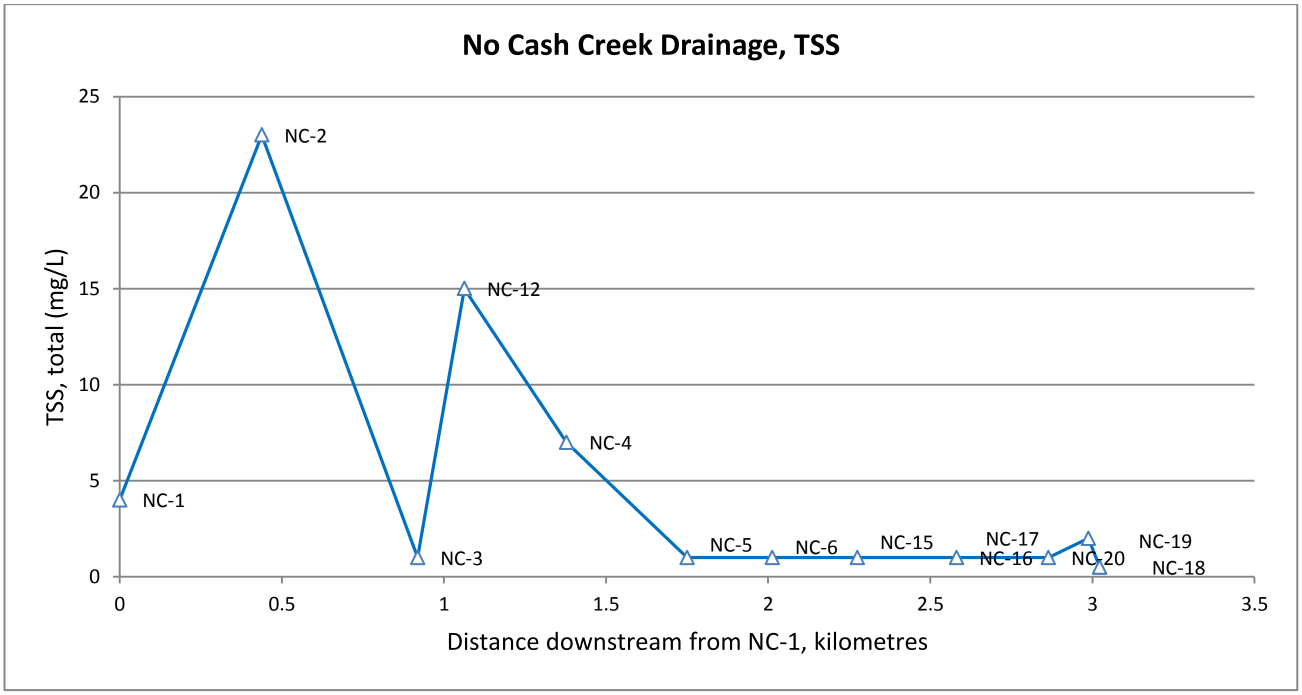



No Cash Creek Drainage, Potassium
K, total (mg/L)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-18
NC-19
NC-20
Oct-10
Sep-09
Jul-09


No Cash Creek Drainage, Sodium
Na, dissolved (mg/L)
0
0.5
1
1.5
2
2.5
0
0.5
1
1.5
2
2.5
3
3.5
Distance downstream from NC-1, kilometres
NC-1
NC-2
NC-3
NC-12
NC-4
NC-5
NC-6
NC-15
NC-16
NC-17
NC-19
NC-20
NC-18
Oct-10
Sep-09
Jul-09

A.2.4 NO CASH – PHYSICAL PARAMETERS GRAPHS





A.3 NO CASH - TABLE OF PORE WATER CHEMISTRY DATA

		NC-4-SW	NC-5-SW	NC-6-PW	NC-12-SW	NC-15-PW	NC-16-PW-12in	NC-16-PW-3in	NC-17-PW	NC-20-PW
Dissolved Metals		11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010	11-Oct-2010
Aluminum (Al)	mg/L	0.038	0.013	0.081	0.024	0.031	0.456	0.177	0.107	0.114
Arsenic (As)	mg/L	0.0013	0.0006	0.0077	0.0014	0.0018	0.0122	0.005	0.0016	0.0038
Barium (Ba)	mg/L	0.063	0.041	0.084	0.051	0.059	0.154	0.133	0.152	0.123
Boron (B)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Beryllium (Be)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth (Bi)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium (Cd)	mg/L	0.00254	0.00104	0.00042	0.00889	0.00026	0.00032	0.0003	0.00028	0.00013
Cobalt (Co)	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	0.002	0.002	<0.001	<0.001
Chromium (Cr)	mg/L	<0.0005	<0.0005	0.0009	<0.0005	0.0007	0.0007	0.0007	0.0011	0.0005
Copper (Cu)	mg/L	0.0025	0.0008	0.0015	0.0028	0.0009	0.0055	0.0043	0.0026	0.0016
Iron (Fe)	mg/L	0.135	0.086	0.214	0.17	0.133	1.93	1.07	0.293	0.306
Lithium (Li)	mg/L	0.005	0.01	0.009	0.012	0.01	<0.005	<0.005	0.009	0.007
Manganese (Mn)	mg/L	0.008	0.372	1.27	1.47	1.1	1.32	1.22	4.85	2.99
Molybdenum (Mo)	mg/L	<0.001	<0.001	0.005	<0.001	<0.001	0.002	<0.001	<0.001	0.001
Nickel (Ni)	mg/L	0.004	0.002	0.002	0.009	0.002	0.003	0.002	0.002	0.001
Lead (Pb)	mg/L	0.0013	<0.0002	0.0032	0.0034	0.0008	0.0036	0.0029	0.0011	0.0008
Antimony (Sb)	mg/L	<0.0005	<0.0005	0.0023	<0.0005	<0.0005	0.0006	0.0005	<0.0005	0.0007
Selenium (Se)	mg/L	0.0002	0.0003	0.0001	<0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
Silicon (Si)	mg/L	2.96	2.76	2.52	2.52	2.86	3.73	2.82	2.66	3.51
Silver (Ag)	mg/L	0.00009	<0.00002	0.00008	0.00022	0.00003	0.00005	0.00005	0.00004	0.00003
Tin (Sn)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (Sr)	mg/L	0.233	0.338	0.289	0.325	0.301	0.108	0.116	0.257	0.237
Titanium (Ti)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.016	0.008	<0.005	0.007
Thallium (Tl)	mg/L	<0.00005	<0.00005	<0.00005	0.00007	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Uranium (U)	mg/L	0.0011	0.0036	0.0046	0.0016	0.0029	0.0008	0.001	0.0016	0.0033
Vanadium (V)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc (Zn)	mg/L	0.49	0.275	0.037	1.62	0.079	0.044	0.027	0.026	0.017
Zirconium (Zr)	mg/L	0.0017	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	0.0008	0.0016	<0.0005
Calcium (Ca)	mg/L	106	136	118	135	126	45	51.1	108	106
Potassium (K)	mg/L	0.48	0.45	0.78	1.07	0.44	0.77	0.3	0.74	0.58
Magnesium (Mg)	mg/L	22.5	26.2	24.9	27.3	25.4	10	11	22.1	24
Sodium (Na)	mg/L	1.73	1.6	1.66	1.41	1.48	0.64	0.59	1.68	2.34
Sulfur (S)	mg/L	73	108	97	121	103	13	19	90	86
Hardness (CaCO3) from dissolved metal scan	mg/L	357	447	398	451	419	154	173	360	365

Continued.

Total Metals		NC-4-SW	NC-5-SW	NC-6-PW	NC-12-SW	NC-15-PW	NC-16-PW-12in	NC-16-PW-3in	NC-17-PW	NC-20-PW
Aluminum (Al)	mg/L	203	13.2	128	34.3	24.1	944	210	1210	390
Arsenic (As)	mg/L	0.846	0.0421	0.432	0.264	0.112	1.35	0.247	2.28	0.584
Barium (Ba)	mg/L	5.1	0.413	3.4	0.786	0.86	35.1	6.89	37.6	14.6
Beryllium (Be)	mg/L	<0.2	<0.05	<0.1	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	mg/L	0.0097	0.0005	0.0062	0.0016	0.001	0.047	0.007	0.051	0.014
Boron (B)	mg/L	0.004	<0.001	0.003	<0.001	<0.001	0.019	<0.01	0.028	<0.01
Cadmium (Cd)	mg/L	0.837	0.0496	0.227	0.324	0.0524	0.153	0.0348	0.326	0.0702
Cobalt (Co)	mg/L	0.277	0.0151	0.196	0.0498	0.0434	0.99	0.18	1.41	0.381
Chromium (Cr)	mg/L	0.408	0.025	0.233	0.06	0.044	1.83	0.379	2.6	0.72
Copper (Cu)	mg/L	1.69	0.0823	0.873	0.433	0.211	4.69	0.994	6.74	1.9
Iron (Fe)	mg/L	500	33.5	312	99.9	73.3	2000	363	2890	808
Mercury (Hg)	mg/L	0.219	0.025	0.162	0.045	0.035	1.07	0.232	1.49	0.46
Lithium (Li)	mg/L	60.6	5.83	10.2	19.2	9.01	90	14.2	219	34
Manganese (Mn)	mg/L	0.00178	0.00011	0.00096	0.00027	0.00021	0.0075	0.0016	0.0108	0.0029
Molybdenum (Mo)	mg/L	0.016	0.002	0.014	0.004	0.004	0.078	0.017	0.103	0.039
Nickel (Ni)	mg/L	0.986	0.052	0.554	0.237	0.115	3.18	0.556	4.16	1.18
Lead (Pb)	mg/L	3.5	0.1	2.28	1.58	0.301	1.74	0.429	3.56	0.831
Antimony (Sb)	mg/L	0.023	0.0032	0.018	0.0158	0.005	0.051	0.016	0.061	0.028
Selenium (Se)	mg/L	0.0215	0.0018	0.0088	0.0031	0.0022	0.141	0.024	0.176	0.06
Silicon (Si)	mg/L	125	20.9	107	43	33.4	812	212	1010	430
Silver (Ag)	mg/L	0.087	0.00292	0.0373	0.0409	0.00493	0.0347	0.0086	0.0828	0.0176
Tin (Sn)	mg/L	<0.02	<0.005	<0.01	<0.005	<0.005	<0.05	<0.05	<0.05	<0.05
Strontium (Sr)	mg/L	1.22	0.401	0.877	0.51	0.481	5.66	1	6.36	1.96
Titanium (Ti)	mg/L	2.05	0.265	1.4	0.529	0.391	11.4	2.96	13.3	5.94
Thallium (Tl)	mg/L	0.0056	0.00031	0.0043	0.00187	0.00069	0.0092	0.0025	0.0132	0.0051
Uranium (U)	mg/L	0.0566	0.0057	0.0242	0.0102	0.0079	0.161	0.041	0.215	0.074
Vanadium (V)	mg/L	0.62	0.035	0.373	0.093	0.068	2.84	0.534	3.59	1.08
Zinc (Zn)	mg/L	78.4	3.98	28.4	20.3	6.78	29.7	5.55	55.8	11.2
Zirconium (Zr)	mg/L	0.038	0.0023	0.018	0.0053	0.003	0.133	0.02	0.236	0.05
Calcium (Ca)	mg/L	389	163	303	201	194	2010	308	2110	598
Potassium (K)	mg/L	8.4	1.86	6.6	2.99	2.22	44.2	13.8	63.5	24.6
Magnesium (Mg)	mg/L	121	35.2	94.9	44.7	46.7	554	105	718	214
Sodium (Na)	mg/L	4	2.38	3.2	2.36	2.2	15.6	5.7	17.7	12.1
Sulfur (S)	mg/L	95	122	117	134	104	220	49	327	137
Hardness (CaCO3) from total metal scan	mg/L	1470	552	1150	685	676	7310	1200	8220	2370

Continued.

Other Paramaters		NC-4-SW	NC-5-SW	NC-6-PW	NC-12-SW	NC-15-PW	NC-16-PW-12in	NC-16-PW-3in	NC-17-PW	NC-20-PW
pH	pH units	7.74	7.86	7.77	7.63	7.98	7.27	7.43	7.32	7.47
Conductivity	µS/cm	652	859	794	869	804	346	346	732	720
Bicarbonate (HCO3)	mgCaCO3/L	160	180	160	160	180	170	150	150	170
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	130	150	130	130	150	140	120	130	140
Nitrate plus Nitrite (N)	mg/L	0.02	0.06	<0.02	<0.02	0.08	<0.02	<0.02	0.04	<0.02
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005
Nitrate (N)	mg/L	0.02	0.06	<0.02	<0.02	0.08	<0.02	<0.02	0.03	<0.02
Nitrogen (N)	mg/L	1.4	3	4	1.1	0.9	9	7	5	6
Dissolved Chloride (Cl)	mg/L	1.6	1.2	1.7	<0.5	<0.5	1.4	0.8	1.5	0.9
Dissolved Sulfate (SO4)	mg/L	180	300	280	320	260	56	59	240	230
Dissolved Organic Carbon (C)	mg/L	9.2	4	8.7	8.1	7.7	30	24	14.1	12.2
Total Organic Carbon (C)	mg/L	38.8	11.5	55	27.5	19.5	152	119	106	95

B NO CASH STREAM SEDIMENT, ALLUVIUM, AND PEAT DATA

B.1 TABLE OF WHOLE ROCK CHEMISTRY DATA

Sample	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V
ID	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
NC-15-Stream-Sed.	4.4	64.5	109.4	5354	2.8	62.1	32.1	>10000	3.76	59	2.3	<0.1	3.8	136	37.6	5	0.2	52
NC-1C-Stream-Sed.	18.9	106.3	1101.8	>10000	33.7	96.7	38.8	>10000	2.98	112	5.2	<0.1	6.1	71	191.6	36.6	0.2	73
NC-16-Peat-3"	8.6	57.6	30.7	467	0.6	30.6	8.1	1012	1.88	6	3	<0.1	6.2	124	3.4	2	0.2	73
NC-16-Peat-18"	9	55.3	30.7	299	0.5	35.9	11.7	1183	2.65	12	3.2	<0.1	6.9	113	2.2	1.7	0.3	93
NC-20-Stream	16.1	40.1	26.2	565	0.4	29.8	11.2	1849	2.4	15	2.4	<0.1	7.5	130	2.9	1.6	0.2	79
NC-17-Peat-24"	3.1	50.3	9.3	69	0.3	19.2	3.9	535	1.08	5	1.3	<0.1	3	101	0.4	1.2	0.2	36
NC-17-Peat-12"	3.7	47.6	26.2	738	0.6	29.2	9.2	1089	2.04	11	5.1	<0.1	4.4	96	3.7	2.5	0.2	59
NC-17-Stream	6.6	60	30.7	1156	0.6	43.8	17.6	9113	3.03	23	3.7	<0.1	8.1	145	5.7	2.2	0.3	103
NC-12-Stream-Sed.	21.3	50.9	423.5	6858	11.5	59.9	19.2	>10000	2.52	57	2.3	<0.1	6.2	75	88.8	13.8	0.2	87
NC-20-Soil-3"	18.1	30.8	27.6	242	0.5	25.6	9.4	682	2.13	12	1.8	<0.1	7.4	137	1.5	1.3	0.2	79
NC-17-Peat-3"	5.5	70.9	44	801	0.9	39.3	12.7	1244	2.84	16	4.4	<0.1	7	100	7.3	2.6	0.3	101
NC-12-Soil-8"	18.3	119.2	753.5	>10000	51.1	100.8	37.5	>10000	3.75	92	5	<0.1	7.5	106	200	35.1	0.2	94
NC-20-Soil-12"	11.9	61.8	25.6	302	1.2	37.8	11.3	869	1.98	8	4.6	<0.1	6.1	118	3.8	2.5	0.2	70
NC-1B-Surface-Sed.	25.2	35	644.7	3777	12.5	29.6	9.9	7557	2.15	193	2.5	<0.1	3.9	113	49.4	18	<0.1	66
NC-1-Sed-Waste-6"	27.7	88.5	8945.9	8614	151.2	28.9	9.1	>10000	3.56	164	2.4	<0.1	5.1	38	123.2	66.4	0.1	59
NC-4-Sed/Root-8"	12.9	79.9	224	3617	5.9	51.9	15.6	3280	3.09	37	4.3	<0.1	8.4	137	47.8	6.5	0.3	92
NC-12-Soil-1"	14.6	106.3	820.4	7664	34.1	68.2	22.7	>10000	3.35	95	4.5	<0.1	8.8	133	91.7	22.8	0.2	90
NC-16-Stream-Sed.	7.9	57.4	43.3	393	1.3	30.5	7.9	2155	1.75	8	2.5	<0.1	4.7	106	4.1	2.5	0.2	58
NC-1a-12"	25.9	70.2	3471.7	5651	54.3	39	13	5544	3.41	170	2.9	<0.1	6.6	75	71.9	50	0.3	86
NC-6-Stream-Sed.	21.4	36.7	59.4	879	1.3	29.7	13.2	2589	2.79	24	1.8	<0.1	6	87	6.7	2.5	0.1	95
NC-6-Sed-12"	23.7	55	74.9	1639	1.7	39.8	16.3	2707	3.41	30	2.7	<0.1	6.8	111	15.5	3.4	0.2	86
NC-4-Stream-Sed.	23.1	48.1	65.3	3172	2.1	44.1	19.6	7199	3.39	39	2.3	<0.1	6.2	111	36.5	3.6	0.2	92
NC-6-Peat-15"	16.4	52.7	45.4	1080	1.1	36	11.8	575	2.43	13	2.7	<0.1	6.8	113	11.3	2.2	0.2	85
NC-15-Soil-6"	20.5	57.6	80.8	1200	2	36.7	15.9	3341	2.92	32	2.2	<0.1	7.9	124	7.8	2.9	0.2	82
NC-1a-Surface-Sed.	16.2	85.3	446.9	>10000	39.8	62.2	28.4	>10000	2.7	92	10.2	<0.1	6.1	78	135.1	38	0.1	76
NC-5-Root/Peat-3"	3.5	92.3	179.9	>10000	5.3	52.9	13.6	1741	2.43	24	7.4	<0.1	5.1	96	183.5	6.7	0.2	72
NC-5-Stream-Sed	9.2	75.2	107.6	2661	2.8	42.7	14.4	1999	3.31	30	2.6	<0.1	8	117	35.8	3.8	0.3	92
NC-15-Peat-12"	10.5	53.3	29.2	873	0.9	24.5	7.1	1521	1.78	15	4.8	<0.1	3.1	89	4.9	2.3	0.1	36
NC-1-S-Sed-Surface	10.5	829.2	8017.2	>10000	45.5	255.7	217.9	>10000	11.35	577	607.5	<0.1	4.9	67	1013.2	70.4	<0.1	<1
NC-26-Surface-Sed	21.8	60.8	314.7	6827	4.5	51	19	>10000	2.45	43	2.8	<0.1	4.1	69	72.6	10.5	<0.1	67
NC-4-Sed/Root-3"	13.9	59.2	64.5	1410	2.3	34	10.5	1133	2.43	20	2.7	<0.1	7.2	128	15.9	2.8	0.2	85
NC-16-Peat-12"	6.4	61	20.6	258	0.5	32	9.4	704	2.01	7	2.6	<0.1	6.3	125	1.5	1.9	0.2	79
NC-2A-Stream-Sed.	18.7	32.7	174.3	4699	2.5	29.8	10.9	>10000	3.03	150	1.4	<0.1	3.8	65	55	8	<0.1	99
NC-2-Stream-Sed.	20.5	46.5	169.2	3275	5.5	38.7	11.7	3752	2.6	38	1.7	<0.1	5.3	116	29	6	0.2	80
NC-3-Surface-Sed.	26.2	35.4	155.4	3154	7.5	40.5	13.4	5235	2.58	29	1.8	<0.1	5.6	77	33.2	6.1	0.1	89

B.2 TABLE OF ACID-BASE ACCOUNTING DATA

Sample ID	Paste pH	Total Carbon (Wt.%)	TOC (Wt.%)	CO2 (Wt.%)	CaCO3 Equiv.* (Kg CaCO3/Tonne)	Total Sulfur (Wt.%)	HCl Extractable Sulfur (Wt.%)	HNO3 Extractable Sulfur (Wt.%)	Insoluble Sulfur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)
NC-15-Stream-Sed.		24.06	23.53	1.88	42.7	0.06	<0.01	0.06	0.00	1.9
NC-1C-Stream-Sed.		2.56	1.16	5.06	115.0	0.23	0.05	0.18	0.00	5.6
NC-16-Peat-3"		19.87	19.75	0.34	7.7	0.15	0.01	0.14	0.00	4.4
NC-16-Peat-18"		17.58	17.36	0.74	16.8	0.20	0.04	0.16	0.00	5.0
NC-20-Stream		8.93	8.68	0.83	18.9	0.07	<0.01	0.07	0.00	2.2
NC-17-Peat-24"		39.56	39.45	0.34	7.7	0.13	<0.01	0.13	0.00	4.1
NC-17-Peat-12"		31.69	31.53	0.52	11.8	0.13	<0.01	0.13	0.00	4.1
NC-17-Stream		13.58	13.33	0.85	19.3	0.07	<0.01	0.07	0.00	2.2
NC-12-Stream-Sed.		1.12	0.65	1.67	38.0	0.10	0.03	0.05	0.02	1.6
NC-20-Soil-3"		2.54	2.21	1.11	25.2	0.04	0.01	0.02	0.01	0.6
NC-17-Peat-3"		21.17	20.99	0.63	14.3	0.25	0.05	0.17	0.03	5.3
NC-12-Soil-8"		6.79	6.27	1.84	41.8	0.17	0.05	0.10	0.02	3.1
NC-20-Soil-12"		20.92	20.75	0.58	13.2	0.25	0.06	0.14	0.05	4.4
NC-1B-Surface-Sed.		1.28	0.52	2.70	61.4	0.31	0.02	0.22	0.07	6.9
NC-1-Sed-Waste-6"		1.16	0.54	2.21	50.2	1.41	0.03	0.91	0.47	28.4
NC-4-Sed/Root-8"		11.04	10.88	0.51	11.6	0.11	0.01	0.04	0.06	1.3
NC-12-Soil-1"		7.02	6.71	1.07	24.3	0.16	0.01	0.10	0.05	3.1
NC-16-Stream-Sed.		29.60	29.45	0.50	11.4	0.25	0.01	0.16	0.08	5.0
NC-1a-12"		1.50	0.56	3.40	77.3	1.18	0.02	0.97	0.19	30.3
NC-6-Stream-Sed.		2.66	2.49	0.55	12.5	0.04	<0.01	0.04	0.00	1.3
NC-5 alk/ort	Insufficient sample									
NC-6-Sed-12"		6.23	5.98	0.87	19.8	0.09	<0.01	0.03	0.06	0.9
NC-4-Stream-Sed.		5.44	5.25	0.62	14.1	0.05	<0.01	0.02	0.03	0.6
NC-6-Peat-15"		7.14	7.01	0.35	8.0	0.33	<0.01	0.08	0.25	2.5
NC-15-Soil-6"		4.12	3.69	1.53	34.8	0.05	0.01	0.02	0.02	0.6
NC-1a-Surface-Sed.		3.14	0.26	10.52	239.1	0.41	0.15	0.14	0.12	4.4
NC-5-Root/Peat-3"		25.86	25.72	0.49	11.1	0.74	0.12	0.22	0.40	6.9
NC-5-Stream-Sed		10.92	10.72	0.69	15.7	0.13	0.03	0.05	0.05	1.6
NC-15-Peat-12"		31.10	30.92	0.65	14.8	0.47	0.09	0.21	0.17	6.6
NC-1-S-Sed-Surface		4.31	3.11	4.33	98.4	0.14	0.12	0.02	0.00	0.6
NC-26-Surface-Sed		1.02	0.28	2.63	59.8	0.15	0.04	0.07	0.04	2.2
NC-4-Sed/Root-3"		8.01	7.86	0.46	10.5	0.07	0.01	0.03	0.03	0.9
NC-16-Peat-12"		15.50	15.31	0.65	14.8	0.22	0.01	0.10	0.11	3.1
NC-2A-Stream-Sed.		1.27	0.20	3.89	88.4	0.28	<0.01	0.12	0.16	3.8
NC-2-Stream-Sed.		1.76	1.15	2.14	48.6	0.06	<0.01	0.04	0.02	1.3
NC-3-Surface-Sed.		1.87	1.63	0.81	18.4	0.07	<0.01	0.07	0.00	2.2

B.3 TABLE OF XRD RESULTS

Sample ID	Quartz (%)	Plagioclase (%)	Muscovite-Illite (%)	Clinochlore (%)	Actinolite (%)	Dolomite (%)	K-feldspar (%)	Augite (%)	Clinozoisite (%)	Pyrite (%)	Kaolinite (%)	Calcite (%)	Goethite (%)	Hematite (%)	Hydroxylapatite (%)	Rutile (%)	Siderite (%)	Sphalerite (%)	Galena (%)	Ankerite (%)	Magnetite (%)
NC-15-Stream-Sed.	47.6	7.1	25.0	15.2	3.4	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-1C-Stream-Sed.	67.7	3.0	13.1	4.1	-	8.7	1.7	-	-	0.9	-	0.3	-	-	0.5	-	-	-	-	-	-
NC-16-Peat-3"	57.2	15.4	12.2	7.2	2.7	-	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-16-Peat-18"	50.9	13.5	20.2	8.8	2.2	0.6	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-20-Stream	65.5	12.8	9.3	4.4	2.5	1.6	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-17-Peat-24"	45.5	12.0	28.4	7.4	2.9	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-17-Peat-12"	47.3	12.5	28.6	8.0	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-17-Stream	50.5	13.4	21.4	6.8	2.5	0.6	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-12-Stream-Sed.	72.0	5.6	16.4	2.5	-	1.5	-	-	-	0.3	-	0.8	-	-	-	0.8	-	-	-	-	-
NC-20-Soil-3"	68.4	13.8	6.6	3.6	2.6	1.8	2.8	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
NC-17-Peat-3"	44.7	10.7	29.3	9.1	2.0	0.7	3.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-12-Soil-8"	64.0	6.3	19.6	4.9	1.8	1.6	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-20-Soil-12"	58.4	14.1	13.7	6.1	2.4	0.8	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-1B-Surface-Sed.	77.7	1.5	10.4	1.3	-	3.4	1.3	-	-	0.6	-	0.9	-	-	1.6	-	1.1	0.2	-	-	-
NC-1-Sed-Waste-6"	74.0	-	13.2	1.9	-	0.5	2.1	-	-	2.1	0.7	-	-	-	-	-	4	0.8	0.8	-	-

Continued.

	Quartz	Plagioclase	Muscovite-Illite	Clinochlore	Actinolite	Dolomite	K-feldspar	Augite	Clinozoisite	Pyrite	Kaolinite	Calcite	Goethite	Hematite	Hydroxylapatite	Rutile	Siderite	Sphalerite	Galena	Ankerite	Magnetite
Sample ID	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**
NC-4-Sed/Root-8"	56.4	13.7	16.1	5.9	2.6	-	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-12-Soil-1"	62.8	11.6	15.6	3.9	2.2	0.8	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-16-Stream-Sed.	57.3	13.1	16.8	6.7	2.4	1.0	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-1a-12"	67.1	1.0	17.9	2.0	-	5.2	1.8	-	-	2.1	0.7	1.0	-	-	-	-	0.7	0.4	0.2	-	-
NC-6-Stream-Sed.	73.4	6.8	8.1	2.9	3.3	0.9	3.7	-	-	-	0.6	-	-	-	-	-	0.2	-	-	-	-
NC-6-Sed-12"	67.6	10.1	10.8	4.5	3.1	1.5	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-4-Stream-Sed.	69.6	10.0	9.5	4.7	2.5	0.5	2.9	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
NC-6-Peat-15"	67.0	11.7	11.4	3.9	3.0	0.4	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-15-Soil-6"	65.1	11.3	11.0	3.8	2.5	2.4	3.1	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-
NC-1a-Surface-Sed.	52.3	1.5	16.3	3.5	0.4	20.8	2.1	-	-	1.0	-	2.0	-	-	-	-	-	-	-	-	-
NC-5-Root/Peat-3"	44.3	12.2	28.5	8.1	1.3	0.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-5-Stream-Sed	55.5	11.6	18.7	7.0	2.2	0.6	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-15-Peat-12"	62.9	13.8	11.9	4.8	1.8	1.8	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-1-S-Sed-Surface	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-26-Surface-Sed	73.3	5.1	9.3	3.6	1.3	4.0	1.6	-	-	-	-	1.1	-	-	0.5	-	-	0.2	-	-	-
NC-4-Sed/Root-3"	63.4	14.5	9.9	5.4	2.4	0.6	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-16-Peat-12"	56.1	15.4	14.7	5.9	2.4	0.7	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NC-2A-Stream-Sed.	65.2	3.9	8.7	3.1	7.4	3.4	2.7	-	-	-	-	1.0	-	-	-	-	2.6	0.4	-	1.7	-
NC-2-Stream-Sed.	66.4	10.8	9.8	3.7	2.3	2.9	2.9	-	-	-	-	1.0	-	-	-	-	0.2	-	-	-	-
NC-3-Surface-Sed.	69.0	8.5	12.3	4.2	2.4	0.9	2.6	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-

B.4 INTERIM PETROGRAPHIC REPORT FROM B. SHERRIFF

DRAFT

Interim Report on optical and scanning electron microscopic and electron microprobe analysis of Keno Hills samples

Barbara L. Sherriff Ph.D., P.Geo.,
Sherriff Environmental Inc.
5394 Manson Ave.,
Powell River, BC, V8A3P4

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1. Introduction

The objective of this study was to determine the environment of zinc, lead and other heavy metals in the sediments to help determine the long term geochemical stability. The chemical composition and bulk mineralogy of the solid stream sediments had been obtained previously.

2. Samples

83 Soil samples were received numbered 1-84 with number 47 missing as this was a water sample. The samples were described in terms of heavy metal composition, colour, grain size and amount of plant material (Table 1).

Twenty samples were selected for analysis on three criteria:

1. to be representative of each of the streams with a focus on those locations with multiple depth samples
2. to have a high zinc and other heavy metal content
3. to represent the different colored sediments

3. Analytical Techniques

The 20 selected soil and plant samples were made into polished thin sections by Vancouver Petrographics Ltd specifically for SEM and EMP analysis. Table 2 shows the samples selected for thin section preparation with chemical composition.

All 20 thin sections were first studied using an optical microscope attached to imaging software. Full petrographic analysis was not done as this study was to focus on secondary deposits precipitated around mineral and lithic grains and wood fragments. Digital photomicrographs were taken of all samples.

Selected thin sections were analyzed using a scanning electron microscope (SEM, Stereoscan 120, Cambridge Instruments) equipped with an X-ray energy-dispersive spectral analyzer (EDX) to provide qualitative analyses and imaging. Back scatter electron images and selected spectra were obtained.

Mapping of significant elements and quantitative point analyses on selected samples were done using a CAMECA-SX100 electron microprobe on polished mineral mounts.

One line scan was obtained across a Mn rich coating in #38 NC12Soil 8" for Mn, Fe, Zn and S, using 15 kV, 9.9 nA, with 0.475 μm step and dwell times of 0.029 ms.

The microprobe was operated at an acceleration potential of 15 kV and a beam current of 3 nA measured on the Faraday cup, with a 1 μm diameter beam. The standards for the quantitative analysis were albite (Na), olivine (Mg), andalusite (Al), diopside (Si, Ca), pyrite (S , Fe), orthopyroxene (K), sphene (Ti), spessartine (Mn), pentlandite(Ni), chalcopyrite (Cu), Gahnite (Zn), cobaltite (As), barite (Ba), chromite (Cr), and galena (Pb).

Quantitative point analyses were obtained across various coatings on lithic grains and wood fragments. The results are given in wt. % elements with oxygen added from calculation to balance the cations. With these narrow bands of precipitate, the 1 μm diameter beam can sample more than one phase both vertically and horizontally. The totals can give an idea of the validity of the data. Hydrogen and carbon are too light to be determined, therefore, low totals may indicate the presence of carbonate, hydroxides or organic matter. High totals usually indicate that a silicate mineral was sampled.

4. Results

Table 3 gives the list of samples and a brief description of thin sections from optical analysis. Most of the samples contained large rounded lithic fragments, angular quartz, feldspar, and calcite grains. Many contained plant fragments and sulfide grains. Brown or black coatings were observed on lithics in samples from No Cash Creek (NC), GC and Husky SW (HSW). Sadie Ladue (SL) samples were much cleaner with little coating although several samples contained clay binding mineral grains together.

The SEM allowed imaging of wood fragments, mineral grains and lithic fragments at much higher magnification. The EDX spectra indicated the chemical composition of points selected on mineral grains or coatings. These analyses are not quantitative. Quantitative analysis of selected points was done using the EMP. Descriptions below relate to samples that were analyzed using either the SEM or EMP.

4.1 Sample #38 NC12Soil 8"

Brown coatings were observed in sample #38 NC12Soil 8" using optical microscopy (Fig. 1). An overnight scan of the whole thin section using the EMP showed that Zn was associated with Mn in coatings around alumino silicate lithic grains (Fig. 2) and not directly associated with Fe or S. The results for Pb, Ni, Cr, Cd, As, and Ba gave no information due to the low concentration and rapid scan rate.

An EMP line scan for Mn, Fe, S, and Zn across a manganese coating confirmed this association of Mn and Zn (Fig. 3). High Fe spikes are related to higher S. This could be due to pyrite or iron sulfate.

Quantitative point analyses were obtained across a Mn-rich coating of a lithic grain (Fig. 3). The results in wt. % elements are given in Table 4. Except for points 1 and 7, the totals vary from 20-50 wt. %. Point 1 contains a contribution from K feldspar and Point 7 has very low total of 2 wt. %. These points were not used in further calculations. Point 6 has 2 wt. % Fe and could be a combination of Fe and Mn oxy-hydroxides. There was no Fe found in the other points on the precipitate. There was an average of 18.2(6.7) wt. % Mn and 5.4(2.1) wt. % Zn. Ratios were calculated of weight % Ni, Cu, Zn and Pb with Mn to see if there is a stoichiometric relationship between Mn and adsorbed metals. The average ratio of Zn:Mn is 0.31 (0.11), Ni:Mn is 0.004 (0.002), Cu:Mn 0.003 (0.002) and Pb:Mn 0.019 (0.016). These values indicate that the Mn-rich phase is absorbing Zn, Cu, Ni and Pb but not necessarily in stochiometric amountsalthough the ratio of Zn:Mn seems to be consistent 0.3 wt. % Zn being absorbed on each 1 wt. % Mn.

An EMP line scan was done across a wood fragment in sample #38 NC12Soil 8" (Fig. 5). There are two spikes in the S data which line up spikes in Mn, Fe, and Zn indicating either sulfide minerals or more likely sulfates.

The quantitative analyses were done on spots on the same wood fragment coating in sample #38 NC12Soil 8". The results are given in table 5. Points 9, 10, 11, 12 13, 15, 17, 18, and 26 were removed from the calculations because of totals below 20 %. Points 1, 5, 6 and 8 contain predominantly data from silicate minerals and so are also removed from consideration of the composition of the coating. The coating on the wood has much higher Fe (av. 23.6(16.3) wt. %) and lower Mn (av. 0.6 (1.1) wt. %) and Zn (av. 1.49 (0.87) wt. %) than for the coating on the lithic grain. The ratios of wt. % Fe:Mn show a great variation indicating that these phases are probably not coprecipitated. The ratios of Cu, Zn, Cr, Pb to both Mn and Fe have a larger standard deviation than average value except for Zn:Fe. There is, therefore, an indication that Zn is being adsorbed by Feoxy-hydroxides on coatings surrounding particles of wood.

4.2 Sample #56 NC1-S Sed-Surface

There was very little on this thin section visible under the optical microscope except for fine grained angular quartz grains, plant fragments and brown areas that appeared to be Fe oxy-hydroxide films (Fig. 7). SEM EDX analysis of the brown film showed varying concentrations of Mn, Fe and Zn in these films (Fig. 8). EMP area maps show an association of Fe with S, Mn, Zn, U, and Pb (Fig. 9).

Point analyses were collected at high resolution across a coating to see the variation across a 50 µm width with a 1 µm diameter beam (Fig. 10). The results are given in Table 6. These analyses have totals between 20 and 50 wt. % which is still very low and indicates missing phases such as carbonate or organics. None of the points have high Si indicating that there is no overlap with Al-Si minerals. The quantitative analysis of these points show average concentrations of 18.1 (4.1) wt. % Mn, 0.1 (0.3) wt. % Fe and 5.8(1.0) wt .% Zn. There is a consistent Zn:Mn wt % ratio of 0.32 (0.05). This is very similar to the Zn:Mn ratio found for NC 12 of 0.31 (0.11).

4.3 Sample #28 NC1c Stream Sediment

Optical microscopy showed that this sample consisted of coarse grained lithics and fine angular quartz grains some coated with brown material (Fig. 11). There were also sulfides enclosed within lithic grains. Rutile, calcite, siderite, and quartz were identified using SEM EDX analysis. Coatings of lithics were mostly Mn rich (Fig. 12 C, D, E) with some Fe-rich (Fig 12 B). All coatings contained Zn. Pyrite grains were altered to FeOOH (Fig 12F).

4.4 Sample # 6 FC-6 Peat 3”

Optical microscopy showed brown stained plant fragments, some containing grains of quartz. EMP imaging of the plant material showed coatings of Fe, some of which are coincident with S indicating either Fe sulfates or sulfides (Fig. 13).

4.5 Sample #13 HSW 9 Stream-12"

Optical microscopy showed fine grained quartz and feldspar grains and plant fragments with brown coatings. EMP EDX mapping showed the plants to be coated with Al and Fe with little Mn or Zn (Fig. 14). Quantitative EMP analysis of a coating in wood fragments is given in Table 7 with the EDX image of the wood in Figure 15. Point 2 is quartz and points 1, 3, 5, 7, and 10 have totals less than 20 wt. % and therefore are eliminated from further calculations. While there is some correlation between Fe and S, the concentration of S is too low for either iron sulfide or sulfate minerals. This may be caused by contributions from FeOOH as well as pyrite under the 1 μm beam. There is no correlation between Fe and Mn. There is very little Zn in this sample.

4.6 Sample #77 SL11 Sediment 6"

Optical microscopy showed large lithic fragments, quartz, calcite and sulfide grains with a few wood fragments (Fig. 17a). Some lithic grains and wood fragments had thin brown coatings. EMP EDX maps show lithic rims to consist of Mn, Fe, Pb, Zn and the wood particles to be outlined in Mn, Fe, Pb and Si (Fig. 16).

Quantitative analyses were done on points along rims around a lithic (points 1-10) and a wood fragment (11-20). The results are given in wt. % in Table 8. The totals are between 60 and 75% so all analyses are used in the calculations. The rims around the lithic and wood are calculated separately. The lithic rim contains 18.7(3.3) wt. % Mn, 4.3 (2.4) wt. % Fe, 1.4(0.16) wt. % Zn, 27.8 (3.1) wt.% Pb and 0.0 wt. % As. The wood rim contains 16.3(4.7) wt % Mn, 5.91(5.11) wt. % Fe, 1.06(0.25) wt. % Zn, 25.7(4.0) wt.% Pb, and 0.10(0.07)wt.% As. Note the high concentration of Pb and Zn in both rims but although the concentrations of Mn, Fe, Zn and Pb are comparable between the two rims, it is significant that arsenic was only found coating the wood. The ratios of Zn and Pb to Mn or Fe are also similar between rims.

5. Preliminary Conclusions

These are very preliminary findings from an initial scan of sections from several streams. Further detailed work is ongoing concentrating on No Cash Creek.

There are concentric layers of coatings on lithic grains up to 100 μm in thickness in the No Cash Creek samples (for example figure 4). These coating consist mainly of Mn and Zn with some Fe. In the samples examined so far there seems to be a consistent Mn: Zn ratio of 3:1 which could indicate that a mineral phase may be forming. The mineral phases are most likely oxides as little sulfate is found in the water or sulfur in the EMP analyses. Some wood fragments in the No Cash Creek samples also have coatings but these are mainly Fe with some Zn adsorbed. All of the coatings appear to be authogenic rather than transported indicating that they may be responsible for removing zinc from the creek water.

SL samples have brown coatings on lithic and wood grains which contain Mn, Zn, Pb and lesser Fe. The wood coating also contains As.

The coatings in samples from HSW contain Al and Fe with little Mn or Zn.

6. Recommendations for future work.

A second phase of detailed mineralogy/petrography is currently underway including a focus on No Cash samples that have multiple sample depths. Results from this work will be reported in a subsequent report. Further recommendations include:

- Use optical microscopy for initial scans and determining the areas of interest for higher magnification imaging and quantitative analysis.
- EMP element maps using just Mn, Zn, Fe and S should be done on sections of the slides identified as areas on interest under the optical microscope. Quantitative analysis should be concentrated in areas identified by mapping.
- Further samples should be sent immediately wet for thin preparation to reduce the possibility of fine grained sulfide minerals oxidizing to sulfate or oxides.
- High energy sources or single crystal XRD may be utilized to obtain further information about the mineralogy of the coatings and hence their stability under environmental conditions
- The quantitative analyses of coatings from different sites and depths along No Cash Creek should give information about relative amounts of Zn adsorbed to Mn and Fe and possible precipitation of sulfides.

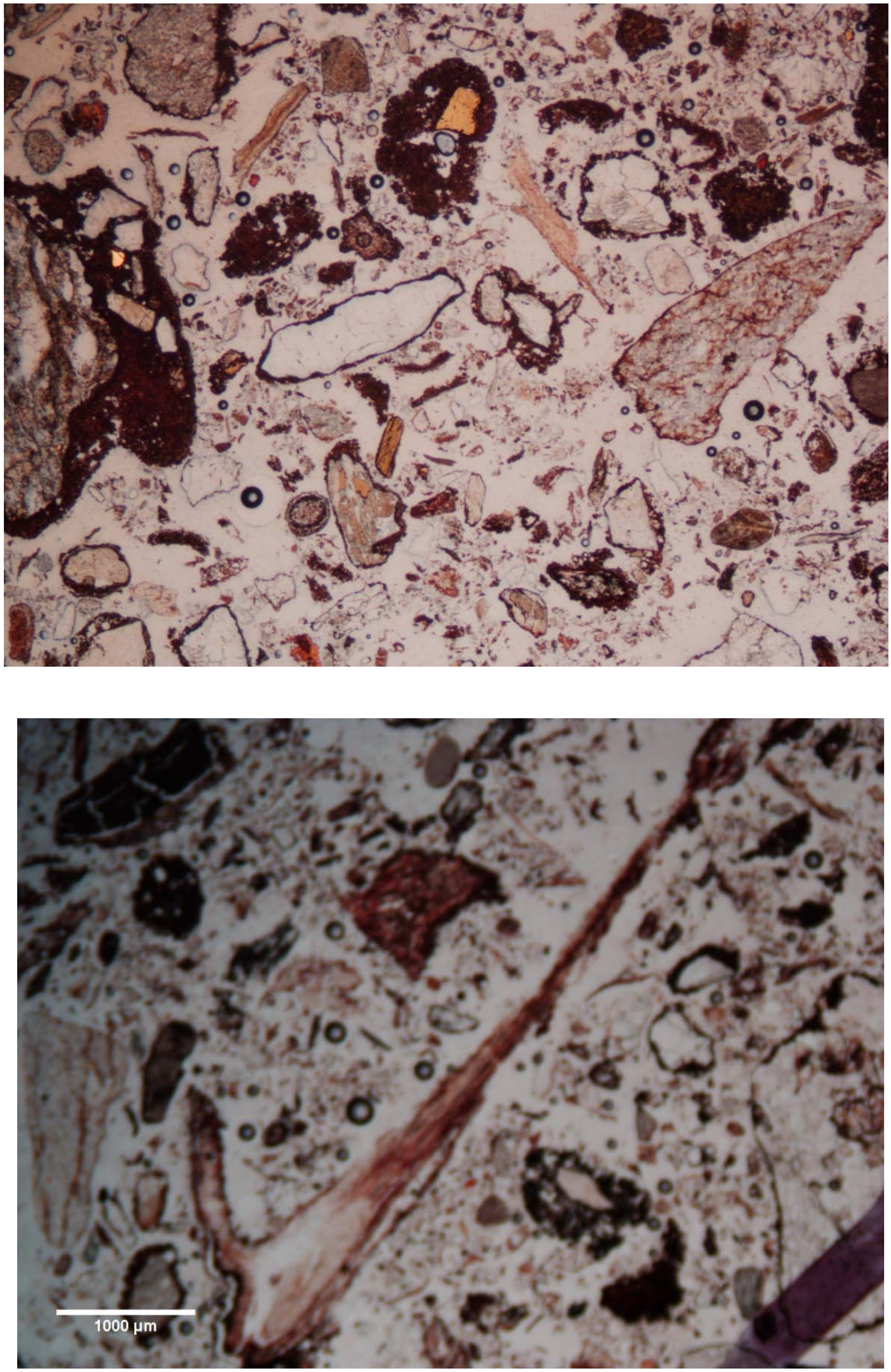


Figure 1: Optical photomicrographs of #38 NC12 Soil 8" in PPL and reflected light howing coating around lithic grains and around a fragment of wood.

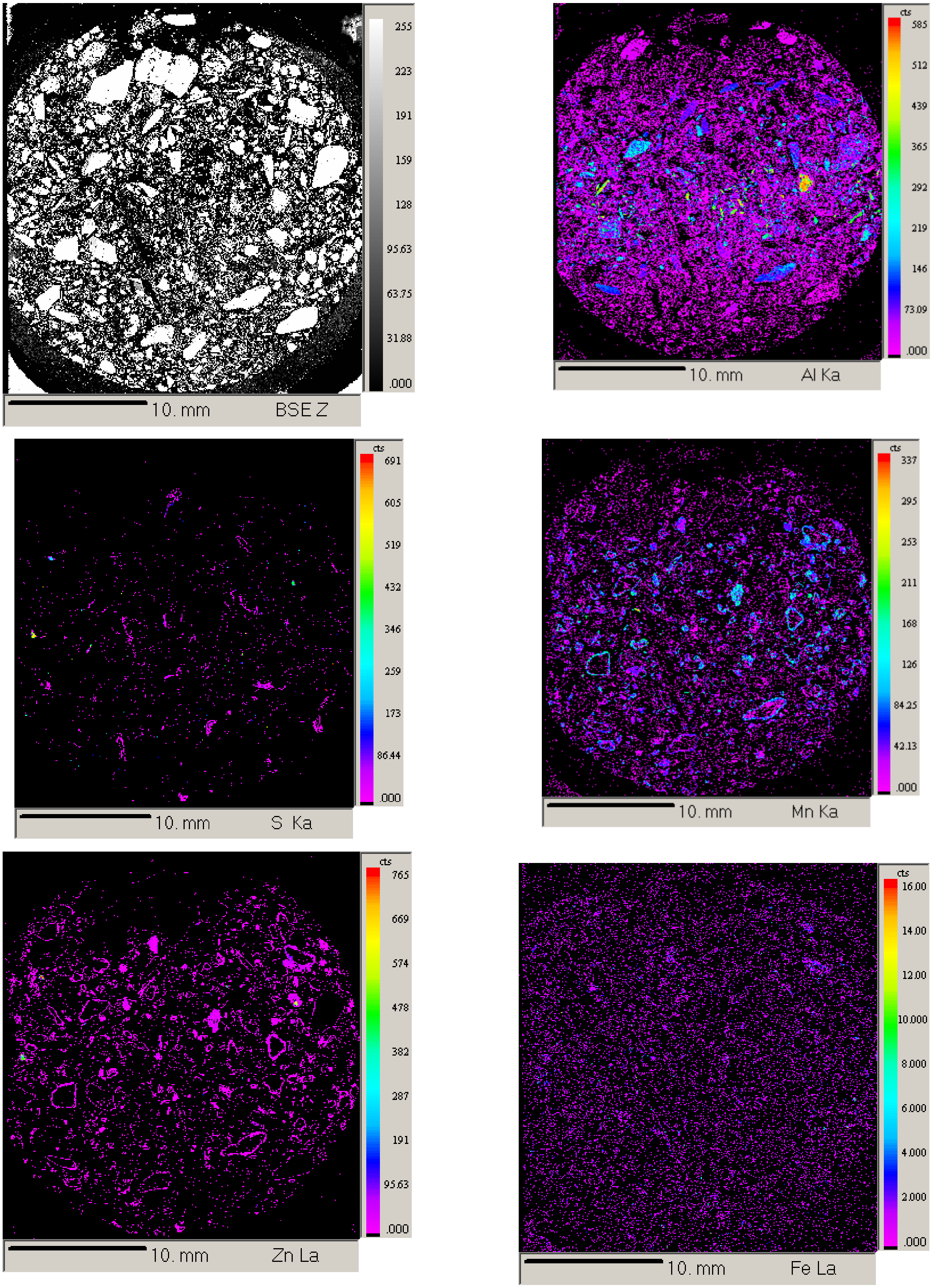


Figure 2: #38 NC12 Soil 8" EMP Map

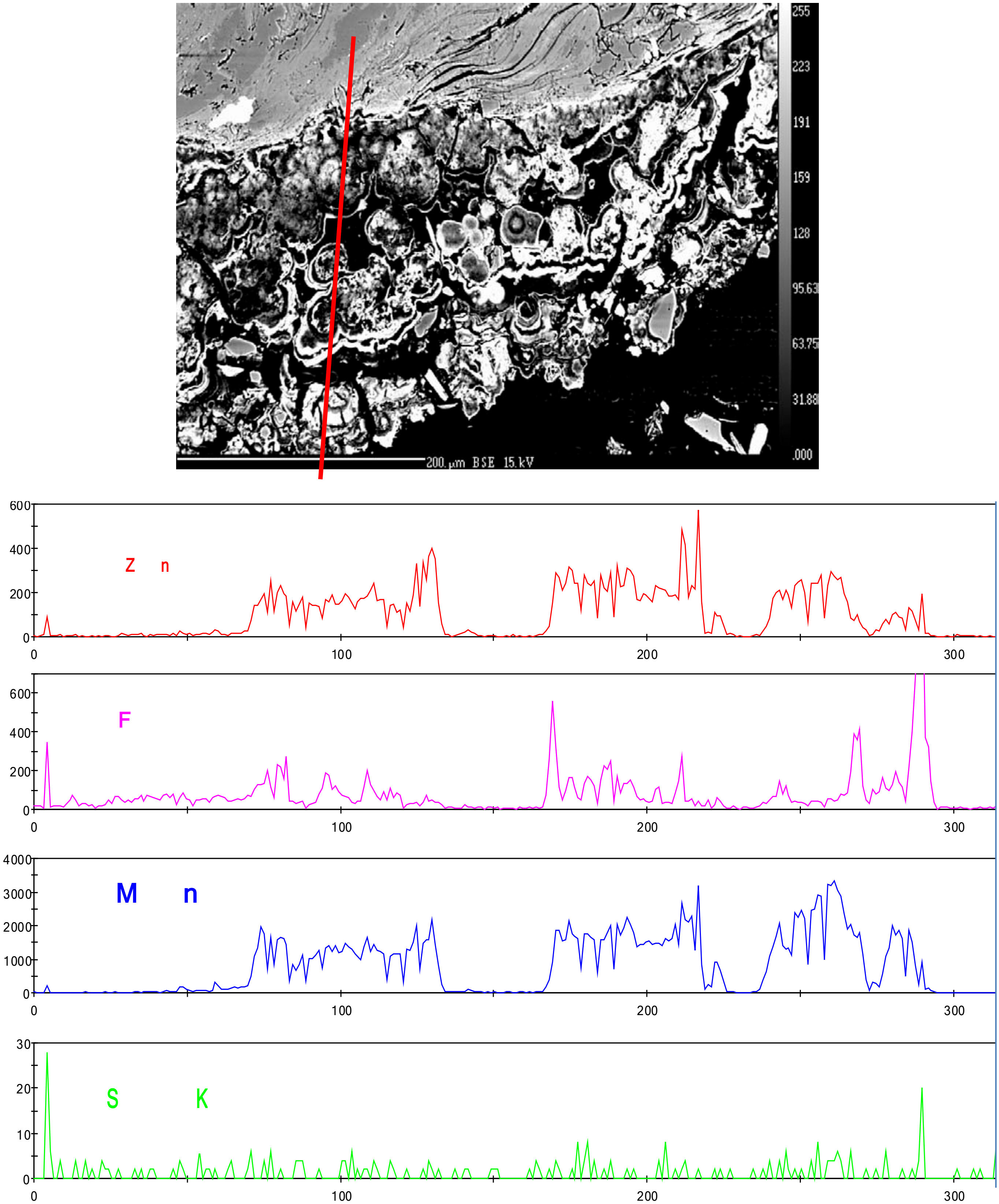


Figure 3 : #38 NC12 Soil 8” Line scan across Mn coating

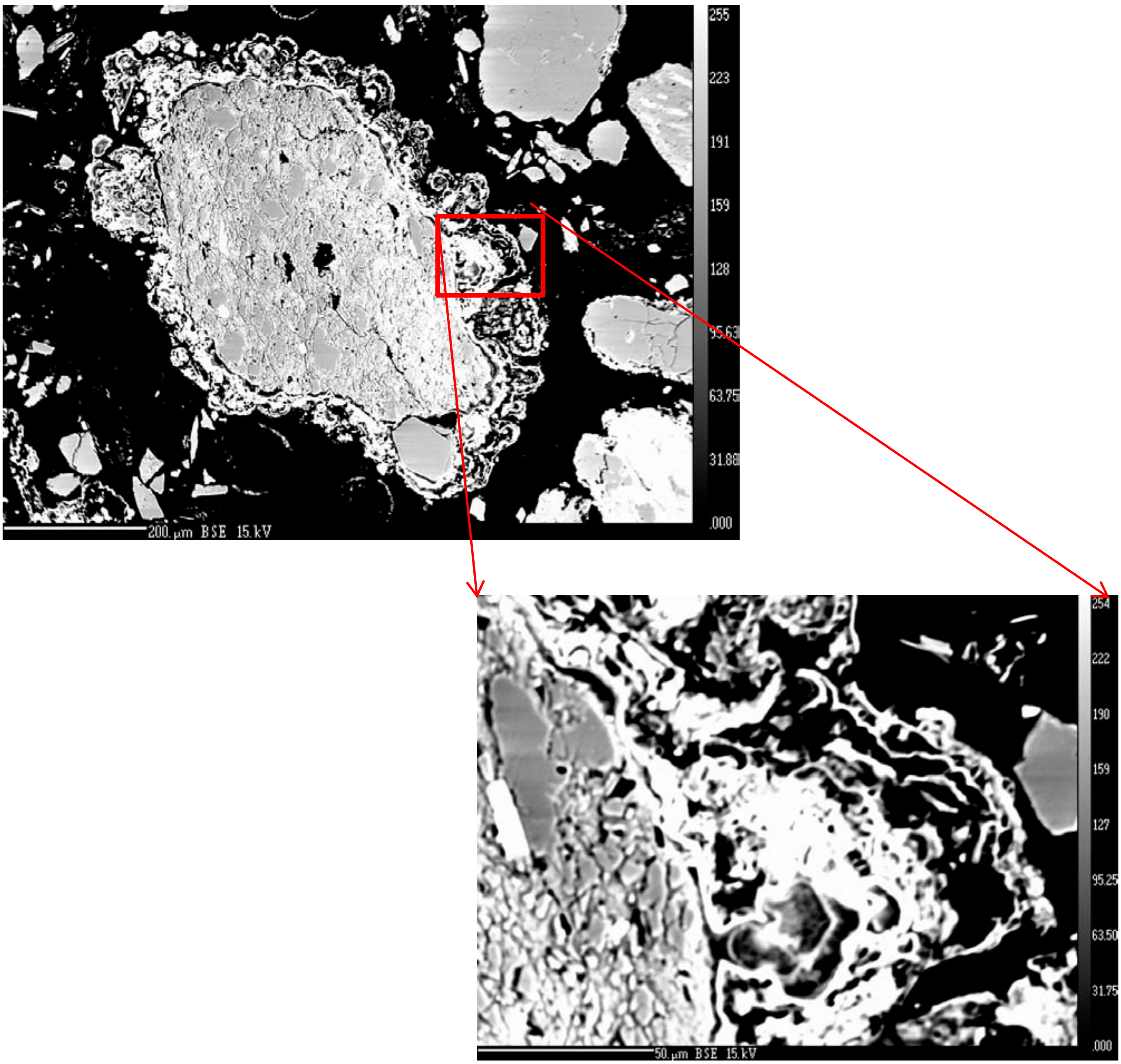


Figure 4: #38 NC12 Soil 8” area for quantitative point analysis

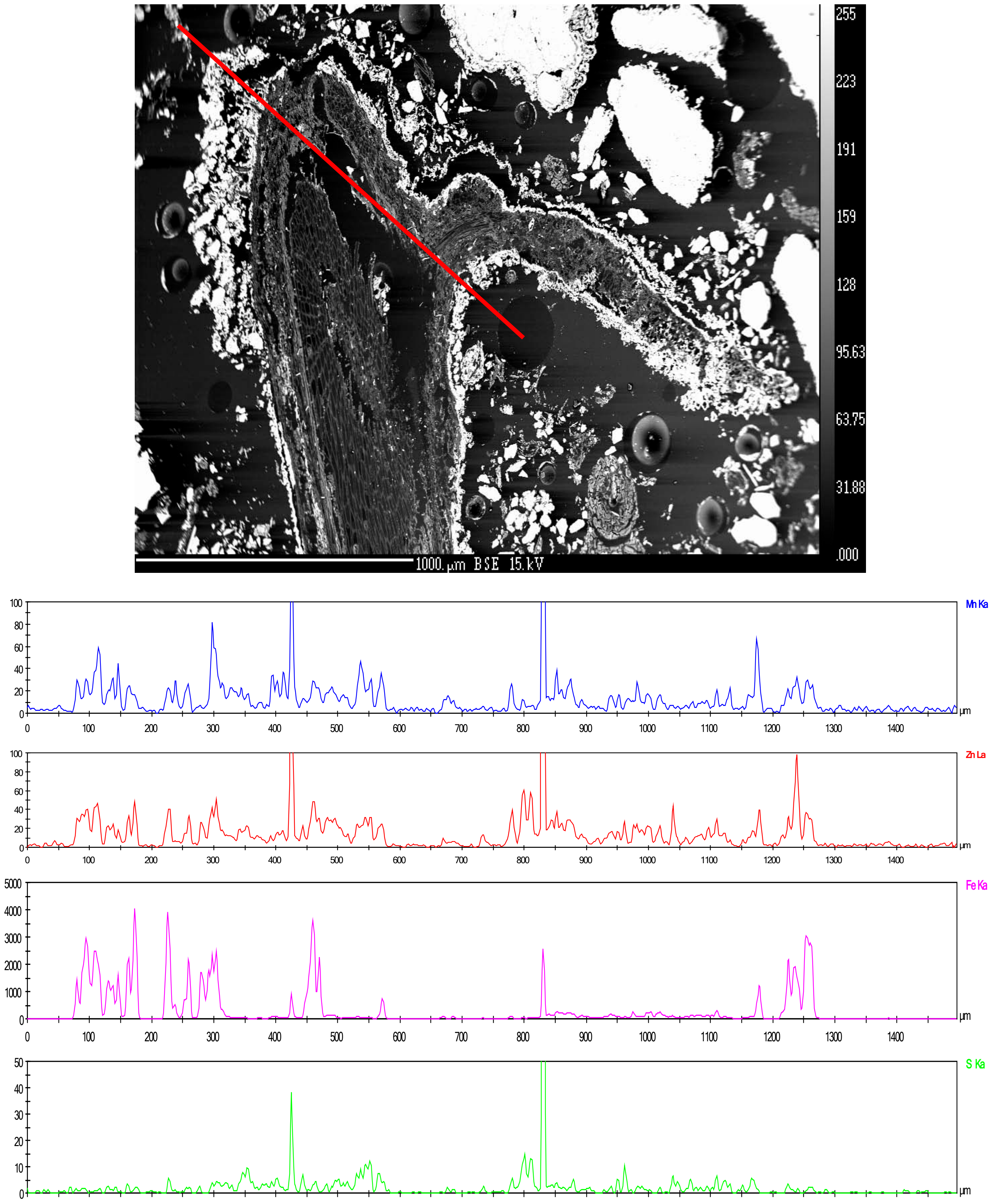


Figure 5: #38 NC12 Soil 8” EMP Line Scans across a wood fragment

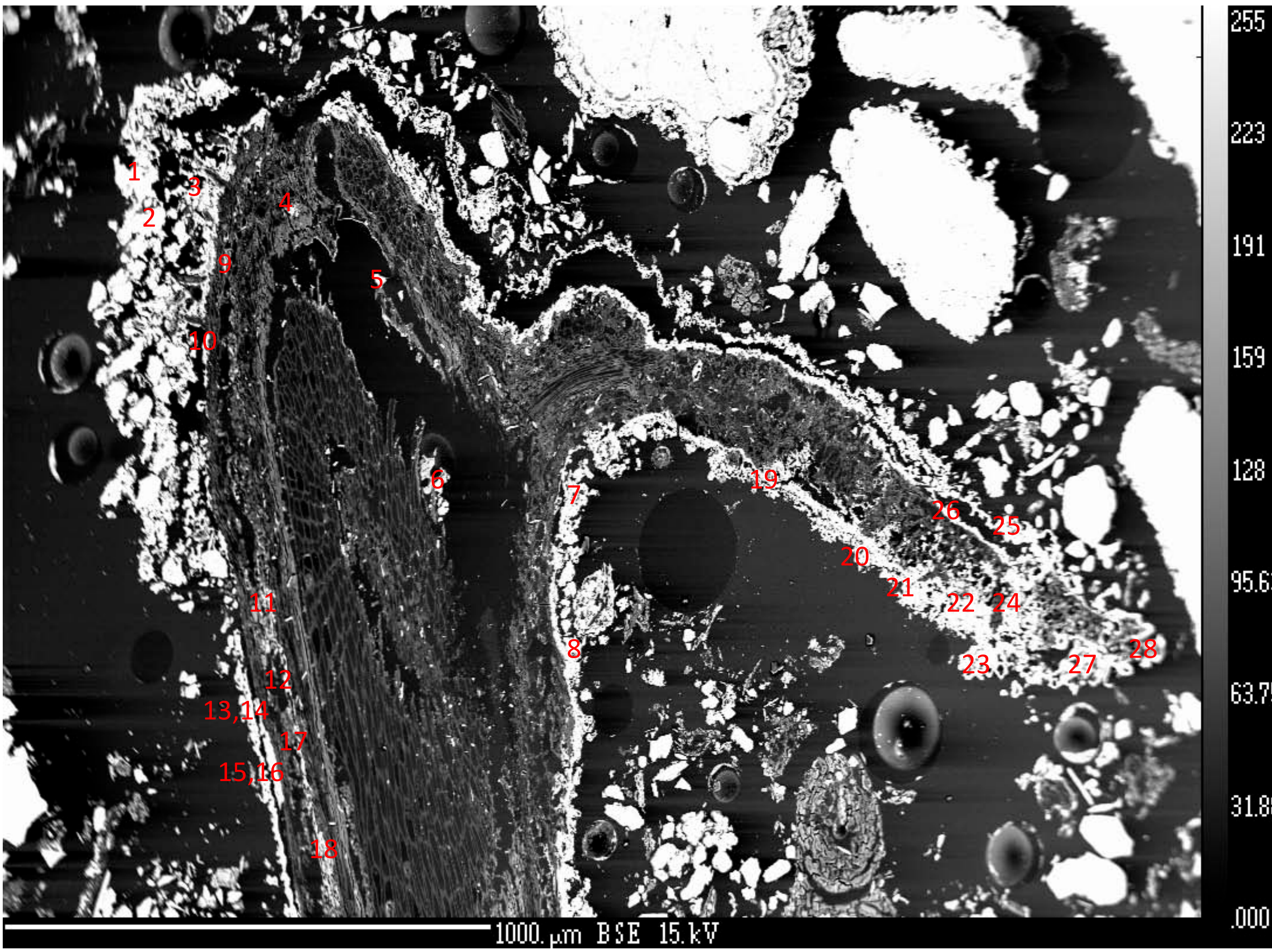


Figure 6: NC12 -2 quantitative points across a wood fragment

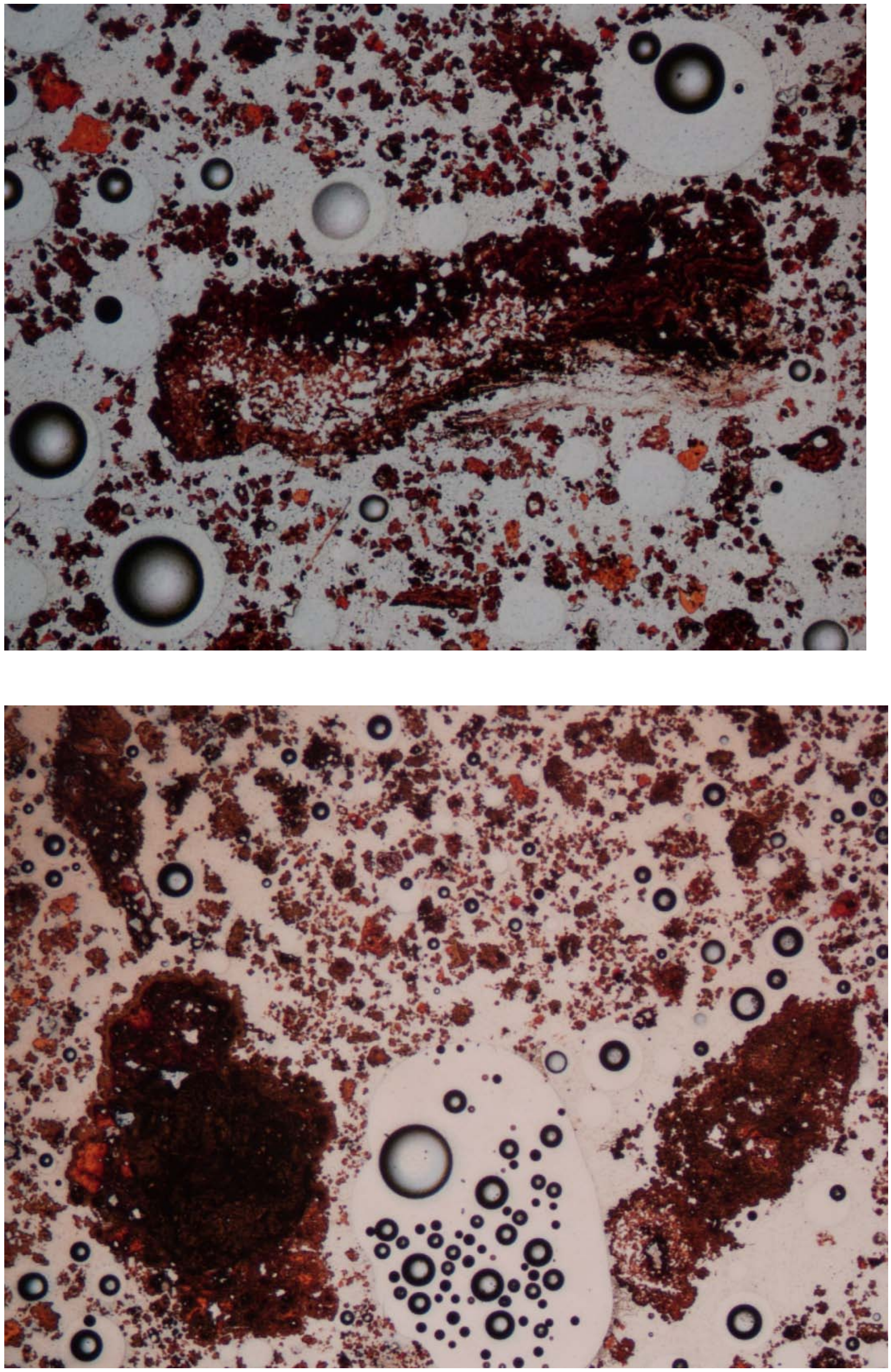


Figure 7: Optical photomicrograph of #56 NC 1S in PPL

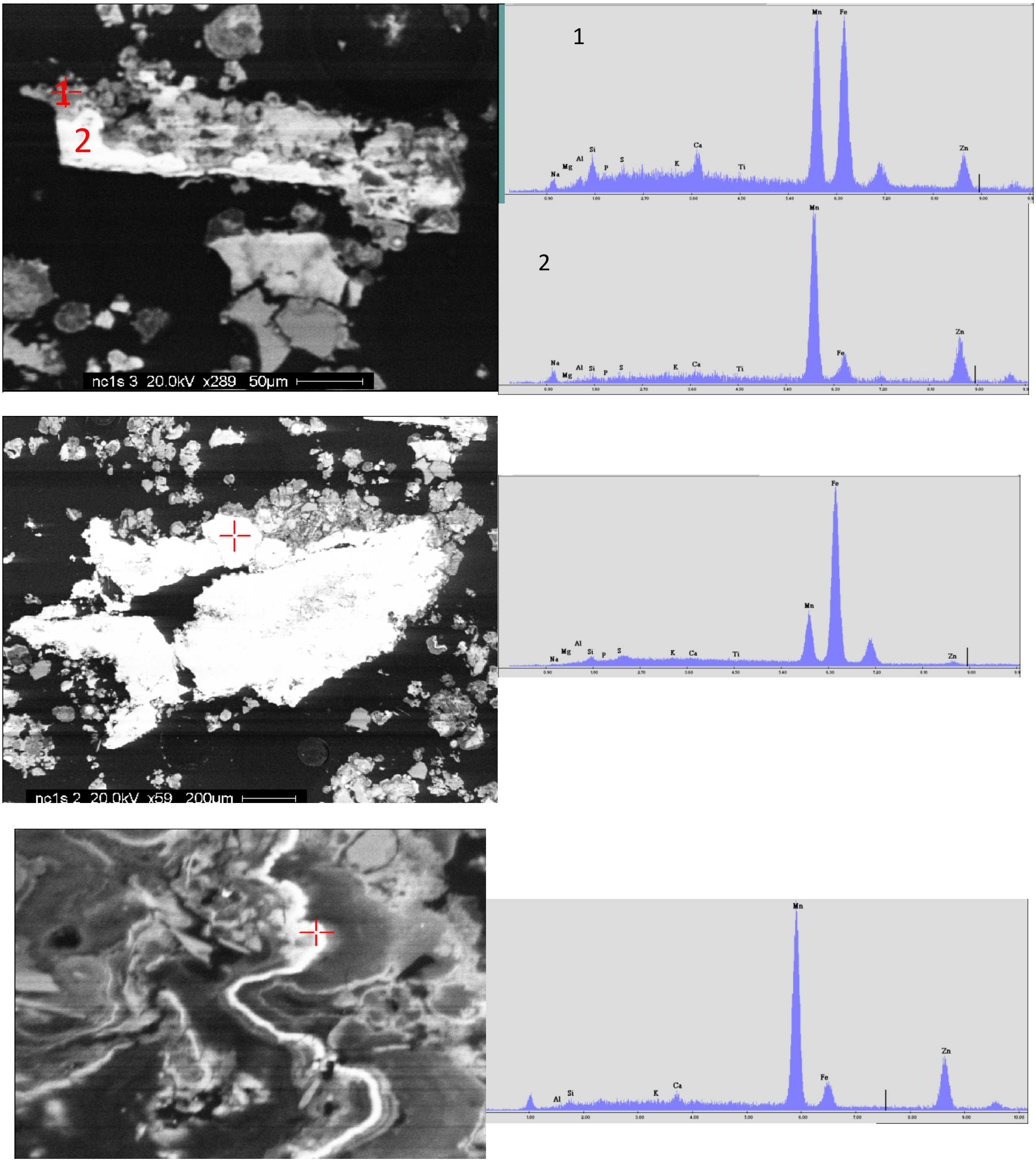


Figure 8: #56 NC 1S: BSE images and SEM EDX analyses showing the variation in the ratio of Fe, Mn and Zn

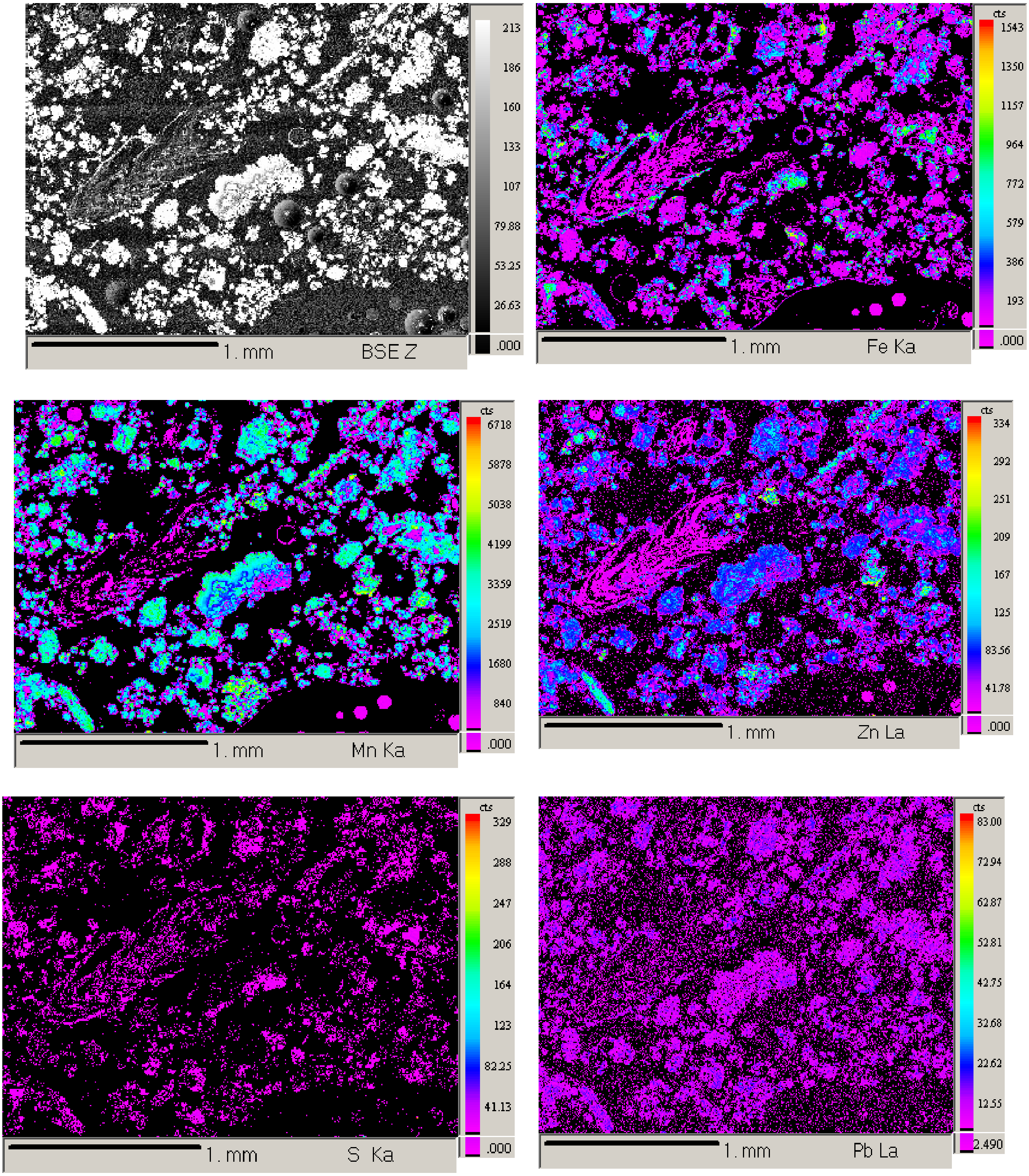


Figure 9: #56 NC 1S: EMP EDX scans showing the association of Fe, Mn, Zn, S and Pb.

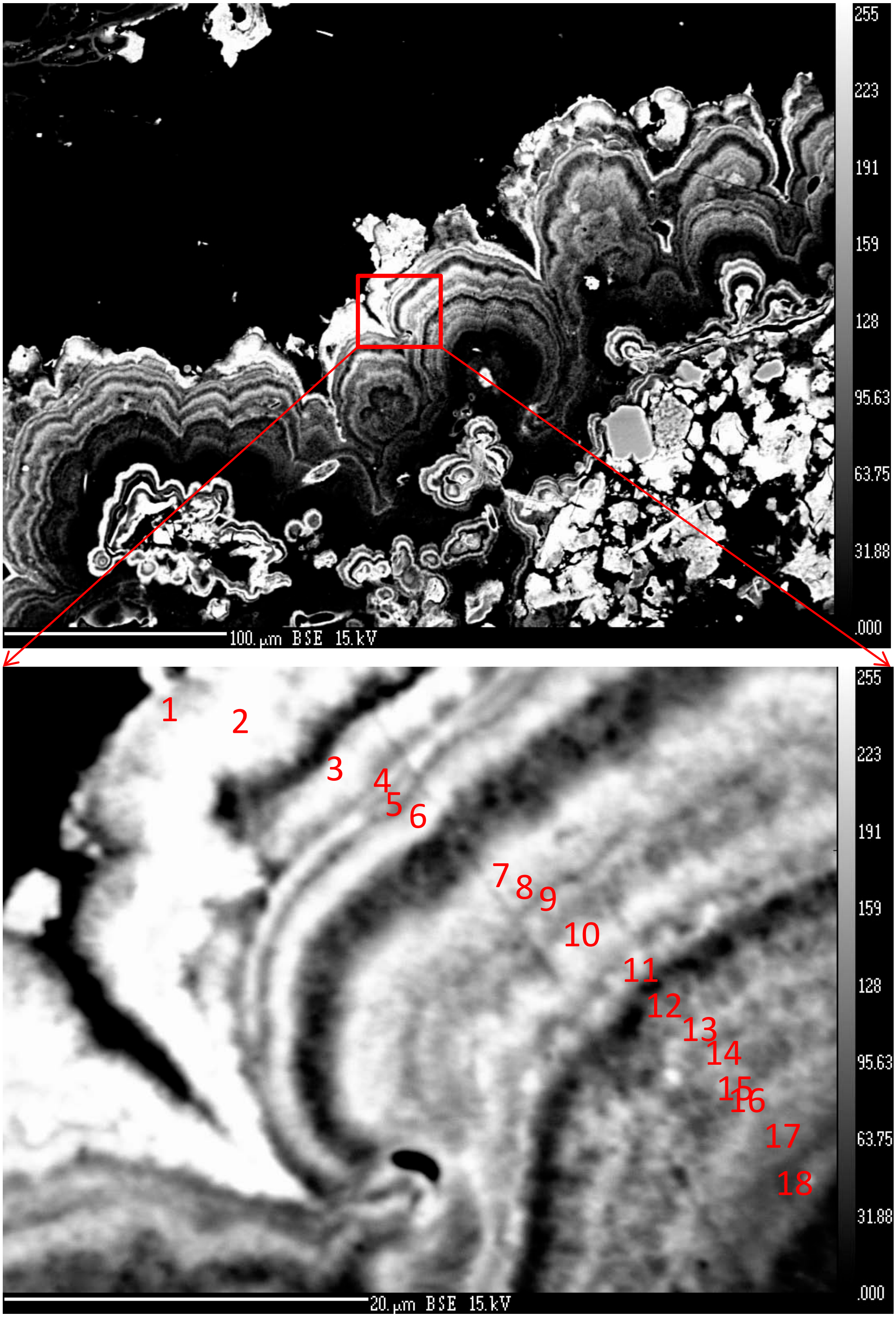


Figure 10: : #56 NC 1S EMP image and points for analysis

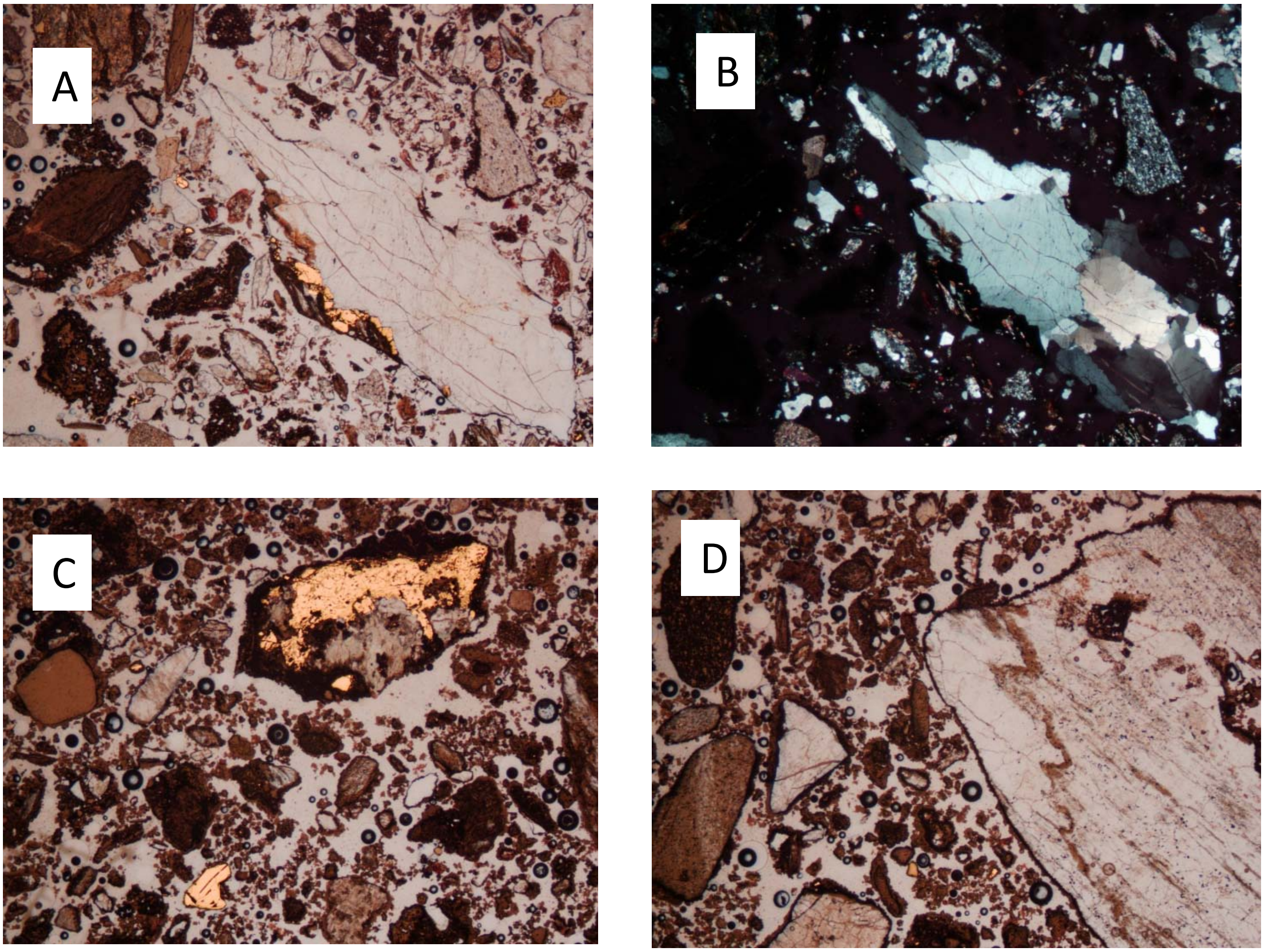


Figure 11: #28 NC1c Stream sediment: optical photomicrographs. A, B and D are PPL and reflected light, C is XPL

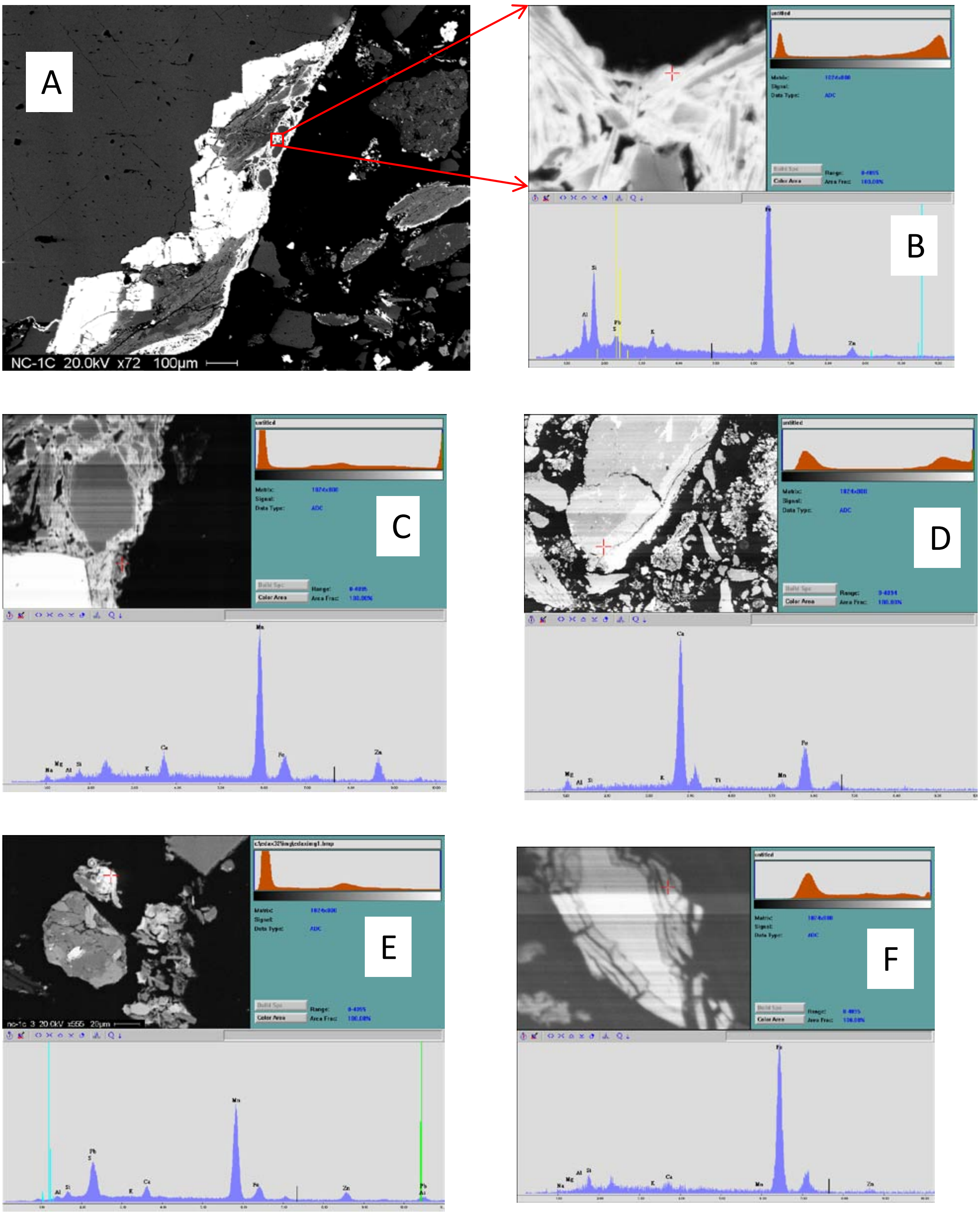


Figure 12: #28 NC1c Stream sediment SEM BSE images and EDX spectra showing (B)Fe and (C, D, E) Mn rich coatings. (F) shows a FEOOH alteration of pyrite.

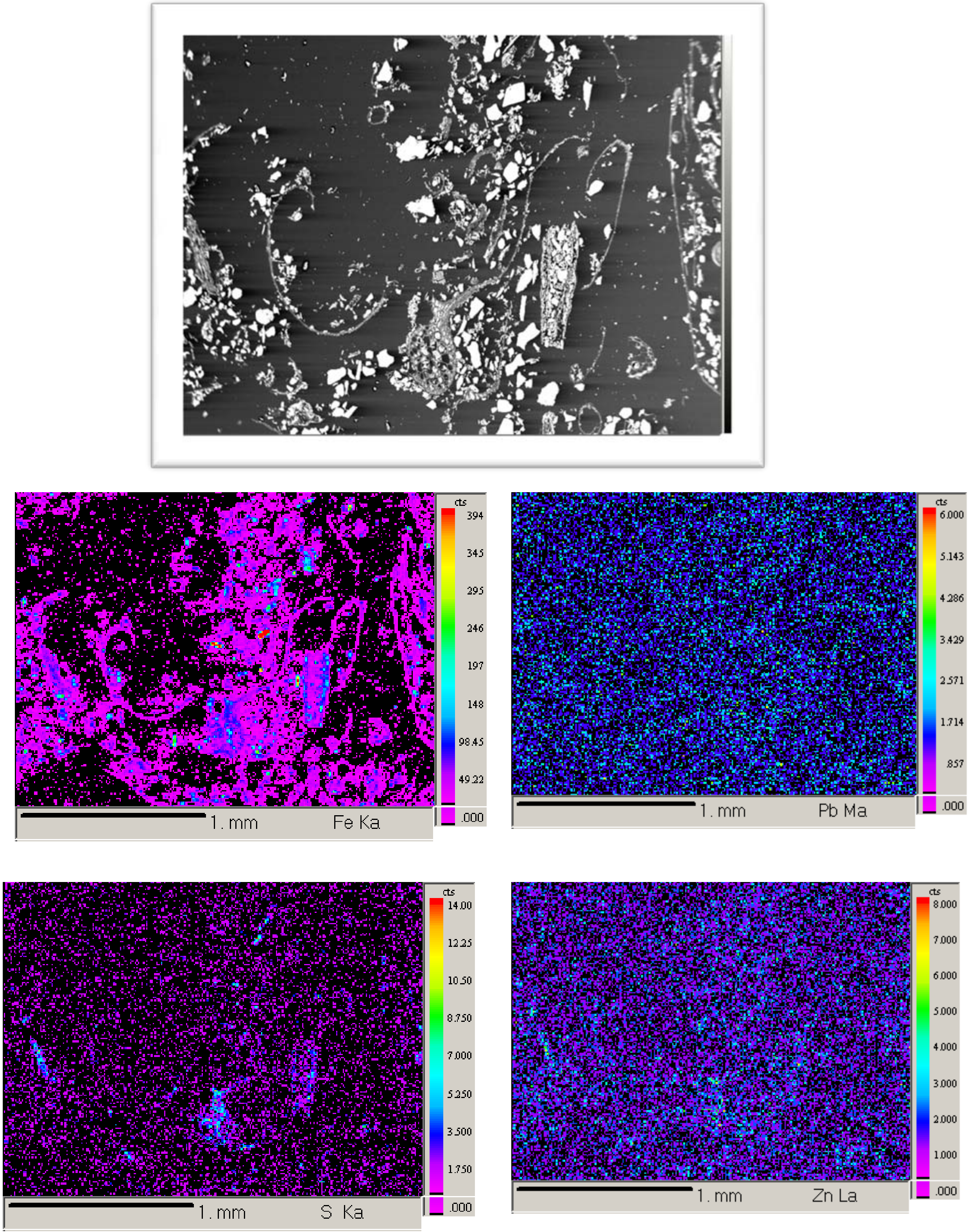


Figure 13: #6 FC-6 peat 3”: BSE image and EMP EDX element scans

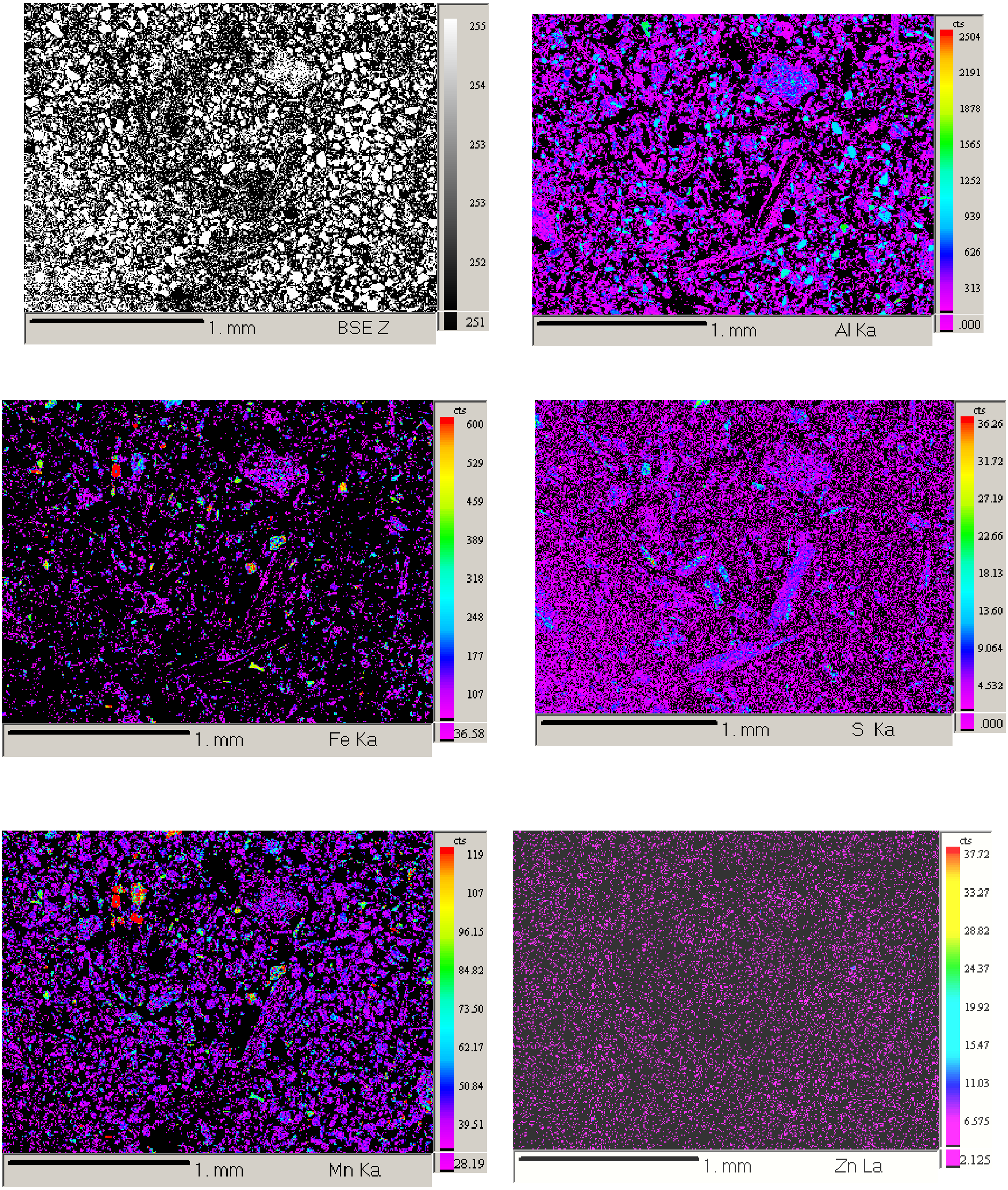


Figure 14: HSW-9 stream 12” EMP BSE image and element maps

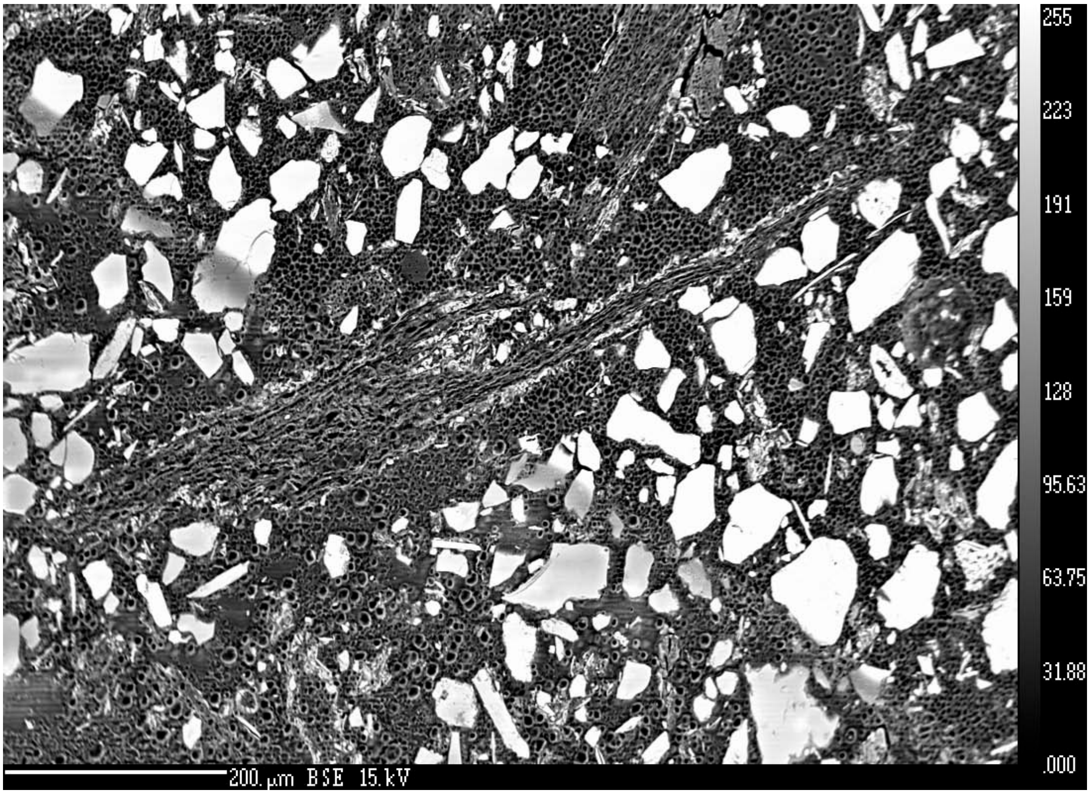


Figure 15: HSW-9 Stream 12”: EMP BSE image of wood fragment for quantitatively analysis.

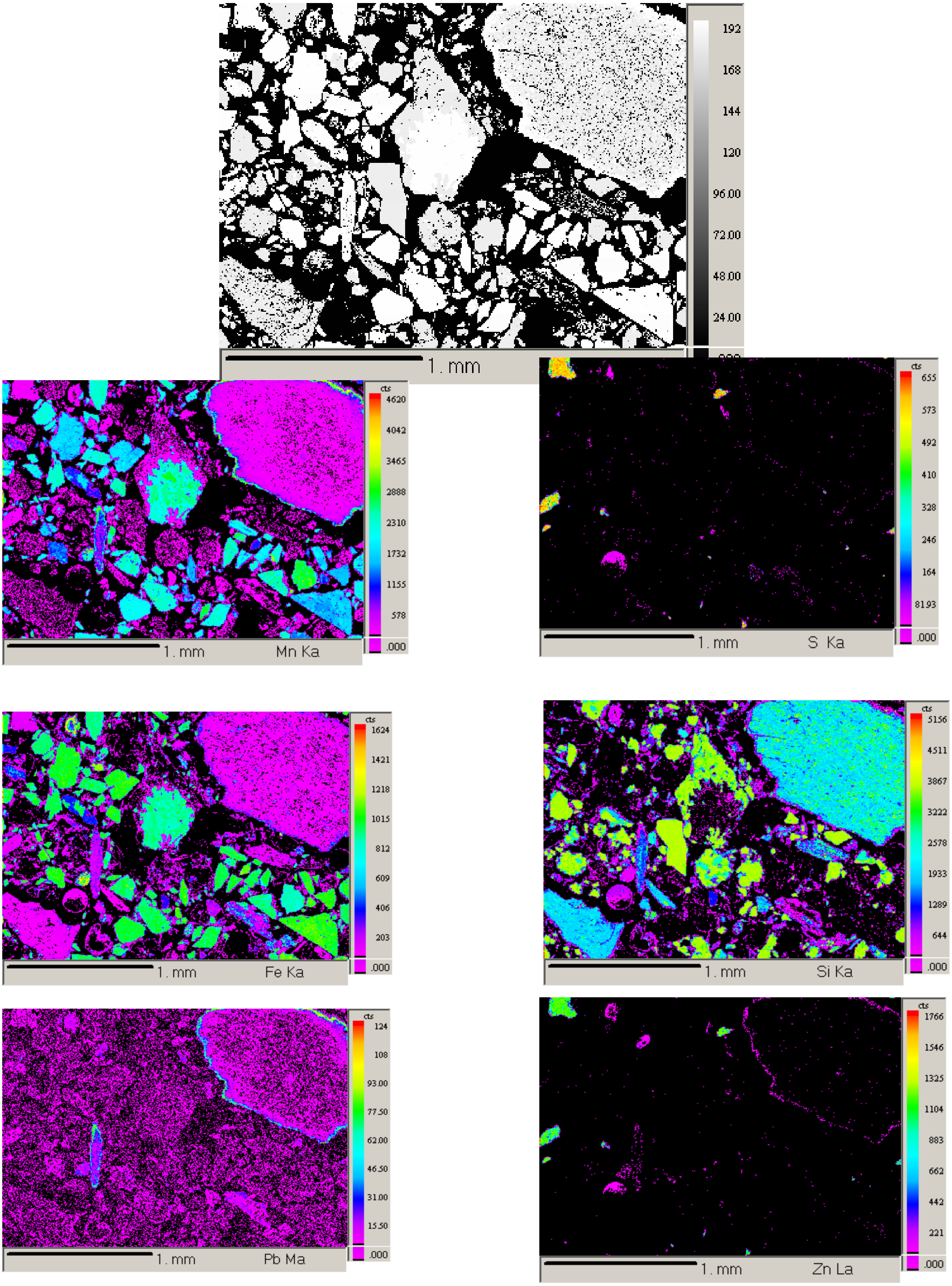


Figure 16: #77 SL11: EMP BSE image and element maps

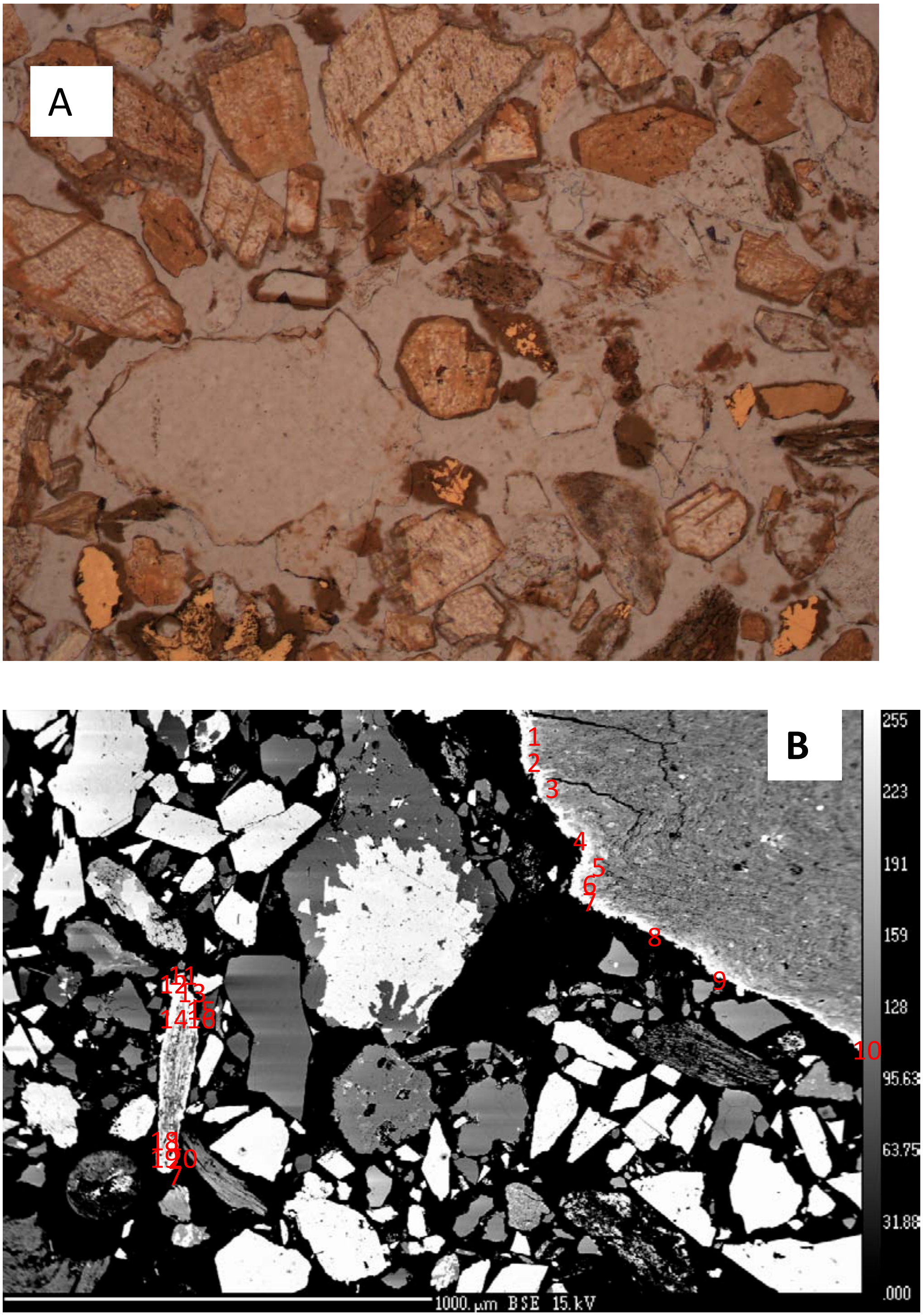


Figure 17: SL11 sediment 6": (A) photomicrograph in PPL and reflected light, (B)SEM BSE showing points for quantitative analysis

B.5 NO CASH 2010 DRILL LOGS

Table 1: NC - MW-1 BOREHOLE LOG

From (m bgs)	To (m bgs)	Sample (m bgs)	Description	Notes
0.00	1.52	0-0.3	Black frozen organics grading into reddish frozen peat at 1.5'	
1.52	3.05	1.52-1.83	Reddish frozen peat, frozen ice rich gray silt below massive ice layer	Massive ice between 5.5-6.5'
3.05	4.57	3.05-3.35	Frozen gray ice rich gray silt	Compressor catastrphically failed at 10'7" total depth -- EOH

Table 2: NC – MW-1 WELL CONSTRUCTION LOG

From (m bgs)	To (m bgs)	Pipe	From (m bgs)	To (m bgs)	Fill
0.00	1.22	Solid	0.00	0.91	Bentonite
1.22	3.23	Slotted	0.91	3.12	Sand
			3.12	3.23	Bentonite
					EOH

Table 3: NC – MW-2 BOREHOLE LOG

From (m bgs)	To (m bgs)	Sample (m bgs)	Description	Notes
0.00	1.52	NS	0-2.5', frozen, red brown peat grading into grozen dark brown silt	
1.52	3.05	1.52-1.83	Silt with trace sand, dark brown	Significant ice content between 6-7 feet
3.05	4.57	3.05-3.35	Dark brown silt with trace sand	Frozen
4.57	6.10	4.57-4.88	Grading into silty gravel at 15 feet	Frozen, becoming dryer at 18'
6.10	7.62	6.1-6.4	Silty sand and gravel, dry	Thin paleosol with a ~1cm layer of peat/grass and organics at 22'
7.62	9.14	7.62-7.92	Gray silty gravel to 1"	Possibly a boulder at 27'
9.14	10.67	9.14-9.45	Sandy gray gravel, trace silt	Dry/Dusty schist chips, probably a boulder at 34'
10.67	12.19	10.67-10.97	Gray silty gravel, some moisture	Large greenstone boulder 37-39'
12.19	13.72	12.19-12.50	Gray rounded gravel and cobbles with silt, moist	Granitic boulder at 44'
13.72	15.24	13.72-14.02	Moist dark gray silty gravel <1"	Quartzite boulder from 49.5-52.5'
15.24	16.76	15.24-15.54	Moist dark gray silty gravel	Quartzite boulder at 48.5. Hole dry at 55', decision made to abandon hole. Backfilled with cuttings to 8' and bentonite chips to surface and then hydrated

Table 4: NC – MW-2: WELL CONSTRUCTION LOG

From (m bgs)	To (m bgs)	Pipe	From (m bgs)	To (m bgs)	Fill
0.00	0.91	Solid	0.00	0.61	Bentonite
0.91	3.35	Slotted	0.61	3.51	Sand
			3.51	3.66	Bentonite
					EOH

Table 5: NC – MW-3: BOREHOLE LOG

From (m bgs)	To (m bgs)	Sample (m bgs)	Description	Notes
0.00	1.52	NS	Reddish silt grading into brown silty sand at approximately 2.5 feet, grading coarser down to mixed sand/silt gravel at 5'	Approx 4" of peat and organics scraped off by cat
1.52	3.05	1.52-1.83	clean gray sand and gravel	becoming drier, harder with larger cobbles around 9'
3.05	4.57	3.05-3.35	Sandy gravel, grayish brown	becoming more brown, slightly most and faster drilling around 11' Hard cobbles or boulder encountered at 14 feet with mixed lithology chips
4.57	6.10	4.57-4.88	Hard mixed lithology cobbles	Drill trouble -broken fuel injector on Compressor. Drill abandoned in hole on Nov 12 4:00 PM
6.10	7.62	6.1-6.4	Hard mixed lithology cobbles to 17', change to gray/brown sandy gravel, moist, becoming grayer and siletier with some clay around 18'	Recommenced drilling on Nov 18 at 10:00 AM
7.62	9.14	7.62-7.92	Cobbly till with sand, silt, and clay becoming slightly finer towards 30'	
9.14	10.67	9.14-9.45	Brown sandy gravel	slightly moist
10.67	12.19	10.67-10.97	Silty gravel gravel, becoming clean gravel at 36'	some moisture
12.19	13.72	12.19-12.50	clean gray gravel	dry
13.72	15.24	13.72-14.02	gravel becoming brown (oxidized) at 45 feet	dry
15.24	16.76	15.24-15.54	Clean gravel with silt	wet - Perched? Water at approx 48-49 feet
16.76	18.29	16.76-17.07	Clean gravel with silt	wet
18.29	19.81	18.29-18.59	Dry gray silt at 60-61 feet	Hole lost due to stuck casing shoe which required pulling casing. 20 feet of hole collapsed. Redrilled down to 70 feet on Nov 20
19.81	21.34	19.81-20.12		Water at ~61 feet
21.34	22.86	21.34-21.64		EOH 70'

Table 6: NC – MW-3: WELL CONSTRUCTION LOG

From (m bgs)	To (m bgs)	Pipe	From (m bgs)	To (m bgs)	Fill
0.00	14.33	Solid	0.00	12.50	Drill Cuttings
14.33	20.42	Slotted	12.50	13.41	Bentonite
			13.41	21.34	Sand
					EOH

Table 7:NC – MW-4: BOREHOLE LOG

From (m bgs)	To (m bgs)	Sample (m bgs)	Description	Notes
0.00	1.52	NS	Brown gravel with some silt	Trace moisture at 4'
1.52	3.05	1.52-1.83	Brown sand and gravel	
3.05	4.57	3.05-3.35	Brown gravel with sand and silt	Hard drilliing at 13-15, cobbles or possibly a boulder
4.57	6.10	4.57-4.88	Clean brown dry gravel with sand	Greenstone boulder between 16-18, hard drilling
6.10	7.62	6.1-6.4	Gray gravel with moist silt, slightly clumpy	Greenstone boulder 21-22', cobbles and gravel to 25
7.62	9.14	7.62-7.92	Granite chips, gray gravel with clumpy silt (moist)	Granite boulder around 25'
9.14	10.67	9.14-9.45	Moist gray clumpy silt and fine gravel	
10.67	12.19	10.67-10.97	Moist gray gravel with silt and sand, becoming less clumpy	Granite boulder between 37-38'
12.19	13.72	12.19-12.50	Moist gray gravel with clumpy silt	Greenstone boulder between 42-43'
13.72	15.24	13.72-14.02	Dry light brown gravel and sand	Becoming dusty and dry
15.24	16.76	15.24-15.54	Clean dry light brown gravel and sand	
16.76	18.29	16.76-17.07	Clean gray gravel and cobbles, mixed lithologies	
18.29	19.81	18.29-18.59	Fine light brown gravel and sand	Trace moisture at 62', brownish, becoming fine grained
19.81	21.34	19.81-20.12	Fine light brown gravel and sand	Organic rich silt, wet 68-69' (paleosol?) EOH at 70', ran out of casing

Table 8: NC – MW-4 WELL CONSTRUCTION LOG

From (m bgs)	To (m bgs)	Pipe	From (m bgs)	To (m bgs)	Fill
0.00	11.89	Solid	0.00	1.52	Bentonite
11.89	21.03	Slotted	1.52	10.06	Drill Cuttings
			10.06	10.97	Bentonite
			10.97	21.34	Sand
					EOH

C HUSKY SW WATER CHEMISTRY DATA

C.1 TABLE OF CHEMISTRY DATA FROM FALL 2010

Dissolved Metals		HSW-1	HSW-2	HSW-3	HSW-4	HSW-5	HSW-6	HSW-7	HSW-8	HSW-9	HSW-10	HSW-11	HSW-12
		6-Oct-2010	6-Oct-2010	6-Oct-2010	6-Oct-2010	6-Oct-2010	6-Oct-2010	7-Oct-2010	7-Oct-2010	7-Oct-2010	7-Oct-2010	7-Oct-2010	7-Oct-2010
Aluminum (Al)	mg/L	0.0032	0.005	0.006	0.086	0.005	0.012	0.009	0.011	0.007	0.008	0.005	0.003
Arsenic (As)	mg/L	0.00040	0.0073	0.0054	0.0017	0.0009	0.0010	0.0013	0.0013	0.0010	0.0009	0.0027	0.0031
Barium (Ba)	mg/L	0.0655	0.0126	0.142	0.0794	0.0713	0.0772	0.0926	0.0908	0.0934	0.0842	0.0496	0.0388
Boron (B)	mg/L	<0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Beryllium (Be)	mg/L	<0.000005	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Bismuth (Bi)	mg/L	<0.05	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cadmium (Cd)	mg/L	0.000039	0.00562	<0.00003	<0.00003	0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	0.00014	0.00019
Cobalt (Co)	mg/L	0.0003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0007	0.0007	0.0007	<0.0005
Chromium (Cr)	mg/L	0.000023	0.00560	0.00277	0.00112	0.00080	0.00085	0.00077	0.00062	0.00052	0.00040	0.00025	0.00021
Copper (Cu)	mg/L	0.00060	0.0008	<0.0003	0.0007	0.0004	0.0009	0.0004	0.0005	0.0006	0.0005	0.0005	0.0005
Iron (Fe)	mg/L	0.005	1.53	3.58	0.433	0.147	0.103	0.247	0.093	0.152	0.143	0.065	0.058
Lithium (Li)	mg/L	0.0026	0.029	0.025	0.021	0.02	0.019	0.02	0.019	0.017	0.016	0.011	0.01
Manganese (Mn)	mg/L	0.00062	3.92	3.72	1.3	1.04	0.934	0.871	0.869	0.996	0.596	0.548	0.537
Molybdenum (Mo)	mg/L	0.00040	<0.0003	0.0009	0.0005	0.0003	0.0003	0.0005	0.0005	0.0004	0.0004	<0.0003	<0.0003
Nickel (Ni)	mg/L	0.00035	0.0266	0.0020	0.0018	0.0015	0.0012	0.0013	0.0011	0.0015	0.0010	0.0011	0.0009
Lead (Pb)	mg/L	0.000147	0.00049	0.00005	0.00010	0.00007	0.00037	0.00015	0.00005	0.00018	0.00010	0.00061	0.00080
Antimony (Sb)	mg/L	0.00062	0.0006	0.0006	0.0002	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005	0.0005
Selenium (Se)	mg/L	0.00033	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Silicon (Si)	mg/L	2.46	3.82	5.86	5.12	4.64	4.68	4.28	4.15	3.98	3.79	3.21	2.91
Silver (Ag)	mg/L	<0.000005	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Tin (Sn)	mg/L	0.00001	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Strontium (Sr)	mg/L	0.198	0.322	0.359	0.352	0.306	0.31	0.322	0.308	0.304	0.286	0.317	0.334
Titanium (Ti)	mg/L	<0.0005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Thallium (Tl)	mg/L	<0.000002	0.00048	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Uranium (U)	mg/L	0.000955	0.00313	0.00160	0.00135	0.00132	0.00139	0.00160	0.00153	0.00150	0.00140	0.00124	0.00111

Continued.

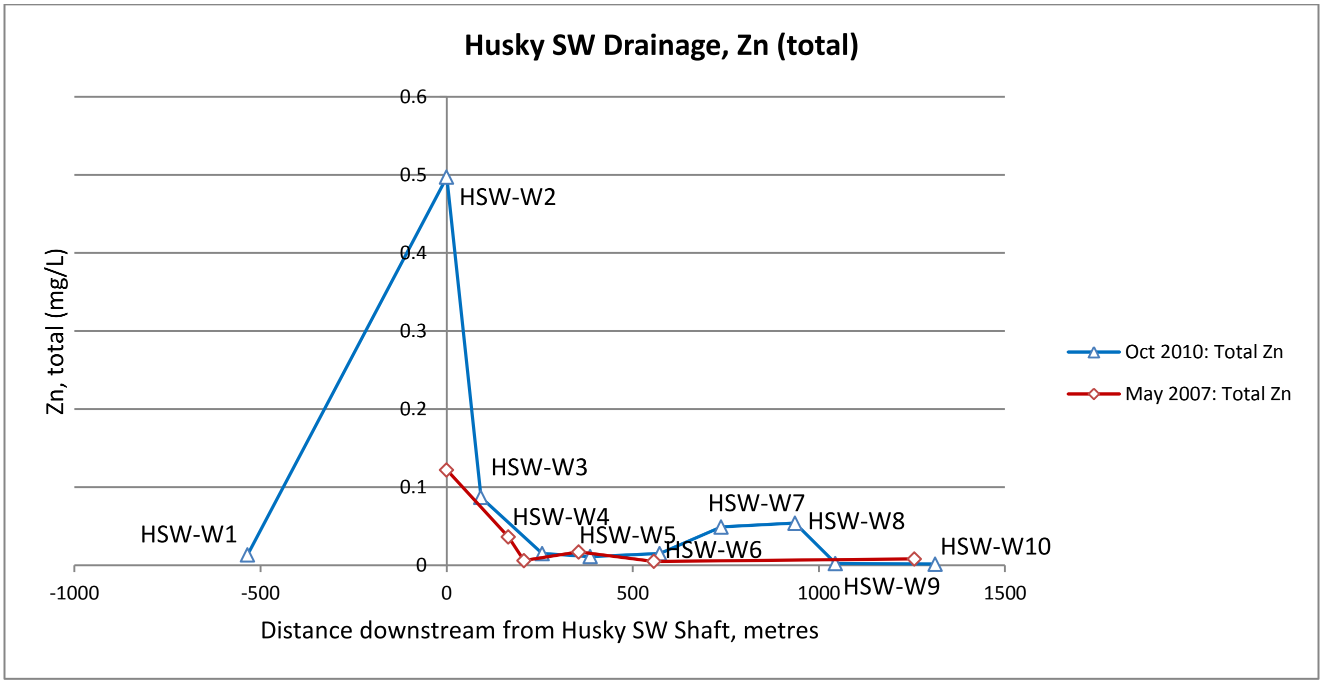
		HSW-1	HSW-2	HSW-3	HSW-4	HSW-5	HSW-6	HSW-7	HSW-8	HSW-9	HSW-10	HSW-11	HSW-12
Dissolved Metals		**6-Oct-2010**	**6-Oct-2010**	**6-Oct-2010**	**6-Oct-2010**	**6-Oct-2010**	**6-Oct-2010**	**7-Oct-2010**	**7-Oct-2010**	**7-Oct-2010**	**7-Oct-2010**	**7-Oct-2010**	**7-Oct-2010**
Vanadium (V)	mg/L	<0.0002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc (Zn)	mg/L	0.0029	0.506	0.0022	0.0050	0.0039	0.0040	0.0023	0.0019	0.0015	0.0026	0.0518	0.0676
Zirconium (Zr)	mg/L	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Calcium (Ca)	mg/L	64.8	187	199	194	196	198	199	192	186	173	153	153
Potassium (K)	mg/L	0.30	1.5	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.0	0.7	0.5
Magnesium (Mg)	mg/L	17.3	41.2	42.5	41.1	38.9	38.5	41.6	39.1	39.7	37.8	36.5	34.2
Sodium (Na)	mg/L	0.62	3.4	2.3	2.0	1.9	1.9	2.1	1.9	2.0	1.9	2.1	2.1
Sulfur (S)	mg/L	12	165	161	151	146	150	157	138	134	122	113	110
Hardness ($CaCO_3$) from dissolved metal scan	mg/L	233	636	671	654	649	652	668	640	628	589	531	523
Total Metals		**HSW-1**	**HSW-2**	**HSW-3**	**HSW-4**	**HSW-5**	**HSW-6**	**HSW-7**	**HSW-8**	**HSW-9**	**HSW-10**	**HSW-11**	**HSW-12**
Aluminum (Al)	mg/L	0.341	<0.02	8.37	0.952	0.76	1.52	5.6	6.03	0.0356	0.0245	0.0170	0.0053
Arsenic (As)	mg/L	0.0017	0.0123	0.0279	0.0060	0.0038	0.0058	0.0181	0.0173	0.00147	0.00102	0.00338	0.00396
Barium (Ba)	mg/L	0.0796	0.0134	0.356	0.109	0.0951	0.123	0.246	0.247	0.0947	0.0830	0.0458	0.0382
Beryllium (Be)	mg/L	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.05	<0.05	<0.05	<0.05
Bismuth (Bi)	mg/L	<0.00005	<0.00005	0.00030	<0.00005	<0.00005	0.00008	0.00024	0.00021	<0.00001	<0.00001	<0.00001	<0.00001
Boron (B)	mg/L	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0001	0.0001	<0.000005	<0.000005	<0.000005	<0.000005
Cadmium (Cd)	mg/L	0.00011	0.00590	0.00068	0.00010	0.00010	0.00015	0.00041	0.00027	0.000025	0.000018	0.000278	0.000380
Cobalt (Co)	mg/L	0.00034	0.00578	0.0120	0.00220	0.00162	0.00243	0.00627	0.00603	0.000638	0.000355	0.000231	0.000195
Chromium (Cr)	mg/L	<0.003	<0.003	0.015	<0.003	<0.003	<0.003	0.011	0.012	0.0004	0.0004	0.0004	0.0004
Copper (Cu)	mg/L	0.002	0.002	0.036	0.004	0.004	0.007	0.025	0.024	0.00088	0.00078	0.00064	0.00057
Iron (Fe)	mg/L	0.645	3.29	18.1	3.51	2.3	3.43	12.3	12.3	0.457	0.289	0.28	0.263
Mercury (Hg)	mg/L	<0.003	0.029	0.036	0.024	0.022	0.022	0.027	0.027	0.0160	0.0144	0.0097	0.0087
Lithium (Li)	mg/L	0.0322	4.17	4.66	1.46	1.16	1.06	1.16	1.18	1.16	0.6	0.563	0.547
Manganese (Mn)	mg/L									<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum (Mo)	mg/L	0.0006	<0.0003	0.0017	0.0006	0.0004	0.0004	0.0008	0.0007	0.00042	0.00037	0.00024	0.00022
Nickel (Ni)	mg/L	0.0035	0.0273	0.0251	0.0044	0.0033	0.0051	0.0153	0.0152	0.00134	0.00101	0.00099	0.00097
Lead (Pb)	mg/L	0.0085	0.0075	0.0145	0.0016	0.0015	0.0028	0.0094	0.0089	0.000212	0.000191	0.00412	0.00378
Antimony (Sb)	mg/L	0.0007	0.0007	0.0014	0.0003	<0.0003	0.0003	0.0009	0.0009	0.00018	0.00016	0.00039	0.00052
Selenium (Se)	mg/L	0.0004	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	0.0008	0.0008	0.00007	0.00005	0.00008	0.00010
Silicon (Si)	mg/L	2.67	4.67	14.6	6.31	5.64	6.08	11.3	12.1	4.05	3.84	3.34	3.13

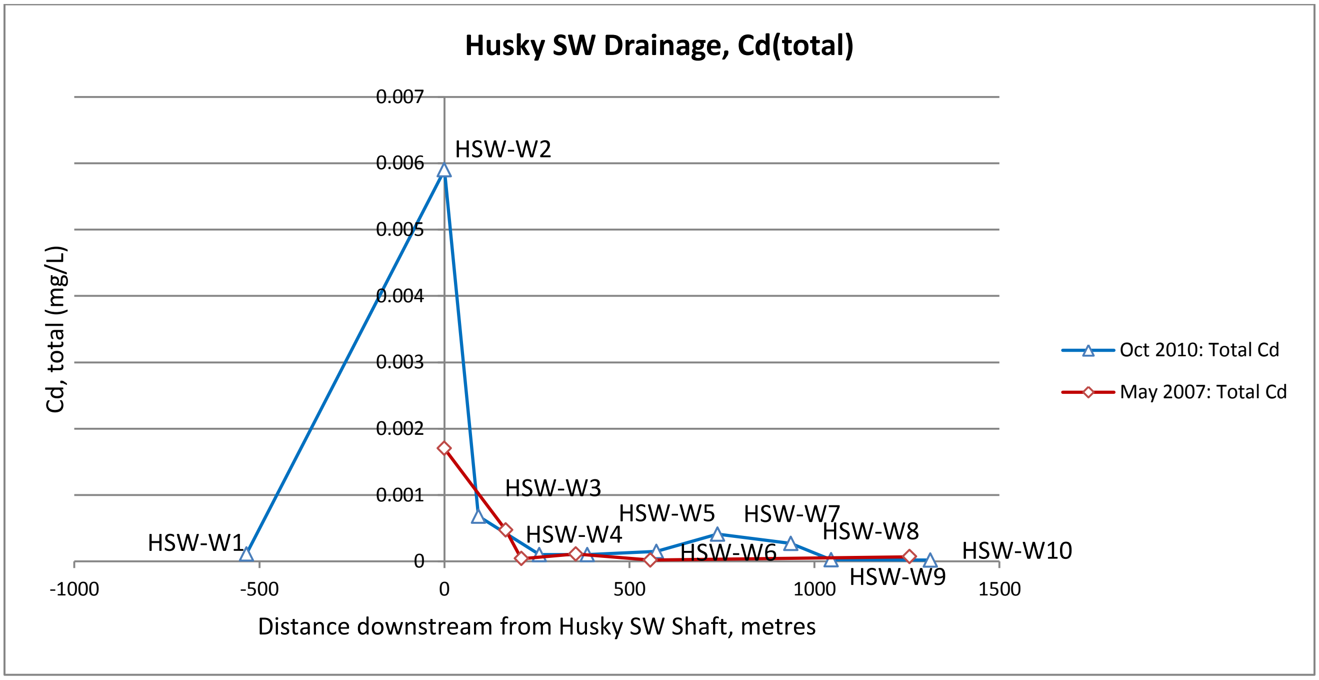
Continued

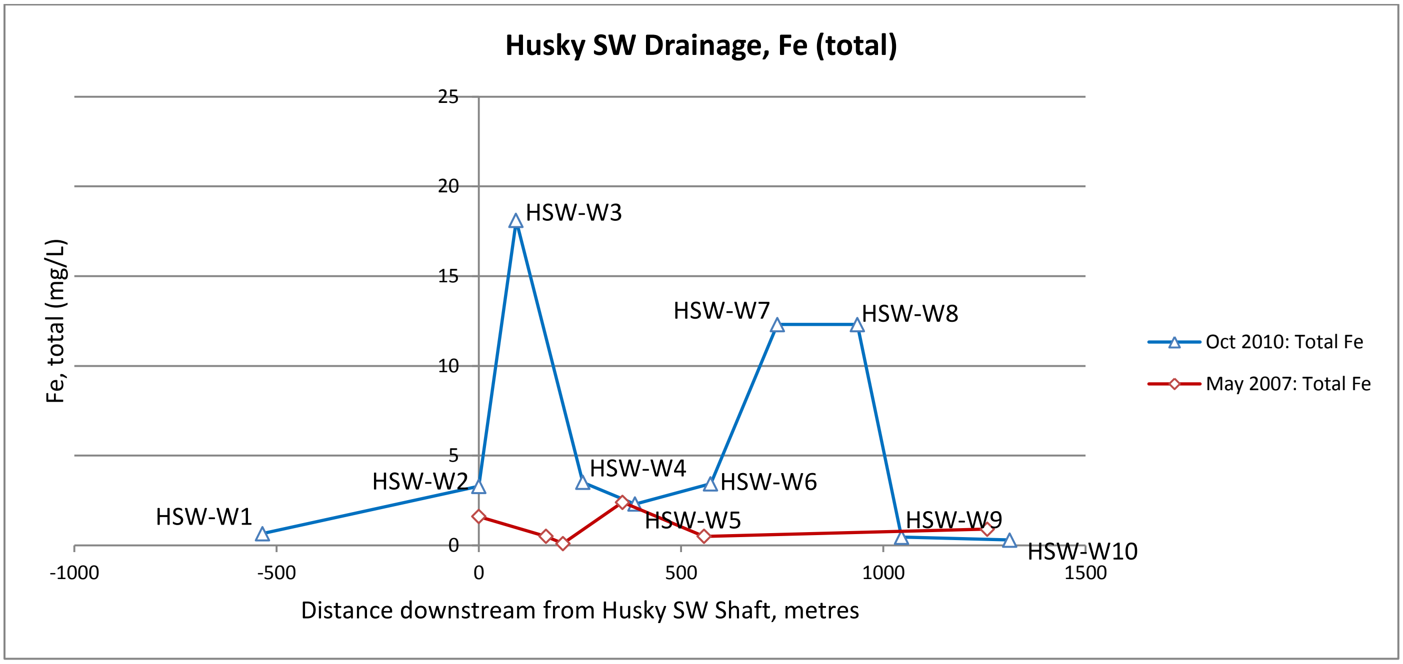
Total Metals		HSW-1	HSW-2	HSW-3	HSW-4	HSW-5	HSW-6	HSW-7	HSW-8	HSW-9	HSW-10	HSW-11	HSW-12
Silver (Ag)	mg/L	0.00022	<0.00003	0.00029	0.00004	<0.00003	0.00006	0.00025	0.00031	<0.000005	<0.000005	0.000014	0.000008
Tin (Sn)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium (Sr)	mg/L	0.2	0.334	0.422	0.375	0.33	0.327	0.35	0.336	0.314	0.295	0.309	0.341
Titanium (Ti)	mg/L	<0.03	<0.03	0.21	<0.03	<0.03	0.041	0.15	0.164	0.0009	0.0010	<0.0005	<0.0005
Thallium (Tl)	mg/L	0.00001	0.00050	0.00015	0.00003	0.00002	0.00003	0.00009	0.00009	0.000002	0.000002	0.000006	0.000007
Uranium (U)	mg/L	0.00099	0.00331	0.00267	0.00148	0.00147	0.00161	0.00220	0.00208	0.00146	0.00132	0.00111	0.00112
Vanadium (V)	mg/L	<0.003	<0.003	0.025	<0.003	<0.003	0.005	0.017	0.018	0.0002	0.0002	<0.0002	<0.0002
Zinc (Zn)	mg/L	0.013	0.497	0.087	0.015	0.011	0.015	0.049	0.054	0.0023	0.0015	0.0495	0.0651
Zirconium (Zr)	mg/L	<0.0005	<0.0005	0.0014	<0.0005	<0.0005	<0.0005	0.0009	0.0008	<0.0001	<0.0001	<0.0001	<0.0001
Calcium (Ca)	mg/L	62.5	208	209	205	202	188	203	196	181	166	155	150
Potassium (K)	mg/L	0.5	1.6	2.4	1.6	1.4	1.4	1.8	1.8	1.14	0.98	0.67	0.54
Magnesium (Mg)	mg/L	17.7	42.7	49.3	44.7	41.3	41.7	44.4	43.2	40.4	38.4	34.8	33.6
Sodium (Na)	mg/L	0.8	3.5	3.0	2.3	2.2	2.1	2.4	2.3	2.13	2.02	2.20	2.25
Sulfur (S)	mg/L	<50	165	166	165	156	152	152	145	141	129	122	121
Hardness ($CaCO_3$) from total metal scan	mg/L	229	696	726	697	675	642	691	667	619	574	531	512
Other Paramaters		**HSW-1**	**HSW-2**	**HSW-3**	**HSW-4**	**HSW-5**	**HSW-6**	**HSW-7**	**HSW-8**	**HSW-9**	**HSW-10**	**HSW-11**	**HSW-12**
pH	pH units	7.86	7.47	7.34	7.88	8.03	8.02	8.17	8.17	8.12	8.13	8.16	8.16
Conductivity	µS/cm	438	1180	1190	1170	1110	1120	1110	1100	1060	1000	933	911
Bicarbonate (HCO3)	mgCaCO3/L	250	300	320	300	290	290	290	280	290	280	260	250
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	210	250	260	250	240	240	230	230	240	230	210	200
Nitrate plus Nitrite (N)	mg/L	0.12	0.06	<0.02	0.02	0.03	0.04	0.05	0.04	0.05	0.52	0.08	0.1
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate (N)	mg/L	0.12	0.06	<0.02	0.02	0.03	0.04	0.05	0.04	0.05	0.52	0.08	0.10
Nitrogen (N)	mg/L	0.45	0.27	0.9	0.21	0.27	0.7	0.4	0.6	0.31	3.6	0.31	0.32
Dissolved Chloride (Cl)	mg/L	<0.5	2.3	2.3	1.7	1.8	2.3	2.1	2.2	1.6	1.4	0.7	0.5
Dissolved Sulfate (SO4)	mg/L	27	420	390	420	380	370	440	430	390	340	320	320
Dissolved Organic Carbon (C)	mg/L	4.2	1.0	1.5	1.6	1.7	2.2	3.3	3.4	4.2	4.0	3.7	3.9
Total Organic Carbon (C)	mg/L	6.3	2.1	9.4	2.7	2.2	3.0	6.4	9.1	5.0	3.9	3.7	3.9
Total Dissolved Solids	mg/L	230	920	890	870	830	840	860	870	820	750	720	690
Total Suspended Solids	mg/L	15	7	1000	68	40	160	360	540	11	2	2	1

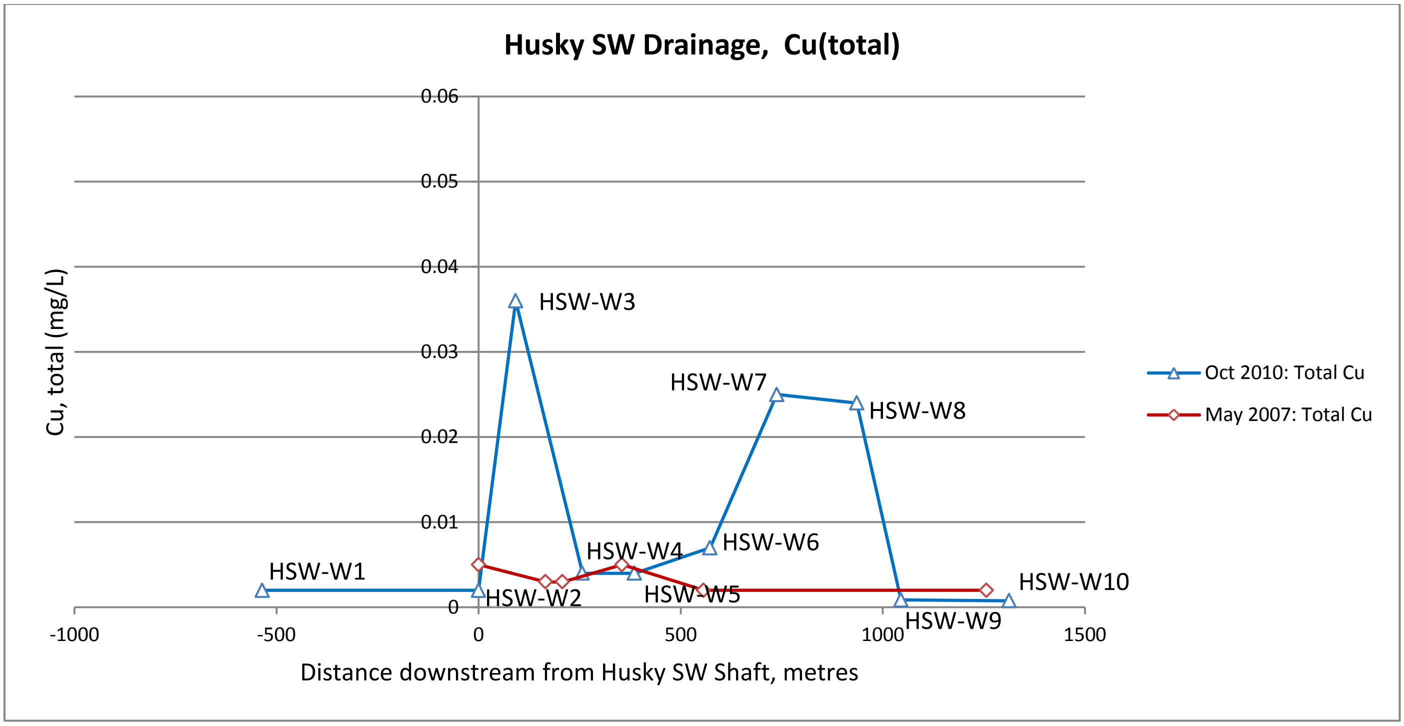
C.2 HUSKY SW - GRAPHS OF KEY CONSTITUENTS

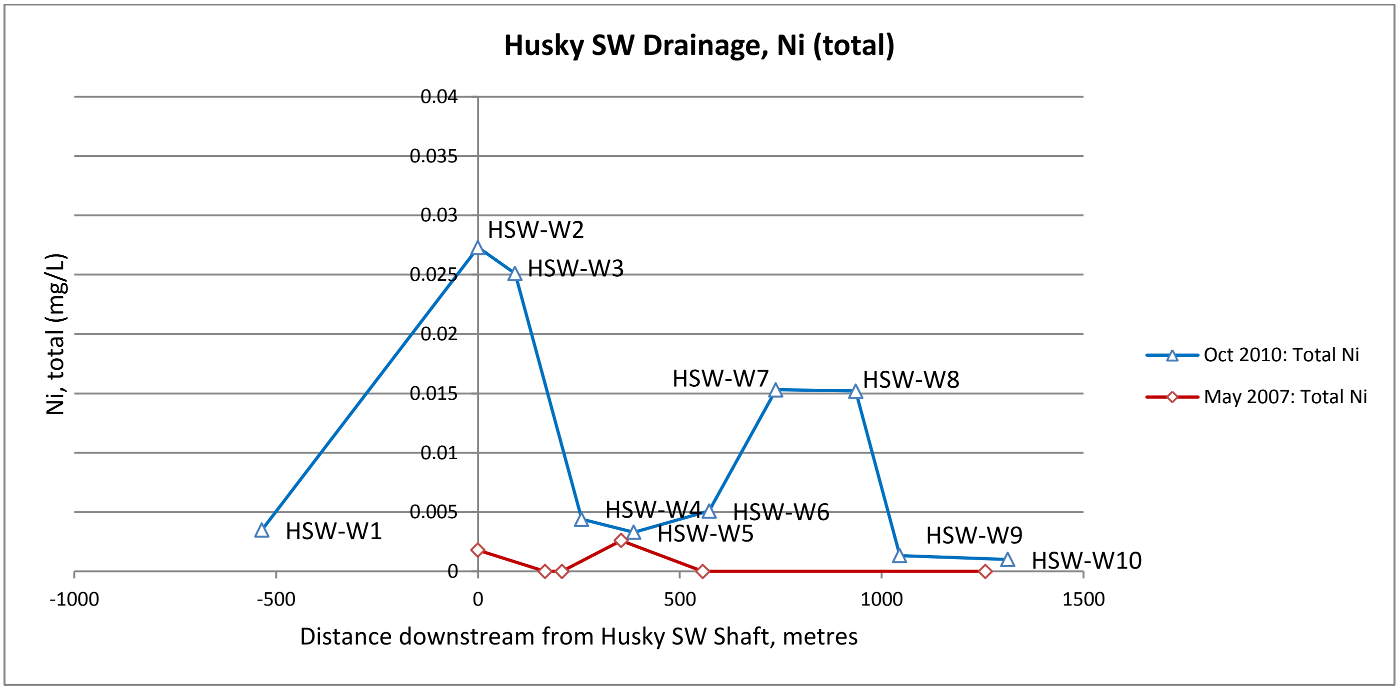
C.2.1 HUSKY SW - METALS GRAPHS

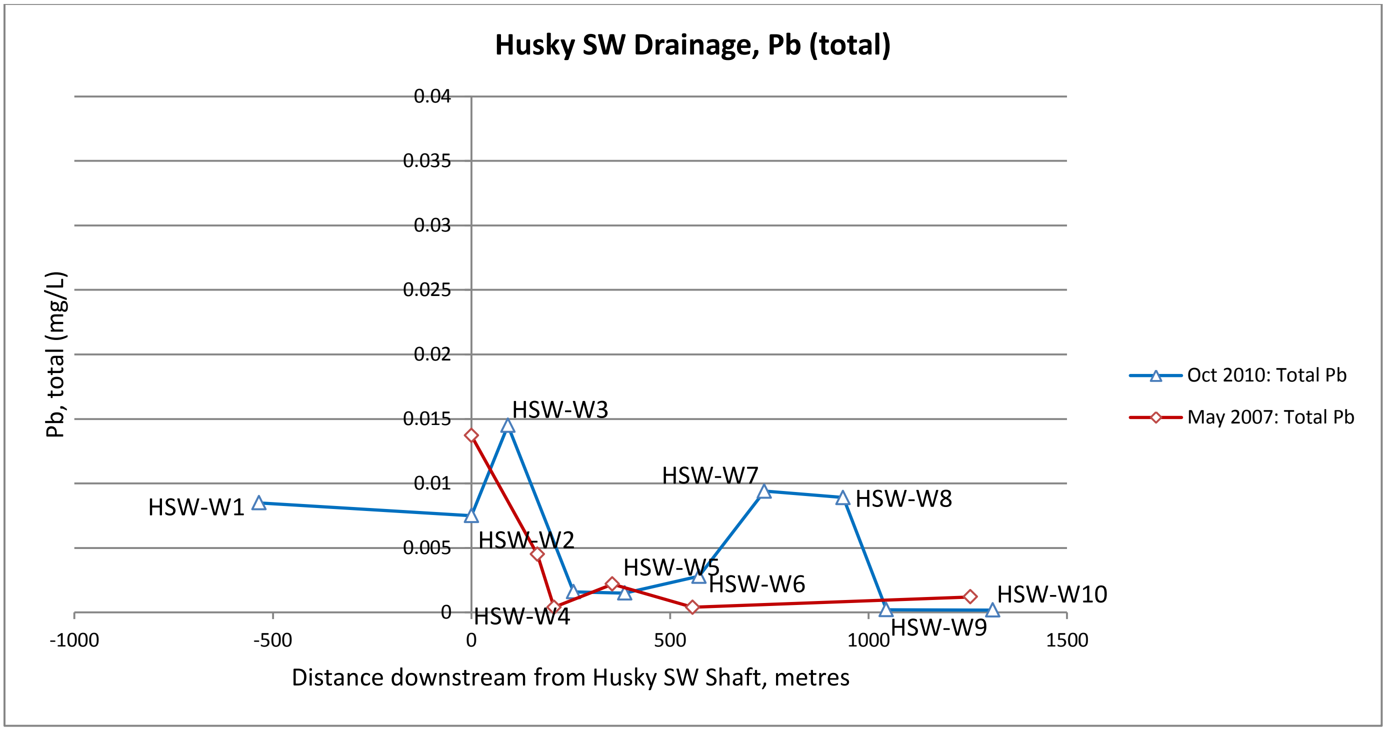


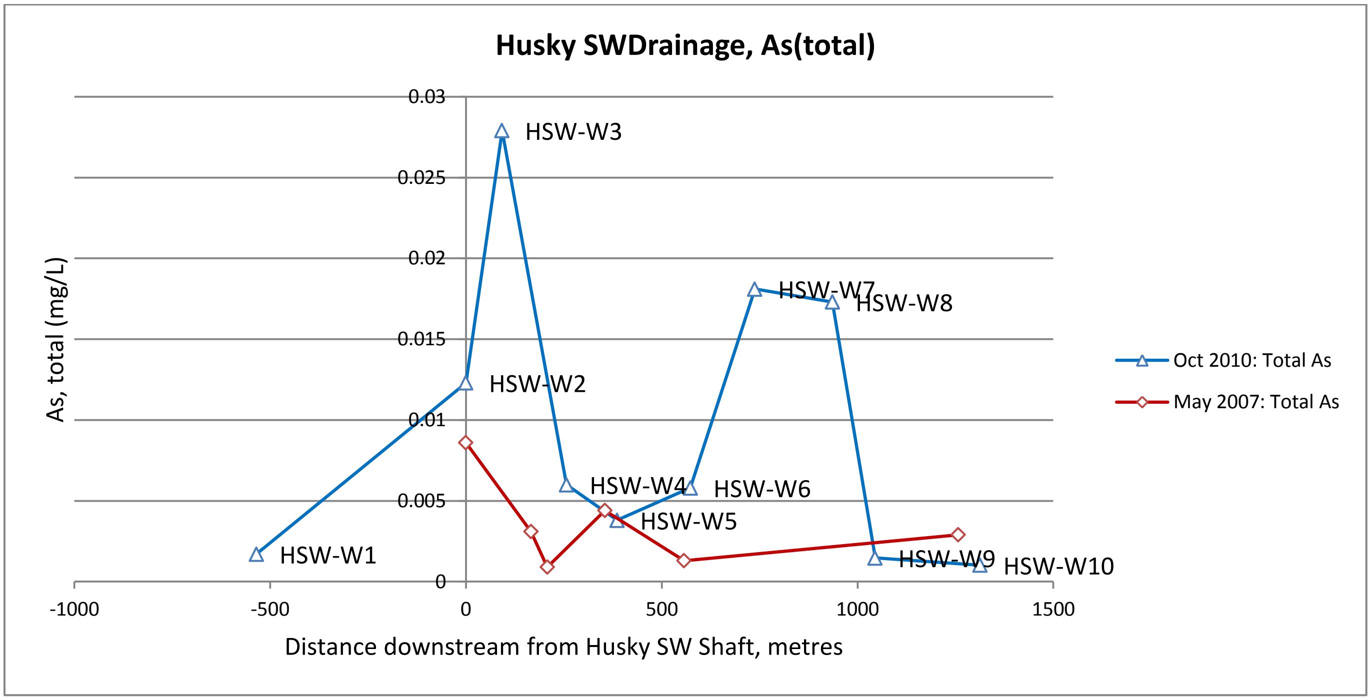


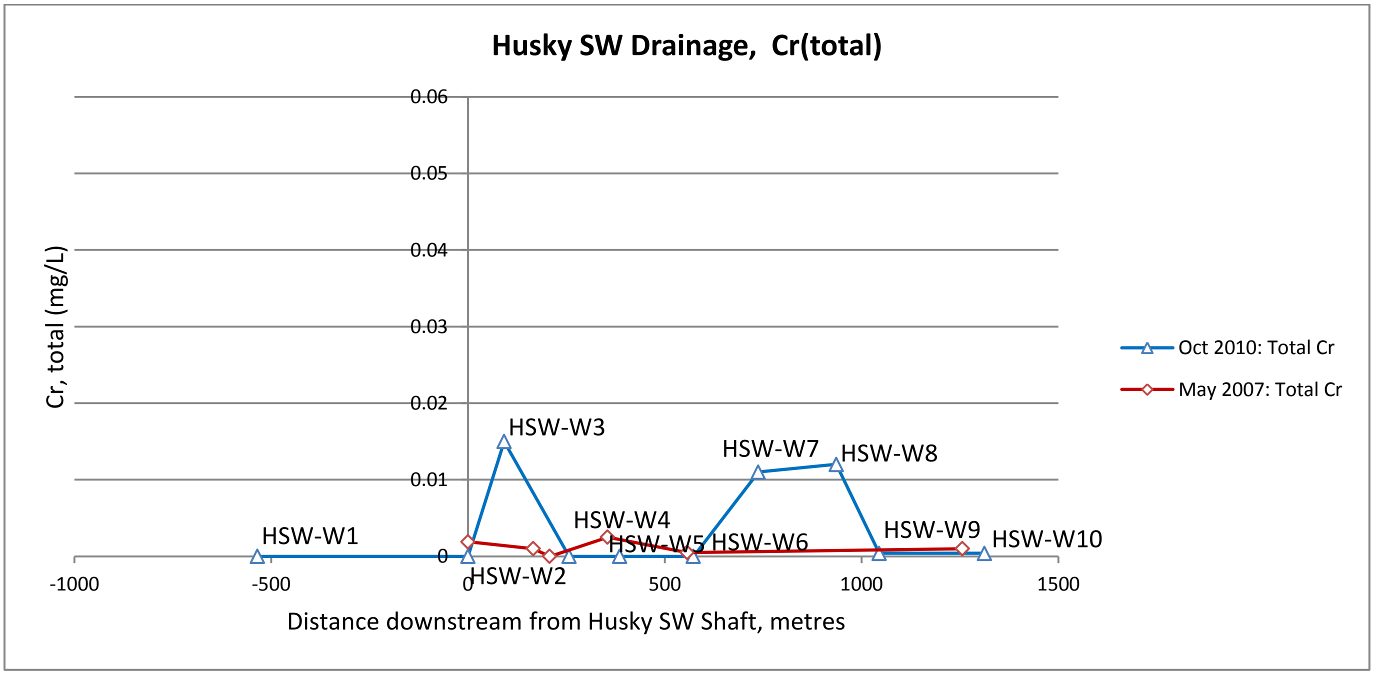

Husky SW Drainage, Fe (total)
Fe, total (mg/L)
25
20
15
10
5
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Fe
May 2007: Total Fe

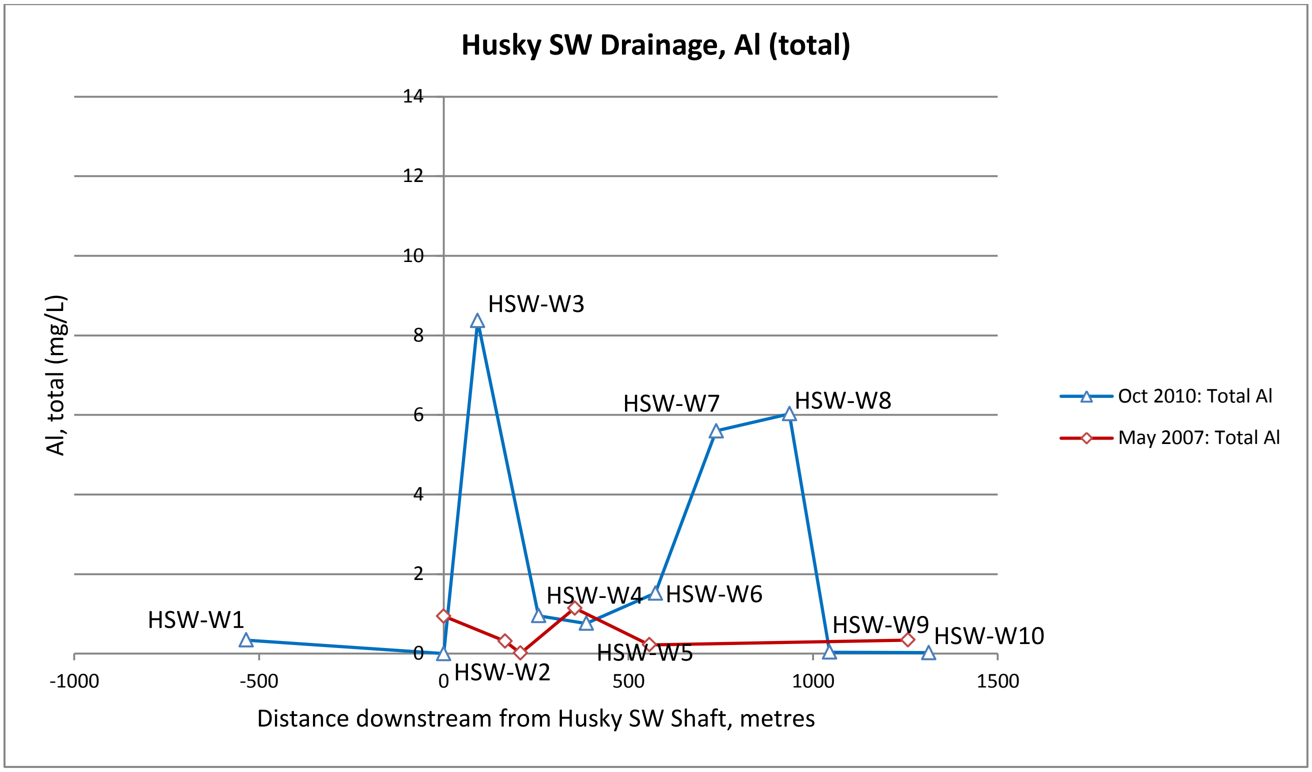

Husky SW Drainage, Cu(total)
Cu, total (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Cu
May 2007: Total Cu


Husky SW Drainage, Ni (total)
Ni, total (mg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Ni
May 2007: Total Ni

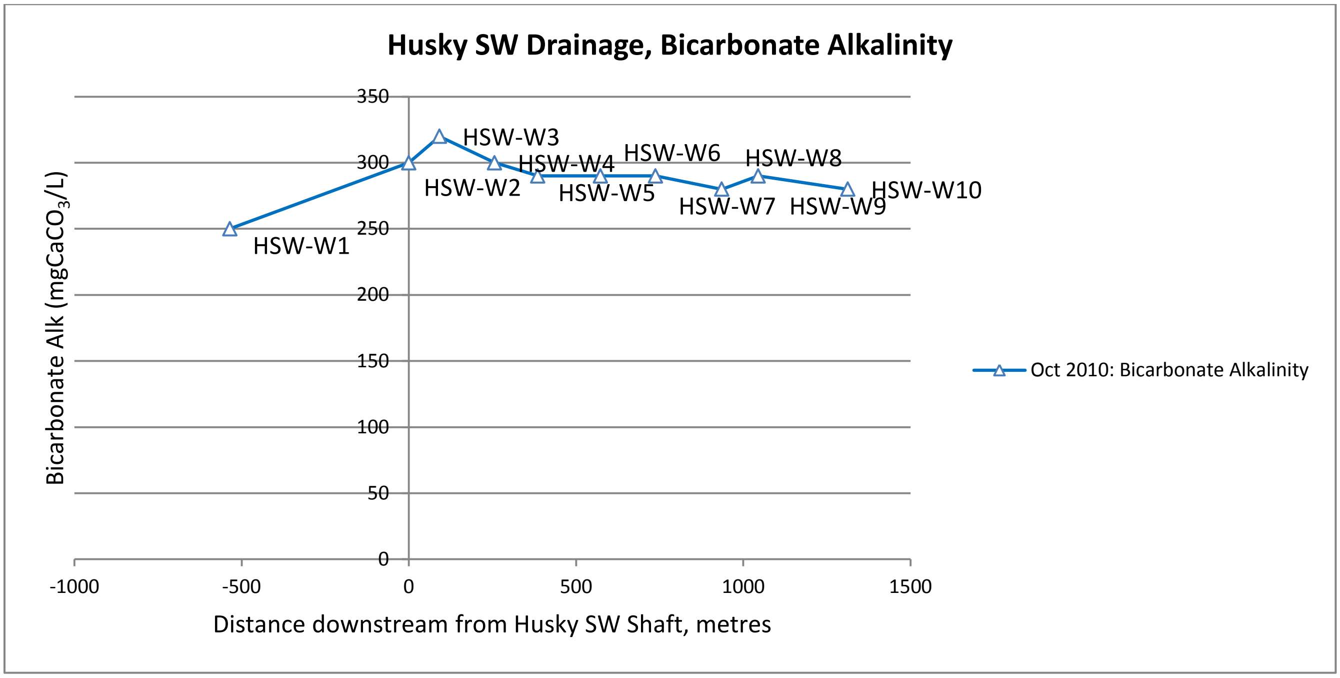

Husky SW Drainage, Pb (total)
Pb, total (mg/L)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Pb
May 2007: Total Pb

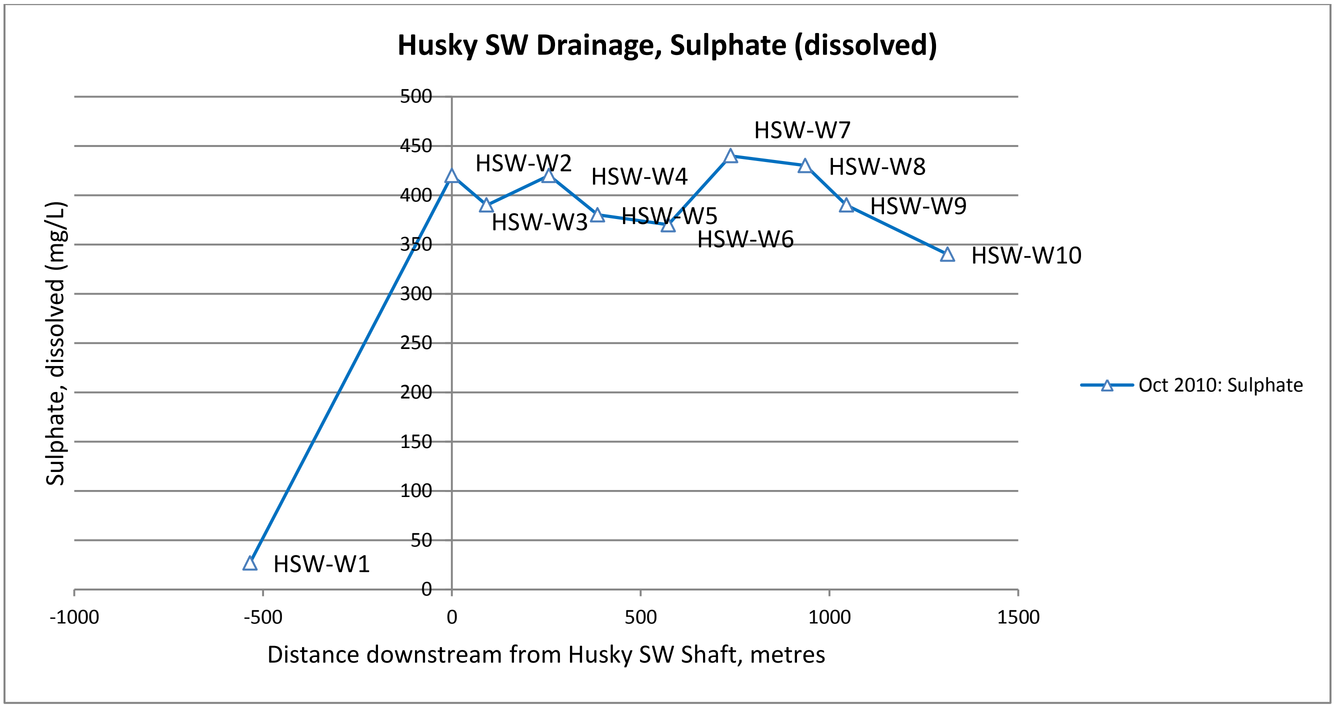

Husky SWDrainage, As(total)
As, total (mg/L)
0.03
0.025
0.02
0.015
0.01
0.005
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total As
May 2007: Total As

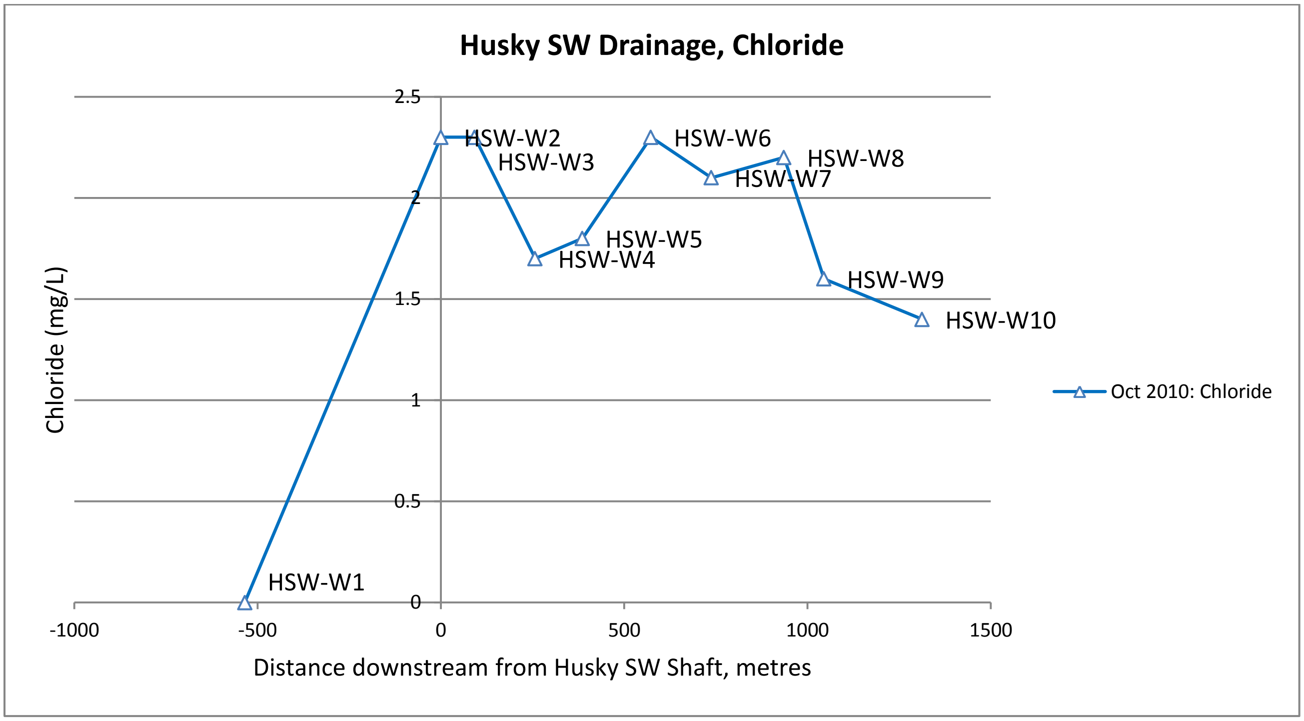

Husky SW Drainage, Cr(total)
Cr, total (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Cr
May 2007: Total Cr

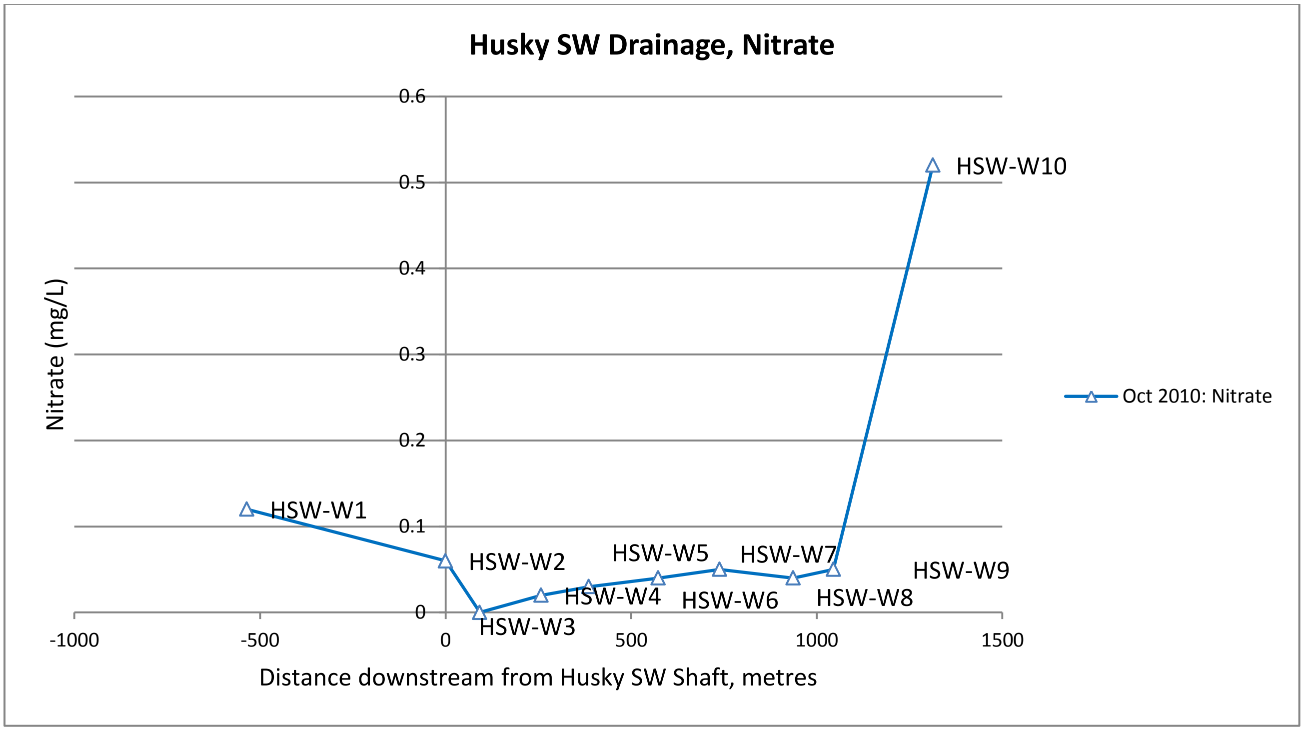

Husky SW Drainage, Al (total)
Al, total (mg/L)
14
12
10
8
6
4
2
0
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
Oct 2010: Total Al
May 2007: Total Al

C.2.2 HUSKY SW - ANIONS GRAPHS

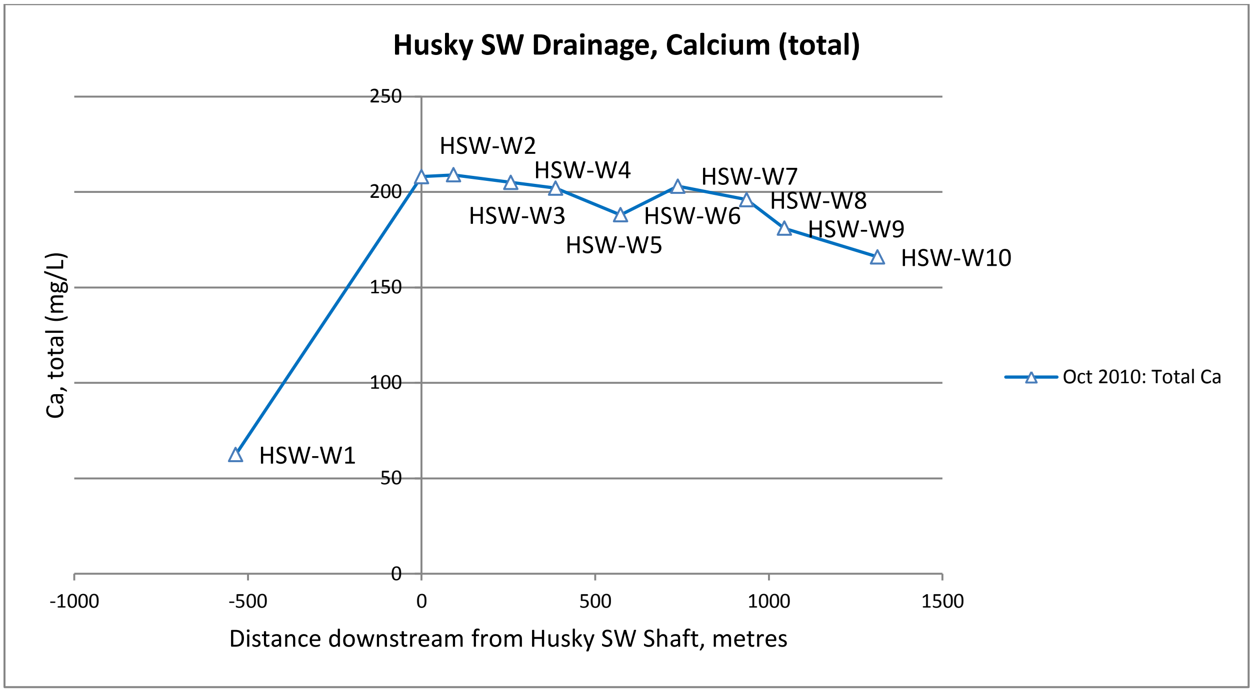


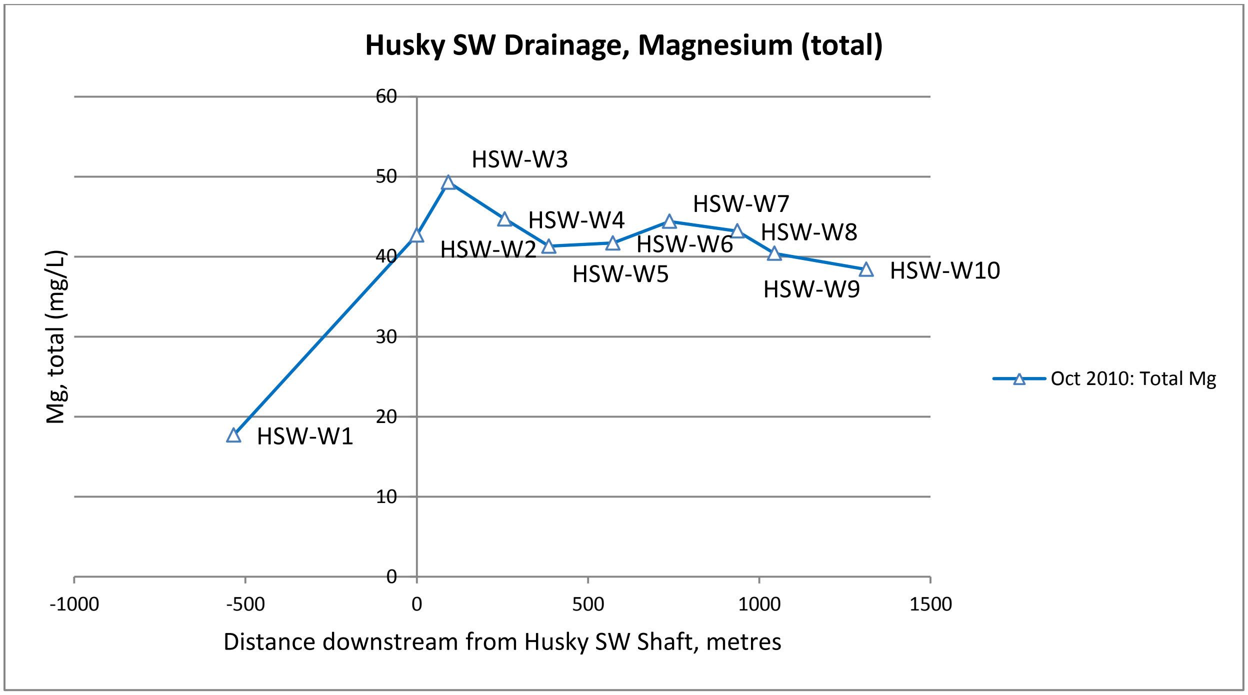


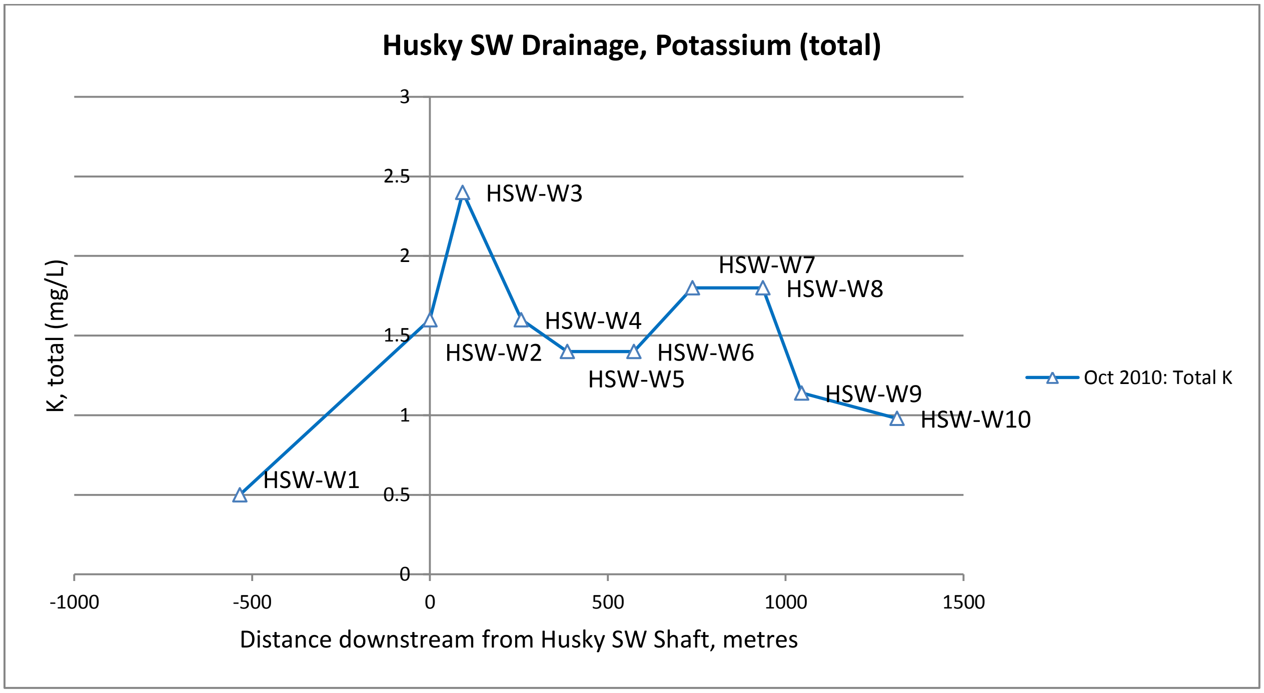

Husky SW Drainage, Chloride
Chloride (mg/L)
2.5
2
1.5
1
0.5
0
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
Oct 2010: Chloride

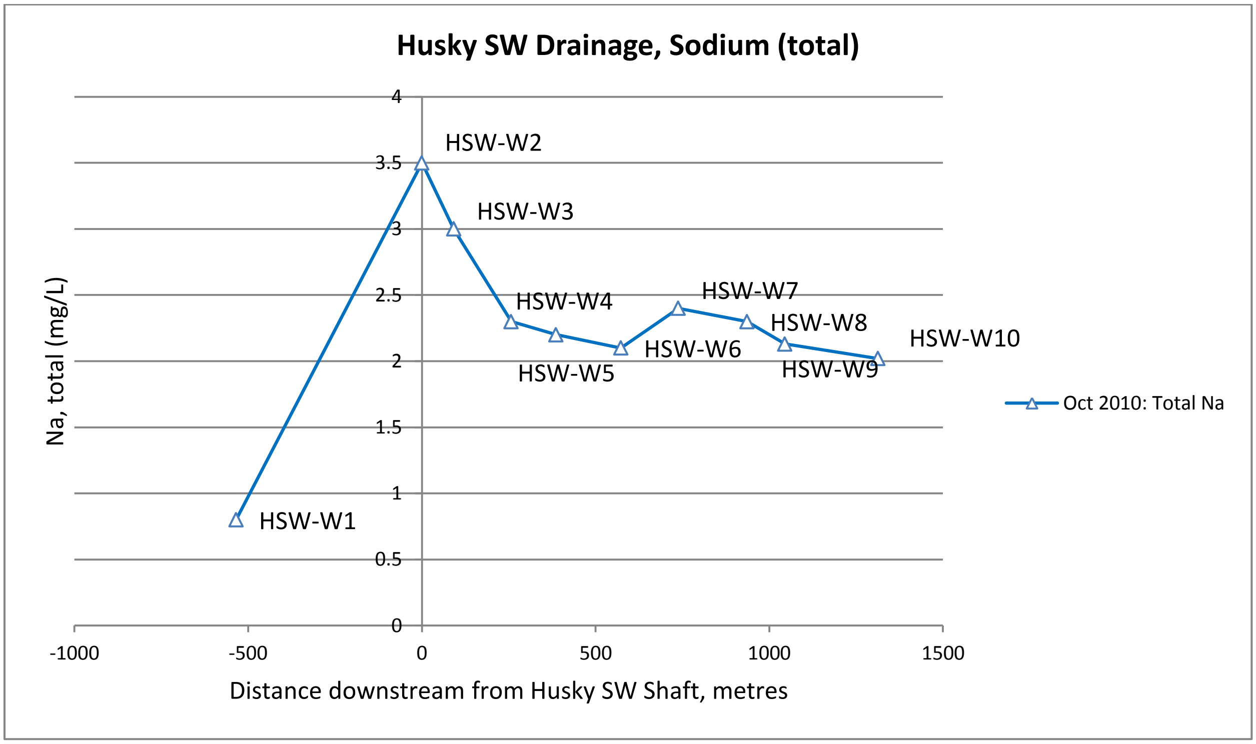

Husky SW Drainage, Nitrate
Nitrate (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
Oct 2010: Nitrate

C.2.3 HUSKY SW – CATIONS GRAPHS

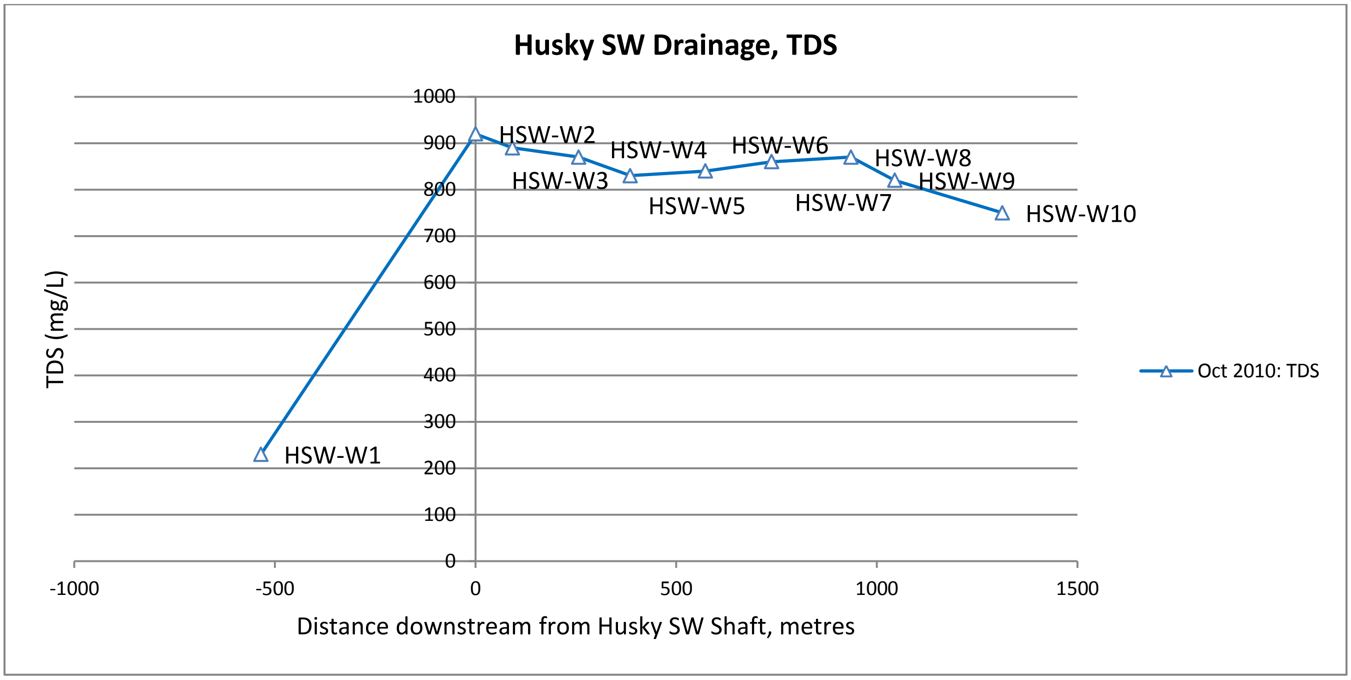


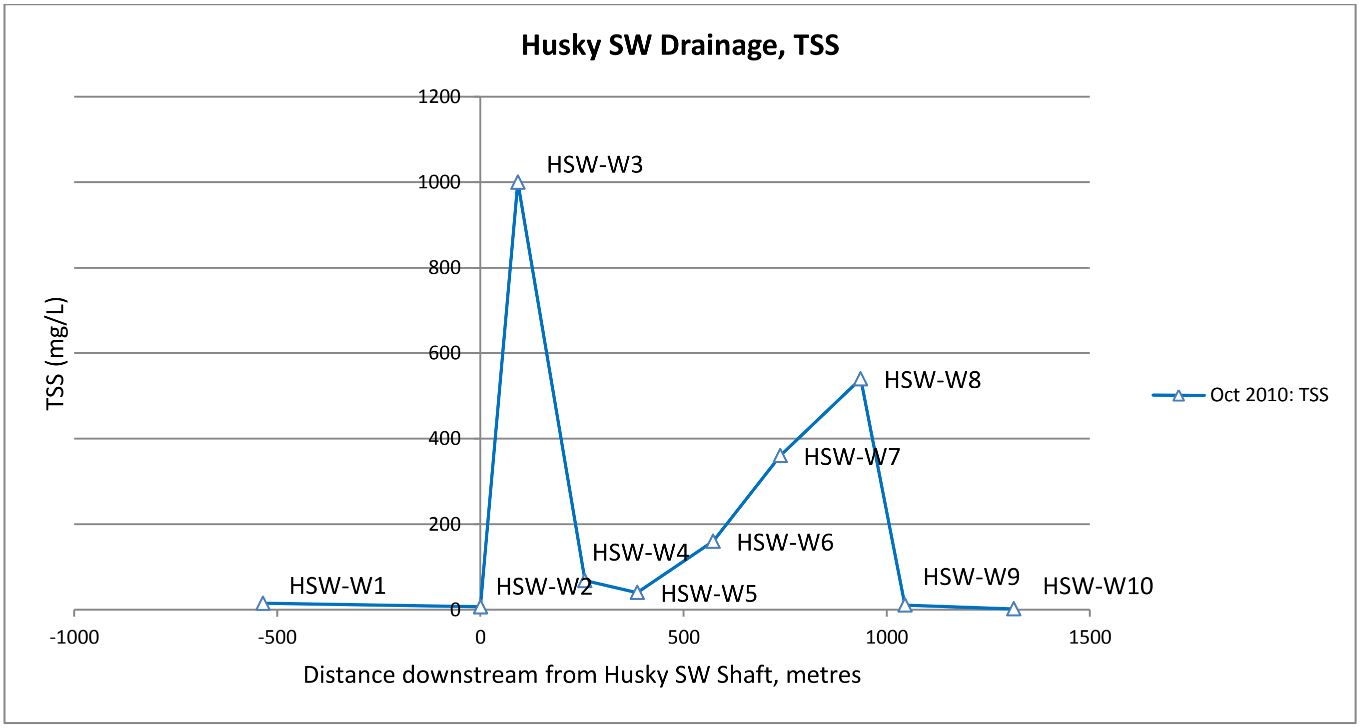



Husky SW Drainage, Potassium (total)
K, total (mg/L)
0
0.5
1
1.5
2
2.5
3
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
Oct 2010: Total K


Husky SW Drainage, Sodium (total)
Na, total (mg/L)
0
0.5
1
1.5
2
2.5
3
3.5
4
HSW-W1
HSW-W2
HSW-W3
HSW-W4
HSW-W5
HSW-W6
HSW-W7
HSW-W8
HSW-W9
HSW-W10
-1000
-500
0
500
1000
1500
Distance downstream from Husky SW Shaft, metres
Oct 2010: Total Na

C.2.4 HUSKY SW - PHYSICAL PARAMATERS GRAPHS





C.3 HUSKY SW – TABLE OF PORE WATER CHEMISTRY DATA

Dissolved Metals		HSW-1-PW 10-Oct-2010	HSW-2-PW 10-Oct-2010	HSW-3-SW 10-Oct-2010	HSW-5-SW 10-Oct-2010	HSW-7-PW 10-Oct-2010	HSW-9-SW 10-Oct-2010
Aluminum (Al)	mg/L	0.007	0.069	0.16	0.013	0.035	0.009
Arsenic (As)	mg/L	0.0089	0.0012	0.0031	0.0046	0.0029	0.0011
Barium (Ba)	mg/L	0.069	0.056	0.084	0.109	0.06	0.086
Boron (B)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Beryllium (Be)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bismuth (Bi)	mg/L	0.286	0.193	0.138	0.099	0.072	0.054
Cadmium (Cd)	mg/L	0.00011	0.00015	0.00046	0.00007	0.00027	0.00007
Cobalt (Co)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (Cr)	mg/L	0.0018	<0.0005	<0.0005	0.002	0.0015	<0.0005
Copper (Cu)	mg/L	0.0005	0.0007	0.0036	0.0005	0.0026	0.0011
Iron (Fe)	mg/L	0.382	0.094	0.691	0.503	0.193	0.048
Lithium (Li)	mg/L	0.024	0.02	0.019	0.012	0.008	0.016
Manganese (Mn)	mg/L	1.83	0.011	0.137	2.68	1.91	0.571
Molybdenum (Mo)	mg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel (Ni)	mg/L	0.002	0.002	0.002	0.002	0.002	0.001
Lead (Pb)	mg/L	0.0011	0.0004	0.0013	<0.0002	0.0008	<0.0002
Antimony (Sb)	mg/L	0.0015	<0.0005	<0.0005	<0.0005	0.0008	<0.0005
Selenium (Se)	mg/L	0.0001	<0.0001	0.0004	<0.0001	0.0002	<0.0001
Silicon (Si)	mg/L	2.79	4.59	4.66	3.29	3.43	4.02
Silver (Ag)	mg/L	0.00004	0.00003	0.00008	<0.00002	0.00014	<0.00002
Tin (Sn)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (Sr)	mg/L	0.307	0.323	0.33	0.299	0.251	0.314
Titanium (Ti)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium (Tl)	mg/L	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Uranium (U)	mg/L	0.0021	0.0016	0.0012	0.0009	0.0011	0.0016
Vanadium (V)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc (Zn)	mg/L	0.008	0.012	0.009	<0.005	0.008	<0.005
Zirconium (Zr)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Calcium (Ca)	mg/L	178	189	186	170	148	178
Potassium (K)	mg/L	3.52	2.11	3.14	0.8	1.15	1.11
Magnesium (Mg)	mg/L	38.3	35.7	37.3	37.7	32	37.7
Sodium (Na)	mg/L	3.9	1.77	1.83	1.81	1.64	1.7
Sulfur (S)	mg/L	147	132	133	133	98	133
Hardness (CaCO3) from dissolved metal scan	mg/L	603	619	617	579	501	599

Continued

Total Metals		HSW-1-PW	HSW-2-PW	HSW-3-SW	HSW-5-SW	HSW-7-PW	HSW-9-SW
Aluminum (Al)	mg/L	423	56.8	269	89.2	98.9	17.5
Arsenic (As)	mg/L	2.83	0.605	2.12	0.501	0.916	0.0657
Barium (Ba)	mg/L	7.48	1.8	6.82	2.02	2.18	0.611
Beryllium (Be)	mg/L	<0.5	<0.1	<0.5	<0.1	<0.1	<0.05
Bismuth (Bi)	mg/L	0.045	0.0019	0.015	0.0054	0.0075	0.0007
Boron (B)	mg/L	0.01	<0.002	<0.01	<0.002	<0.002	<0.001
Cadmium (Cd)	mg/L	0.285	0.0278	0.122	0.0201	0.0462	0.00137
Cobalt (Co)	mg/L	0.981	0.121	0.6	0.148	0.265	0.0216
Chromium (Cr)	mg/L	0.57	0.108	0.505	0.144	0.149	0.031
Copper (Cu)	mg/L	1.64	0.298	2.49	0.719	1.22	0.0947
Iron (Fe)	mg/L	1940	185	1110	306	431	50.8
Mercury (Hg)	mg/L	0.55	0.108	0.378	0.12	0.134	0.038
Lithium (Li)	mg/L	101	46.5	230	16.3	31.7	3.89
Manganese (Mn)	mg/L	0.0003	0.00036	<0.0002	0.00024	0.00021	<0.00002
Molybdenum (Mo)	mg/L	0.018	0.011	0.021	0.003	0.003	0.001
Nickel (Ni)	mg/L	2.37	0.317	1.38	0.36	0.674	0.05
Lead (Pb)	mg/L	5.63	0.492	1.77	0.339	0.8	0.0452
Antimony (Sb)	mg/L	0.048	0.017	0.017	0.006	0.018	0.0018
Selenium (Se)	mg/L	0.019	0.0046	0.017	0.005	0.0046	0.0014
Silicon (Si)	mg/L	204	71.2	169	79.4	82.9	24.5
Silver (Ag)	mg/L	0.15	0.02	0.0527	0.00425	0.0718	0.00107
Tin (Sn)	mg/L	<0.05	<0.01	<0.05	<0.01	<0.01	<0.005
Strontium (Sr)	mg/L	5.65	0.643	1.98	0.817	1	0.401
Titanium (Ti)	mg/L	1.84	0.672	2.24	0.919	0.772	0.285
Thallium (Tl)	mg/L	0.0317	0.0041	0.0088	0.0014	0.0025	0.00026
Uranium (U)	mg/L	0.053	0.0117	0.032	0.0112	0.0184	0.0032
Vanadium (V)	mg/L	1.27	0.161	0.851	0.329	0.38	0.051
Zinc (Zn)	mg/L	25.4	2.99	8.42	1.68	4.29	0.202
Zirconium (Zr)	mg/L	0.029	0.005	0.028	0.011	0.01	0.0026
Calcium (Ca)	mg/L	2920	338	804	398	444	232
Potassium (K)	mg/L	28.9	7.5	19.5	5	5.5	2.39
Magnesium (Mg)	mg/L	461	80	241	86.8	84	50.6
Sodium (Na)	mg/L	9.2	3.3	4.7	3.5	3.3	2.52
Sulfur (S)	mg/L	172	158	140	156	116	147
Hardness (CaCO3) from total metal scan	mg/L	9190	1170	3000	1350	1460	787

Continued

Other Paramaters		HSW-1-PW	HSW-2-PW	HSW-3-SW	HSW-5-SW	HSW-7-PW	HSW-9-SW
pH	pH units	7.83	7.98	7.91	7.91	7.9	8.14
Conductivity	µS/cm	1130	1140	1150	1070	956	1100
Bicarbonate (HCO3)	mgCaCO3/L	230	290	300	250	270	290
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	180	240	250	200	220	240
Nitrate plus Nitrite (N)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	0.1
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	0.008	<0.005	0.007
Nitrate (N)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	0.1
Nitrogen (N)	mg/L	3.1	1.9	2.6	1.8	13	1
Dissolved Chloride (Cl)	mg/L	4.4	1.7	2.3	1.8	2.3	1.9
Dissolved Sulfate (SO4)	mg/L	500	440	430	410	300	410
Dissolved Organic Carbon (C)	mg/L	15.1	12.6	28.4	8.4	20.4	4.2
Total Organic Carbon (C)	mg/L	96	41	108	83	113	10.8

D HUSKY SW STREAM SEDIMENT, ALLUVIUM, AND PEAT DATA

D.1 TABLE OF WHOLE ROCK CHEMISTRY DATA

Sample	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb	Hf
ID	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
HSW-1-Sed-6"	27	37.6	97.1	385	4.8	30.4	8.4	550	3.04	84	1.6	<0.1	4.3	63	4.7	8.6	0.2	85	1.09	0.052	17.8	407	0.61	648	0.239	3.15	0.338	0.79	3.5	30.8	36	2.5	7.6	5.1	0.3	<1	7	18.1	0.3	40.6	0.8
HSW-4-Stream-Sur.	33.6	14.5	8.4	59	0.2	22.8	8.6	908	2.3	13	1	<0.1	3.6	77	0.2	0.9	<0.1	89	1.17	0.068	16.7	423	0.65	531	0.307	2.82	0.597	0.64	0.5	30.2	34	1	8.4	6	0.2	<1	7	15.6	<0.1	25.8	0.8
HSW-2-Peat-3"	3.6	35.2	3.9	227	0.2	45.9	10.5	8014	0.73	7	6.5	<0.1	1	85	6	1.1	<0.1	14	3.93	0.089	2.6	18	0.33	316	0.032	0.73	0.07	0.16	<0.1	7	5	0.8	2.7	0.8	<0.1	<1	2	3.5	0.4	7.2	0.2
HSW-7-Oxi-Sed.	18.7	25.1	14	112	0.5	27.9	9.7	1912	15.83	206	1.3	<0.1	3.2	127	0.8	1.5	0.1	43	3	0.356	13.1	268	0.47	585	0.106	2.05	0.342	0.55	0.7	21.7	25	1.4	7.2	3	0.2	<1	6	12.8	0.3	24.9	0.7
HSW-9-Stream-12"	19.9	47.3	23.8	112	0.7	32.1	12.8	1025	3.19	20	1.9	<0.1	7.2	133	1	1.9	0.2	84	1.65	0.1	28.1	315	0.71	918	0.276	4.46	0.876	1.1	0.6	41.8	55	1.7	12.7	7.4	0.5	<1	10	25.9	<0.1	46.1	1.2
HSW-7-Peat/Root-12"	13	105	155.3	401	18.9	59.8	23.3	1806	4.02	151	3.1	<0.1	7.9	122	5.4	11.9	0.2	85	1.73	0.085	25.8	228	0.62	873	0.248	3.78	0.683	0.92	1.1	36	50	2.2	13	7.2	0.4	1	10	21.2	0.1	44.8	1.1
HSW-2-Stream-3"	40.6	37.3	21.9	317	0.6	37.6	21.6	6229	4.46	50	1.9	<0.1	5.6	103	3	1.7	0.2	79	1.55	0.083	22.3	607	0.56	890	0.241	3.31	0.609	0.81	0.6	33.4	43	1.6	11.3	6.2	0.3	<1	8	17.9	<0.1	35.8	0.9
HSW-3-Stream-Sed.	13.9	83.2	38.6	228	1.2	45.2	18.2	5514	4.2	81	2	<0.1	6.7	120	3.9	2.5	0.2	83	2.19	0.1	20.9	247	0.76	944	0.208	3.73	0.55	1.02	1.2	35	45	1.8	11.9	6.1	0.3	1	10	24.9	0.2	44.3	0.9
HSW-5-Stream-6"	15.6	124.8	38.6	325	1.1	47	14	575	2.81	39	2.9	<0.1	6.2	101	5.4	3	0.2	77	1.82	0.089	18	281	0.63	730	0.227	3.21	0.527	0.84	0.6	29.7	36	1.4	12.2	5.8	0.3	<1	8	17.7	0.3	35	0.8
HSW-1-Soil-Stream	11.3	128.5	1602	5176	25.6	160.4	68.5	>10000	24.84	1015	13.1	<0.1	3.4	104	85.6	43.4	0.1	47	2.19	0.055	13.1	150	0.5	470	0.104	1.74	0.279	0.43	0.9	19.1	26	2.1	10.7	2.2	0.1	<1	5	9.5	0.2	22.4	0.6
HSW-9-Stream-Surface	11.7	50.8	33.4	151	0.8	35.2	12.3	939	3.17	29	2	<0.1	6.3	126	1.3	2.2	0.3	89	1.49	0.09	24.8	217	0.7	976	0.258	4.26	0.891	1.08	0.7	41.1	45	1.3	12.5	7.9	0.4	1	10	23.7	<0.1	44.5	1
HSW-4-Peat/Root-8"	14.1	166.9	43.8	688	2.3	68.4	21.1	2098	5.97	288	3.2	<0.1	8.7	105	11.4	3.4	0.2	76	1.82	0.092	23.2	248	0.58	765	0.221	3.33	0.518	0.83	0.8	31.5	45	1.2	13.6	5.9	0.3	<1	10	18.4	0.2	40.3	1
HSW-10-Stream-Surface	14.6	44.4	21	122	0.6	36.2	13.6	1400	3.29	18	1.6	<0.1	6.7	124	1	1.7	0.2	90	1.45	0.086	26	238	0.72	1018	0.286	4.29	0.806	1.15	0.8	45.1	48	1.4	12.4	8.5	0.4	1	10	26	0.1	50.1	1.3
HSW-5-Stream-Surface	21.6	19.5	12.5	66	0.2	19.6	9.6	2085	2.35	21	1	<0.1	4.1	89	0.5	1.2	0.2	82	1.22	0.07	20	311	0.6	650	0.276	2.99	0.672	0.72	0.6	31.2	41	1.4	9.1	6.4	0.3	<1	7	16.7	<0.1	27.4	0.9
HSW-5-Bank-12"	25.7	29.3	16.7	83	0.7	27.6	10.3	1295	2.73	24	1.3	<0.1	4.6	81	0.6	1.6	0.1	84	1.42	0.073	19.9	388	0.66	689	0.302	2.97	0.585	0.69	0.9	32.6	41	1.3	9.9	6.6	0.3	<1	8	16.8	<0.1	28.9	0.9
HSW-1-Soil-6"	8.2	87	680.9	2894	18.4	133.7	48.3	>10000	29.72	1720	13.8	<0.1	3.3	73	25.5	25.6	0.1	49	1.35	0.065	12.5	90	0.44	487	0.111	1.7	0.274	0.44	1.3	18.3	22	1.6	11.3	2.7	0.1	<1	5	10.5	0.2	20.5	0.6
HSW-7-Peat/Root-Surface	12.8	53.8	40.8	220	1.5	39.7	17.3	3715	4.06	89	1.8	<0.1	5.9	106	2.1	3.5	0.2	70	1.77	0.078	21.9	231	0.57	708	0.224	3.26	0.63	0.82	0.7	31.9	43	1	10.5	6.2	0.4	<1	8	17.7	0.1	36.7	0.8
HSW-3-Stream-Surface	28.7	68.4	27.8	1358	1.4	220.4	133.9	>10000	13.71	270	3.1	<0.1	3.6	138	20.4	8	0.1	6	3.09	0.078	14.1	128	0.45	1351	0.1	1.8	0.22	0.49	2.1	20.1	25	1.2	7.8	2.9	0.1	<1	5	14.4	0.1	25.3	0.5

D.2 TABLE OF ACID-BASE ACCOUNTING DATA

Sample ID	Paste pH	Total Carbon (Wt.%)	TOC (Wt.%)	CO2 (Wt.%)	CaCO3 Equiv.* (Kg CaCO3/Tonne)	Total Sulfur (Wt.%)	HCl Extractable Sulfur (Wt.%)	HNO3 Extractable Sulfur (Wt.%)	Insoluble Sulfur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)
HSW-7-Peat/Root-12"		10.26	10.15	0.32	7.3	0.04	<0.01	0.04	0.00	1.3
HSW-2-Stream-3"		7.76	7.66	0.27	6.1	0.02	0.01	0.01	0.00	0.3
HSW-3-Stream-Sed.		14.74	14.52	0.75	17.0	0.06	0.01	0.05	0.00	1.6
HSW-5-Stream-6"		13.26	13.14	0.37	8.4	0.09	<0.01	0.09	0.00	2.8
HSW-1-Soil-Stream		2.63	1.91	2.57	58.4	0.09	0.05	0.04	0.00	1.3
HSW-9-Stream-Surface		6.52	6.37	0.46	10.5	0.07	0.02	0.02	0.03	0.6
HSW-4-Peat/Root-8"		12.97	12.84	0.42	9.5	0.15	0.06	0.05	0.04	1.6
HSW-10-Stream-Surface		6.11	5.98	0.40	9.1	0.09	0.03	0.04	0.02	1.3
HSW-5-Stream-Surface		2.14	2.01	0.38	8.6	<0.02	0.01	0.01	<0.02	0.3
HSW-5-Bank-12"		3.75	3.56	0.59	13.4	0.02	<0.01	0.02	0.00	0.6
HSW-1-Soil-6"		1.28	0.87	1.44	32.7	0.12	0.08	0.04	0.00	1.3
HSW-7-Peat/Root-Surface		11.92	11.79	0.39	8.9	0.05	0.03	0.02	0.00	0.6
HSW-3-Stream-Surface		9.98	8.54	5.21	118.4	0.04	0.03	0.01	0.00	0.3

D.3 TABLE OF XRD RESULTS

Sample ID	Quartz	Plagioclase	Muscovite-Illite	Clinochlore	Actinolite	Dolomite	K-feldspar	Augite	Clinozoisite	Pyrite	Kaolinite	Calcite	Goethite	Hematite	Hydroxylapatite	Rutile	Siderite	Sphalerite	Galena	Ankerite	Magnetite
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
HSW-1-Sed-6"	76.0	4.7	9.7	3.0	1.7	1.2	2.0	-	-	0.5	0.9	0.3	-	-	-	-	-	-	-	-	-
HSW-4-Stream-Sur.	75.7	8.2	5.9	2.7	3.9	0.8	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSW-2-Peat-3"	50.3	12.2	25.5	12.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSW-7-Oxi-Sed.	58.7	13.2	16.5	8.0	-	-	2.6	-	-	0.5	-	0.7	-	-	-	-	-	-	-	-	-
HSW-9-Stream-12"	62.7	14.6	10.3	5.2	3.1	-	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

E SILVER KING WATER CHEMISTRY DATA

E.1 TABLE OF CHEMISTRY DATA FROM FALL 2010

		SK-1	SK-2	SK-3	SK-4	GC-TRIB-8	GC-TRIB-5	GC-TRIB-7	GC-TRIB-4	GC-TRIB-3	GC-TRIB-2	GC-TRIB-1
Dissolved Metals		10/6/2010	10/6/2010	10/6/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010	10/7/2010
Aluminum (Al)	mg/L	0.0078	0.0022	0.0016	0.0037	0.0116	0.0011	0.0105	0.0068	0.0080	0.0081	0.0043
Arsenic (As)	mg/L	0.0042	0.00403	0.0015	0.00029	0.00065	0.00037	0.00115	0.00051	0.00123	0.00057	0.00045
Barium (Ba)	mg/L	0.00607	0.00583	0.00565	0.0713	0.0965	0.0315	0.0806	0.0295	0.0718	0.0583	0.0490
Boron (B)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Beryllium (Be)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Bismuth (Bi)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium (Cd)	mg/L	0.000066	0.000061	0.000039	0.000014	0.000019	<0.000005	0.000035	0.000010	0.000022	0.000013	0.000028
Cobalt (Co)	mg/L	0.0005	0.0005	0.0006	0.0005	0.0003	0.0003	0.0003	0.0004	0.0003	0.0005	0.0004
Chromium (Cr)	mg/L	0.00185	0.00183	0.000349	0.000016	0.000355	0.000015	0.000653	0.000058	0.000525	0.000049	0.000039
Copper (Cu)	mg/L	0.00041	0.00009	0.00011	0.00013	0.00855	0.00021	0.00066	0.00083	0.00055	0.00091	0.00086
Iron (Fe)	mg/L	0.044	0.048	0.02	0.008	0.024	0.004	0.08	0.022	0.116	0.022	0.014
Lithium (Li)	mg/L	0.0164	0.0164	0.0162	0.0159	0.0107	0.0075	0.0072	0.0027	0.0068	0.0055	0.0053
Manganese (Mn)	mg/L	0.615	0.59	0.109	0.00608	0.19	0.00044	0.638	0.0683	0.532	0.0128	0.0124
Molybdenum (Mo)	mg/L	0.00148	0.00147	0.00136	0.00077	0.00041	0.00024	0.00039	0.00024	0.00035	0.00034	0.00029
Nickel (Ni)	mg/L	0.0138	0.0141	0.00473	0.00033	0.00062	0.00046	0.00157	0.00114	0.00115	0.00112	0.00103
Lead (Pb)	mg/L	0.00014	0.000024	0.00004	0.000033	0.000031	0.000020	0.000047	0.000028	0.000042	0.000048	0.000065
Antimony (Sb)	mg/L	0.0228	0.0231	0.0175	0.0131	0.00196	0.00027	0.00167	0.00031	0.00112	0.00047	0.00042
Selenium (Se)	mg/L	0.0002	0.00022	0.00015	0.00014	0.00006	<0.00004	0.00010	0.00006	0.00009	0.00010	0.00007
Silicon (Si)	mg/L	3.45	3.26	3.18	3.18	2.71	2.62	2.61	2.36	2.69	2.59	2.46
Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	0.000007	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	0.000007	<0.000005
Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Strontium (Sr)	mg/L	0.305	0.301	0.307	0.286	0.273	0.292	0.243	0.176	0.255	0.247	0.248
Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Thallium (Tl)	mg/L	0.00211	0.00208	0.00127	0.000005	0.000040	<0.000002	0.000007	<0.000002	0.000004	<0.000002	<0.000002
Uranium (U)	mg/L	0.00261	0.00259	0.00261	0.000252	0.00316	0.00236	0.00151	0.000548	0.00192	0.00204	0.00176
Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Zinc (Zn)	mg/L	0.0086	0.0068	0.0064	0.0011	0.0058	0.0010	0.0010	0.0007	0.0010	0.0008	0.0034
Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium (Ca)	mg/L	163	159	152	147	152	158	137	94.2	144	141	137
Potassium (K)	mg/L	1.36	1.32	1.56	1.73	0.95	0.74	0.68	0.19	0.68	0.76	0.68
Magnesium (Mg)	mg/L	37.2	36.1	36.3	37	38.8	42.2	36.4	31.0	38.6	38.0	38.0
Sodium (Na)	mg/L	2.49	2.28	2.3	2.36	3.20	2.91	3.01	1.82	3.00	2.95	2.99
Sulfur (S)	mg/L	155	150	151	152	140	138	131	94	133	124	126
Hardness (CaCO3) from dissolved metal scan	mg/L	559	545	530	518	538	569	491	363	518	507	499

Continued.

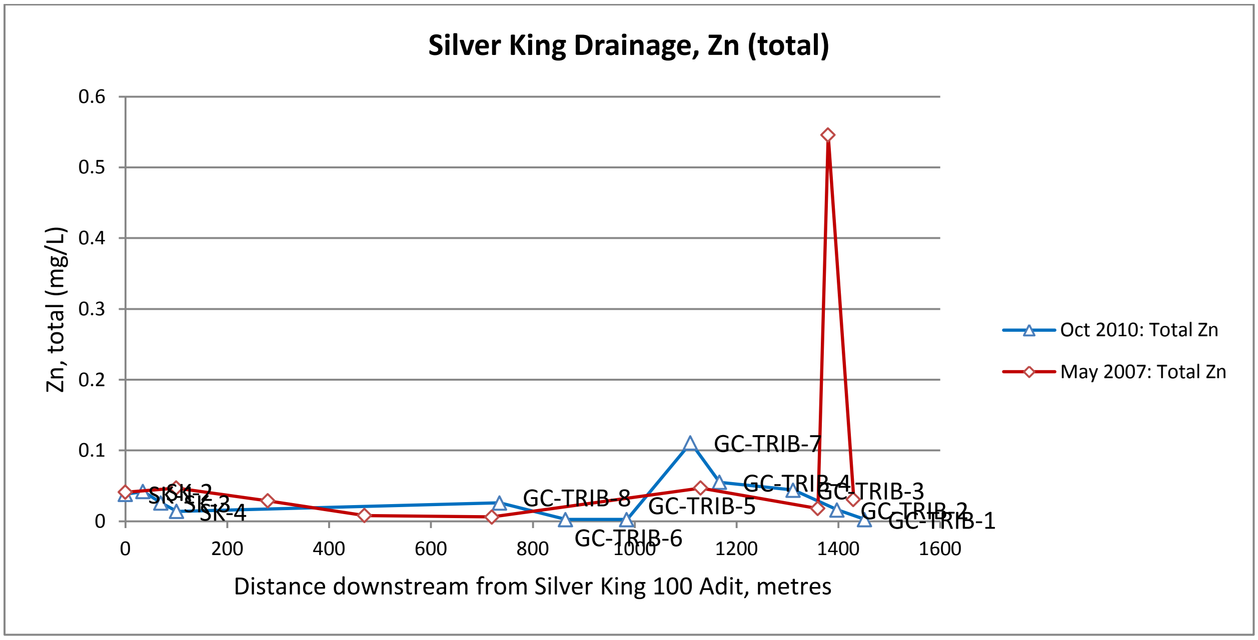
Total Metals		SK-1	SK-2	SK-3	SK-4	GC-TRIB-8	GC-TRIB-5	GC-TRIB-7	GC-TRIB-4	GC-TRIB-3	GC-TRIB-2	GC-TRIB-1
Aluminum (Al)	mg/L	0.0058	0.0065	0.0045	0.0914	3.04	<0.02	9.86	4.93	4.09	1.18	0.067
Arsenic (As)	mg/L	0.00679	0.00725	0.00442	0.00168	0.0080	0.0005	0.0466	0.0146	0.0177	0.0042	0.0006
Barium (Ba)	mg/L	0.00595	0.00612	0.00505	0.119	0.209	0.0337	0.396	0.146	0.211	0.101	0.0549
Beryllium (Be)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Bismuth (Bi)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	0.00013	<0.00005	0.00046	0.00016	0.00012	<0.00005	<0.00005
Boron (B)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.0001	<0.0001	0.0002	<0.0001	0.0001	<0.0001	<0.0001
Cadmium (Cd)	mg/L	0.00031	0.00034	0.000199	0.0002	0.00035	0.00003	0.00096	0.00021	0.00038	0.00010	0.00003
Cobalt (Co)	mg/L	0.00227	0.00233	0.000991	0.00223	0.00318	0.00009	0.0124	0.00438	0.00513	0.00139	0.00008
Chromium (Cr)	mg/L	0.0004	0.0004	0.0004	0.0005	0.006	<0.003	0.018	0.01	0.007	<0.003	<0.003
Copper (Cu)	mg/L	0.00038	0.00043	0.00029	0.00161	0.014	<0.001	0.043	0.011	0.017	0.004	0.001
Iron (Fe)	mg/L	0.845	0.942	0.632	0.986	6.14	0.112	22.6	9.11	8.98	2.36	0.123
Mercury (Hg)	mg/L	0.015	0.0145	0.0143	0.0143	0.014	0.007	0.02	0.008	0.01	0.007	0.005
Lithium (Li)	mg/L	0.66	0.656	0.262	1.44	0.296	0.0450	1.42	0.3	0.736	0.332	0.0170
Manganese (Mn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001							
Molybdenum (Mo)	mg/L	0.00146	0.00146	0.00133	0.0008	0.0006	<0.0003	0.0012	0.0006	0.0007	0.0004	0.0003
Nickel (Ni)	mg/L	0.0148	0.0146	0.0082	0.00152	0.0087	0.0005	0.0327	0.0123	0.0128	0.0053	0.0016
Lead (Pb)	mg/L	0.000043	0.000069	0.000034	0.00133	0.0048	<0.0003	0.0325	0.0089	0.0103	0.0029	0.0004
Antimony (Sb)	mg/L	0.0208	0.0211	0.0168	0.00922	0.0026	<0.0003	0.0040	0.0013	0.0021	0.0008	0.0004
Selenium (Se)	mg/L	0.00018	0.00019	0.00016	0.00015	0.0004	<0.0002	0.0009	0.0003	0.0004	<0.0002	<0.0002
Silicon (Si)	mg/L	3.25	3.12	3.03	2.96	6.81	3.63	15.6	9.92	8.09	4.81	3.3
Silver (Ag)	mg/L	<0.000005	<0.000005	<0.000005	0.000022	0.00011	<0.00003	0.00098	0.00038	0.00035	0.00011	<0.00003
Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	0.00001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Strontium (Sr)	mg/L	0.307	0.303	0.299	0.295	0.284	0.289	0.299	0.2	0.272	0.263	0.246
Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	0.0017	0.083	<0.03	0.247	0.097	0.113	<0.03	<0.03
Thallium (Tl)	mg/L	0.00215	0.0021	0.00152	0.000097	0.00013	<0.00001	0.00017	0.00010	0.00008	0.00002	<0.00001
Uranium (U)	mg/L	0.00246	0.00242	0.00239	0.000304	0.00352	0.00200	0.00297	0.00073	0.00234	0.00211	0.00173
Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	0.0004	0.009	<0.003	0.029	0.012	0.011	<0.003	<0.003
Zinc (Zn)	mg/L	0.0382	0.042	0.0259	0.0139	0.026	<0.005	0.111	0.055	0.044	0.016	<0.005
Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.0007	<0.0005	0.0014	0.0008	0.0006	<0.0005	<0.0005
Calcium (Ca)	mg/L	147	144	140	137	166	174	149	112	146	151	151
Potassium (K)	mg/L	1.3	1.27	1.29	2.07	1.3	0.8	1.5	0.9	1.1	0.9	0.7
Magnesium (Mg)	mg/L	36.6	35.6	35.6	38	44.4	46.9	45.6	37.8	43.4	43.2	43.0
Sodium (Na)	mg/L	2.26	2.21	2.2	2.37	3.6	3.2	3.6	2.2	3.3	3.3	3.3
Sulfur (S)	mg/L	146	144	149	145	147	142	132	102	135	136	143
Hardness (CaCO3) from total metal scan	mg/L	519	505	497	498	598	627	559	434	544	555	554

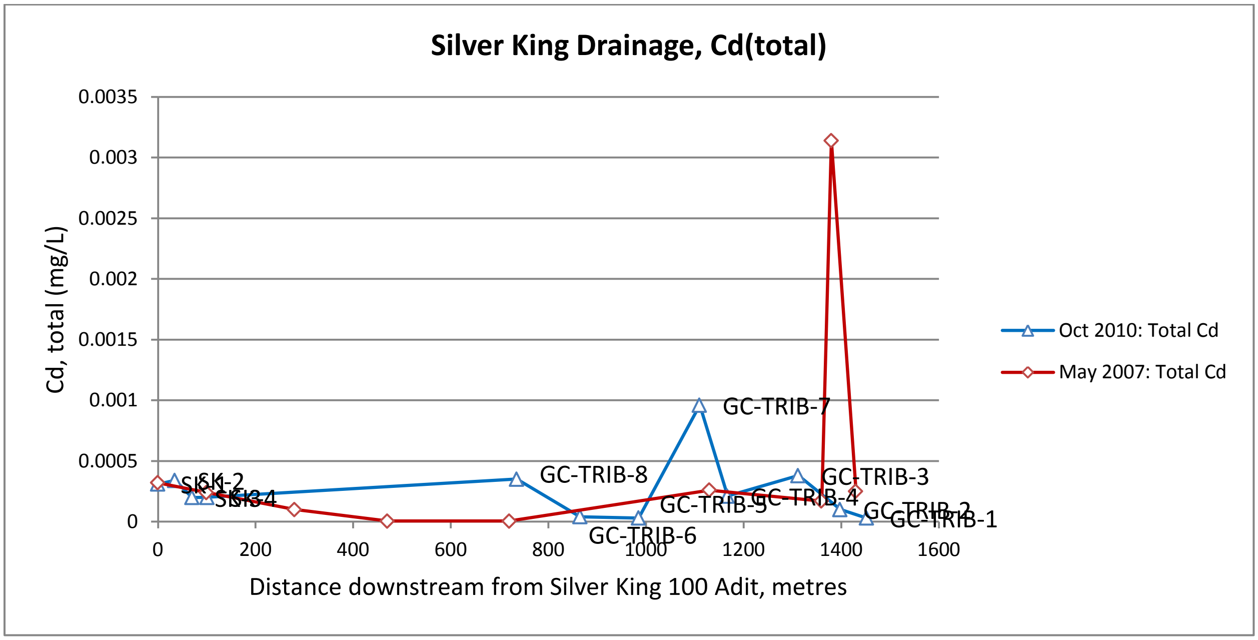
Continued.

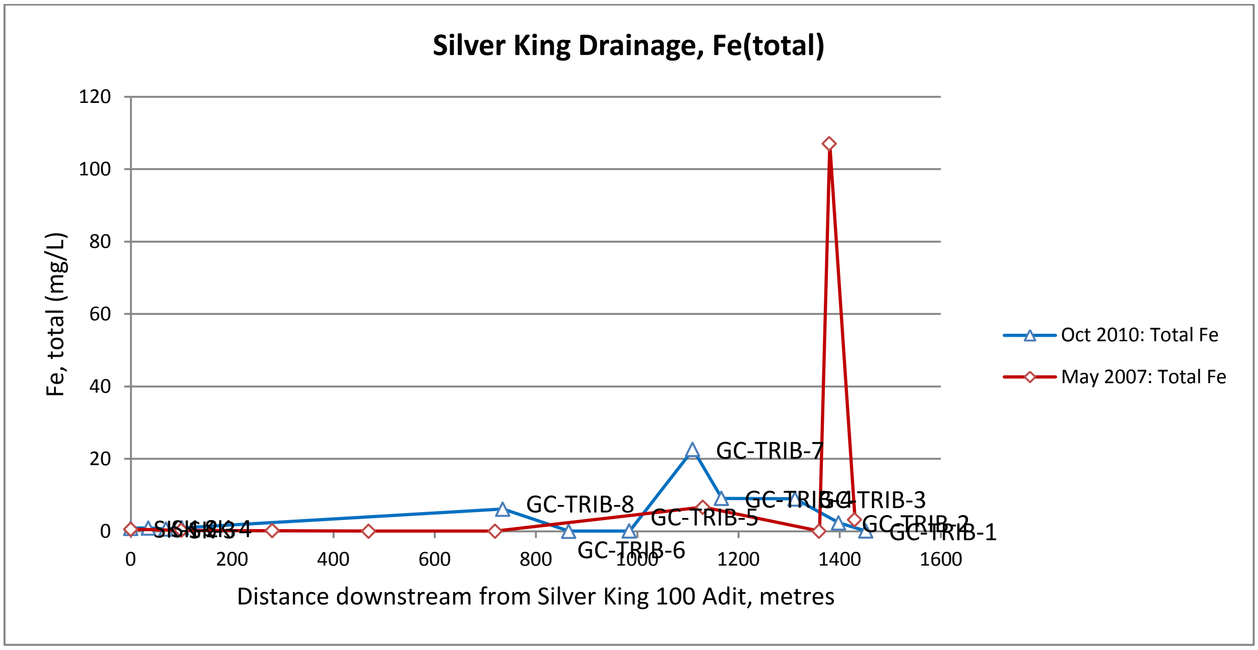
Other Paramaters		SK-1	SK-2	SK-3	SK-4	GC-TRIB-8	GC-TRIB-5	GC-TRIB-7	GC-TRIB-4	GC-TRIB-3	GC-TRIB-2	GC-TRIB-1
pH	pH units	8.05	8.07	8.14	7.76	8.17	8.23	8.07	8.03	8.14	8.19	8.12
Conductivity	µS/cm	916	913	923	902	1020	1100	917	790	961	965	949
Bicarbonate (HCO3)	mgCaCO3/L	130	130	130	120	190	250	140	140	180	170	170
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	110	110	110	97	150	200	110	120	150	140	140
Nitrate plus Nitrite (N)	mg/L	<0.02	<0.02	0.07	<0.02	0.07	0.07	0.13	0.05	0.15	0.11	0.07
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005
Nitrate (N)	mg/L	<0.02	<0.02	0.07	<0.02	0.07	0.07	0.13	0.05	0.15	0.11	0.07
Nitrogen (N)	mg/L	0.24	0.2	0.21	0.43	0.6	0.21	0.8	0.7	0.8	0.35	0.36
Dissolved Chloride (Cl)	mg/L	0.8	0.8	0.8	0.8	1.2	1.0	1.3	0.9	1.2	1.1	1.3
Dissolved Sulfate (SO4)	mg/L	410	410	410	390	460	400	400	260	380	380	380
Dissolved Organic Carbon (C)	mg/L	1.2	1.6	1.2	2.4	2.7	3.4	3.8	9.8	4.0	5.2	5.6
Total Organic Carbon (C)	mg/L	1.8	1.4	2.2	7.5	3.4	3.5	9.9	12.8	6.9	6.2	5.8
Total Dissolved Solids	mg/L	710	710	710	690	810	810	700	600	740	740	690
Total Suspended Solids	mg/L	10	13	9	230	180	3	830	360	370	28	5

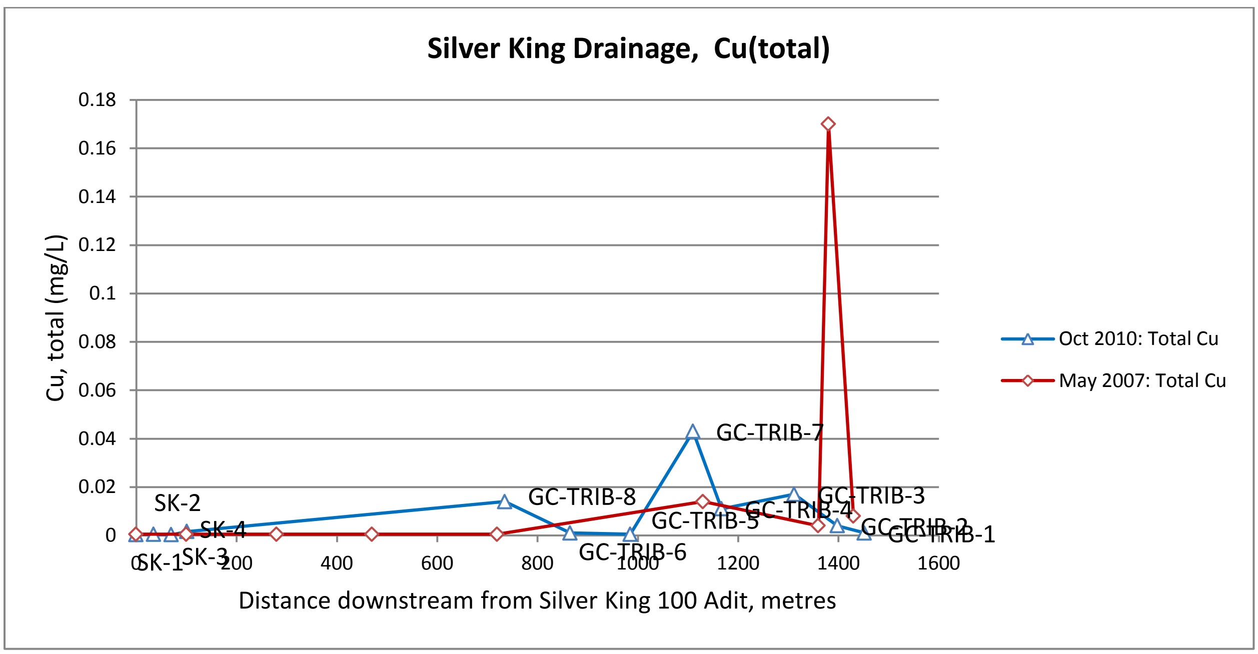
E.2 SILVER KING GRAPHS OF KEY CONSTITUENTS

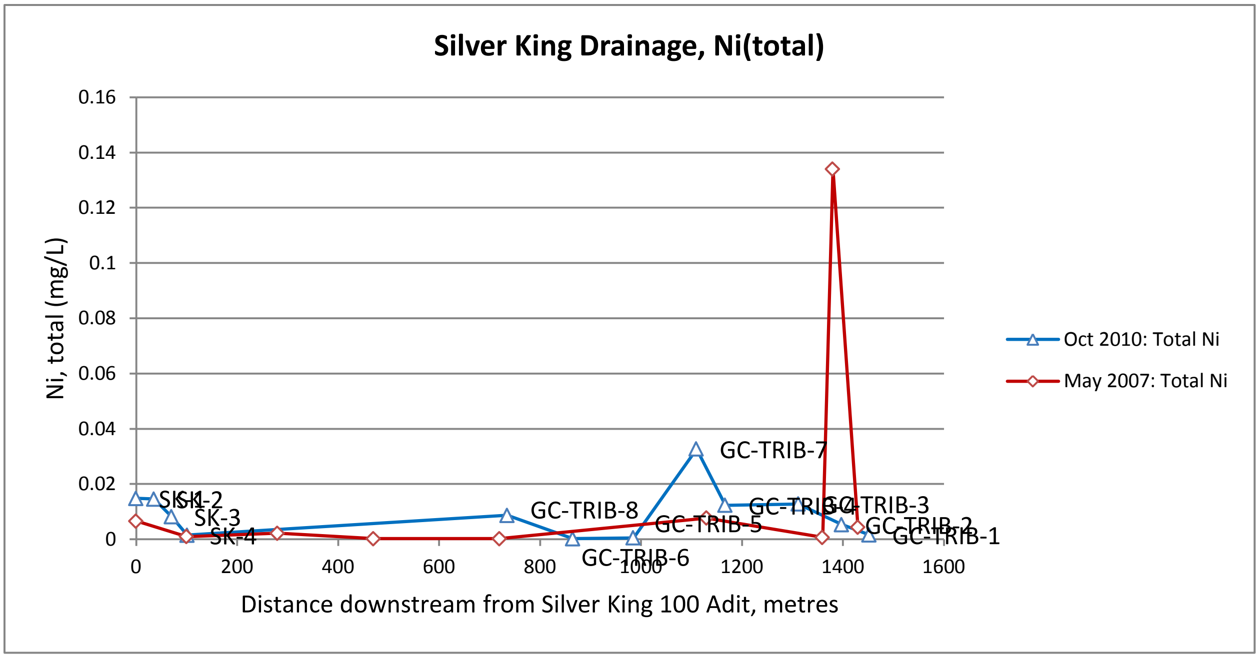
E.2.1 SILVER KING – METALS GRAPHS

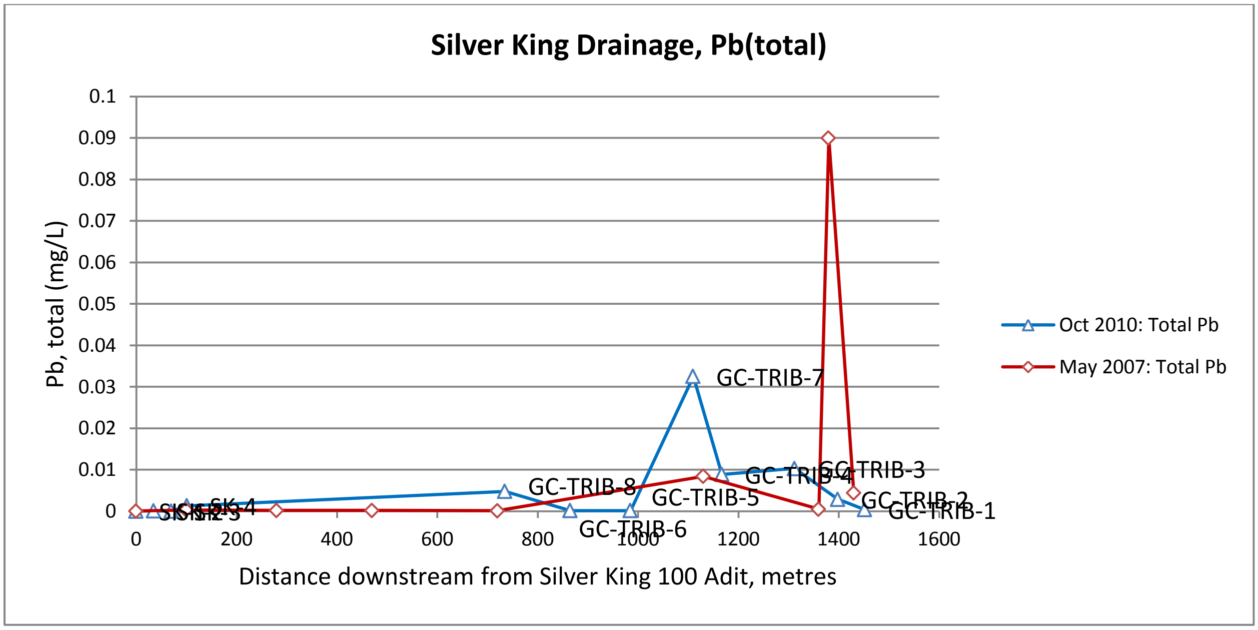


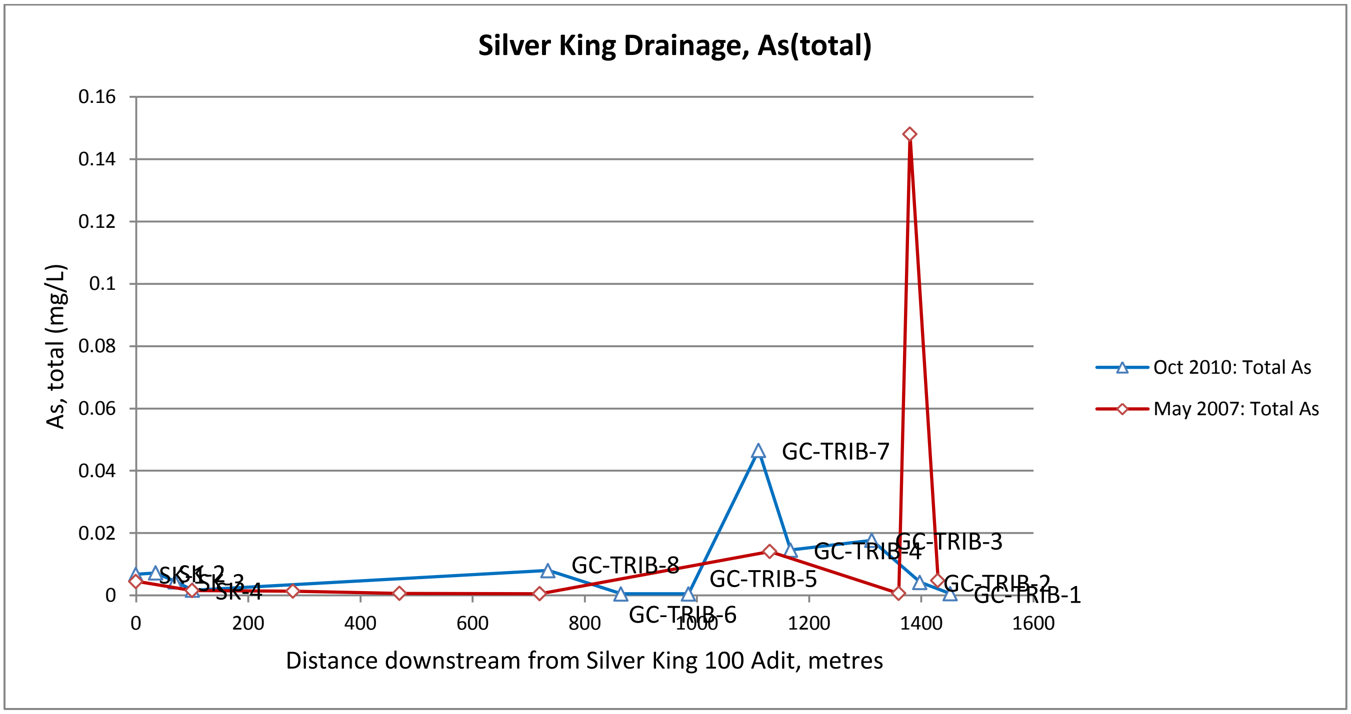


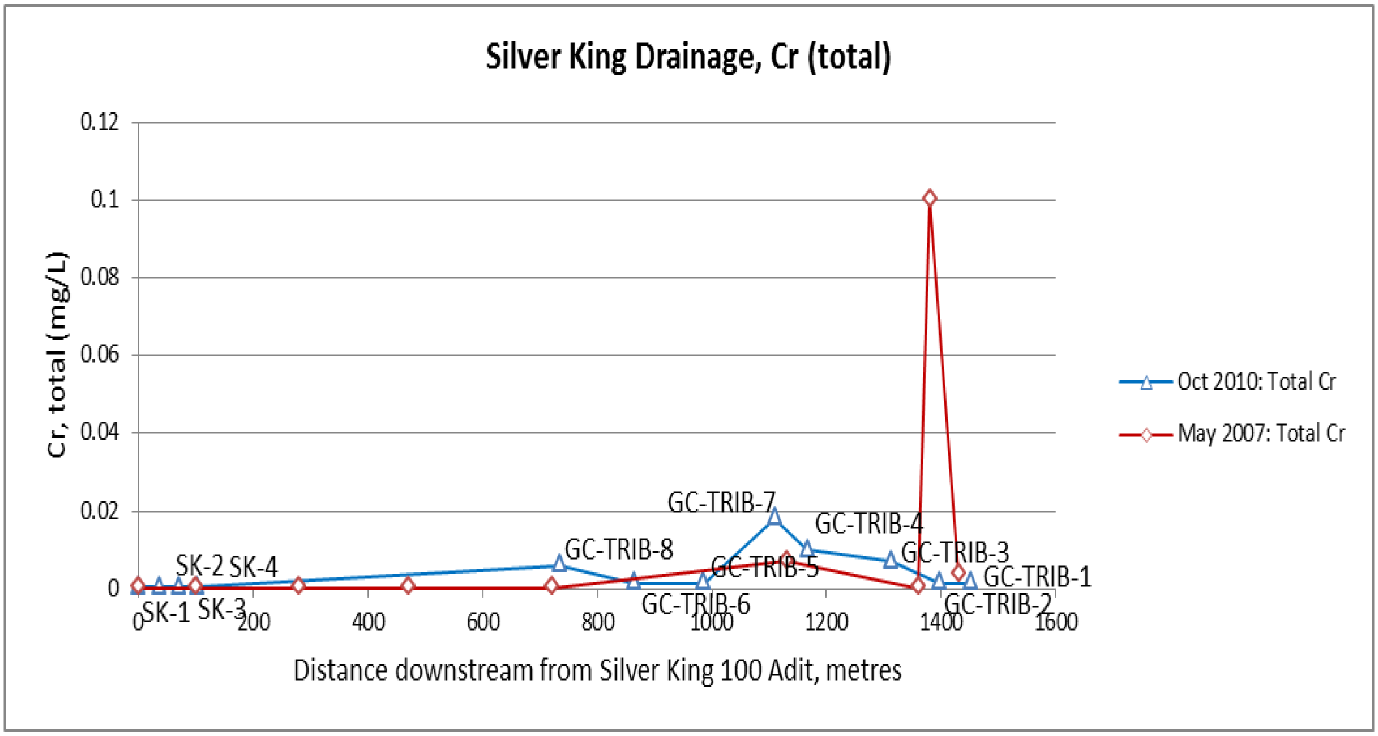

Silver King Drainage, Fe(total)
Fe, total (mg/L)
120
100
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
GC-TRIB-7
GC-TRIB-8
GC-TRIB-5
GC-TRIB-6
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
Oct 2010: Total Fe
May 2007: Total Fe

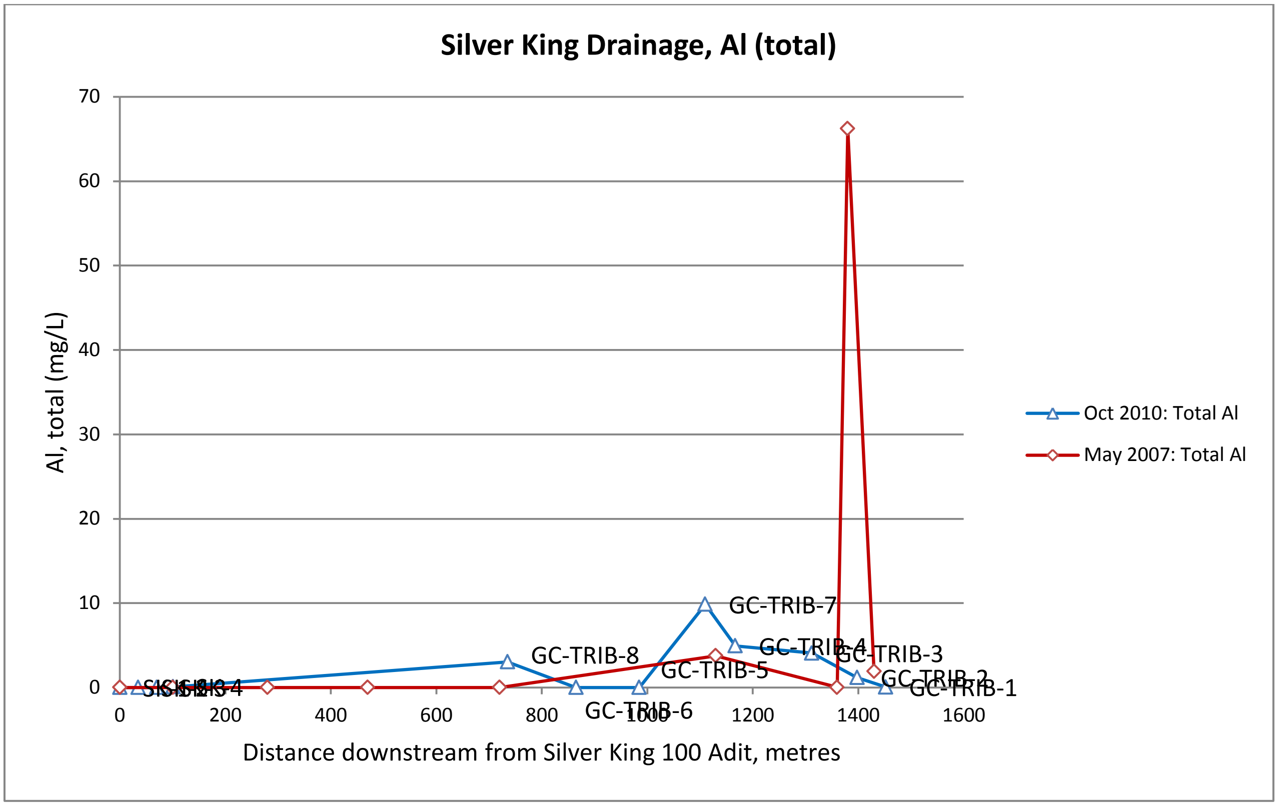

Silver King Drainage, Cu(total)
Cu, total (mg/L)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
SK-1
SK-2
SK-3
SK-4
GC-TRIB-7
GC-TRIB-8
GC-TRIB-5
GC-TRIB-6
GC-TRIB-4
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
Oct 2010: Total Cu
May 2007: Total Cu


Silver King Drainage, Ni(total)
Ni, total (mg/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
GC-TRIB-8
GC-TRIB-7
GC-TRIB-6
GC-TRIB-5
GC-TRIB-3
GC-TRIB-1
SK-3
SK-4
Oct 2010: Total Ni
May 2007: Total Ni

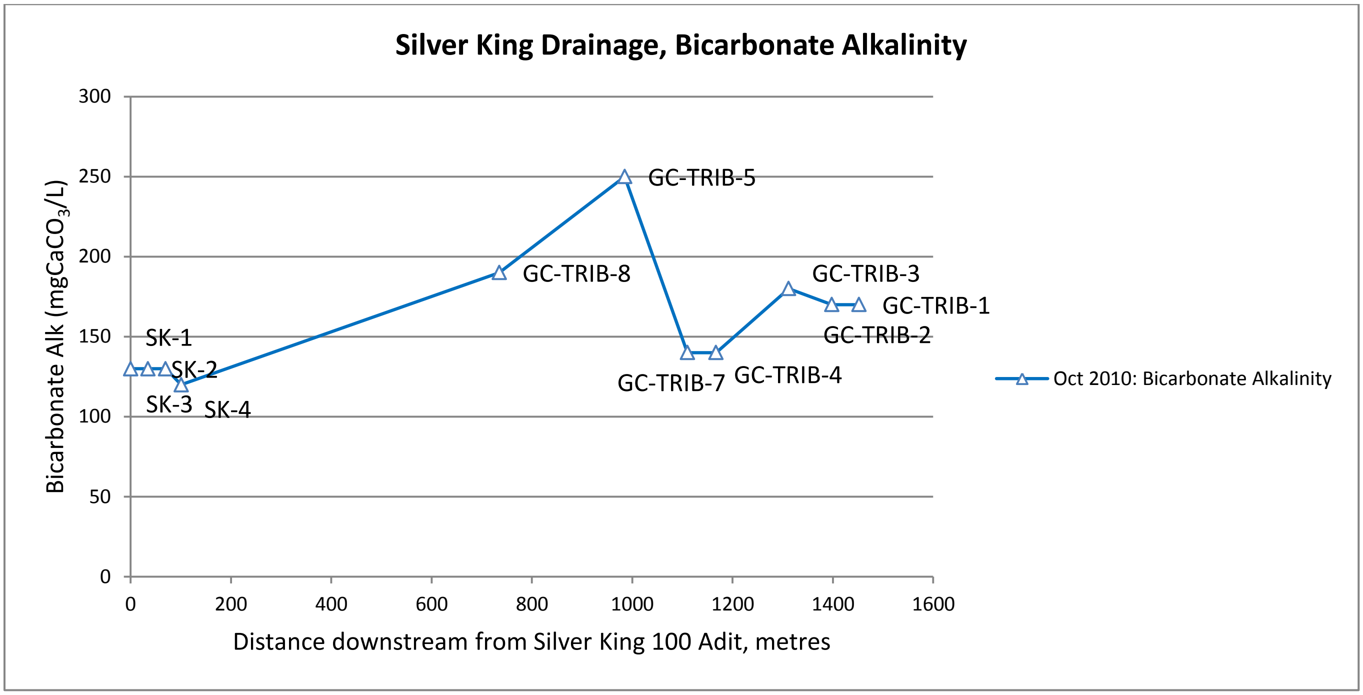

Silver King Drainage, Pb(total)
Pb, total (mg/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
GC-TRIB-8
GC-TRIB-7
GC-TRIB-6
GC-TRIB-5
GC-TRIB-3
GC-TRIB-1
SK-4
Oct 2010: Total Pb
May 2007: Total Pb

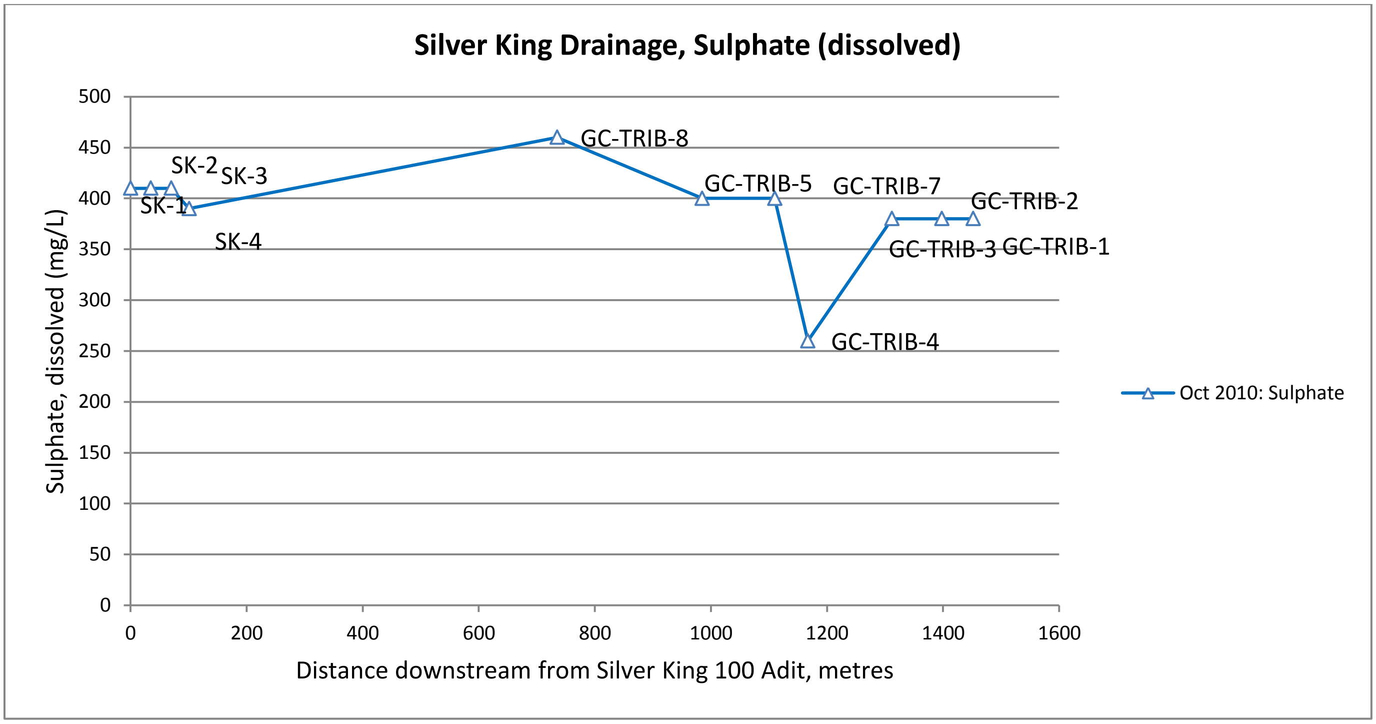

Silver King Drainage, As(total)
As, total (mg/L)
Distance downstream from Silver King 100 Adit, metres
Oct 2010: Total As
May 2007: Total As
GC-TRIB-7
GC-TRIB-8
GC-TRIB-5
GC-TRIB-6
GC-TRIB-4
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
SK-2
SK-3
SK-4

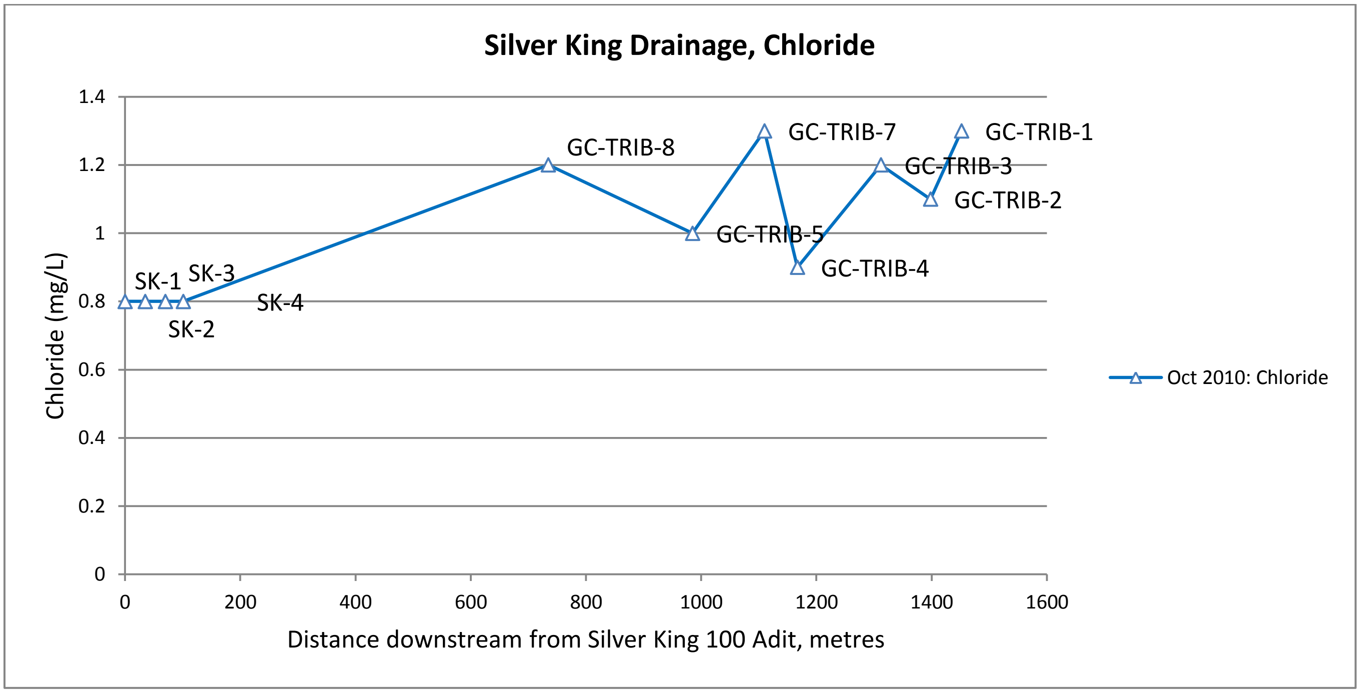

Silver King Drainage, Cr (total)
Cr, total (mg/L)
Distance downstream from Silver King 100 Adit, metres
Oct 2010: Total Cr
May 2007: Total Cr
GC-TRIB-7
GC-TRIB-4
GC-TRIB-8
GC-TRIB-3
GC-TRIB-5
GC-TRIB-1
GC-TRIB-6
GC-TRIB-2
SK-2 SK-4
SK-1 SK-3

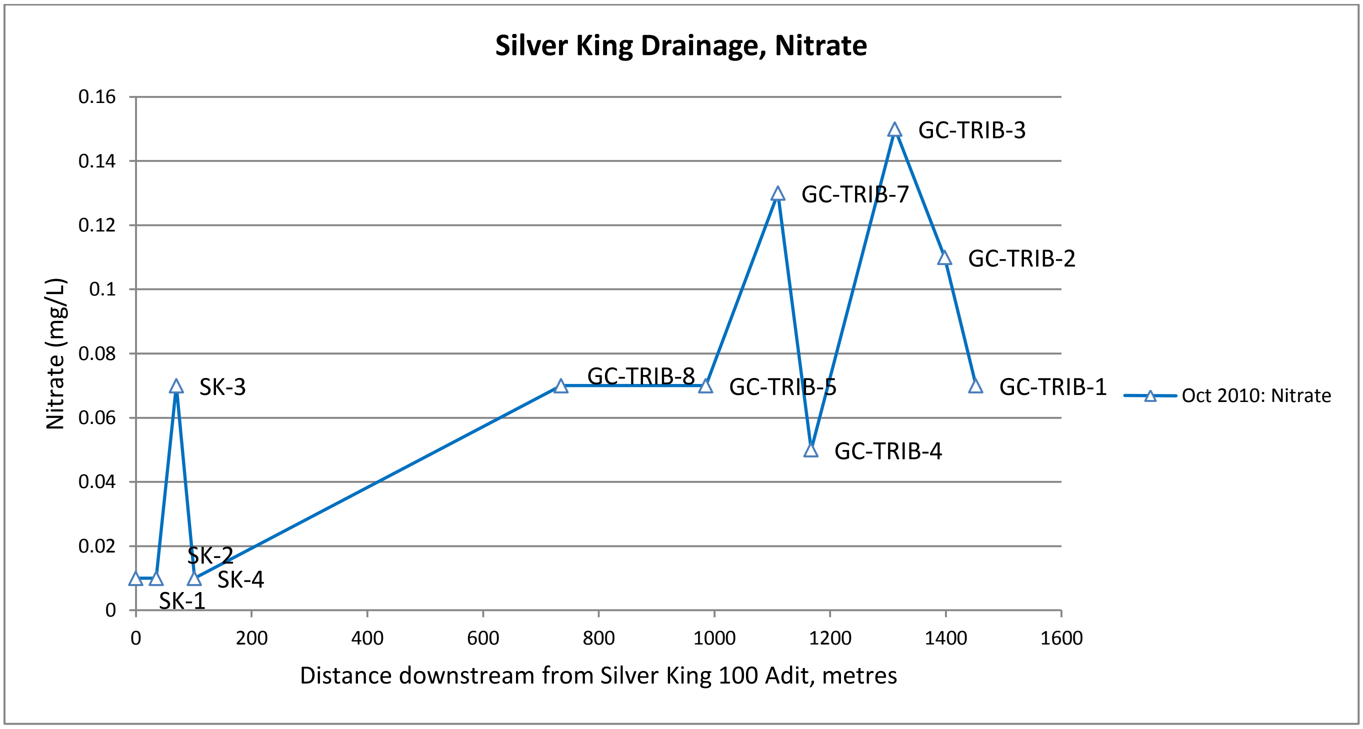

Silver King Drainage, Al (total)
Al, total (mg/L)
70
60
50
40
30
20
10
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
GC-TRIB-8
GC-TRIB-7
GC-TRIB-6
GC-TRIB-5
GC-TRIB-4
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
Oct 2010: Total Al
May 2007: Total Al

E.2.2 SILVER KING – ANIONS GRAPHS

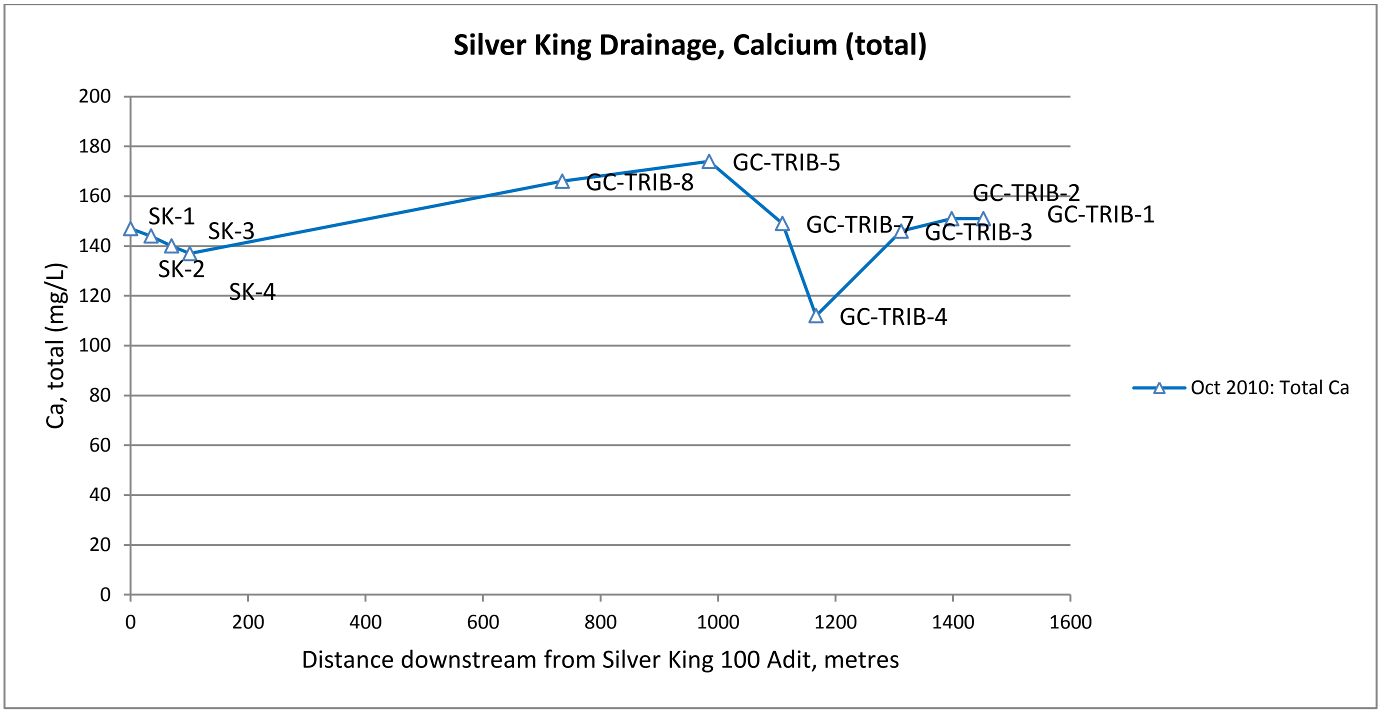


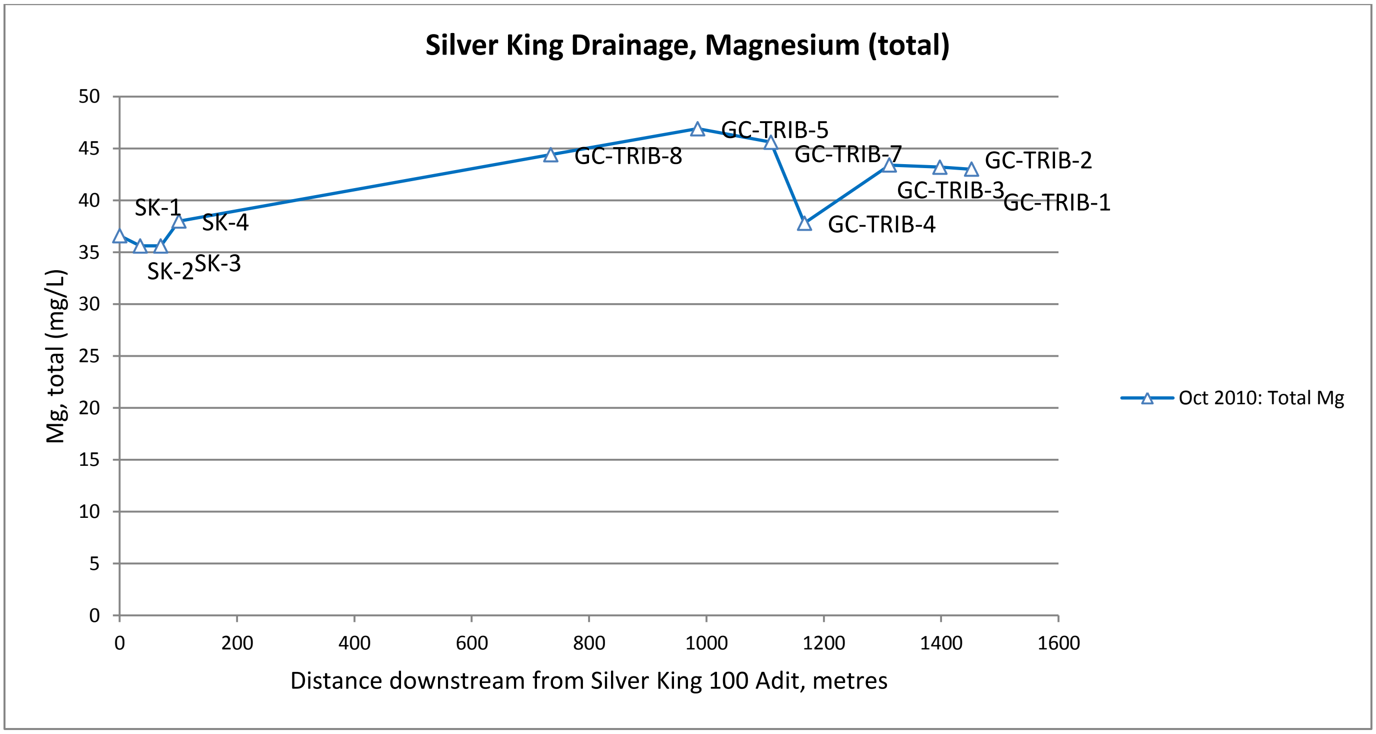


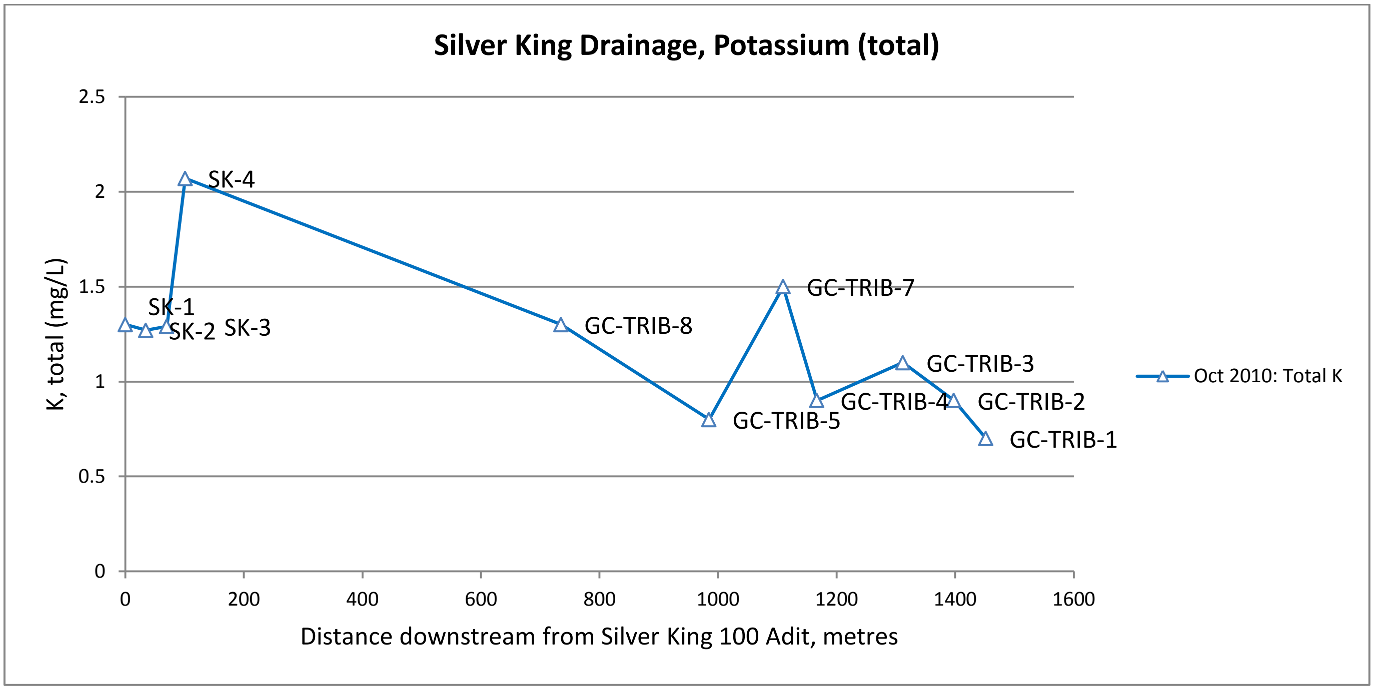

Silver King Drainage, Chloride
Chloride (mg/L)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
SK-1
SK-2
SK-3
SK-4
GC-TRIB-8
GC-TRIB-5
GC-TRIB-7
GC-TRIB-4
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
Oct 2010: Chloride

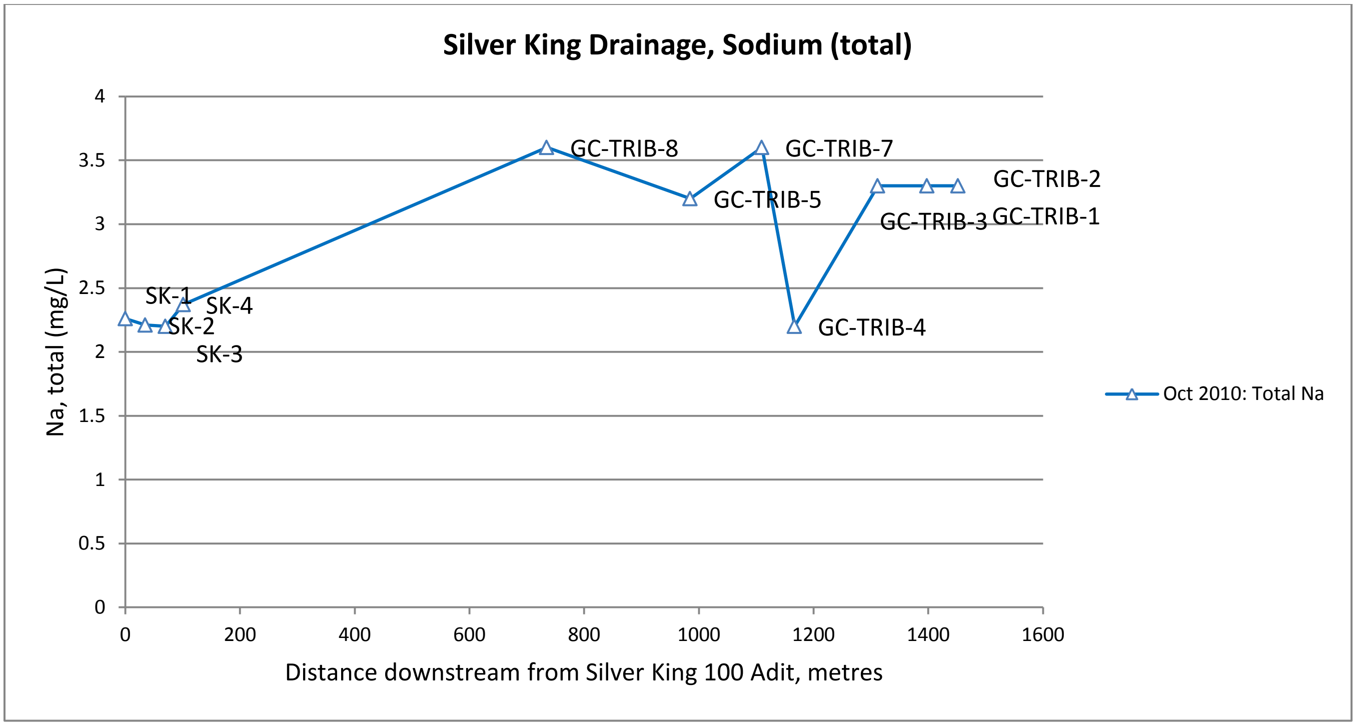

Silver King Drainage, Nitrate
Nitrate (mg/L)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
SK-1
SK-2
SK-3
SK-4
GC-TRIB-8
GC-TRIB-5
GC-TRIB-7
GC-TRIB-4
GC-TRIB-3
GC-TRIB-2
GC-TRIB-1
Oct 2010: Nitrate

E.2.3 SILVER KING – CATIONS GRAPHS

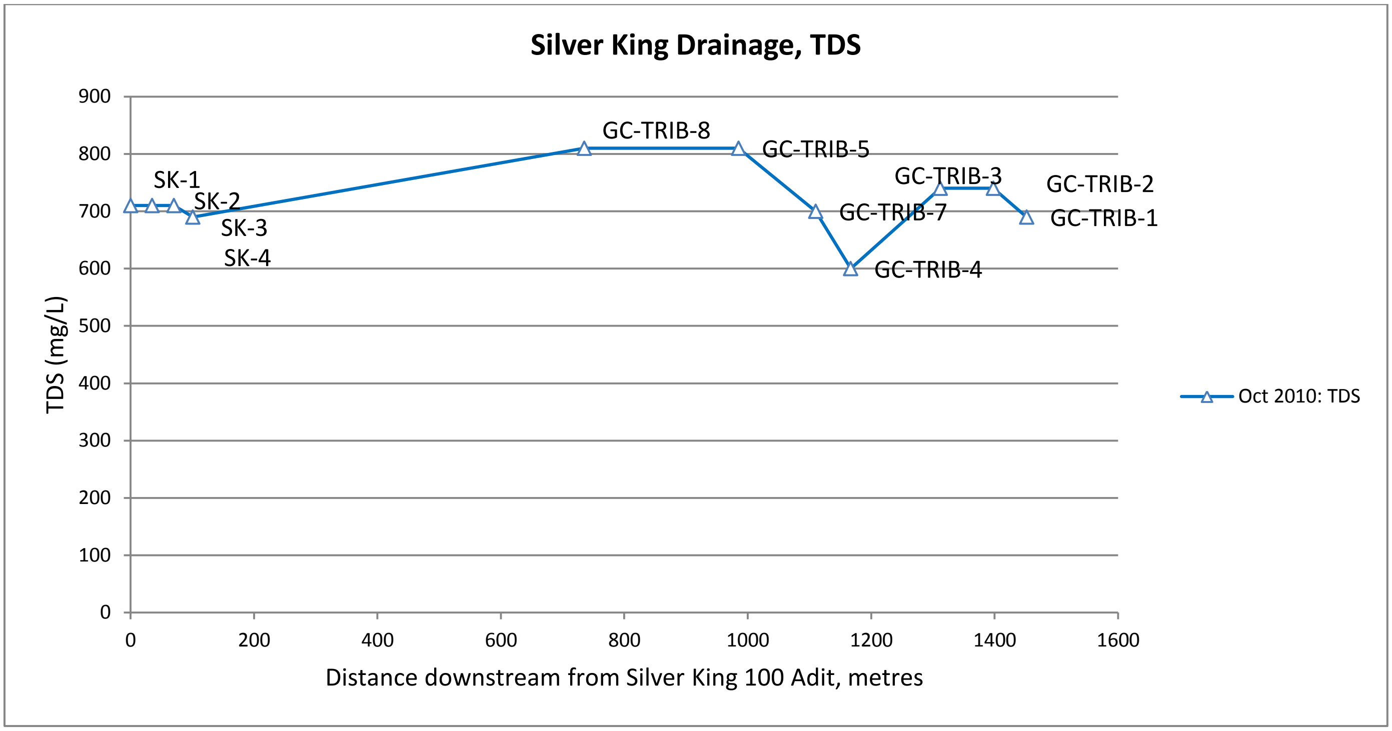


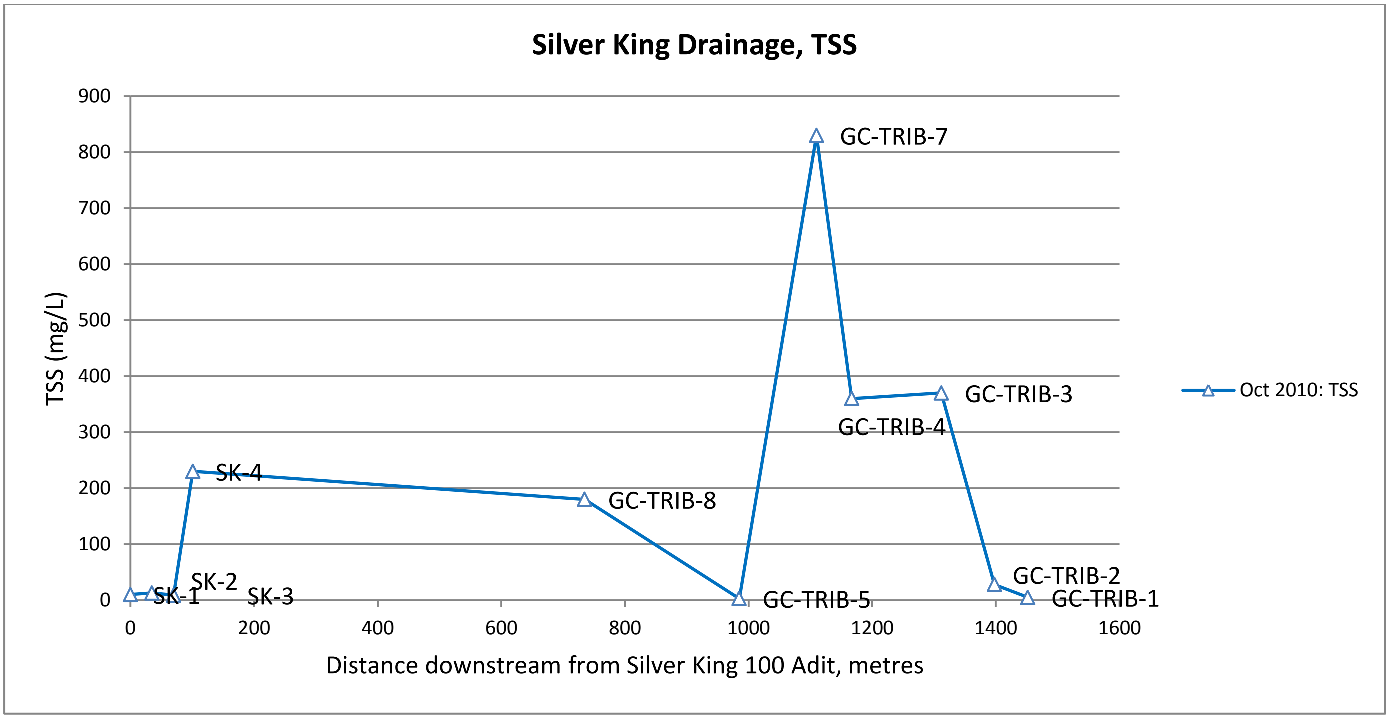



Silver King Drainage, Potassium (total)
K, total (mg/L)
2.5
2
1.5
1
0.5
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
SK-4
SK-1
SK-2
SK-3
GC-TRIB-8
GC-TRIB-7
GC-TRIB-3
GC-TRIB-4
GC-TRIB-2
GC-TRIB-5
GC-TRIB-1
Oct 2010: Total K


Silver King Drainage, Sodium (total)
Na, total (mg/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
0
200
400
600
800
1000
1200
1400
1600
Distance downstream from Silver King 100 Adit, metres
GC-TRIB-8
GC-TRIB-7
GC-TRIB-2
GC-TRIB-5
GC-TRIB-3
GC-TRIB-1
SK-1
SK-4
SK-2
SK-3
GC-TRIB-4
Oct 2010: Total Na

E.2.4 SILVER KING – PHYSICAL PARAMATERS GRAPHS





E.3 SILVER KING – TABLE OF PORE WATER CHEMISTRY DATA

		GC-4-PW	GC-5-PW	GC-TRIB-5-PW-12in	GC-TRIB-5-PW-3in
Dissolved Metals		9-Oct-2010	9-Oct-2010	9-Oct-2010	9-Oct-2010
Aluminum (Al)	mg/L	0.053	0.531	0.045	0.031
Arsenic (As)	mg/L	0.002	0.0117	0.0014	0.0009
Barium (Ba)	mg/L	0.044	0.068	0.112	0.076
Boron (B)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
Beryllium (Be)	mg/L	<0.001	<0.001	<0.001	<0.001
Bismuth (Bi)	mg/L	<0.05	<0.05	<0.05	<0.05
Cadmium (Cd)	mg/L	0.00065	0.00425	0.00006	0.00011
Cobalt (Co)	mg/L	<0.001	<0.001	0.002	0.002
Chromium (Cr)	mg/L	<0.0005	0.0007	0.0005	<0.0005
Copper (Cu)	mg/L	0.0026	0.0149	0.0011	0.0008
Iron (Fe)	mg/L	0.122	2.91	0.246	0.042
Lithium (Li)	mg/L	<0.005	<0.005	0.009	0.01
Manganese (Mn)	mg/L	0.012	0.071	0.519	0.024
Molybdenum (Mo)	mg/L	<0.001	<0.001	0.002	0.003
Nickel (Ni)	mg/L	<0.001	0.004	0.001	<0.001
Lead (Pb)	mg/L	0.0026	0.0194	<0.0002	0.0002
Antimony (Sb)	mg/L	0.0007	0.0012	<0.0005	<0.0005
Selenium (Se)	mg/L	0.0009	0.0003	0.0001	0.0003
Silicon (Si)	mg/L	3.33	4.7	3.72	4.16
Silver (Ag)	mg/L	0.0003	0.00035	0.00006	0.00003
Tin (Sn)	mg/L	<0.005	<0.005	<0.005	<0.005
Strontium (Sr)	mg/L	0.174	0.125	0.301	0.315
Titanium (Ti)	mg/L	<0.005	0.02	<0.005	<0.005
Thallium (Tl)	mg/L	<0.00005	0.0001	<0.00005	<0.00005
Uranium (U)	mg/L	0.0022	0.0013	0.003	0.0033
Vanadium (V)	mg/L	<0.005	<0.005	<0.005	<0.005
Zinc (Zn)	mg/L	0.008	0.106	<0.005	0.006
Zirconium (Zr)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005
Calcium (Ca)	mg/L	87.9	56.9	187	202
Potassium (K)	mg/L	1.21	0.44	1.08	2.31
Magnesium (Mg)	mg/L	25.7	19.6	51.7	53.5
Sodium (Na)	mg/L	2.85	2.12	4.02	4.22
Sulfur (S)	mg/L	40	23	159	163
Hardness (CaCO3) from dissolved metal scan	mg/L	326	223	679	725

Continued.

Total Metals		GC-4-PW	GC-5-PW	GC-TRIB-5-PW-12in	GC-TRIB-5-PW-3in
Aluminum (Al)	mg/L	21.1	5.16	227	26.2
Arsenic (As)	mg/L	0.213	0.0267	1.5	0.117
Barium (Ba)	mg/L	0.581	0.143	12.6	2.05
Beryllium (Be)	mg/L	<0.05	<0.05	<2	<0.1
Bismuth (Bi)	mg/L	0.0008	0.0002	0.01	0.0011
Boron (B)	mg/L	<0.001	<0.001	<0.04	<0.002
Cadmium (Cd)	mg/L	0.0267	0.00764	0.0421	0.0104
Cobalt (Co)	mg/L	0.0406	0.0057	0.325	0.048
Chromium (Cr)	mg/L	0.037	0.008	0.326	0.035
Copper (Cu)	mg/L	0.114	0.0307	1.16	0.146
Iron (Fe)	mg/L	64.3	13.2	669	56.9
Mercury (Hg)	mg/L	0.031	0.009	0.234	0.039
Lithium (Li)	mg/L	6.67	0.302	93.1	77.5
Manganese (Mn)	mg/L	0.0002	0.00005	0.001	<0.00004
Molybdenum (Mo)	mg/L	0.003	<0.001	<0.04	0.011
Nickel (Ni)	mg/L	0.079	0.017	1.12	0.143
Lead (Pb)	mg/L	0.77	0.0385	0.433	0.0798
Antimony (Sb)	mg/L	0.0217	0.0026	0.076	0.008
Selenium (Se)	mg/L	0.004	0.0009	0.037	0.0036
Silicon (Si)	mg/L	31.8	10.7	220	31.6
Silver (Ag)	mg/L	0.0604	0.00135	0.026	0.00191
Tin (Sn)	mg/L	<0.005	<0.005	<0.2	<0.01
Strontium (Sr)	mg/L	0.235	0.13	3.87	0.912
Titanium (Ti)	mg/L	0.264	0.087	3.31	0.302
Thallium (Tl)	mg/L	0.00139	0.00035	0.004	0.0009
Uranium (U)	mg/L	0.0041	0.0017	0.148	0.043
Vanadium (V)	mg/L	0.053	0.013	0.482	0.056
Zinc (Zn)	mg/L	1.18	0.257	3.11	0.935
Zirconium (Zr)	mg/L	0.0017	0.0006	0.036	0.003
Calcium (Ca)	mg/L	99.4	60	1680	427
Potassium (K)	mg/L	2.69	0.93	12	4.4
Magnesium (Mg)	mg/L	32.5	21.2	234	76.1
Sodium (Na)	mg/L	2.63	2.13	10	4.7
Sulfur (S)	mg/L	38	25	182	143
Hardness (CaCO3) from total metal scan	mg/L	382	237	5150	1380

Continued.

Other Paramaters		GC-4-PW	GC-5-PW	GC-TRIB-5-PW-12in	GC-TRIB-5-PW-3in
pH	pH units	7.81	8.22	7.72	7.74
Conductivity	µS/cm	576	425	1110	1130
Bicarbonate (HCO3)	mgCaCO3/L	240	190	240	260
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	200	160	200	210
Nitrate plus Nitrite (N)	mg/L	<0.02	<0.02	0.44	0.54
Nitrite (N)	mg/L	0.007	0.012	0.007	0.012
Nitrate (N)	mg/L	<0.02	<0.02	0.43	0.53
Nitrogen (N)	mg/L	1	0.6	1.8	2
Dissolved Chloride (Cl)	mg/L	1.4	1.6	2	2.8
Dissolved Sulfate (SO4)	mg/L	100	70	400	420
Dissolved Organic Carbon (C)	mg/L	4.1	17.2	6.7	4.4
Total Organic Carbon (C)	mg/L	5.8	18.3	54	6.3

E.4 GALENA CREEK TABLE OF CHEMISTRY DATA FROM FALL 2010

Dissolved Metals		GC-1 10/6/2010	GC-2 10/6/2010	GC-3 10/6/2010	GC-4 10/9/2010	GC-5 10/7/2010
Aluminum (Al)	mg/L	0.0086	0.012	0.0062	0.003	0.002
Arsenic (As)	mg/L	0.00235	0.002	0.00127	0.0003	0.00053
Barium (Ba)	mg/L	0.073	0.0682	0.0598	0.047	0.0363
Boron (B)	mg/L	<0.00001	<0.00005	<0.00001	<0.0001	<0.00001
Beryllium (Be)	mg/L	<0.000005	<0.00003	<0.000005	<0.001	<0.000005
Bismuth (Bi)	mg/L	<0.05	<0.3	<0.05	<0.05	<0.05
Cadmium (Cd)	mg/L	0.000166	0.00026	0.000299	0.00004	0.000029
Cobalt (Co)	mg/L	0.0005	<0.0005	0.0005	<0.001	0.0003
Chromium (Cr)	mg/L	0.000169	<0.00003	0.000013	<0.0005	0.000044
Copper (Cu)	mg/L	0.00074	0.001	0.00105	0.0007	0.00041
Iron (Fe)	mg/L	0.03	0.009	0.005	<0.005	0.023
Lithium (Li)	mg/L	0.0023	0.003	0.0023	<0.005	0.0044
Manganese (Mn)	mg/L	0.0127	0.0009	0.0018	0.002	0.045
Molybdenum (Mo)	mg/L	0.00128	0.0011	0.00118	<0.001	0.00048
Nickel (Ni)	mg/L	0.00158	0.0017	0.00094	<0.001	0.00043
Lead (Pb)	mg/L	0.000134	0.00005	0.000078	<0.0002	0.000024
Antimony (Sb)	mg/L	0.00045	0.0006	0.00067	0.0011	0.00056
Selenium (Se)	mg/L	0.00082	0.001	0.00073	0.0004	0.0002
Silicon (Si)	mg/L	3.1	2.81	2.84	2.93	2.73
Silver (Ag)	mg/L	<0.000005	<0.00003	<0.000005	<0.00002	<0.000005
Tin (Sn)	mg/L	<0.00001	<0.00005	<0.00001	<0.005	<0.00001
Strontium (Sr)	mg/L	0.185	0.19	0.181	0.164	0.184
Titanium (Ti)	mg/L	<0.0005	<0.003	<0.0005	<0.005	<0.0005
Thallium (Tl)	mg/L	0.000021	0.00002	0.000017	<0.00005	<0.000002
Uranium (U)	mg/L	0.00143	0.0015	0.00168	0.001	0.00175
Vanadium (V)	mg/L	<0.0002	<0.001	<0.0002	<0.005	<0.0002
Zinc (Zn)	mg/L	0.0088	0.0177	0.0131	<0.005	0.0017
Zirconium (Zr)	mg/L	<0.0001	<0.0005	<0.0001	<0.0005	<0.0001
Calcium (Ca)	mg/L	65.9	65.9	65	67.4	69.7
Potassium (K)	mg/L	0.36	0.4	0.45	0.36	0.51
Magnesium (Mg)	mg/L	18.1	19.2	18.4	18.6	19.3
Sodium (Na)	mg/L	0.99	1.1	1.03	1.03	1.78
Sulfur (S)	mg/L	17	1980	21	18	22
Hardness (CaCO3) from dissolved metal scan	mg/L	239	244	238	245	253

Continued

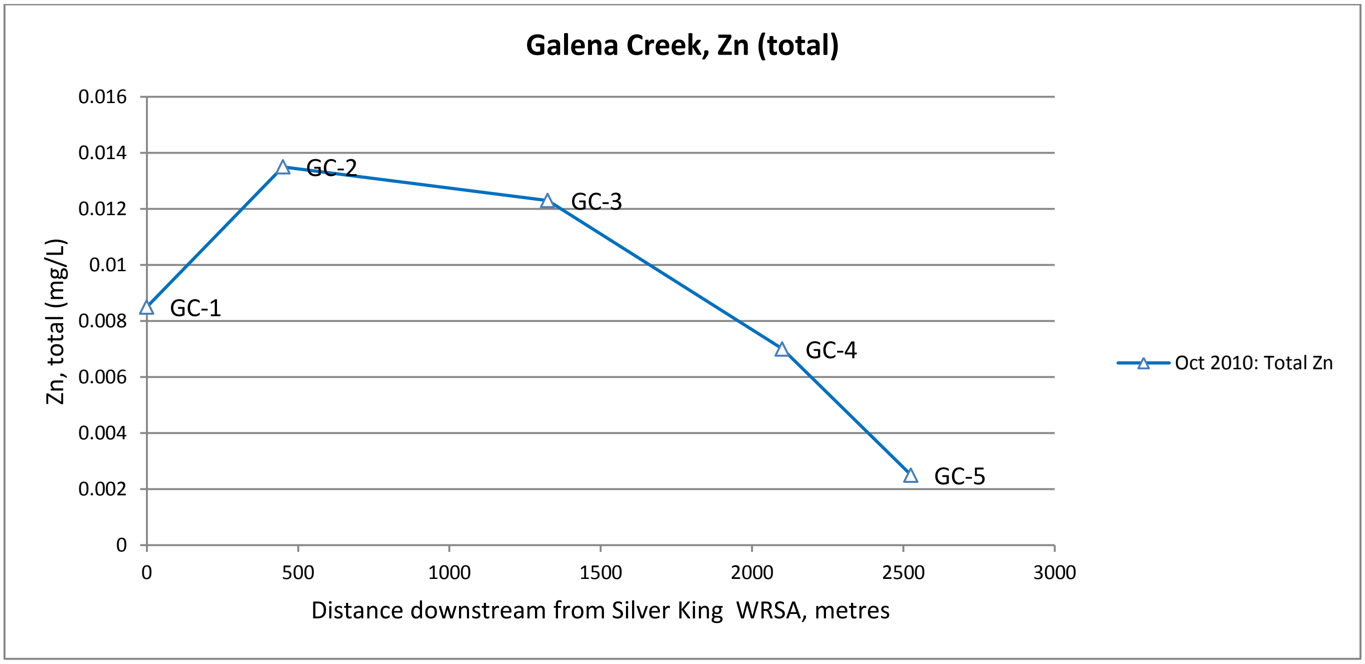
Total Metals		GC-1	GC-2	GC-3	GC-4	GC-5
Aluminum (Al)	mg/L	0.0093	0.0083	0.0094	0.011	<0.02
Arsenic (As)	mg/L	0.00228	0.00191	0.00138	0.0003	0.0005
Barium (Ba)	mg/L	0.0762	0.0649	0.0579	0.048	0.0382
Beryllium (Be)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.3
Bismuth (Bi)	mg/L	<0.00001	<0.00001	<0.00001	<0.0001	<0.00005
Boron (B)	mg/L	<0.000005	<0.000005	<0.000005	<0.001	<0.0001
Cadmium (Cd)	mg/L	0.000185	0.000247	0.00029	0.00004	0.00004
Cobalt (Co)	mg/L	0.00015	0.000021	0.000028	<0.0005	0.00005
Chromium (Cr)	mg/L	0.0003	0.0005	0.0004	<0.001	<0.003
Copper (Cu)	mg/L	0.0007	0.00094	0.00104	0.0008	0.001
Iron (Fe)	mg/L	0.034	0.013	0.018	0.033	0.048
Mercury (Hg)	mg/L	0.0021	0.0023	0.0022	<0.005	0.004
Lithium (Li)	mg/L	0.0123	0.00145	0.00443	0.003	0.0507
Manganese (Mn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00002	
Molybdenum (Mo)	mg/L	0.00128	0.00118	0.00101	<0.001	0.0005
Nickel (Ni)	mg/L	0.00151	0.0014	0.00096	<0.001	<0.0005
Lead (Pb)	mg/L	0.000174	0.00008	0.00016	<0.0002	<0.0003
Antimony (Sb)	mg/L	0.00037	0.00051	0.00055	0.0011	0.0005
Selenium (Se)	mg/L	0.00077	0.00074	0.00069	0.0004	0.0003
Silicon (Si)	mg/L	2.66	2.55	2.5	2.98	3.65
Silver (Ag)	mg/L	<0.000005	<0.000005	0.000008	0.00002	<0.00003
Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.005	<0.001
Strontium (Sr)	mg/L	0.183	0.181	0.17	0.157	0.194
Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	<0.005	<0.03
Thallium (Tl)	mg/L	0.00002	0.000019	0.000017	<0.00005	<0.00001
Uranium (U)	mg/L	0.00132	0.00146	0.00142	0.001	0.00165
Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.005	<0.003
Zinc (Zn)	mg/L	0.0085	0.0135	0.0123	0.007	<0.005
Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005
Calcium (Ca)	mg/L	58.1	60.2	59.2	65.6	79.8
Potassium (K)	mg/L	0.35	0.38	0.43	0.35	0.6
Magnesium (Mg)	mg/L	18.1	19.1	18.8	18.9	21.9
Sodium (Na)	mg/L	0.97	1.03	1.02	0.97	2
Sulfur (S)	mg/L	17	20	20	24	<50
Hardness (CaCO3) from total metal scan	mg/L	220	229	225	241	289

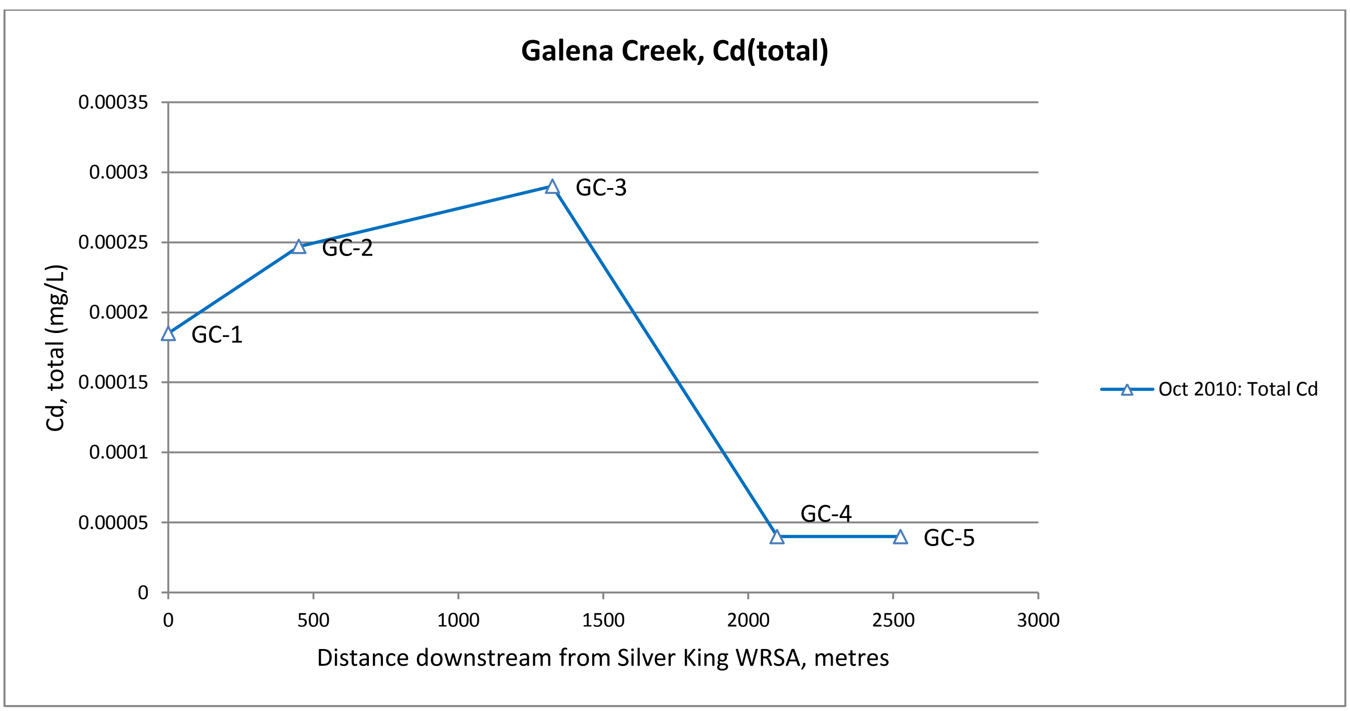
Continued

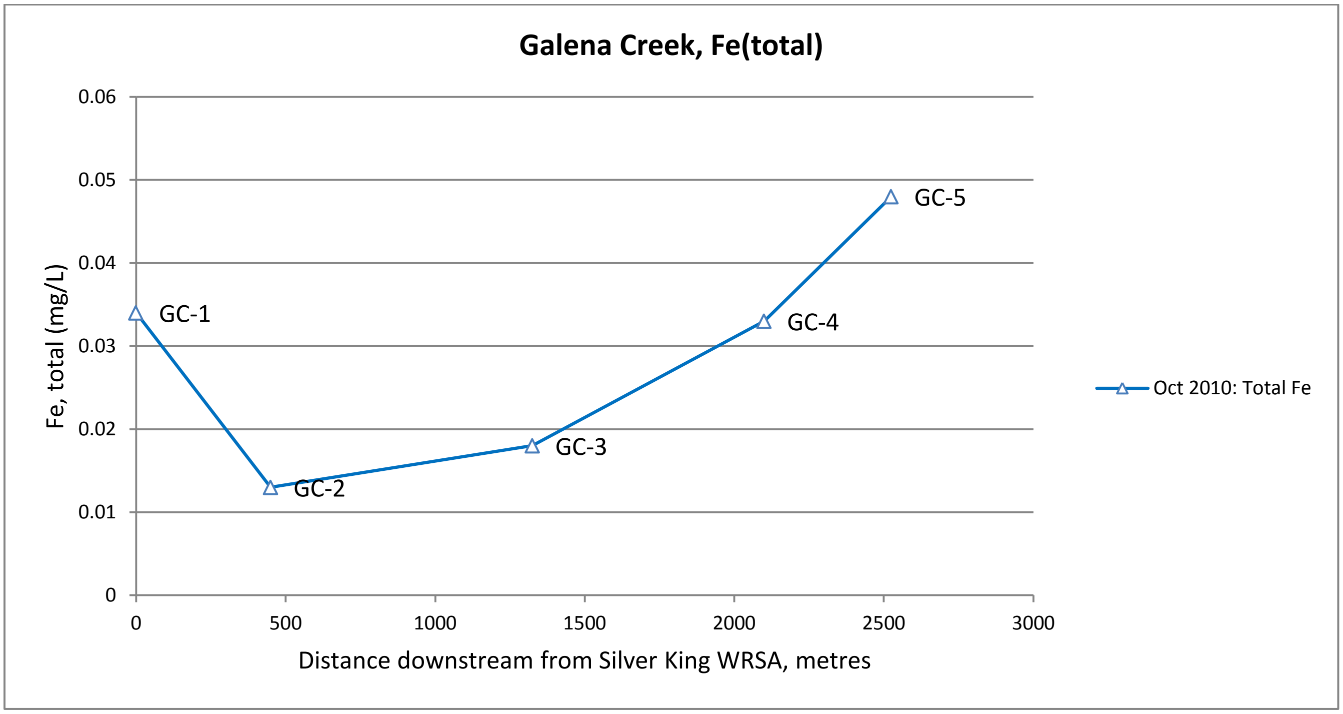
Other Paramaters		GC-1	GC-2	GC-3	GC-4	GC-5
pH	pH units	8.3	8.3	8.23	8.05	8.34
Conductivity	µS/cm	424	445	433	459	513
Bicarbonate (HCO3)	mgCaCO3/L	230	220	220	240	250
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	2.7
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	180	180	180	190	210
Nitrate plus Nitrite (N)	mg/L	0.12	0.21	0.03	0.11	0.04
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate (N)	mg/L	0.12	0.21	0.03	0.11	0.04
Nitrogen (N)	mg/L	0.26	0.28	0.17	0.15	0.18
Dissolved Chloride (Cl)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Sulfate (SO4)	mg/L	44	58	60	48	68
Dissolved Organic Carbon (C)	mg/L	2.2	3.1	3.8	3.1	2.9
Total Organic Carbon (C)	mg/L	3	3.5	4.1	3	3
Total Dissolved Solids	mg/L	240	260	260	240	330
Total Suspended Solids	mg/L	<4	<4	<4	1	<1

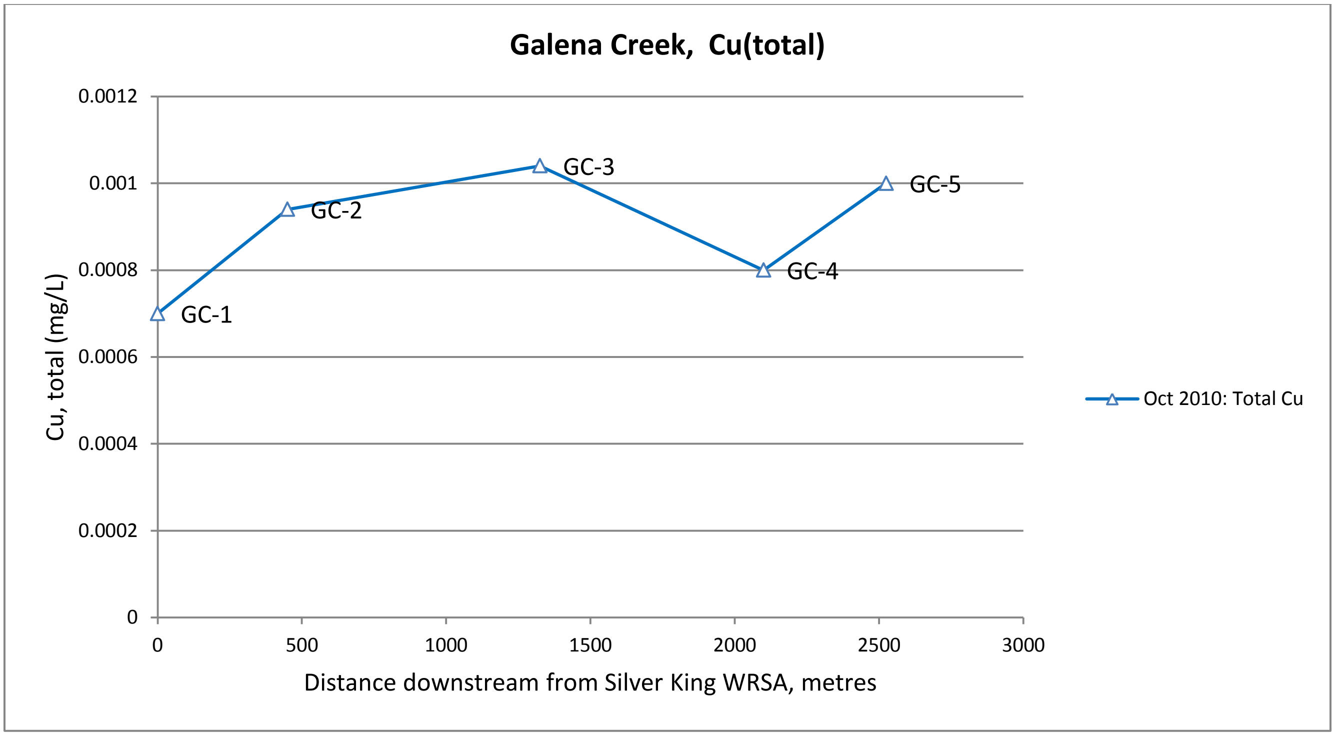
E.5 GALENA CREEK – GRAPHS OF KEY CONSTITUENTS

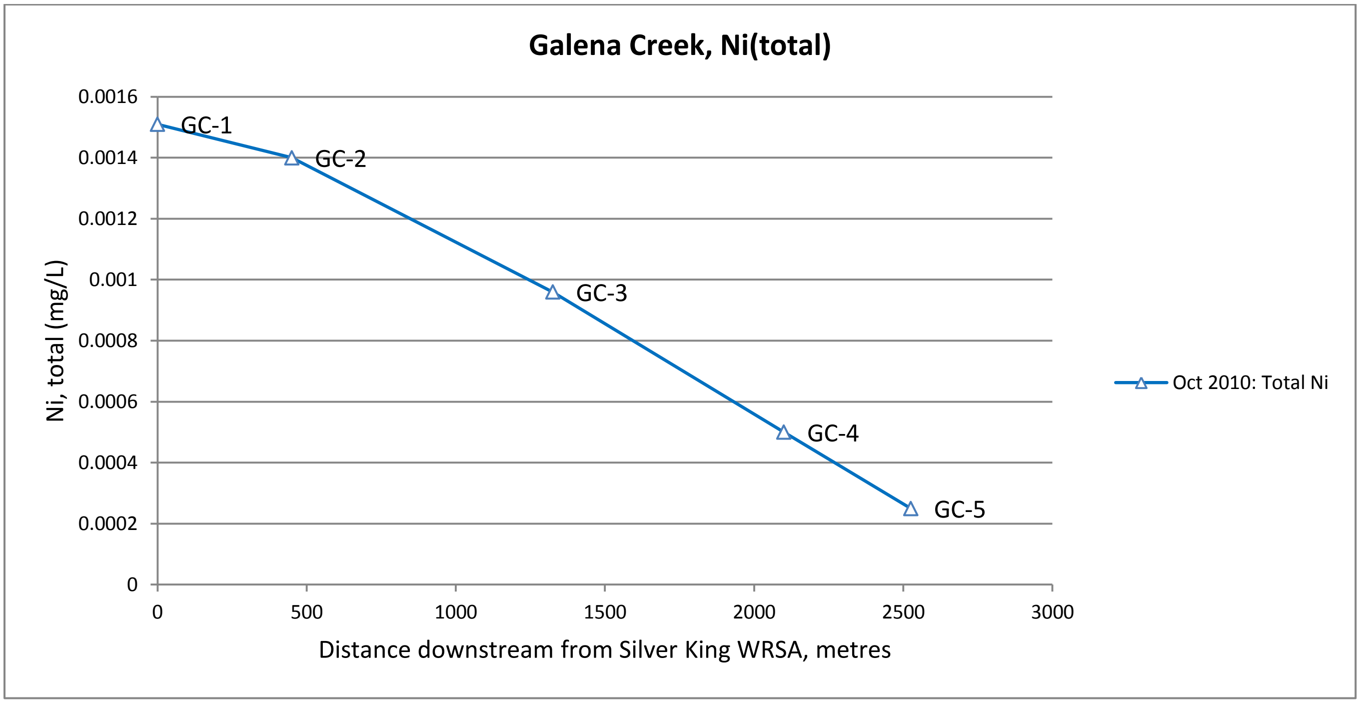
E.5.1 GALENA CREEK – METAL GRAPHS

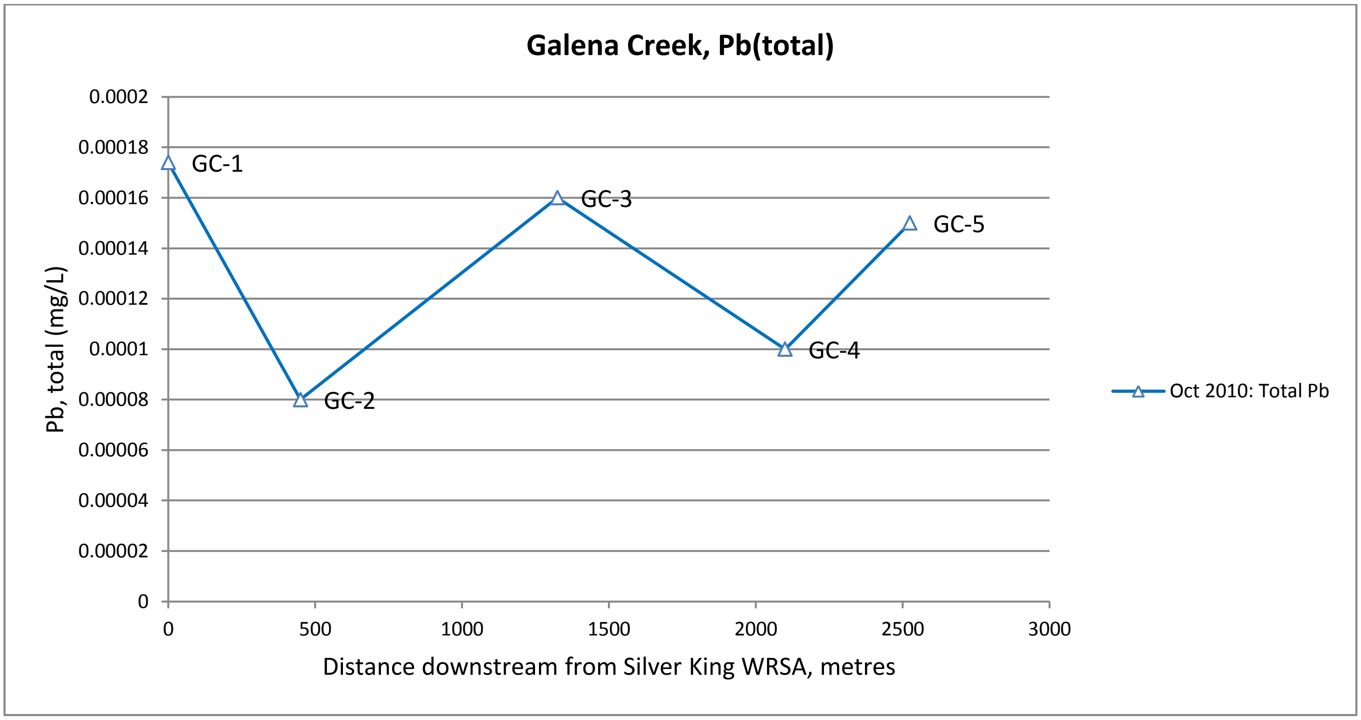


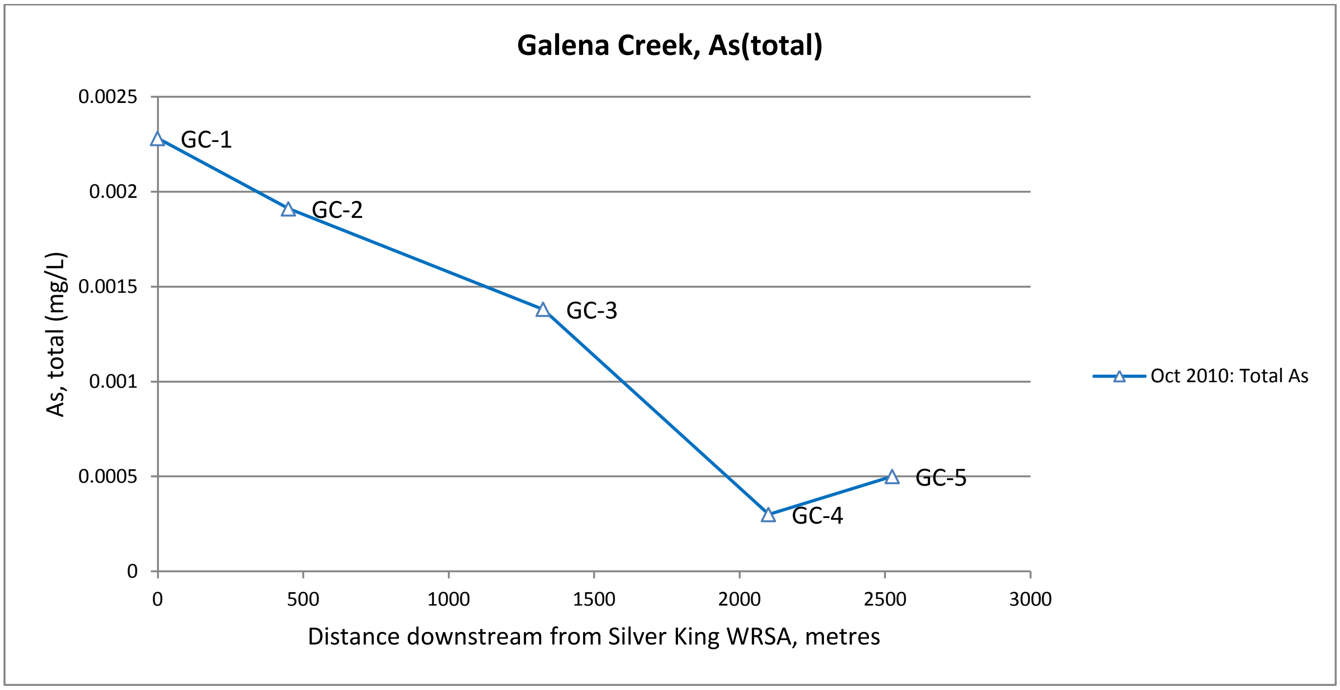


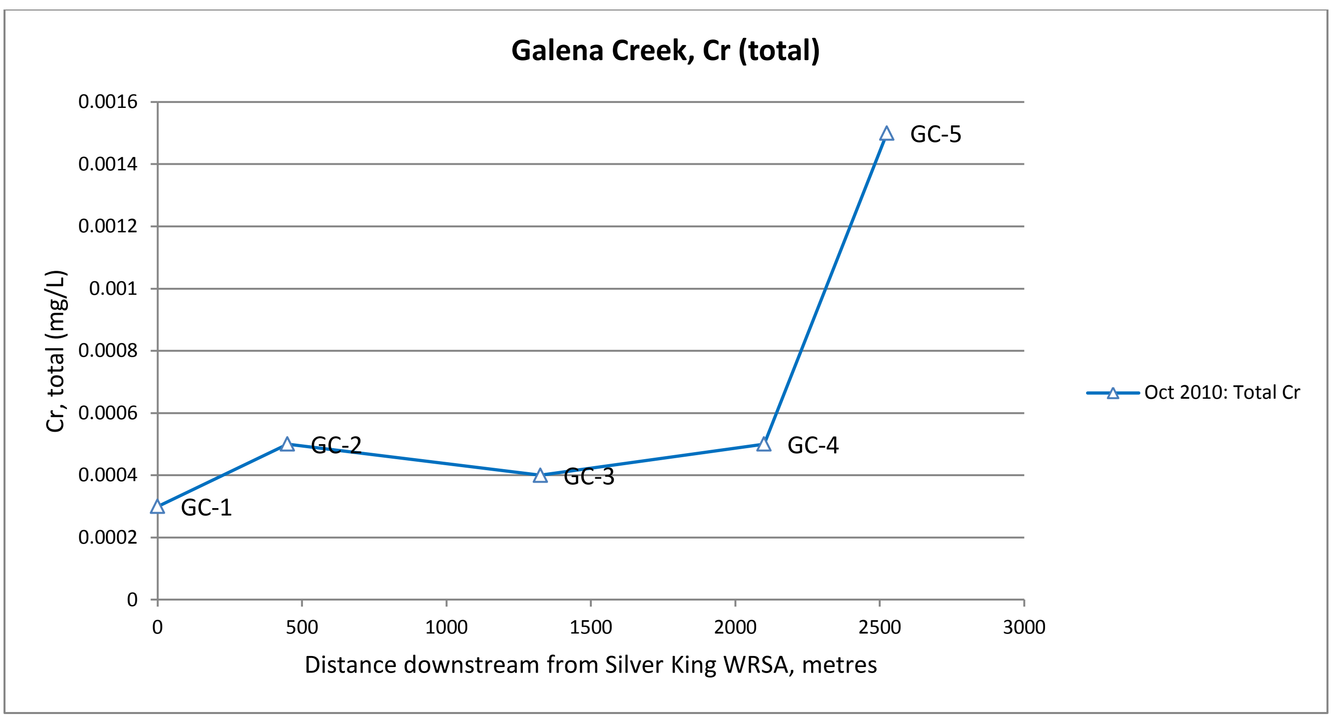

Galena Creek, Fe(total)
Fe, total (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Total Fe

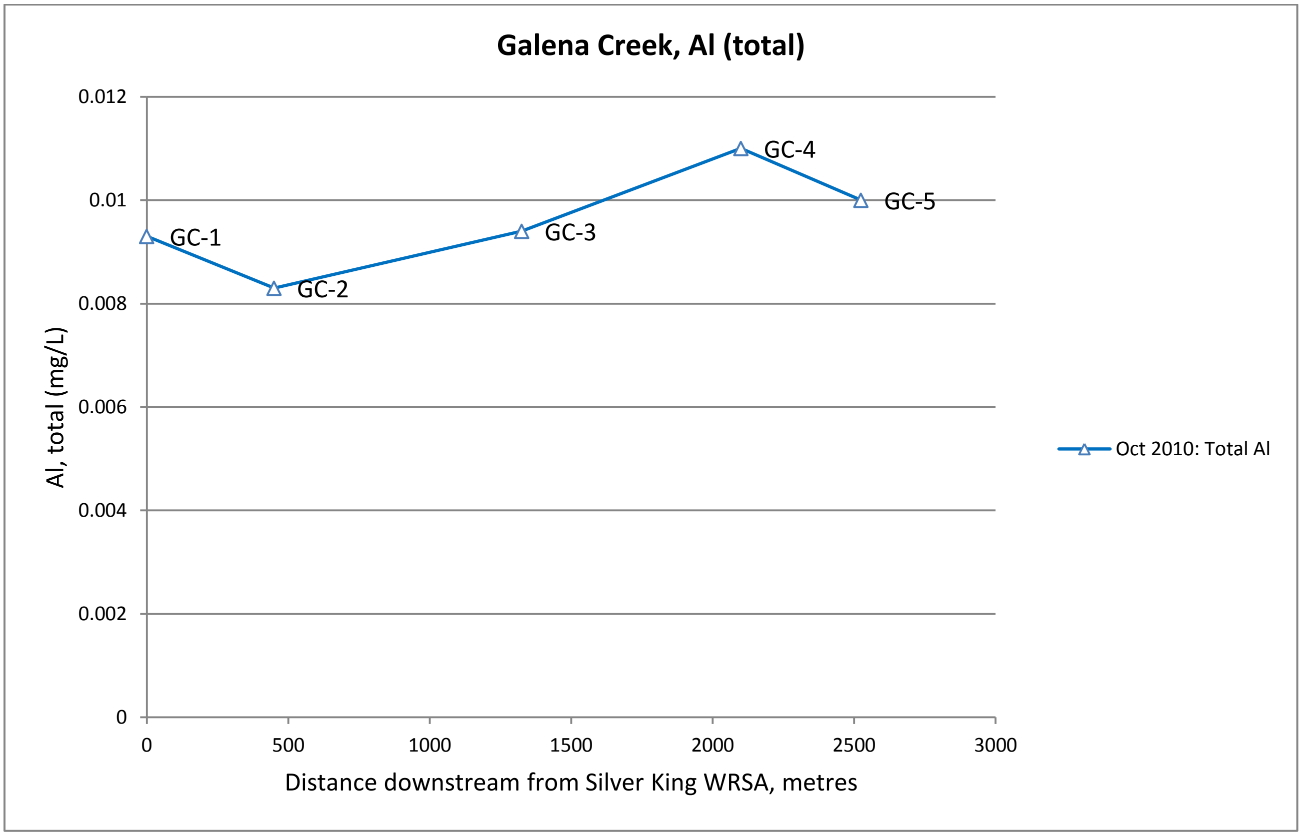

Galena Creek, Cu(total)
Cu, total (mg/L)
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Total Cu


Galena Creek, Ni(total)
Ni, total (mg/L)
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Total Ni

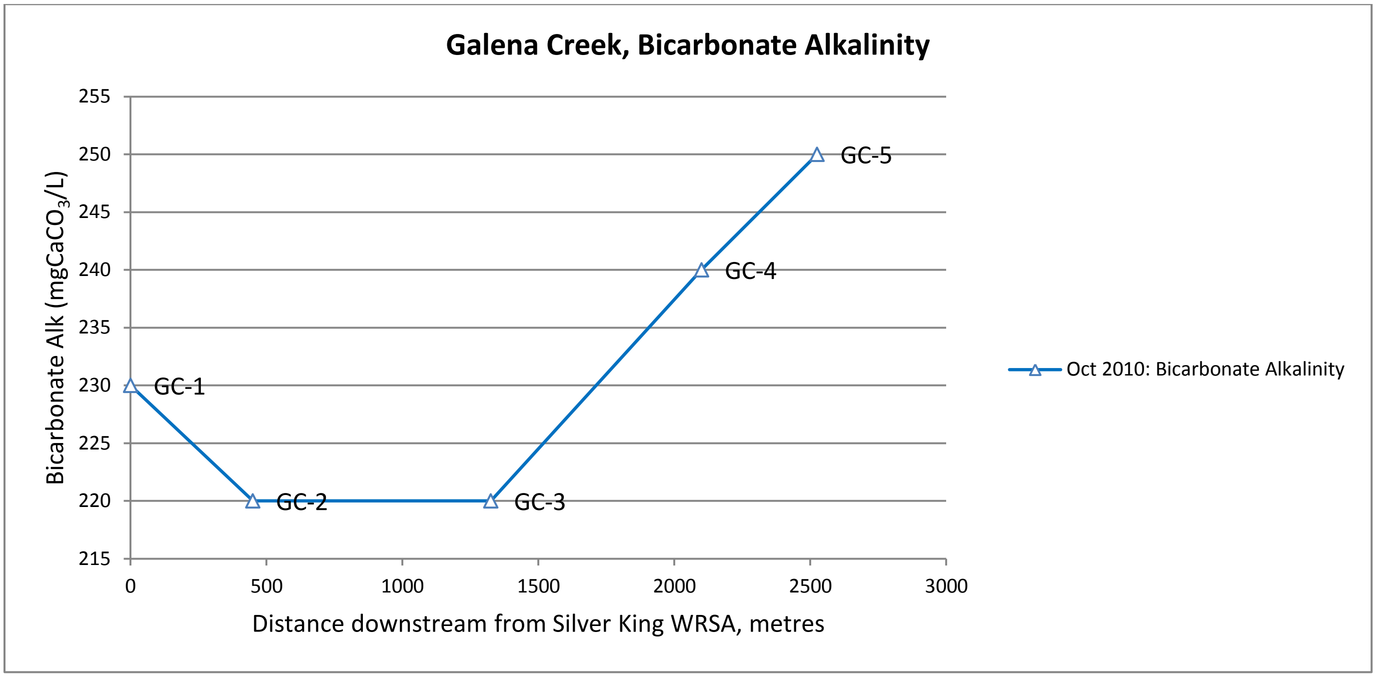

Galena Creek, Pb(total)
Pb, total (mg/L)
0.0002
0.00018
0.00016
0.00014
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Total Pb

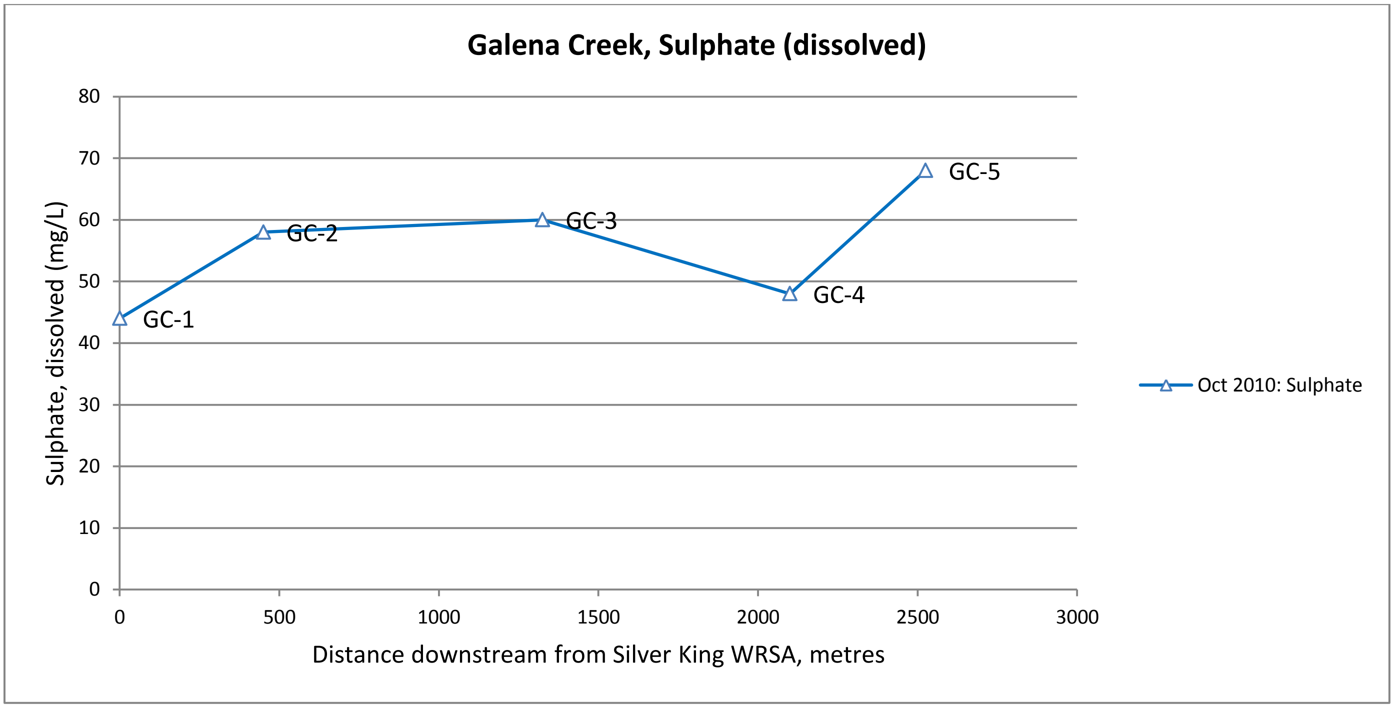

Galena Creek, As(total)
As, total (mg/L)
0.0025
0.002
0.0015
0.001
0.0005
0
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
GC-1
GC-2
GC-3
GC-4
GC-5
Oct 2010: Total As

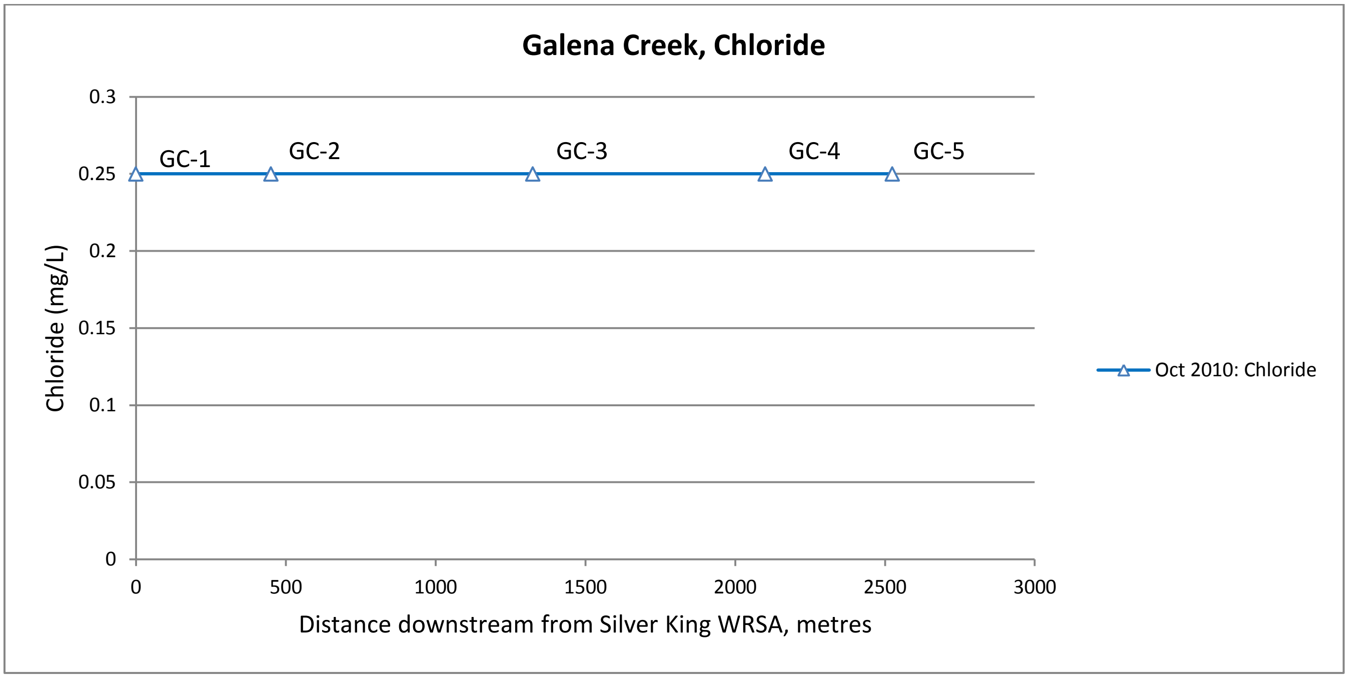

Galena Creek, Cr (total)
Cr, total (mg/L)
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
GC-1
GC-2
GC-3
GC-4
GC-5
Oct 2010: Total Cr

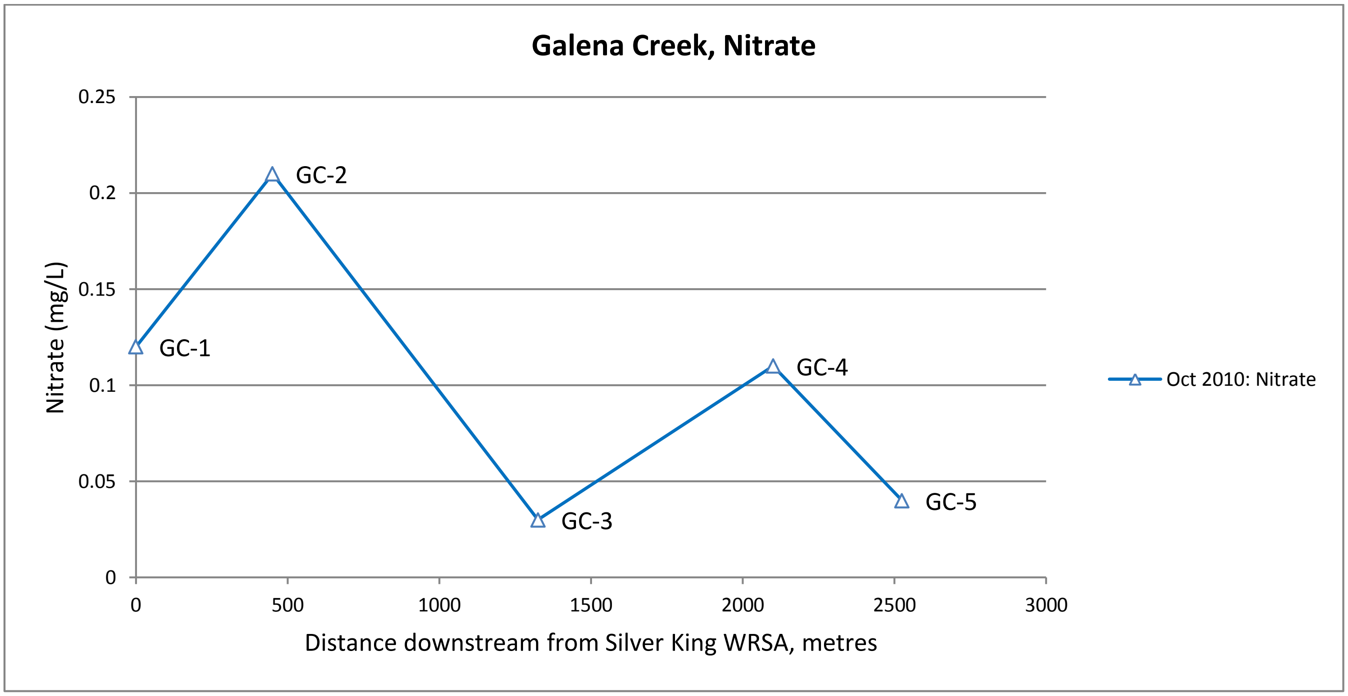

Galena Creek, Al (total)
0.012
0.01
0.008
0.006
0.004
0.002
0
Al, total (mg/L)
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Total Al

E.5.2 GALENA CREEK – ANIONS GRAPHS

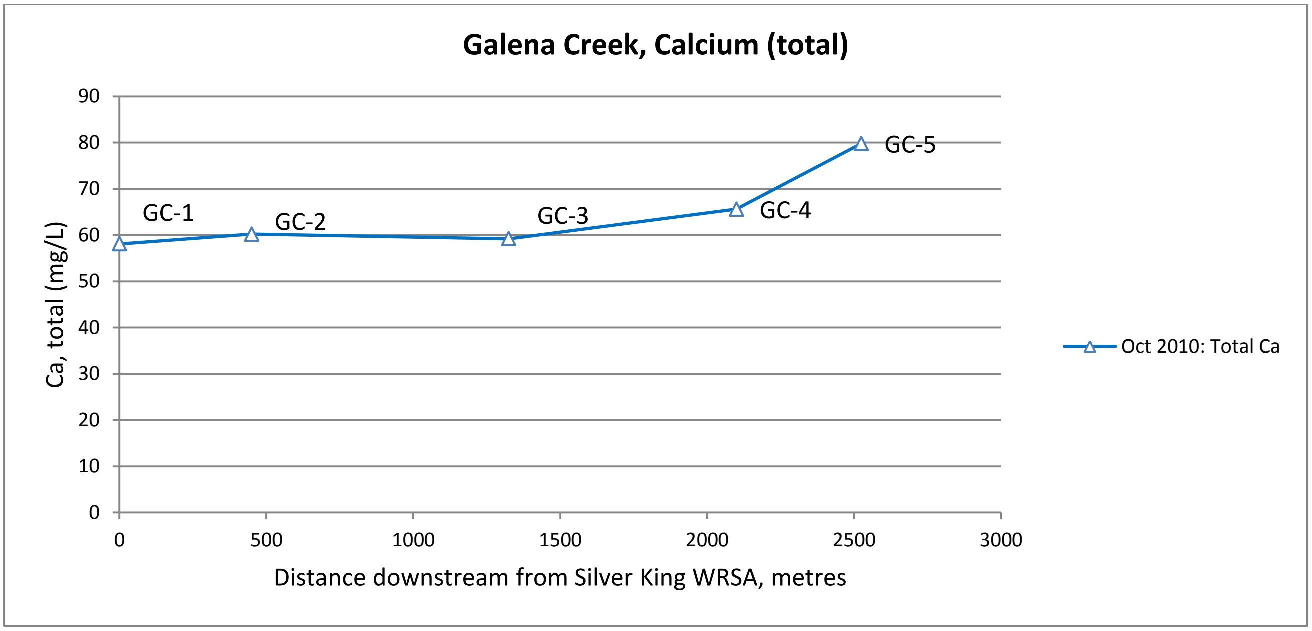


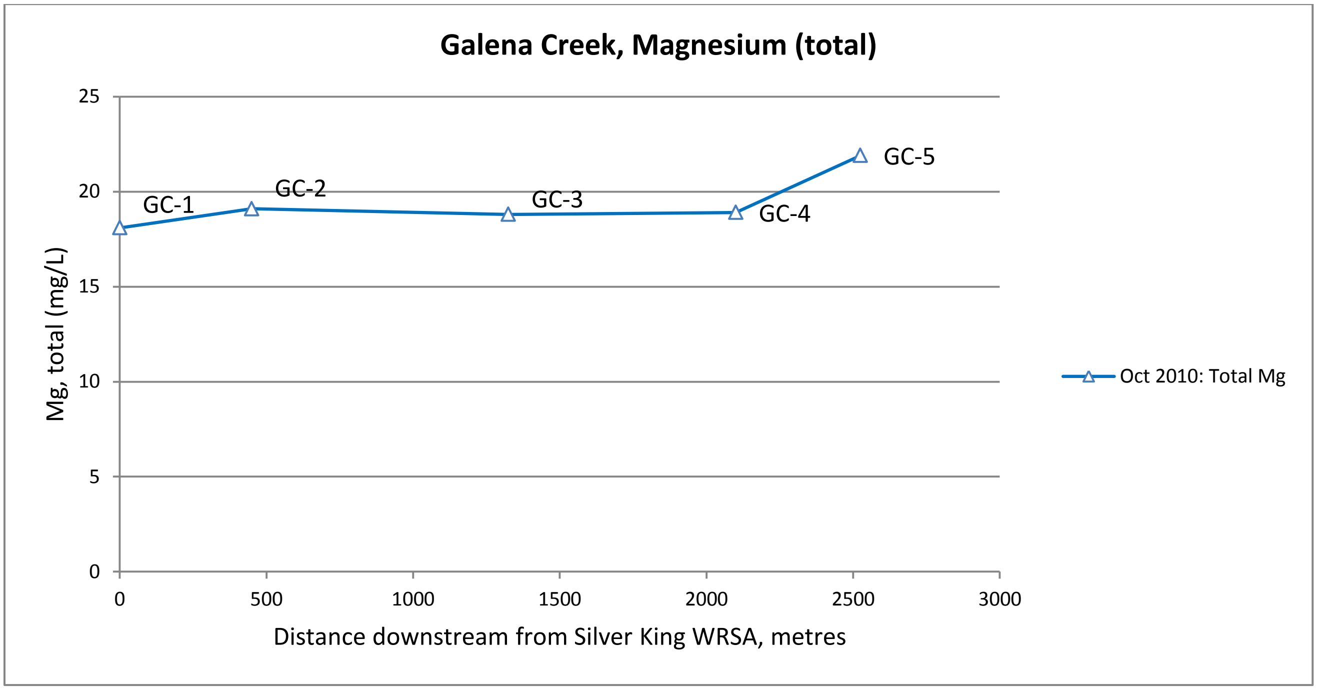


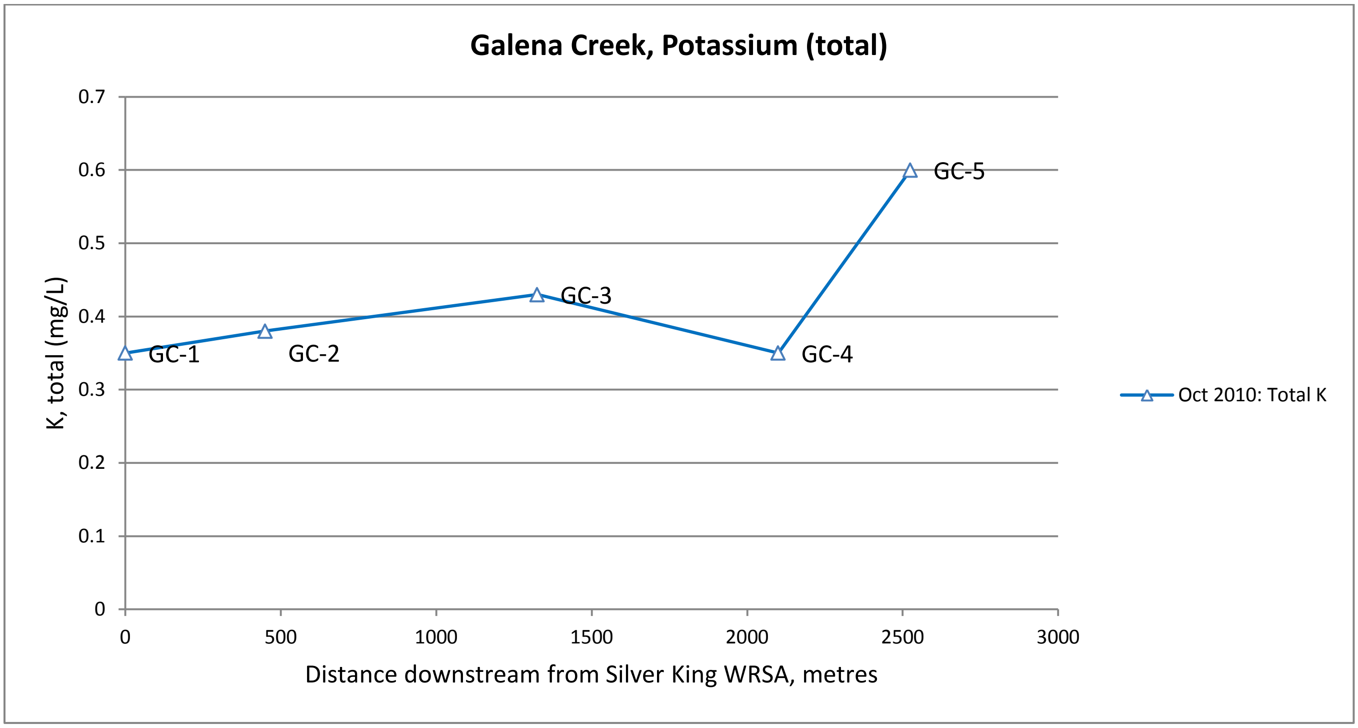

Galena Creek, Chloride
Chloride (mg/L)
0.3
0.25
0.2
0.15
0.1
0.05
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Chloride

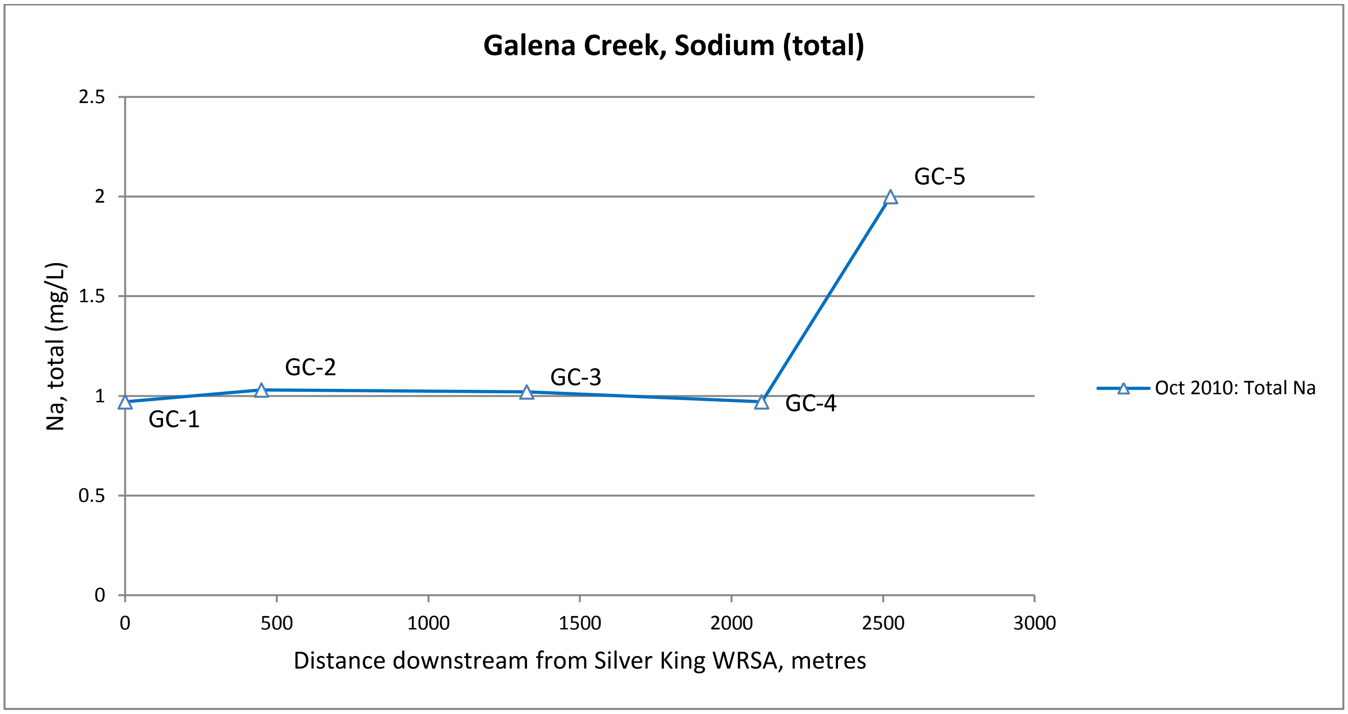

Galena Creek, Nitrate
Nitrate (mg/L)
0.25
0.2
0.15
0.1
0.05
0
GC-1
GC-2
GC-3
GC-4
GC-5
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
Oct 2010: Nitrate

E.5.3 GALENA CREEK – CATIONS GRAPHS

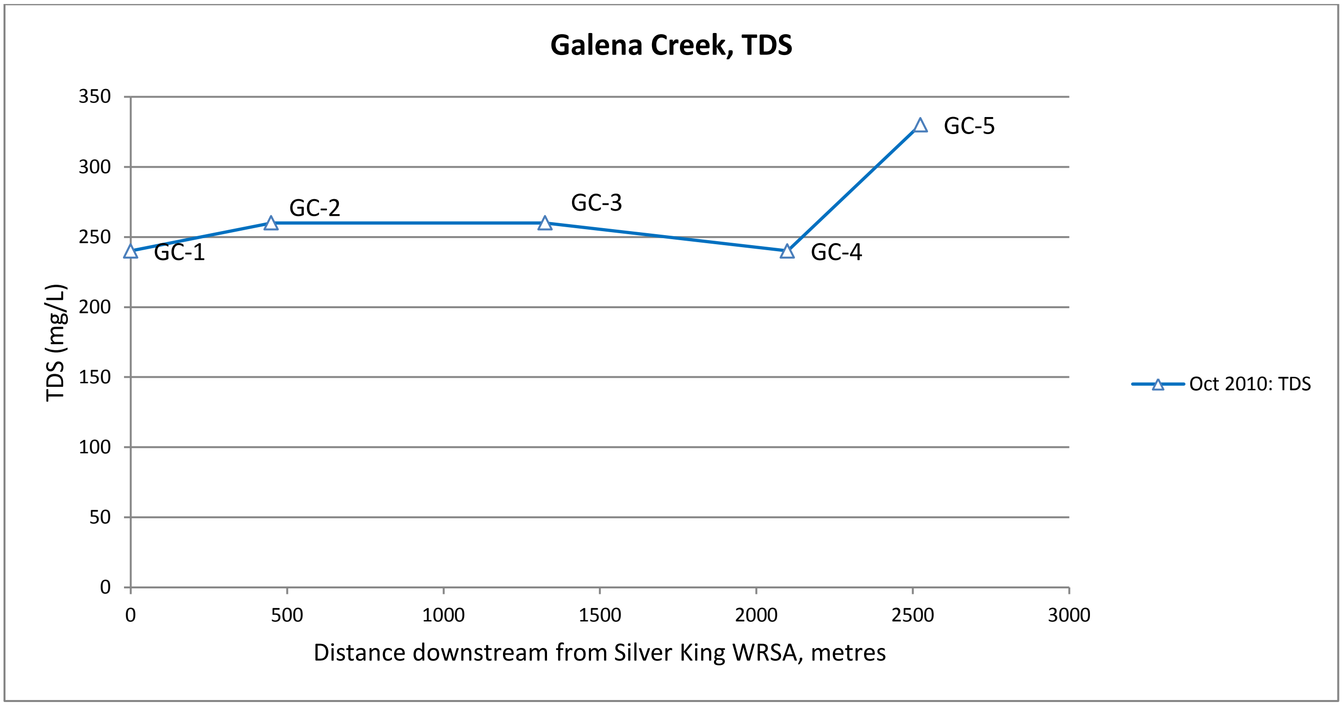


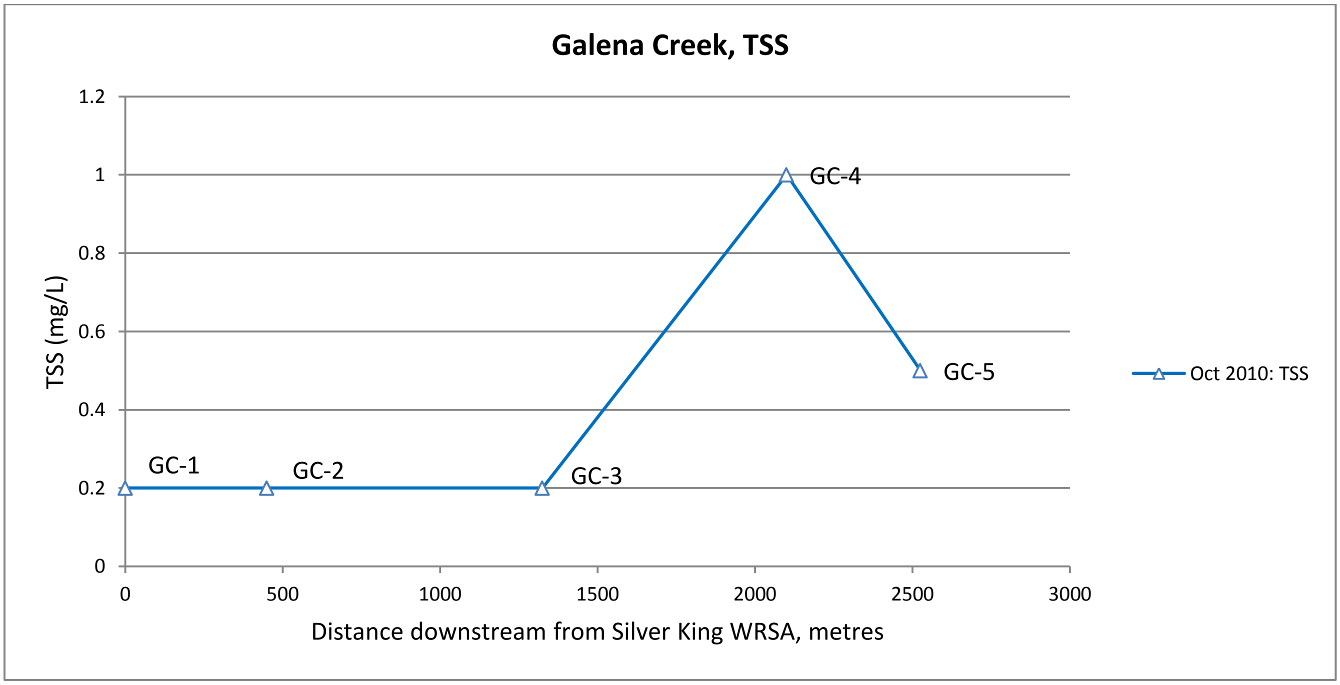



Galena Creek, Potassium (total)
K, total (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
GC-1
GC-2
GC-3
GC-4
GC-5
Oct 2010: Total K


Galena Creek, Sodium (total)
Na, total (mg/L)
2.5
2
1.5
1
0.5
0
0
500
1000
1500
2000
2500
3000
Distance downstream from Silver King WRSA, metres
GC-1
GC-2
GC-3
GC-4
GC-5
Oct 2010: Total Na

E.5.4 GALENA CREEK - PHYSICAL PARAMATERS GRAPHS





F SILVER KING STREAM SEDIMENT, ALLUVIUM, AND PEAT DATA

F.1 TABLE OF WHOLE ROCK CHEMISTRY DATA

Sample	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb	Hf
ID	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
FC-6-Peat 3"	41.4	37.3	28	330	1.1	31.7	14.7	2061	3.31	33	2.2	<0.1	6.7	123	15.4	2.3	0.2	79	1.71	0.089	25.7	587	0.76	744	0.28	3.55	0.652	0.93	0.8	41.6	53	1.9	11.6	7.5	0.4	<1	8	18.5	0.1	41.9	1
FC-5-3"	5.5	22.9	10.3	157	0.4	18.2	1.6	1207	0.31	2	18.1	<0.1	0.4	79	1.7	1.3	<0.1	8	3.95	0.069	1.7	48	0.43	95	0.018	0.31	0.045	0.11	0.3	4.3	3	0.6	1.4	0.5	<0.1	<1	<1	1.9	0.6	4.8	<0.1
FC-5-12"	1.6	32	8.5	73	0.8	28.2	6.9	1170	1.74	72	4.7	<0.1	2	119	1.1	3.3	<0.1	23	3.95	0.086	6.4	15	0.4	497	0.06	1.4	0.164	0.27	0.2	16.2	12	0.6	5	1.7	<0.1	<1	3	6.1	0.3	12.7	0.5

Sample	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb	Hf
ID	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
GC-3-Dry-Sed	10.8	204.7	305.4	1771	19.4	91.7	41.4	3556	5.6	210	3.7	<0.1	9.5	137	30.9	25.4	0.2	102	1.62	0.103	32.9	209	0.84	1258	0.309	4.64	0.565	1.13	1.2	50.2	66	2.1	14.3	7.3	0.3	1	11	26.2	<0.1	53.6	1.5
GC-4-Stream	17.9	45.2	62	237	2.9	52.7	18	1844	3.49	36	2	<0.1	5.1	111	5	4.7	0.2	113	2.76	0.068	20.4	326	1.54	716	0.276	4.55	0.594	0.96	0.8	36.5	42	1.6	10.3	5.3	0.3	<1	13	31.1	<0.1	45.1	1
GC-4-Peat 0-5"	24.2	53.2	211.6	318	13.4	36.6	14	1980	2.93	50	2.1	<0.1	6.1	104	8.2	7.5	0.2	91	1.77	0.075	22.7	383	0.82	922	0.251	3.8	0.477	1.09	0.8	39.8	46	2.1	10.9	6.6	0.3	1	9	23.4	0.1	53.4	0.9
GC-5-Org.Mat	21.8	58.6	68.5	401	2.4	33.5	12	736	4.15	56	1.9	<0.1	7.4	126	10.7	3.9	0.3	84	1.59	0.109	26.4	350	0.76	789	0.26	3.86	0.67	1.08	0.7	43.6	52	1.8	12.5	7.9	0.4	1	9	23.9	0.2	50.3	1.2
GC-6-Soil	30.7	38.1	27.7	145	0.9	33.2	11.2	653	2.84	18	2.1	<0.1	6.4	107	2.2	3	0.2	98	1.27	0.081	24.3	476	0.72	817	0.269	3.76	0.588	1.06	0.9	43.8	50	1.4	10.9	7.5	0.4	1	9	24.2	0.1	50.2	1.2

F.2 TABLE OF ACID-BASED ACCOUNTING DATA

	Paste	Total	TOC	CO2	CaCO3	Total	HCl Extractable	HNO3 Extractable	Insoluble	Maximum Potential
Sample ID	pH	Carbon			Equiv.*	Sulfur	Sulfur	Sulfur	Sulfur*	Acidity**
		(Wt.%)	(Wt.%)	(Wt.%)	(Kg CaCO3/Tonne)	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)	(Kg CaCO3/Tonne)
FC-6-Peat 3"		7.52	7.25	0.89	20.2	0.04	0.02	0.02	0.00	0.6
FC-5-3"		44.83	44.62	0.72	16.4	0.17	<0.01	0.17	0.00	5.3
FC-5-12"		38.73	38.55	0.61	13.9	0.04	<0.01	0.04	0.00	1.3

F.3 TABLE OF XRD RESULTS

	Quartz	Plagioclase	Muscovite-Illite	Clinochlore	Actinolite	Dolomite	K-feldspar	Augite	Clinozoisite	Pyrite	Kaolinite	Calcite	Goethite	Hematite	Hydroxylapatite	Rutile	Siderite	Sphalerite	Galena	Ankerite	Magnetite	Total
Sample ID	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
FC-6-Peat 3"	68.8	11.4	8.6	3.9	2.8	1.3	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
FC-5-3"	80.2	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
FC-5-12"	52.4	16.7	22.4	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0

G SADIE LADUE WATER CHEMISTRY DATA

G.1 TABLE OF CHEMISTRY DATA FROM FALL 2010

		SL-3	SL-4	SL-6	SL-7	SL-8	SL-9	SL-10	SL-11	SL-12	SL-13	SL-14	SL-15
Dissolved Metals		12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010
Aluminum (Al)	mg/L	0.0027	0.0011	0.002	0.0013	0.0012	0.0021	0.0225	0.0022	0.0041	0.0059	0.0037	0.0064
Arsenic (As)	mg/L	0.00352	0.00178	0.00198	0.00148	0.00013	0.00102	0.00056	0.00015	0.00044	0.00066	0.00059	0.00113
Barium (Ba)	mg/L	0.011	0.0118	0.0121	0.0148	0.0325	0.0283	0.0492	0.0448	0.0393	0.0421	0.0420	0.0324
Boron (B)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Beryllium (Be)	mg/L	<0.000005	0.000027	<0.000005	<0.000005	<0.000005	<0.000005	0.000308	0.000006	<0.000005	0.000005	<0.000005	<0.000005
Bismuth (Bi)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium (Cd)	mg/L	0.00159	0.00202	0.00239	0.00379	0.00218	0.00503	0.00457	0.000067	0.00263	0.00226	0.00239	0.000140
Cobalt (Co)	mg/L	0.0003	0.0003	0.0002	0.0003	0.0003	0.0003	0.0005	0.0004	0.0003	0.0004	0.0003	0.0004
Chromium (Cr)	mg/L	0.000116	<0.000005	0.000013	0.000022	0.000015	0.000047	0.000031	0.000007	0.000142	0.000236	0.000219	0.000037
Copper (Cu)	mg/L	0.00024	0.0002	0.0005	0.00086	0.00022	0.00034	0.00171	0.0002	0.00053	0.00029	0.00029	0.00061
Iron (Fe)	mg/L	0.006	0.003	0.004	0.016	0.01	0.025	0.126	0.003	0.097	0.076	0.073	0.019
Lithium (Li)	mg/L	0.0031	0.0033	0.0031	0.0032	0.0024	0.0028	0.0052	0.0043	0.0048	0.0047	0.0047	0.0039
Manganese (Mn)	mg/L	0.0149	0.0001	0.00097	0.0268	0.00908	0.0183	0.03	0.00019	0.099	0.219	0.224	0.0199
Molybdenum (Mo)	mg/L	0.0035	0.00369	0.00374	0.00332	0.0008	0.00255	0.00114	0.0009	0.0008	0.00085	0.00085	0.00099
Nickel (Ni)	mg/L	0.00924	0.00784	0.00684	0.00569	0.00142	0.00456	0.00129	0.00028	0.001	0.00131	0.00122	0.00101
Lead (Pb)	mg/L	0.000554	0.000071	0.00103	0.00106	0.000083	0.000468	0.0058	0.000074	0.000398	0.00133	0.000876	0.00199
Antimony (Sb)	mg/L	0.00397	0.00418	0.00501	0.00642	0.00088	0.00495	0.00183	0.00042	0.00118	0.00120	0.00120	0.0110
Selenium (Se)	mg/L	0.00061	0.00059	0.00065	0.00065	0.00055	0.00061	0.00145	0.00353	0.00222	0.00191	0.00185	0.00094
Silicon (Si)	mg/L	2.73	2.62	2.5	2.49	3.42	2.96	3.13	2.97	2.96	2.76	2.94	1.98
Silver (Ag)	mg/L	0.000018	0.000006	0.000016	0.000028	<0.000005	0.000008	0.000129	<0.000005	0.000008	0.000021	0.000012	0.000026
Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00007	<0.00001	<0.00001	0.00002	<0.00001	0.00002
Strontium (Sr)	mg/L	0.341	0.334	0.333	0.337	0.304	0.333	0.339	0.307	0.335	0.327	0.324	0.259
Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Thallium (Tl)	mg/L	0.000012	0.000009	0.000007	0.00001	<0.000002	0.000005	<0.000002	<0.000002	<0.000002	0.000002	<0.000002	<0.000002
Uranium (U)	mg/L	0.00923	0.0096	0.00921	0.00878	0.00585	0.00755	0.00433	0.00397	0.00371	0.00336	0.00339	0.00266

Continued.

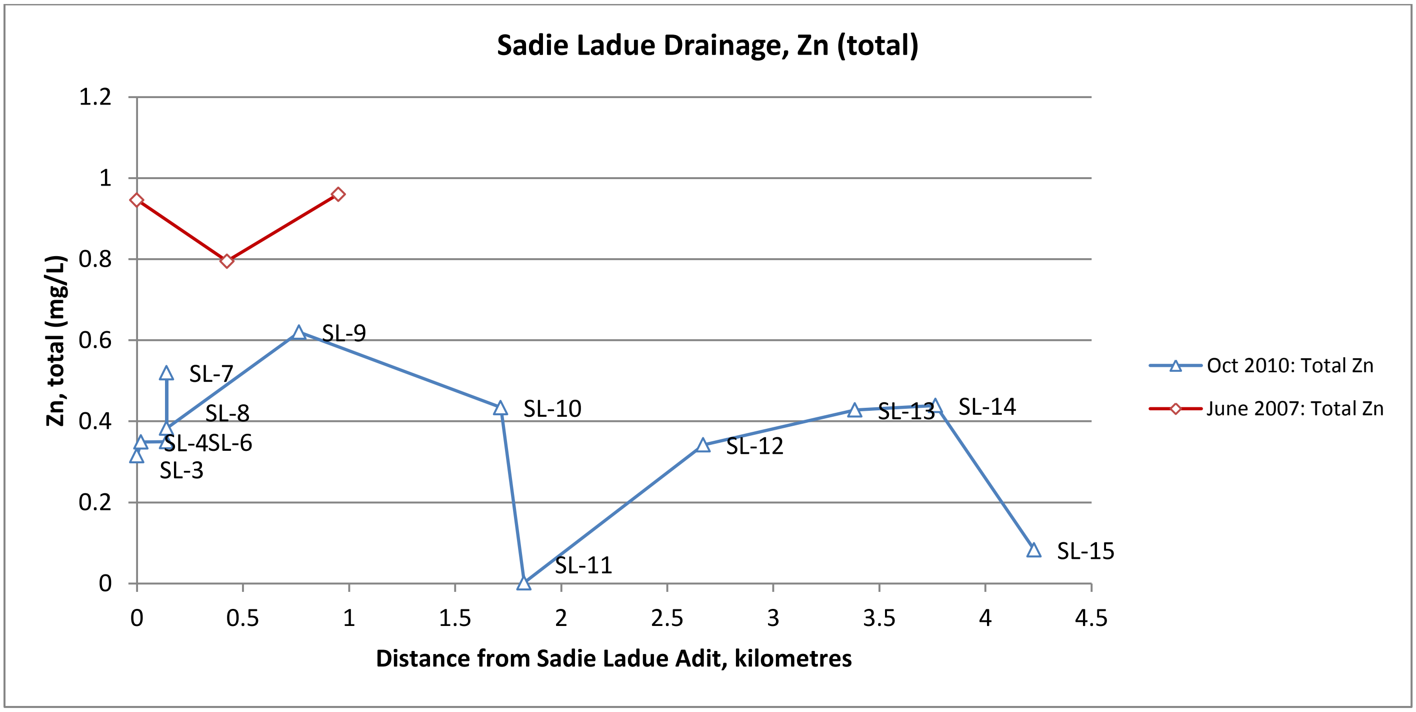
		SL-3	SL-4	SL-6	SL-7	SL-8	SL-9	SL-10	SL-11	SL-12	SL-13	SL-14	SL-15
Dissolved Metals		12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010
Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Zinc (Zn)	mg/L	0.308	0.351	0.354	0.484	0.389	0.613	0.417	0.0016	0.322	0.349	0.363	0.0536
Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium (Ca)	mg/L	72.1	70.2	73.1	77.2	86.2	84.2	97.6	95	116	111	114	75.2
Potassium (K)	mg/L	0.56	0.56	0.57	0.56	0.58	0.58	0.64	0.5	0.54	0.52	0.49	0.23
Magnesium (Mg)	mg/L	23.3	23.6	24.2	24.4	28.3	26.2	25.7	24.5	25.7	25.7	25.2	22.3
Sodium (Na)	mg/L	1.9	1.89	1.91	1.84	1.84	1.94	1.96	1.84	1.8	1.76	1.73	1.52
Sulfur (S)	mg/L	46	44	46	47	51	49	58	58	72	69	69	55
Hardness (CaCO3) from dissolved metal scan	mg/L	276	273	282	293	332	318	350	338	395	382	387	279
Total Metals		SL-3	SL-4	SL-6	SL-7	SL-8	SL-9	SL-10	SL-11	SL-12	SL-13	SL-14	SL-15
Aluminum (Al)	mg/L	0.0142	0.0013	0.0037	0.0047	0.001	0.0063	0.0038	0.028	0.0047	0.039	0.033	0.033
Arsenic (As)	mg/L	0.00376	0.00181	0.00201	0.00158	0.00012	0.00101	0.0004	0.00033	0.00055	0.0010	0.0008	0.0013
Barium (Ba)	mg/L	0.0111	0.0112	0.0117	0.0145	0.0333	0.0286	0.0438	0.0445	0.0403	0.0475	0.0458	0.0364
Beryllium (Be)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.3	<0.3
Bismuth (Bi)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005
Boron (B)	mg/L	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005	<0.0001	<0.0001	<0.0001
Cadmium (Cd)	mg/L	0.00175	0.00198	0.00239	0.00416	0.00213	0.00503	0.00464	0.000075	0.0032	0.00325	0.00298	0.00048
Cobalt (Co)	mg/L	0.000156	<0.000005	0.000007	0.000027	0.000014	0.000043	<0.000005	0.000047	0.000142	0.00027	0.00028	0.00011
Chromium (Cr)	mg/L	0.0004	0.0002	0.0003	0.0002	0.0003	0.0003	0.0003	0.0004	<0.0001	<0.003	<0.003	<0.003
Copper (Cu)	mg/L	0.0007	0.00019	0.00053	0.00089	0.00024	0.00123	0.00029	0.00047	0.00039	<0.001	<0.001	0.001
Iron (Fe)	mg/L	0.013	0.003	0.005	0.015	0.008	0.054	0.011	0.08	0.18	0.482	0.399	0.183
Mercury (Hg)	mg/L	0.0033	0.0032	0.0033	0.0032	0.0023	0.003	0.0051	0.0041	0.0051	0.004	0.004	0.003
Lithium (Li)	mg/L	0.0186	0.00019	0.00126	0.0271	0.00941	0.0216	0.00178	0.0049	0.101	0.243	0.224	0.0611
Manganese (Mn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001			
Molybdenum (Mo)	mg/L	0.00349	0.00371	0.00369	0.00329	0.00083	0.00258	0.00106	0.00087	0.00074	0.0008	0.0009	0.0010
Nickel (Ni)	mg/L	0.00954	0.00773	0.00709	0.00611	0.00134	0.0044	0.00117	0.00046	0.00106	0.0016	0.0014	0.0014
Lead (Pb)	mg/L	0.00134	0.000077	0.00112	0.00118	0.000191	0.00112	0.000578	0.000313	0.000595	0.0013	0.0017	0.0156
Antimony (Sb)	mg/L	0.00404	0.00422	0.005	0.00633	0.00086	0.00499	0.00139	0.00041	0.00117	0.0012	0.0012	0.0120
Selenium (Se)	mg/L	0.00058	0.00062	0.00068	0.00064	0.00054	0.00062	0.00158	0.00334	0.00234	0.0019	0.0018	0.0009
Silicon (Si)	mg/L	2.9	2.75	2.76	2.78	3.71	3.06	3.57	2.96	3.24	3.46	3.43	2.57
Silver (Ag)	mg/L	0.000026	0.000008	0.000026	0.000045	<0.000005	0.000022	0.00001	0.000008	0.000011	0.00004	0.00006	0.00041

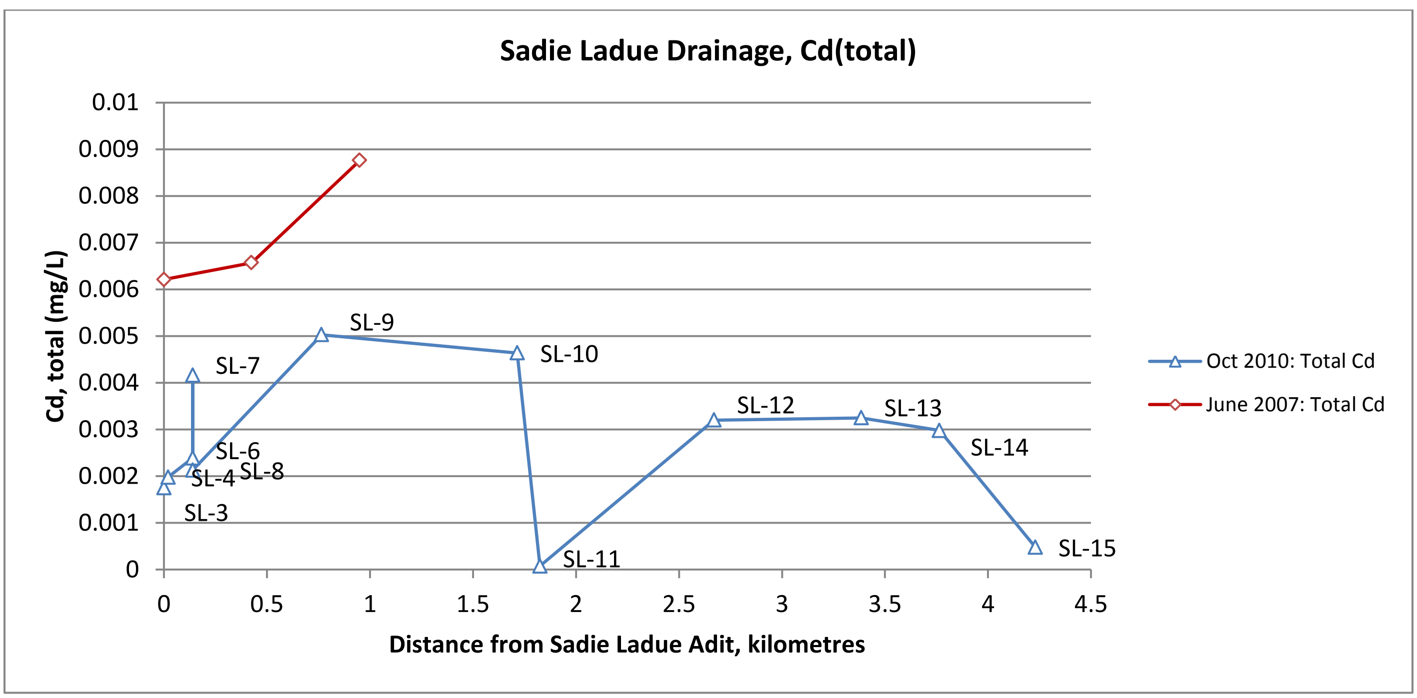
Continued.

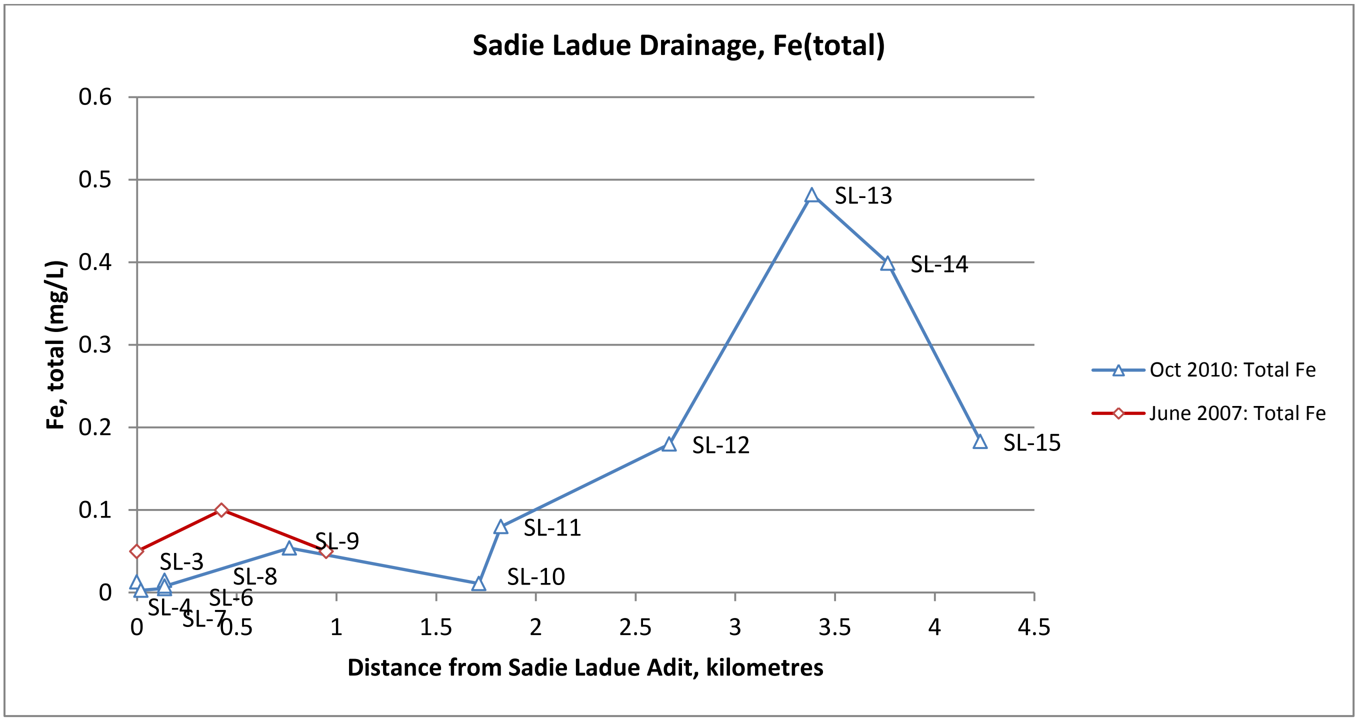
Total Metals		SL-3	SL-4	SL-6	SL-7	SL-8	SL-9	SL-10	SL-11	SL-12	SL-13	SL-14	SL-15
Tin (Sn)	mg/L	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001
Strontium (Sr)	mg/L	0.341	0.324	0.329	0.331	0.31	0.333	0.316	0.298	0.333	0.336	0.323	0.272
Titanium (Ti)	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.03	<0.03	<0.03
Thallium (Tl)	mg/L	0.000014	0.000008	0.000008	0.00001	<0.000002	0.000004	<0.000002	<0.000002	<0.000002	<0.00001	<0.00001	<0.00001
Uranium (U)	mg/L	0.00923	0.00929	0.00906	0.00845	0.00569	0.00749	0.00404	0.00364	0.00342	0.00339	0.00318	0.00257
Vanadium (V)	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.003	<0.003	<0.003
Zinc (Zn)	mg/L	0.315	0.349	0.35	0.52	0.383	0.62	0.434	0.0018	0.342	0.428	0.439	0.083
Zirconium (Zr)	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005
Calcium (Ca)	mg/L	72.8	70.7	77.6	80.9	89.4	86.6	111	93.5	124	117	115	83.9
Potassium (K)	mg/L	0.56	0.54	0.56	0.6	0.58	0.57	0.57	0.47	0.52	0.6	0.6	<0.3
Magnesium (Mg)	mg/L	24	23.4	24.6	26.2	28.6	26.7	28.5	23.9	26.4	28.4	27.8	25.7
Sodium (Na)	mg/L	1.96	1.89	1.94	1.99	1.91	1.99	2.07	1.8	1.84	1.8	1.8	1.7
Sulfur (S)	mg/L	47	47	48	50	53	49	63	55	73	75	73	63
Hardness (CaCO3) from total metal scan	mg/L	281	273	295	310	341	326	394	332	419	409	402	315
Other Paramaters		**SL-3**	**SL-4**	**SL-6**	**SL-7**	**SL-8**	**SL-9**	**SL-10**	**SL-11**	**SL-12**	**SL-13**	**SL-14**	**SL-15**
pH	pH units	7.77	7.95	8.04	7.97	7.85	8.04	8.24	7.75	8.13	8.21	8.17	8.21
Conductivity	µS/cm	538	540	548	568	624	577	636	627	708	718	716	554
Bicarbonate (HCO3)	mgCaCO3/L	190	190	190	200	240	210	220	210	230	250	230	160
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	160	160	160	160	190	180	180	170	180	210	190	130
Nitrate plus Nitrite (N)	mg/L	0.11	0.11	0.1	0.1	0.34	0.09	0.05	0.09	0.05	0.04	0.05	<0.02
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate (N)	mg/L	0.11	0.11	0.1	0.1	0.34	0.09	0.05	0.09	0.05	0.04	0.05	<0.02
Nitrogen (N)	mg/L	0.14	0.15	0.14	0.13	0.39	0.14	0.15	0.16	0.13	0.20	0.19	0.22
Dissolved Chloride (Cl)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.0	<0.5	<0.5
Dissolved Sulfate (SO4)	mg/L	130	130	140	140	150	140	160	180	200	200	170	170
Dissolved Organic Carbon (C)	mg/L	0.6	<0.5	<0.5	<0.5	0.7	1	1	1.3	2	2.4	1.6	5.2
Total Organic Carbon (C)	mg/L	0.6	<0.5	<0.5	<0.5	0.9	0.8	1.6	1.5	1.9	2.1	2.1	4.3
Total Dissolved Solids	mg/L	380	360	370	370	420	370	410	410	500	520	520	400
Total Suspended Solids	mg/L	<1	<1	<1	<1	12	2	<1	8	<1	4	7	2

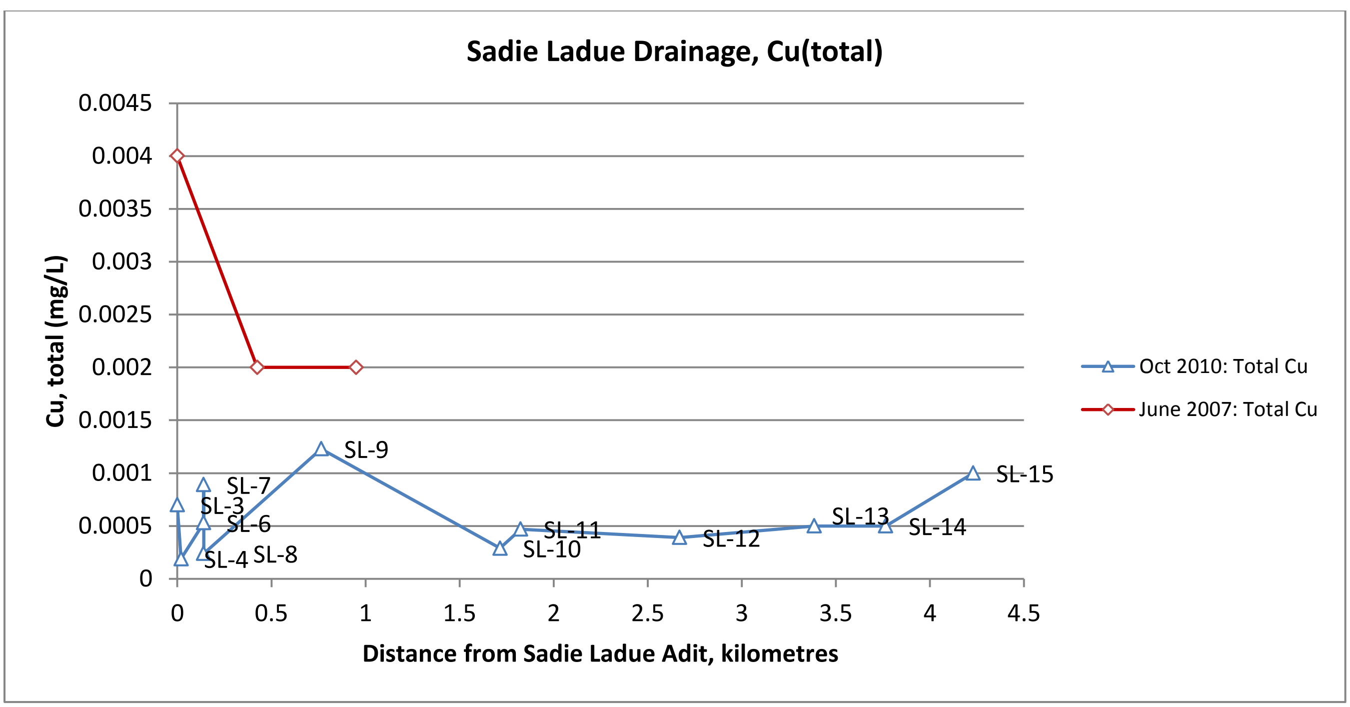
G.2 SADIE LADUE – GRAPHS OF KEY CONSTITUENTS

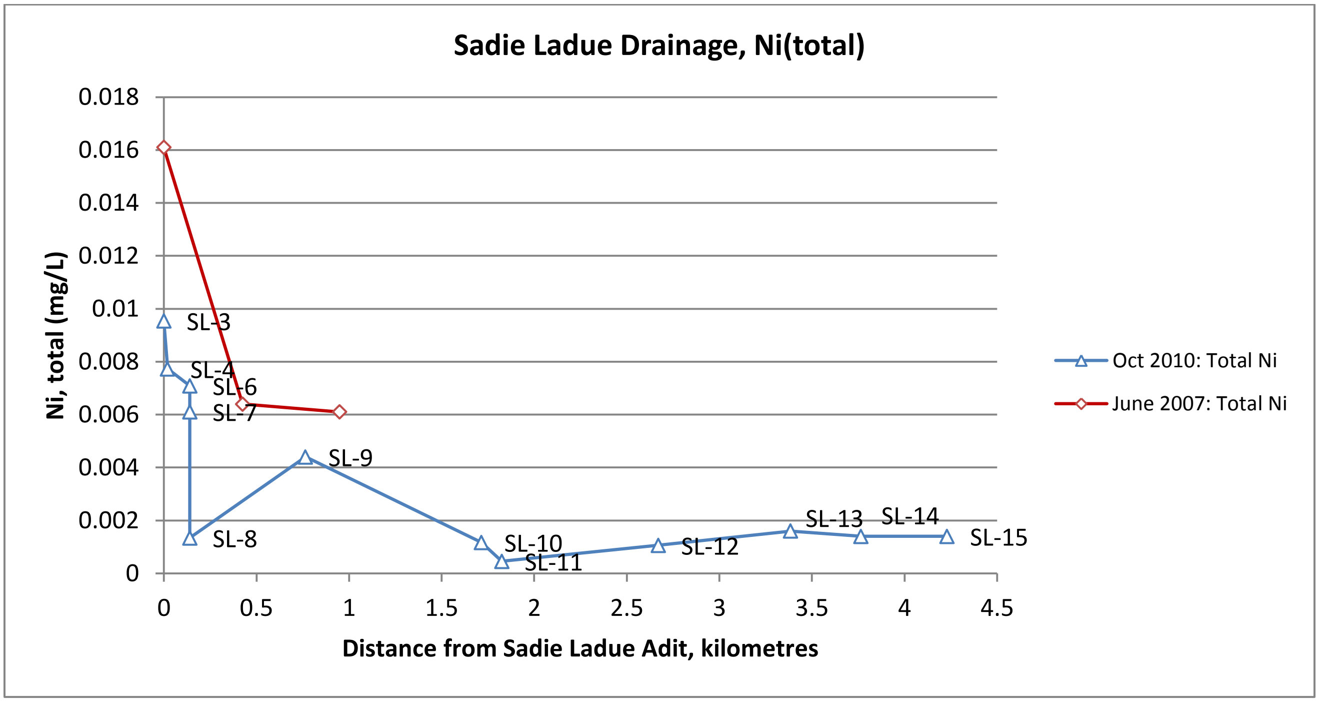
G.2.1 SADIE LADUE – METALS GRAPHS

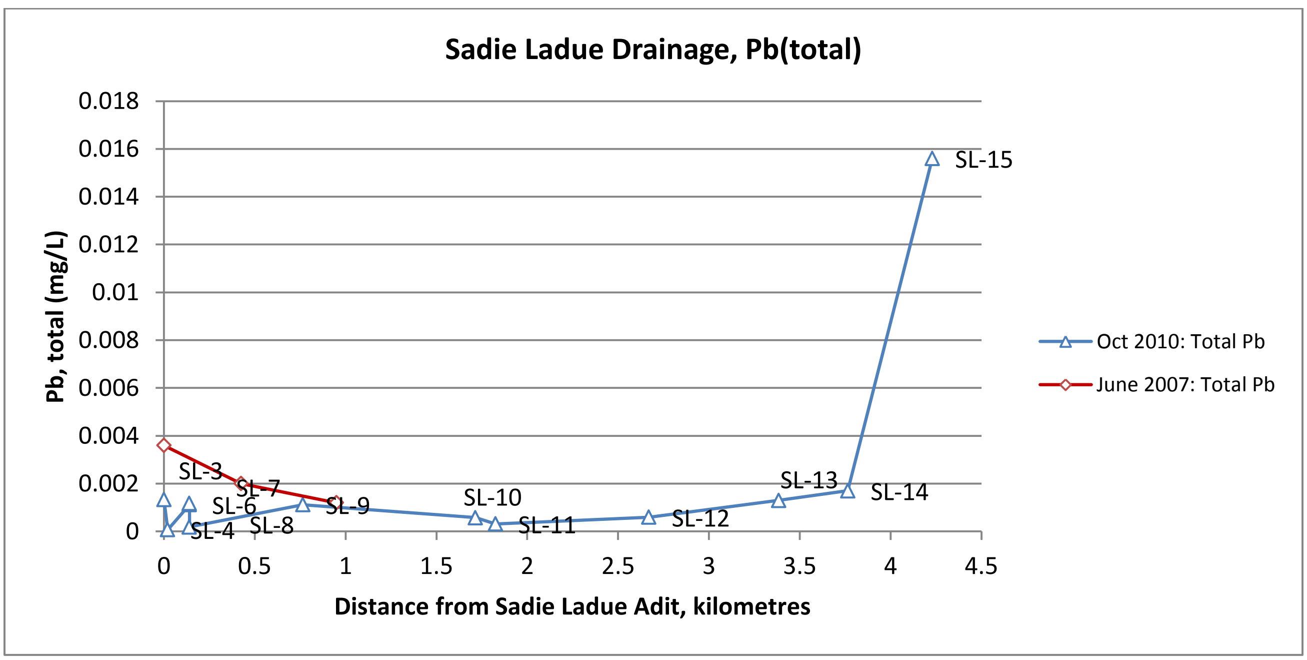


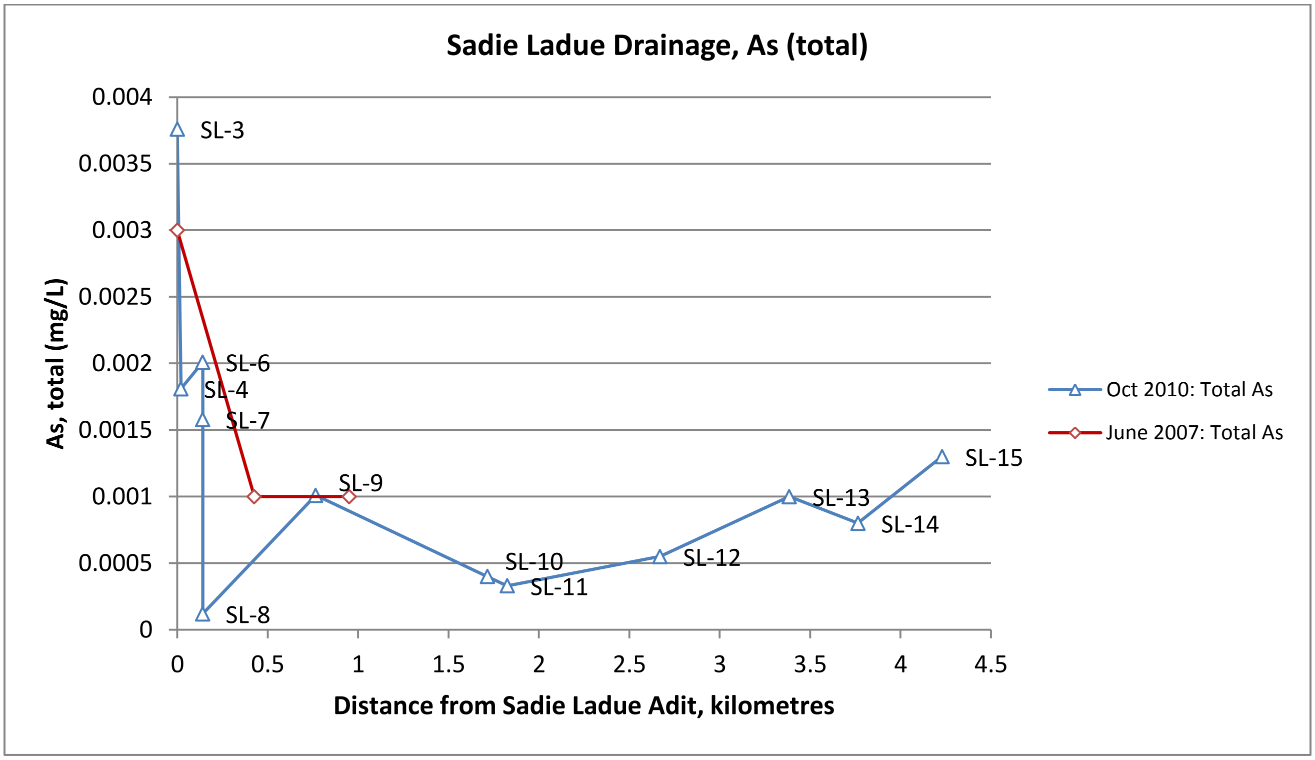


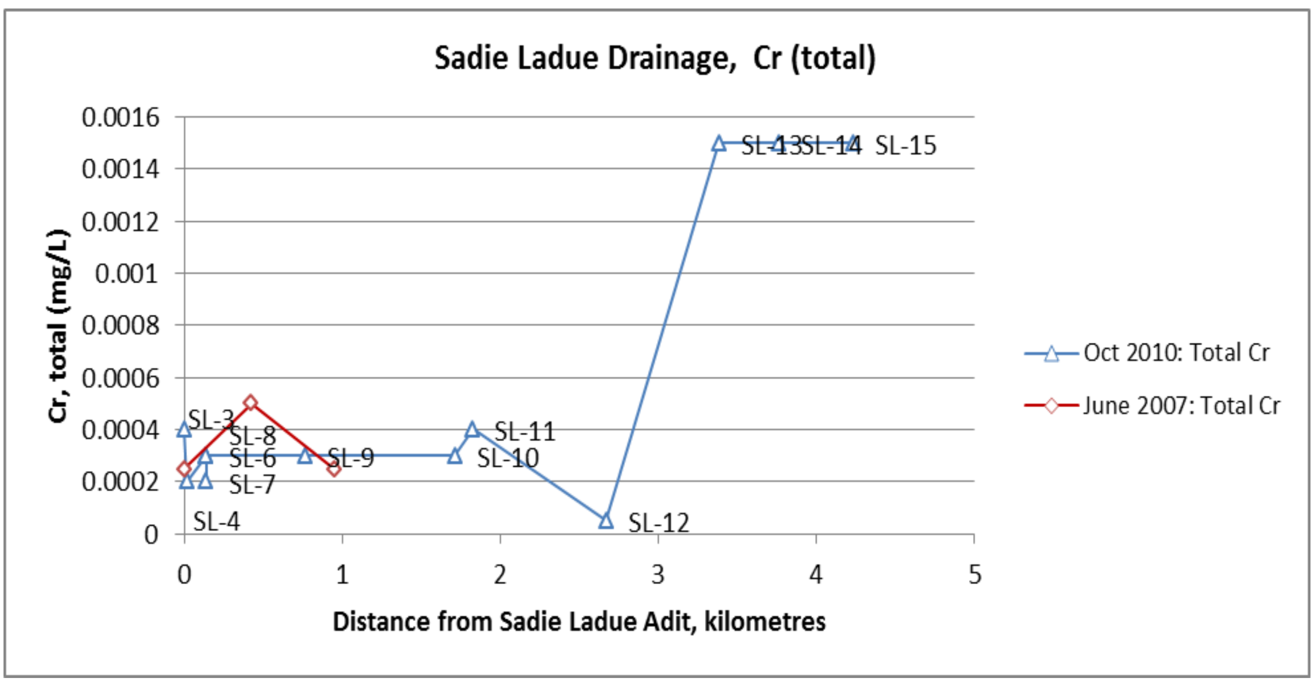

Sadie Ladue Drainage, Fe(total)
Fe, total (mg/L)
0.6
0.5
0.4
0.3
0.2
0.1
0
SL-13
SL-14
SL-12
SL-15
SL-11
SL-10
SL-9
SL-3
SL-8
SL-6
SL-4
SL-7
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Fe
June 2007: Total Fe

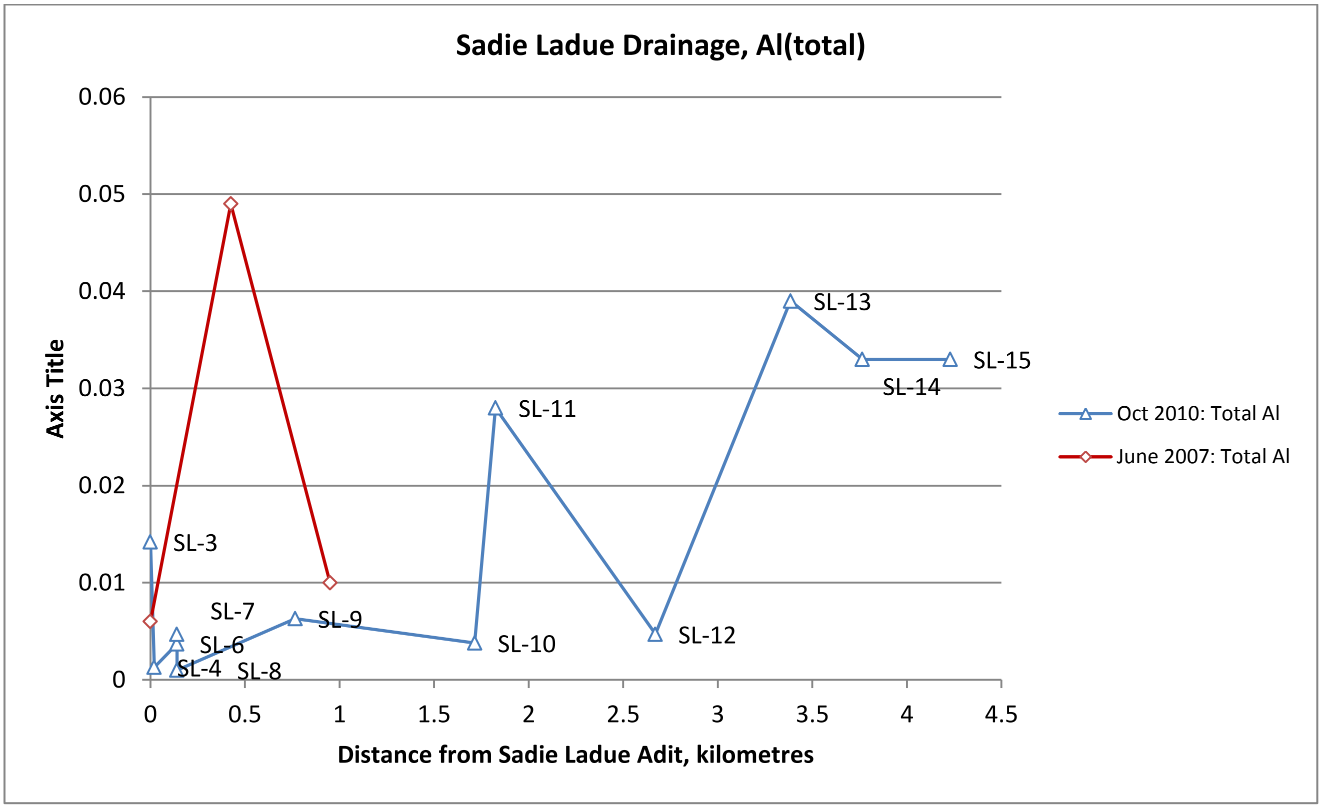

Sadie Ladue Drainage, Cu(total)
Cu, total (mg/L)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
SL-9
SL-7
SL-3
SL-6
SL-4
SL-8
SL-11
SL-10
SL-12
SL-13
SL-14
SL-15
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Cu
June 2007: Total Cu


Sadie Ladue Drainage, Ni(total)
Ni, total (mg/L)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
SL-3
SL-4
SL-6
SL-7
SL-8
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
SL-15
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Ni
June 2007: Total Ni

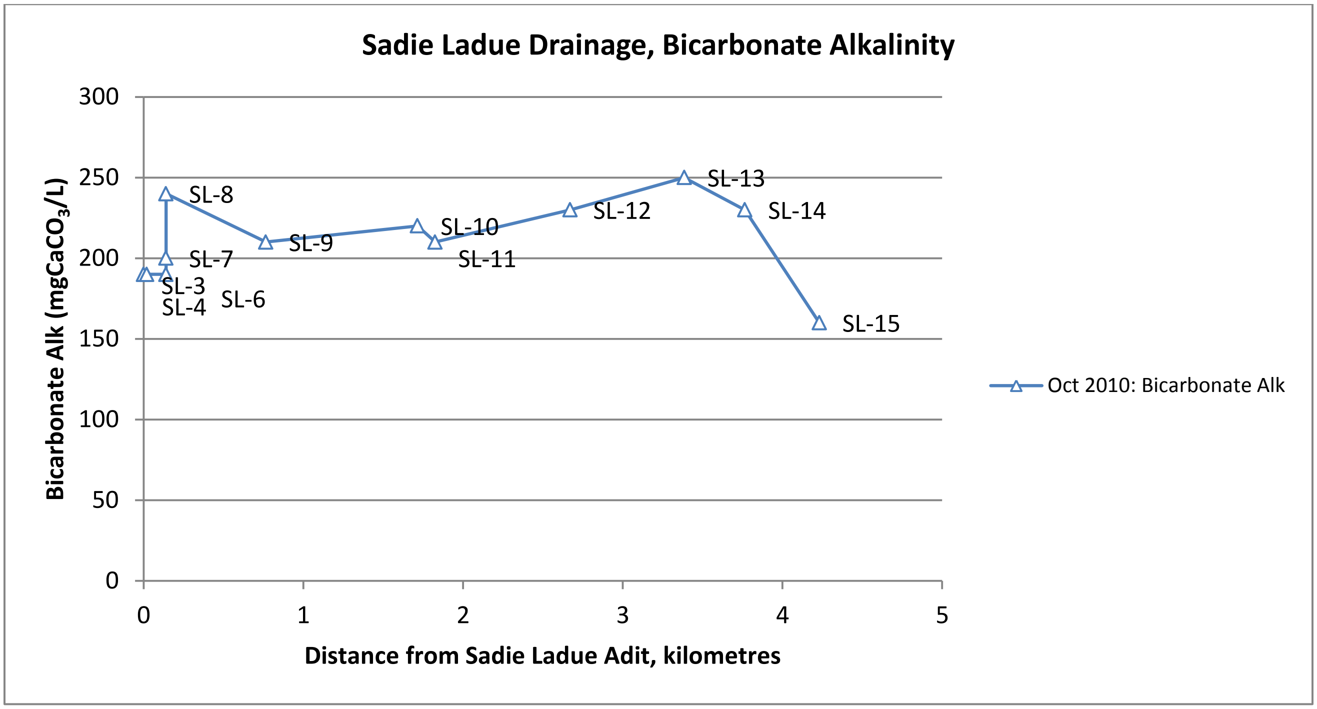

Sadie Ladue Drainage, Pb(total)
Pb, total (mg/L)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
SL-15
SL-3
SL-7
SL-6
SL-4
SL-8
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Pb
June 2007: Total Pb

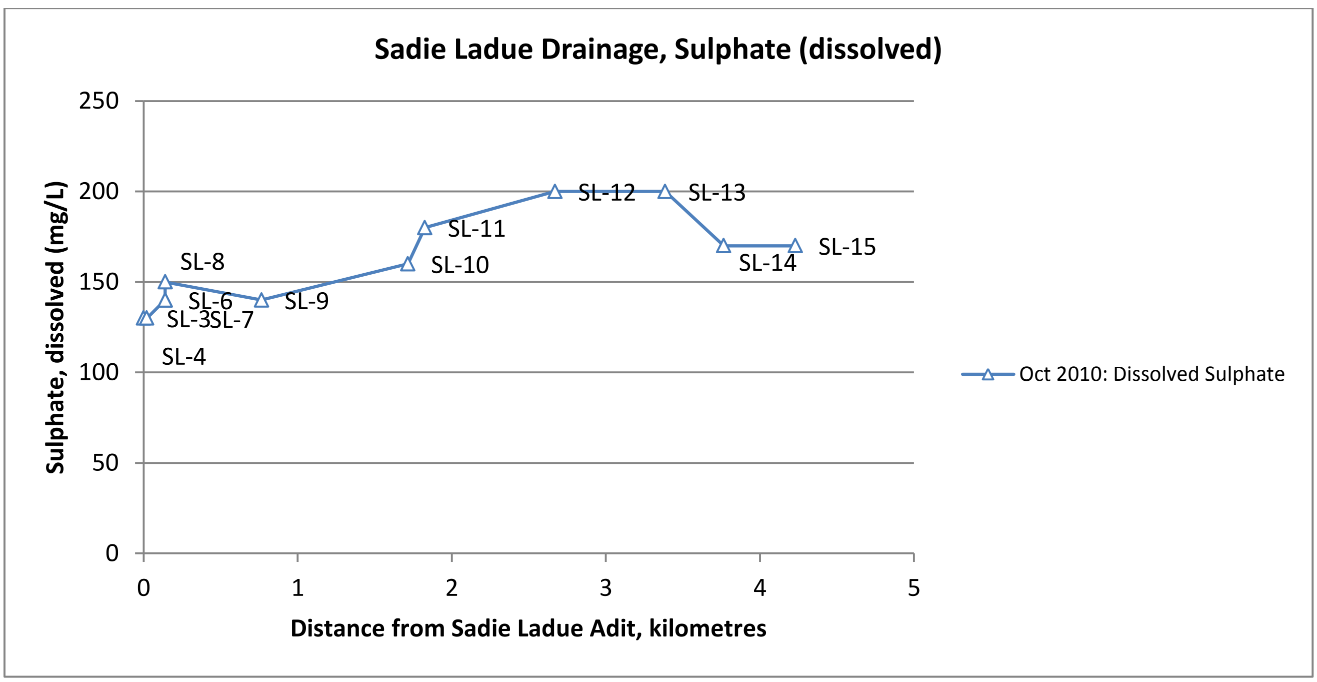

Sadie Ladue Drainage, As (total)
As, total (mg/L)
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
SL-3
SL-6
SL-4
SL-7
SL-9
SL-10
SL-11
SL-8
SL-12
SL-13
SL-14
SL-15
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total As
June 2007: Total As

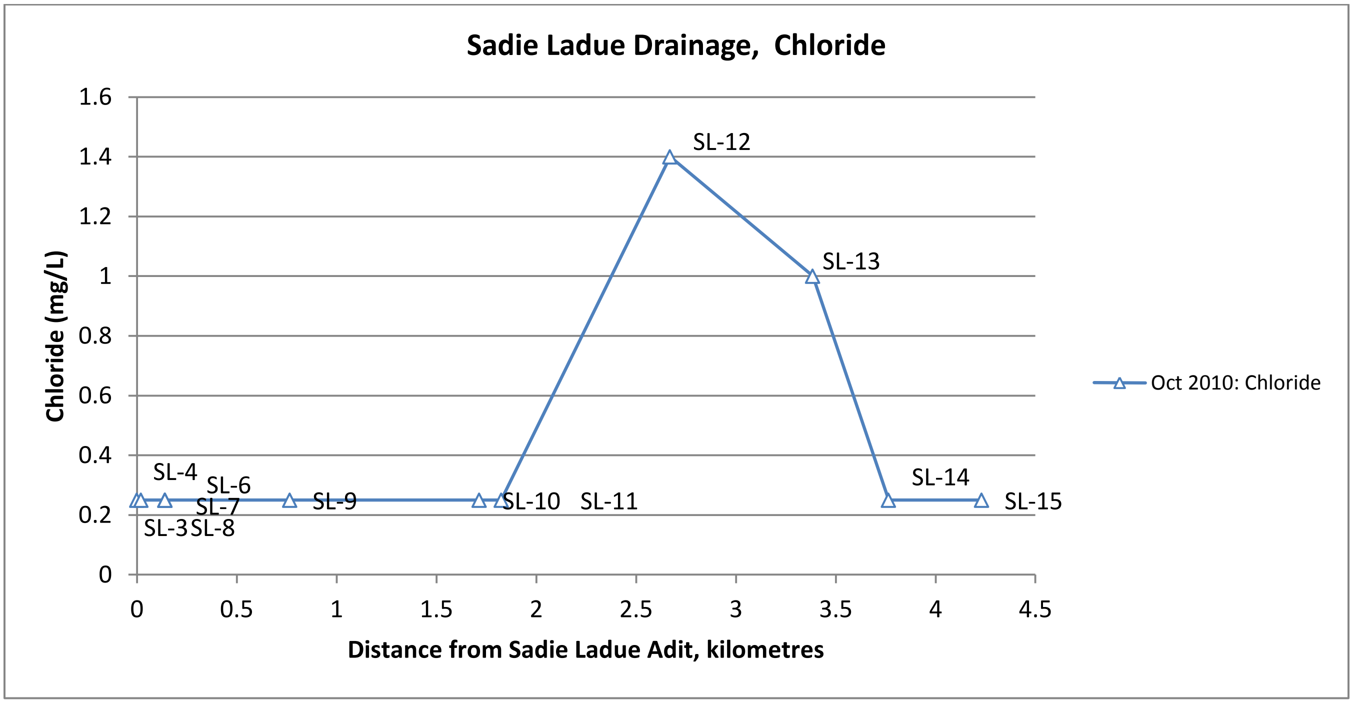

Sadie Ladue Drainage, Cr (total)
Cr, total (mg/L)
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
SL-13
SL-14
SL-15
SL-3
SL-8
SL-6
SL-9
SL-7
SL-4
SL-11
SL-10
SL-12
0
1
2
3
4
5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Cr
June 2007: Total Cr

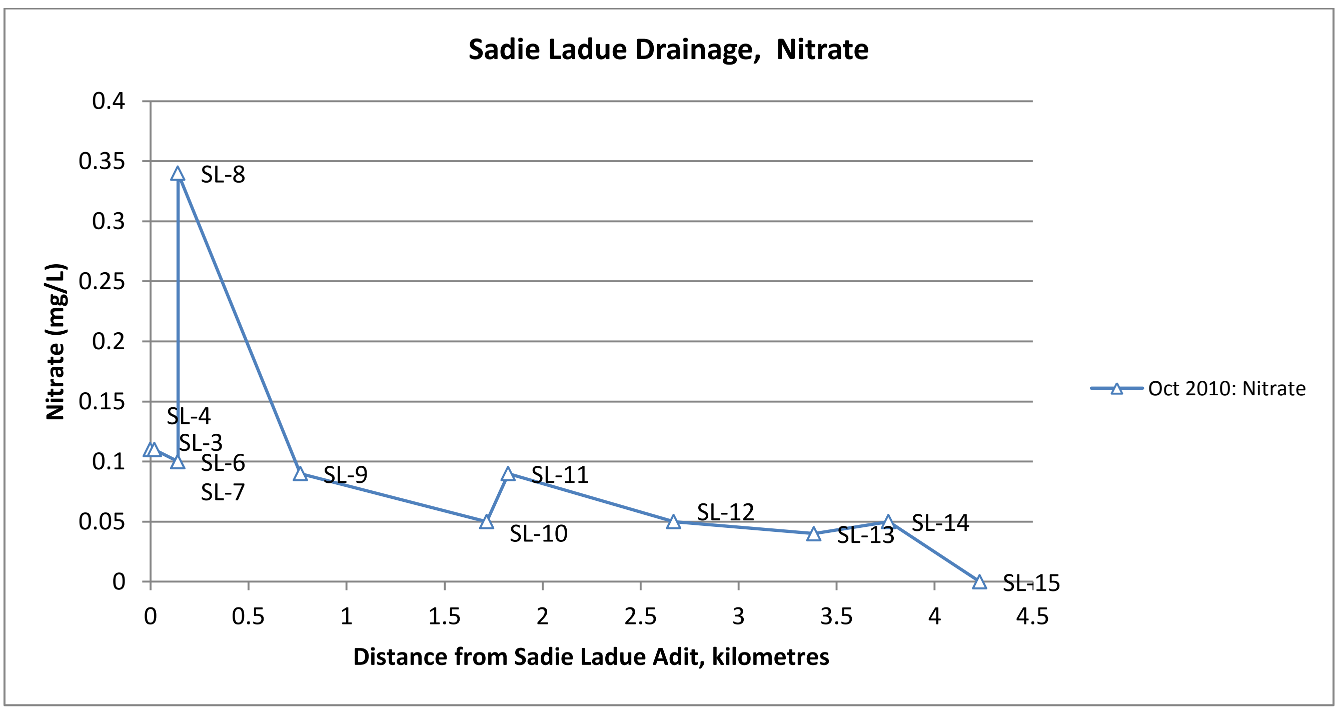

Sadie Ladue Drainage, Al(total)
Axis Title
0.06
0.05
0.04
0.03
0.02
0.01
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
SL-3
SL-4
SL-6
SL-7
SL-8
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
SL-15
Oct 2010: Total Al
June 2007: Total Al

G.2.2 SADIE LADUE – ANIONS GRAPHS

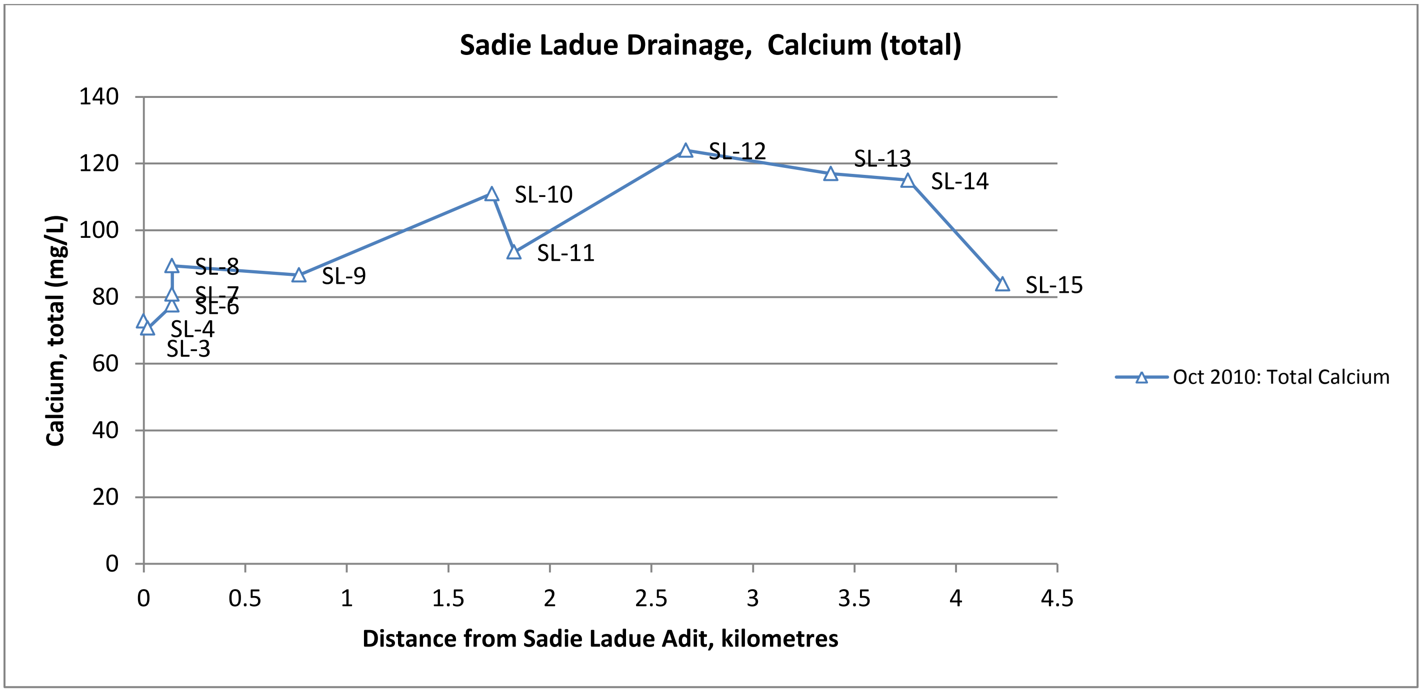


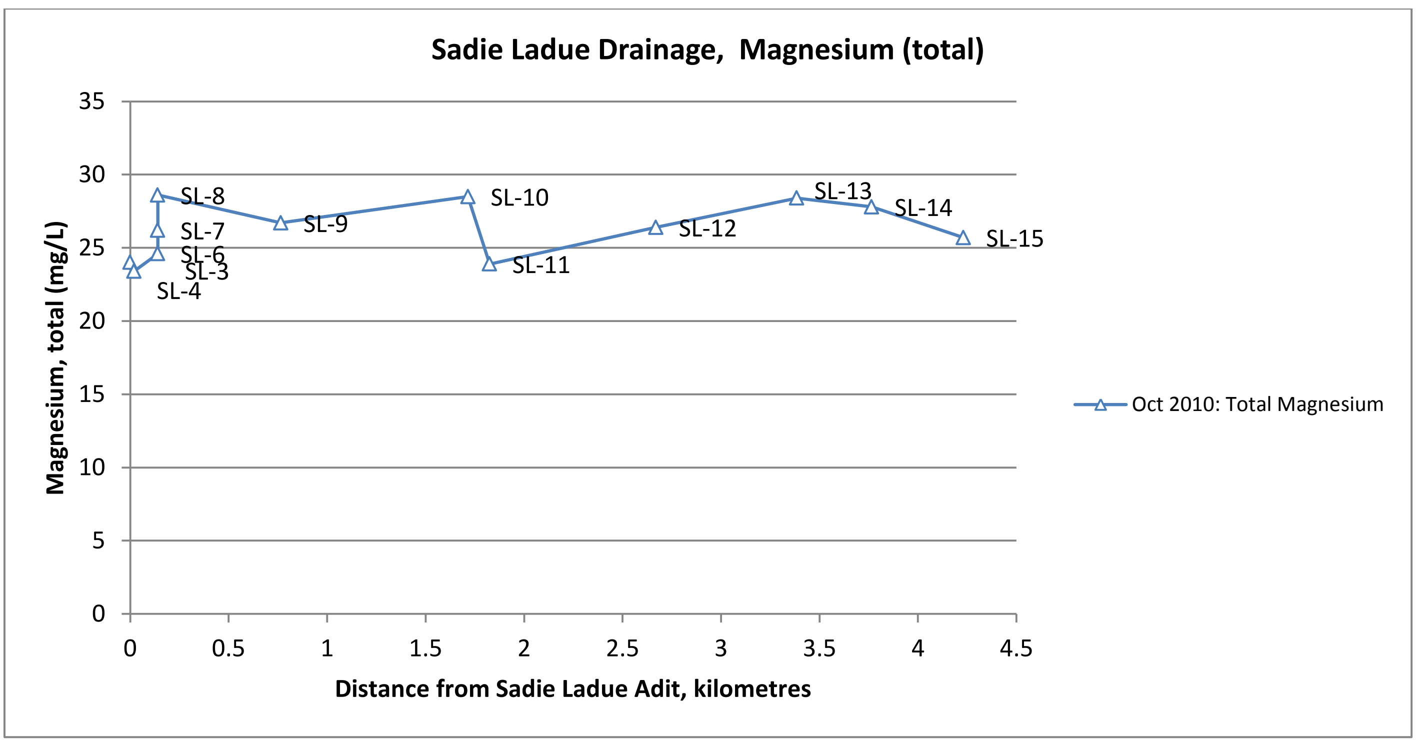


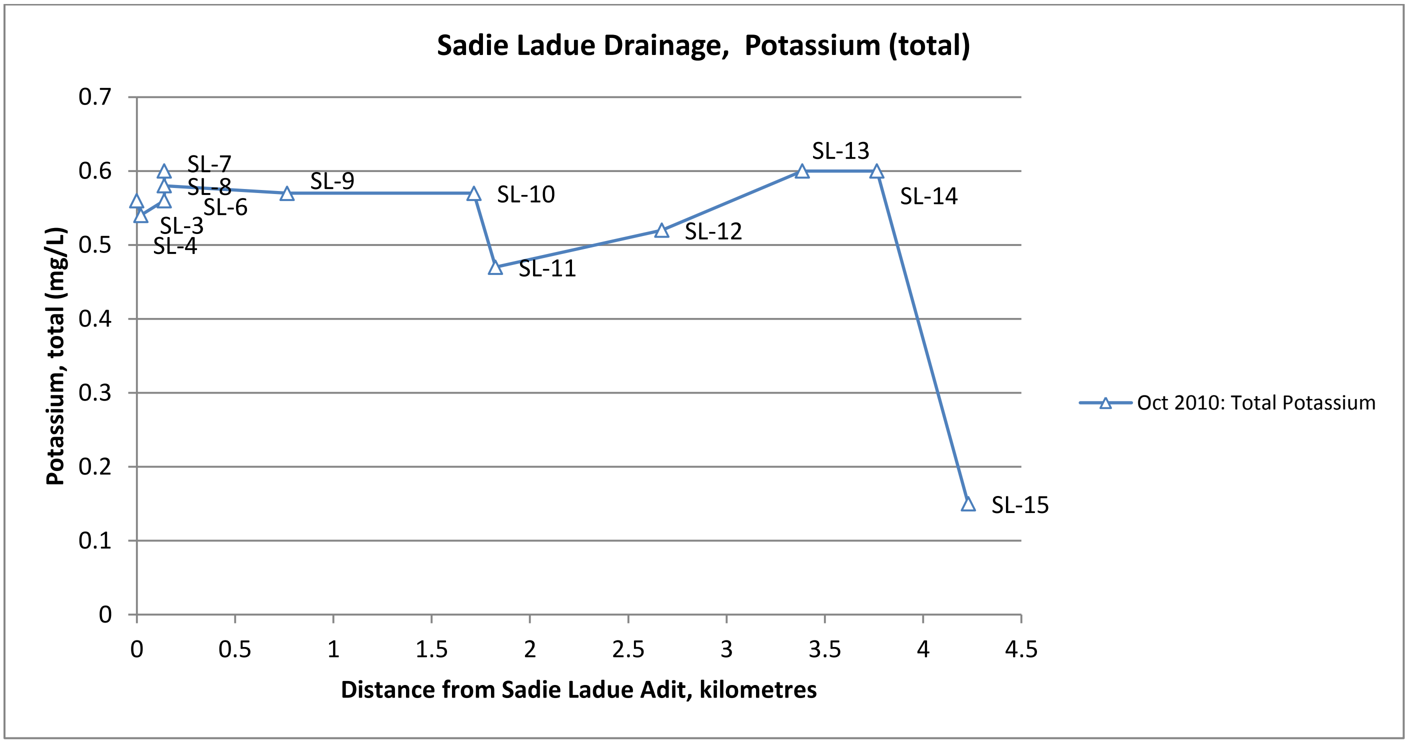

Sadie Ladue Drainage, Chloride
Chloride (mg/L)
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Chloride
SL-3
SL-4
SL-6
SL-7
SL-8
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
SL-15
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5

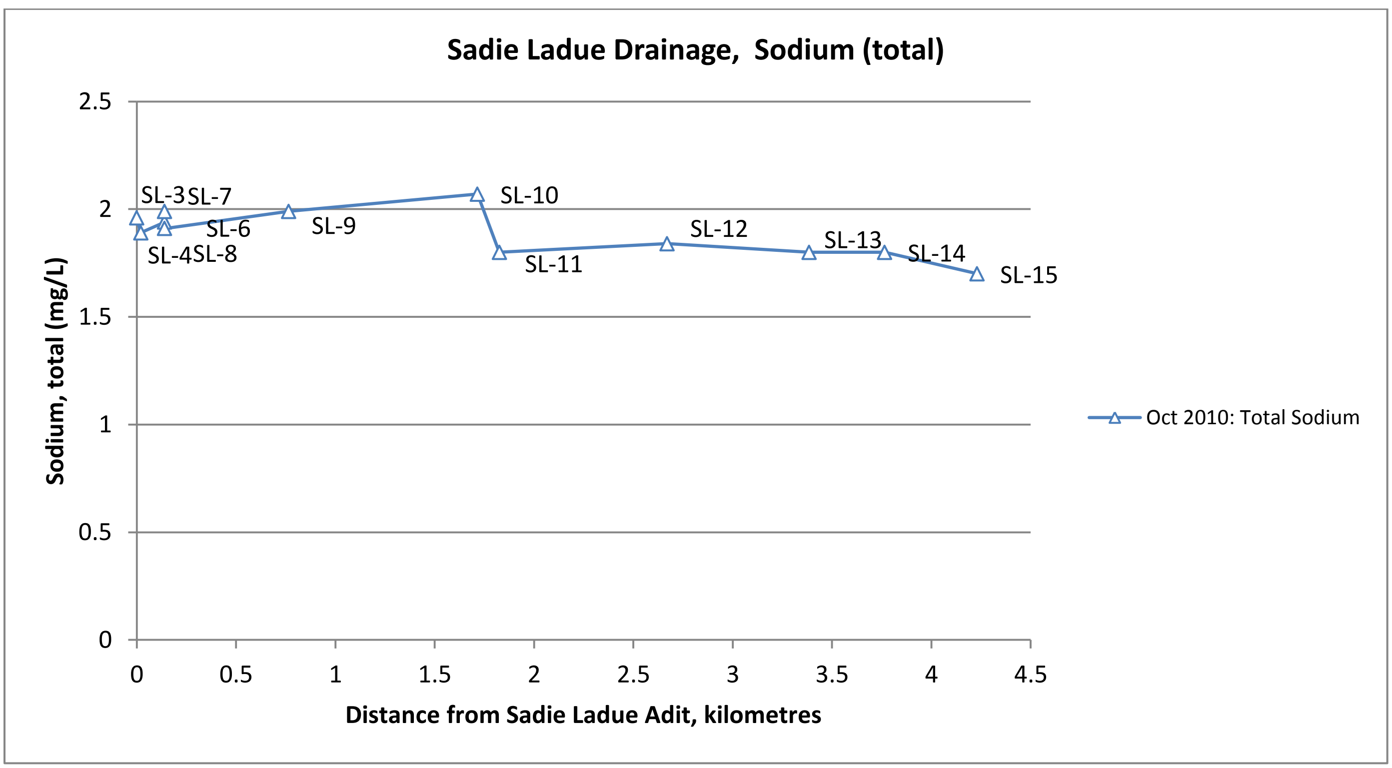

Sadie Ladue Drainage, Nitrate
Nitrate (mg/L)
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Nitrate
SL-8
SL-4
SL-3
SL-6
SL-7
SL-9
SL-11
SL-10
SL-12
SL-13
SL-14
SL-15
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5

G.2.3 SADIE LADUE – CATIONS GRAPHS

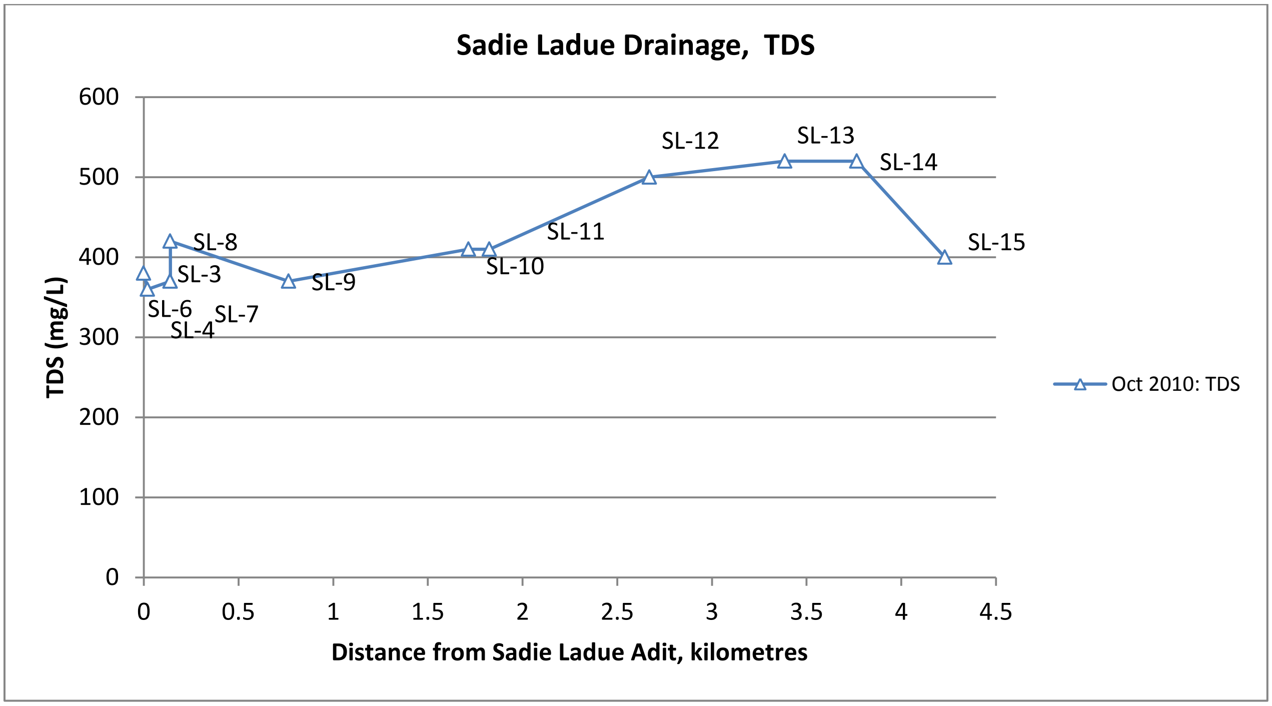


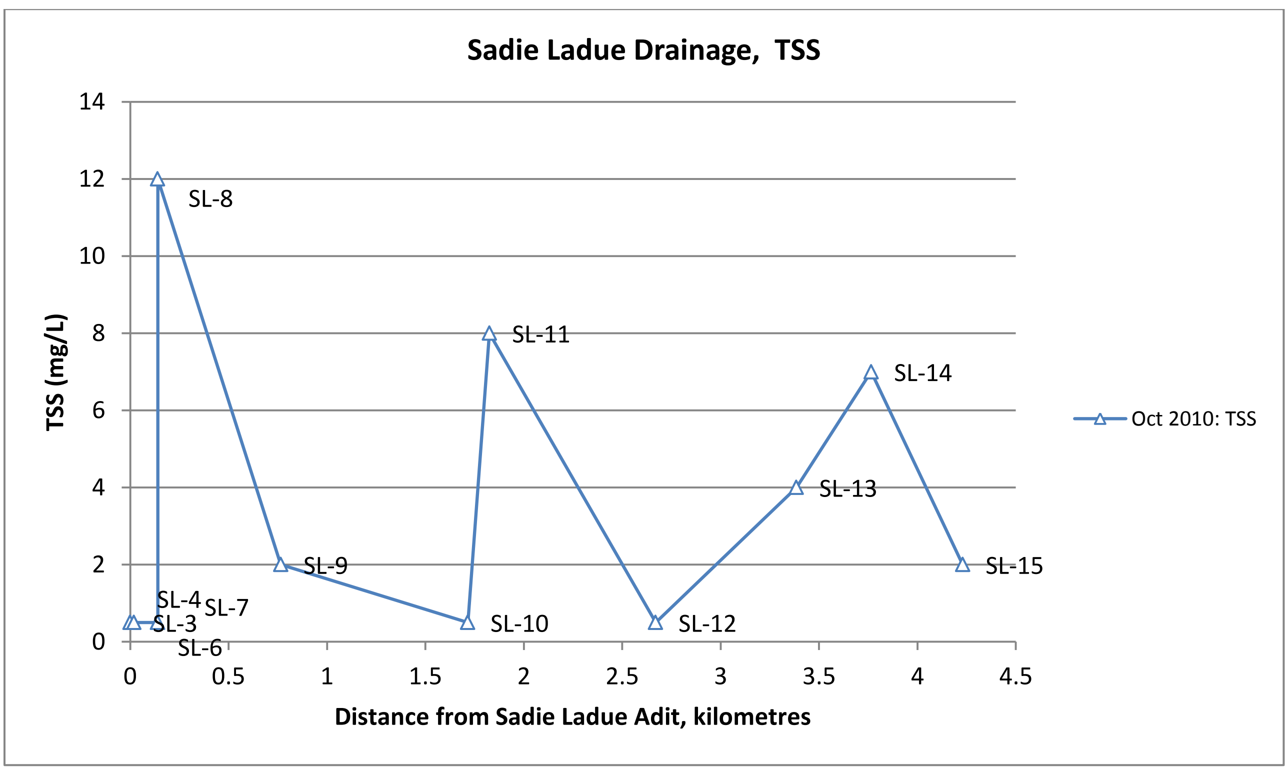



Sadie Ladue Drainage, Potassium (total)
Potassium, total (mg/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SL-7
SL-8
SL-6
SL-3
SL-4
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
SL-15
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Potassium


Sadie Ladue Drainage, Sodium (total)
Sodium, total (mg/L)
2.5
2
1.5
1
0.5
0
SL-3
SL-7
SL-6
SL-4
SL-8
SL-9
SL-10
SL-11
SL-12
SL-13
SL-14
SL-15
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Distance from Sadie Ladue Adit, kilometres
Oct 2010: Total Sodium

G.2.4 SADIE LADUE – PHYSICAL PARAMATERS GRAPHS





G.3 SADIE LADUE – TABLE OF PORE WATER CHEMISTRY DATA

		SL-9-SW	SL-11-SW	SL-12-SW	SL-13-SW	SL-15-SW
Dissolved Metals		12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010	12-Oct-2010
Aluminum (Al)	mg/L	0.095	0.119	0.0689	0.0258	0.053
Arsenic (As)	mg/L	0.0023	0.0059	0.00135	0.00520	0.0199
Barium (Ba)	mg/L	0.0509	0.14	0.0452	0.0912	0.154
Boron (B)	mg/L	<0.00005	<0.00005	<0.00001	<0.00001	<0.00005
Beryllium (Be)	mg/L	<0.00003	<0.00003	<0.000005	<0.000005	<0.00003
Bismuth (Bi)	mg/L	<0.3	<0.3	<0.05	<0.05	<0.3
Cadmium (Cd)	mg/L	0.0332	0.00514	0.0115	0.00263	0.00141
Cobalt (Co)	mg/L	0.0009	0.0013	0.0007	0.0007	<0.0005
Chromium (Cr)	mg/L	0.00049	0.00112	0.000329	0.00888	0.00726
Copper (Cu)	mg/L	0.0072	0.0185	0.00231	0.00621	0.0039
Iron (Fe)	mg/L	0.408	1.13	0.305	0.154	0.335
Lithium (Li)	mg/L	<0.003	0.004	0.0041	0.0023	<0.003
Manganese (Mn)	mg/L	0.0767	1.53	0.593	9.6	9.08
Molybdenum (Mo)	mg/L	0.0017	0.0015	0.00121	0.0105	0.0017
Nickel (Ni)	mg/L	0.0039	0.0022	0.00346	0.00882	0.0105
Lead (Pb)	mg/L	0.0843	0.19	0.00651	0.00822	0.207
Antimony (Sb)	mg/L	0.0077	0.0045	0.00101	0.00108	0.121
Selenium (Se)	mg/L	0.0004	0.0026	0.00051	0.00045	<0.0002
Silicon (Si)	mg/L	3.16	3.27	2.69	3.77	4.46
Silver (Ag)	mg/L	0.009	0.0112	0.00111	0.000468	0.00627
Tin (Sn)	mg/L	0.00010	0.00014	0.00005	0.00006	0.00021
Strontium (Sr)	mg/L	0.31	0.301	0.289	0.367	0.208
Titanium (Ti)	mg/L	<0.003	0.005	0.0012	<0.0005	0.009
Thallium (Tl)	mg/L	0.00002	0.00003	0.000006	0.000006	0.00002
Uranium (U)	mg/L	0.00515	0.00282	0.00265	0.0106	0.00096
Vanadium (V)	mg/L	<0.001	<0.001	<0.0002	<0.0002	<0.001
Zinc (Zn)	mg/L	3.96	0.183	1.67	1.91	1.13
Zirconium (Zr)	mg/L	0.0009	<0.0005	0.0001	0.0003	<0.0005
Calcium (Ca)	mg/L	78.1	87.8	102	123	70.7
Potassium (K)	mg/L	2.0	1.7	0.86	1.11	3.9
Magnesium (Mg)	mg/L	26.2	23.7	24.0	27.9	20.5
Sodium (Na)	mg/L	1.9	1.9	1.72	1.82	1.3
Sulfur (S)	mg/L	<50	59	66	14	65
Hardness (CaCO3) from dissolved metal scan	mg/L	303	317	354	421	261

Continued.

Total Metals		SL-9-SW	SL-11-SW	SL-12-SW	SL-13-SW	SL-15-SW
Aluminum (Al)	mg/L	61.4	1210	34.5	84.8	37.8
Arsenic (As)	mg/L	1.05	65.3	0.31	0.558	0.322
Barium (Ba)	mg/L	1.47	109	1.05	2.68	0.999
Beryllium (Be)	mg/L	<5	<50	<0.5	<0.5	<5
Bismuth (Bi)	mg/L	0.003	0.076	0.0017	0.0051	0.002
Boron (B)	mg/L	<0.002	0.064	0.0012	0.0023	<0.002
Cadmium (Cd)	mg/L	2.03	59.3	0.336	1.01	0.666
Cobalt (Co)	mg/L	0.096	7.57	0.0472	0.164	0.087
Chromium (Cr)	mg/L	0.119	2.79	0.068	0.15	0.067
Copper (Cu)	mg/L	1.07	36.5	0.375	1.12	1.03
Iron (Fe)	mg/L	734	30900	232	438	420
Mercury (Hg)	mg/L	0.063	1.51	0.054	0.12	<0.05
Lithium (Li)	mg/L	178	8020	41.1	68.6	129
Manganese (Mn)	mg/L					
Molybdenum (Mo)	mg/L	0.023	1.26	0.0169	0.0215	0.008
Nickel (Ni)	mg/L	0.334	9.4	0.16	0.513	0.225
Lead (Pb)	mg/L	28.3	1410	2.46	10.3	51.1
Antimony (Sb)	mg/L	0.503	9.91	0.113	0.105	1.26
Selenium (Se)	mg/L	0.011	4.73	0.0199	0.0279	0.008
Silicon (Si)	mg/L	74.7	1170	42.1	76.6	51.2
Silver (Ag)	mg/L	0.95	8.52	0.129	0.227	1.85
Tin (Sn)	mg/L	<0.02	0.471	0.004	0.005	0.03
Strontium (Sr)	mg/L	0.627	16.6	0.479	1.01	0.303
Titanium (Ti)	mg/L	0.592	14.6	0.482	0.857	<0.5
Thallium (Tl)	mg/L	0.0054	0.238	0.00091	0.00264	0.0092
Uranium (U)	mg/L	0.0311	0.986	0.0120	0.0332	0.0162
Vanadium (V)	mg/L	0.15	4.06	0.1	0.245	0.052
Zinc (Zn)	mg/L	134	3330	30	81.2	88.8
Zirconium (Zr)	mg/L	<0.01	0.622	0.006	0.015	<0.01
Calcium (Ca)	mg/L	161	4050	144	273	96
Potassium (K)	mg/L	8	81	3.3	4.7	8
Magnesium (Mg)	mg/L	117	2400	51.1	81.8	63
Sodium (Na)	mg/L	<5	<50	2.5	2.8	<5
Sulfur (S)	mg/L	<1000	<10000	<100	<100	<1000
Hardness (CaCO3) from total metal scan	mg/L	885	20000	570	1020	499

Continued.

Other Paramaters		SL-9-SW	SL-11-SW	SL-12-SW	SL-13-SW	SL-15-SW
pH	pH units	7.70	7.62	7.65	7.62	6.99
Conductivity	µS/cm	610	647	690	858	589
Bicarbonate (HCO3)	mgCaCO3/L	230	210	210	540	100
Carbonate (CO3)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5
Hydroxide (OH)	mgCaCO3/L	<0.5	<0.5	<0.5	<0.5	<0.5
Alkalinity (Total as CaCO3)	mgCaCO3/L	190	170	170	450	84
Nitrate plus Nitrite (N)	mg/L	0.03	<0.02	<0.02	<0.02	0.05
Nitrite (N)	mg/L	<0.005	<0.005	<0.005	<0.005	0.013
Nitrate (N)	mg/L	0.03	<0.02	<0.02	<0.02	0.04
Nitrogen (N)	mg/L	1.8	6	0.9	2.6	2
Dissolved Chloride (Cl)	mg/L	0.5	0.8	0.7	0.9	2.1
Dissolved Sulfate (SO4)	mg/L	150	190	190	52	200
Dissolved Organic Carbon (C)	mg/L	13.0	9.4	14.6	14.8	18.1
Total Organic Carbon (C)	mg/L	35	103	23	69	33.9

H SADIE LADUE STREAM SEDIMENT, ALLUVIUM, AND PEAT DATA

H.1 TABLE OF WHOLE ROCK CHEMISTRY DATA

Sample	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P
ID	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
SL-T3-Tails-Stream	15.3	77.1	991.6	>10000	63.8	21.3	9	>10000	11.4	26	1.3	<0.1	3.7	53	248.7	63.5	0.1	71	1.48	0.061
SL-T4-Bank-Sed-12"	5.7	195	7585.1	>10000	>200.0	31.7	12.9	>10000	9.46	61	3.9	<0.1	7.1	51	164.3	236.7	0.3	132	0.67	0.057
SL-T-2-Stream-Sed.	20.5	60.6	668.8	5665	35.8	34.6	12.8	>10000	6.11	38	2	<0.1	4.7	95	78.7	38.3	0.2	86	1.72	0.078
SL-T1-Bank-18"	22.9	46.7	168.9	2835	5.9	30	9.8	3197	3.56	24	2.2	<0.1	5.7	92	33.8	10.8	0.2	107	1.27	0.098
SL-T2-Pit-Sed-8"	15.1	68.5	365.5	3494	20.2	41	11.7	6446	4.57	25	2.6	<0.1	6.8	125	47.1	18.6	0.3	96	1.75	0.092
SL-T2-Upper-15"	11.1	59.9	37.8	246	1.1	50.9	13.8	474	3.32	18	3.3	<0.1	7.9	129	2.2	2	0.3	125	1.21	0.105
SL-T2-Pit-Sed-18"	15.2	80.6	798.2	5738	26	42.1	11.8	6730	4.69	19	3	<0.1	7.2	122	75.9	29.4	0.3	97	1.67	0.093
SL-T1-Stream-Sed.	20	26.5	143.6	1105	5.3	30.6	10	1882	3.14	25	2.1	<0.1	7	98	10.3	6.6	0.2	170	0.7	0.117
SL-T2-Pit-Sed-24"	12.4	73.9	606.2	6718	23.4	39.7	11.3	6566	4.51	24	2.7	<0.1	6.7	109	91.5	25.5	0.3	94	1.49	0.101
SL-T3-Stream-Org	11.8	77.5	583.1	>10000	27.5	36.7	10.9	>10000	6.83	27	2	<0.1	4.8	93	133	34.2	0.2	82	1.88	0.072
SL-10-Stream-Surface	14.8	98.2	3878.1	6213	117	28.9	11.6	>10000	9.32	76	1.7	<0.1	4.1	78	73	83.6	0.2	81	1.38	0.065
SL-5-Stream-Sed	21.4	53.2	252.9	1392	6.4	78.6	15.6	1336	3.32	40	2.3	<0.1	6.6	108	12.8	8.1	0.2	108	1.64	0.113
SL-1-Stream-Sed	15.1	56.7	685.1	3452	28.1	29	11.5	>10000	6.79	36	2.2	<0.1	6.3	97	48.3	29.9	0.2	91	1.21	0.098
SL-7-Stream-Sed	15	69.6	1874.3	688	49.9	30	10.2	>10000	6.25	23	1.4	<0.1	4	78	8.4	48.4	0.2	101	2.57	0.069
SL-11-Sed-6"	19.4	132.3	4460.3	>10000	>200.0	23.4	13.7	>10000	11.77	156	1.3	<0.1	3.4	52	183.8	150.4	0.2	81	0.83	0.063
SL-T4-Stream-Surface	13.2	57.5	81	267	2.3	39.2	10.6	486	1.83	8	2.7	<0.1	6	88	2.8	3.6	0.2	119	0.63	0.092
SL-9-Sed	24.3	58.4	1395	>10000	63.8	31.6	17.2	>10000	7.71	49	1.9	<0.1	3.8	63	118.6	50.6	0.1	86	1.21	0.068
SL-8-Stream-Sed	17.6	36.8	459.2	1490	18.7	27.9	12.3	8935	4.66	31	1.7	<0.1	5.5	88	16.5	16.7	<0.1	100	1.63	0.093
SL-6-Stream-Sed	19.6	58.2	232.8	1659	6.8	60.4	12.9	1388	3.08	33	2.1	<0.1	6.5	98	15.1	8.5	0.1	112	1.2	0.125
SL-9-Sed-8"	13.8	86.5	2078.4	>10000	74.7	20.4	10.8	>10000	12.4	52	2.2	<0.1	3	50	226.8	82.6	0.1	56	1.29	0.054
SL-11-Sed-5"	17.3	120.8	3649.7	>10000	178.7	28.9	20.9	>10000	15.32	110	1.5	<0.1	3	58	347.8	128.6	0.1	67	0.99	0.061
SL-2-Tails	12.6	125.5	3970.8	>10000	139	16	8.7	>10000	15.58	59	1.2	<0.1	2.6	32	387.3	110.3	0.1	40	0.83	0.051

Continued.

Sample	La	Cr	Mg	Ba	Ti	Al	Na	K	W	Zr	Ce	Sn	Y	Nb	Ta	Be	Sc	Li	S	Rb	Hf
ID	ppm	ppm	%	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm
SL-T3-Tails-Stream	15.1	256	1.3	175	0.139	2.51	0.206	0.81	0.5	26.1	30	6.6	12.9	2.5	<0.1	<1	7	16.1	1.1	51.4	0.7
SL-T4-Bank-Sed-12"	15.6	133	1.21	455	0.194	6.43	0.194	2.27	1.5	43.6	33	35.2	11.6	5.6	0.2	2	13	20.4	1.3	189.3	1.2
SL-T-2-Stream-Sed.	18.8	344	0.77	703	0.185	2.81	0.296	0.81	0.7	30.3	38	3.5	12	4.8	0.2	<1	7	16.7	0.3	43.2	0.8
SL-T1-Bank-18"	20.8	407	0.64	772	0.291	3.33	0.457	0.98	0.8	36.3	43	2	11.4	6.6	0.3	1	8	18.1	<0.1	44.6	1.1
SL-T2-Pit-Sed-8"	22.8	292	0.74	844	0.253	3.59	0.499	1.03	0.7	42	47	2.3	14.1	7.5	0.4	<1	8	23.6	0.2	52.2	1.1
SL-T2-Upper-15"	25.1	204	0.79	1072	0.347	4.03	0.809	1.34	1	62.2	51	1.7	14.4	10.6	0.5	1	10	28.3	0.1	56.6	1.9
SL-T2-Pit-Sed-18"	21.9	281	0.78	851	0.258	3.67	0.518	1.08	0.8	45.9	46	2.7	14	7.4	0.4	<1	9	21.8	0.3	54.7	1.2
SL-T1-Stream-Sed.	29.8	289	0.71	1217	0.378	4.59	0.58	1.63	1.1	55.7	62	2.3	11	11.9	0.6	1	10	29.2	<0.1	74.5	1.6
SL-T2-Pit-Sed-24"	24	232	0.7	837	0.252	3.34	0.483	0.99	1	39.5	48	3.2	14	7.2	0.4	<1	8	21.6	0.2	47.3	1
SL-T3-Stream-Org	14.8	208	0.93	345	0.195	3.09	0.295	0.89	0.7	35.4	32	3.9	12.3	5.2	0.3	<1	7	18.9	0.5	49.4	1
SL-10-Stream-Surface	16.3	248	1.14	612	0.177	2.92	0.267	0.87	0.8	30.1	33	5.7	11.2	4.4	0.2	<1	7	19.1	0.2	49.3	0.8
SL-5-Stream-Sed	25.8	392	0.89	751	0.371	4.06	0.693	1.4	0.7	49.8	54	1.8	13.5	9.8	0.5	2	9	21.9	<0.1	59.1	1.3
SL-1-Stream-Sed	26.2	281	1.02	564	0.256	4.29	0.628	1.19	0.9	41.6	54	3.8	12.8	6.3	0.4	1	9	25.5	<0.1	68.8	1.1
SL-7-Stream-Sed	14.3	216	1.82	631	0.232	3.75	0.445	1.14	0.4	33.1	30	1.9	10	6.2	0.3	<1	8	19.1	0.1	62.5	0.9
SL-11-Sed-6"	15.1	292	1.24	385	0.178	2.84	0.241	0.86	1.1	27.7	31	5.9	11.5	4.6	0.2	<1	7	25.8	0.8	50.2	0.7
SL-T4-Stream-Surface	20.7	225	0.64	954	0.332	2.79	0.685	1.23	1	50.2	43	1.4	10	10.1	0.5	1	7	25.5	0.2	55.4	1.5
SL-9-Sed	17.2	365	1.04	619	0.226	3.18	0.354	0.95	0.9	52.9	35	4.3	11	5.5	0.3	<1	7	21.8	0.3	52.2	1.2
SL-8-Stream-Sed	21.8	288	0.88	612	0.302	4.1	0.605	1.31	0.9	39.7	47	4.5	12.1	7.2	0.4	<1	9	29.1	<0.1	77.9	1.1
SL-6-Stream-Sed	28.5	327	0.77	759	0.356	4.11	0.72	1.68	0.8	54.7	59	2.2	12.6	10.5	0.6	1	9	24.4	<0.1	72.1	1.8
SL-9-Sed-8"	12.8	204	1.36	388	0.149	2.3	0.198	0.75	0.6	23.3	27	7	11.8	3.1	0.1	<1	6	14.4	0.6	48	0.6
SL-11-Sed-5"	14.3	223	1.34	153	0.156	2.11	0.192	0.66	1.7	24.9	30	6.2	13.2	3.2	<0.1	<1	6	13.5	1.2	42.8	0.6
SL-2-Tails	11.5	182	1.46	310	0.098	1.67	0.124	0.62	0.5	20.2	23	8	13.1	1.9	<0.1	<1	5	11	1.1	43.9	0.5

H.2 TABLE OF ACID-BASE ACCOUNTING DATA

Sample ID	Paste pH	Total Carbon (Wt.%)	TOC (Wt.%)	CO2 (Wt.%)	CaCO3 Equiv.* (Kg CaCO3/Tonne)	Total Sulfur (Wt.%)	HCl Extractable Sulfur (Wt.%)	HNO3 Extractable Sulfur (Wt.%)	Insoluble Sulfur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)
SL-T3-Tails-Stream		6.56	2.73	13.97	317.5	1.02	0.01	0.26	0.75	8.1
SL-T4-Bank-Sed-12"		7.33	4.61	9.90	225.0	1.17	0.06	0.39	0.72	12.2
SL-T-2-Stream-Sed.		12.65	11.29	4.91	111.6	0.27	0.01	0.09	0.17	2.8
SL-T1-Bank-18"		4.42	4.01	1.40	31.8	0.06	<0.01	0.03	0.03	0.9
SL-T2-Pit-Sed-8"		12.34	11.64	2.50	56.8	0.16	0.01	0.07	0.08	2.2
SL-T2-Upper-15"		5.35	5.28	0.17	3.9	0.08	0.05	0.02	0.01	0.6
SL-T2-Pit-Sed-18"		11.63	10.85	2.79	63.4	0.22	0.01	0.11	0.10	3.4
SL-T1-Stream-Sed.		1.63	1.40	0.74	16.8	0.03	<0.01	0.02	0.01	0.6
SL-T2-Pit-Sed-24"		9.78	9.07	2.52	57.3	0.11	<0.01	0.07	0.04	2.2
SL-T3-Stream-Org		12.98	11.17	6.56	149.1	0.43	<0.01	0.21	0.22	6.6
SL-10-Stream-Surface		8.53	5.84	9.79	222.5	0.14	0.01	0.06	0.07	1.9
SL-5-Stream-Sed		3.60	3.22	1.31	29.8	0.04	<0.01	0.03	0.01	0.9
SL-1-Stream-Sed		8.73	7.47	4.58	104.1	0.03	<0.01	0.03	0.00	0.9
SL-7-Stream-Sed		2.84	0.38	8.95	203.4	<0.02	<0.01	0.02	<0.02	0.6
SL-11-Sed-6"		4.35	0.82	12.87	292.5	0.63	0.01	0.31	0.31	9.7
SL-T4-Stream-Surface		4.90	4.83	0.14	3.2	0.12	<0.01	0.07	0.05	2.2
SL-9-Sed		3.01	0.91	7.52	170.9	0.22	0.01	0.10	0.11	3.1
SL-8-Stream-Sed		2.57	1.40	4.18	95.0	<0.02	<0.01	0.02	<0.02	0.6
SL-6-Stream-Sed		3.24	2.85	1.25	28.4	<0.02	<0.01	0.02	<0.02	0.6
SL-9-Sed-8"		5.73	2.01	13.60	309.1	0.52	<0.01	0.18	0.34	5.6
SL-11-Sed-5"		5.65	1.79	14.08	320.0	1.06	0.01	0.32	0.73	10.0
SL-2-Tails		8.58	4.41	15.07	342.5	0.86	0.05	0.42	0.39	13.1

H.3 TABLE OF XRD RESULTS

	Quartz	Plagioclase	Muscovite-Illite	Clinochlore	Actinolite	Dolomite	K-feldspar	Augite	Clinozoisite	Pyrite	Kaolinite	Calcite	Goethite	Hematite	Hydroxylapatite	Rutile	Siderite	Sphalerite	Galena	Ankerite	Magnetite
Sample ID	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
SL-T3-Tails-Stream	43.6	3.2	10.1	2.3	-	3.7	1.9	-	-	-	-	-	-	-	-	-	32.1	3.1	-	-	-
SL-T4-Bank-Sed-12"	25.3	3.5	35.2	3.3	-	-	2.3	-	-	-	-	-	-	-	-	-	29.2	1.1	-	-	-
SL-T-2-Stream-Sed.	58.8	6.4	14.0	3.5	1.9	-	1.7	-	-	-	-	-	-	-	-	-	13.3	0.4	-	-	-
SL-T1-Bank-18"	70.6	5.5	11.5	3.5	3.5	0.3	2.1	-	-	-	-	0.3	-	-	-	-	2.7	-	-	-	-
SL-T2-Pit-Sed-8"	57.4	8.7	13.5	7.6	3.1	0.5	2.7	-	-	-	-	-	-	-	-	-	6.5	-	-	-	0.4
SL-T2-Upper-15"	57.5	12.5	17.3	5.0	3.4	-	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SL-T2-Pit-Sed-18"	54.7	9.7	16.8	4.9	2.6	0.7	2.6	-	-	-	-	-	-	-	-	-	7.6	0.4	-	-	-
SL-T1-Stream-Sed.	64.5	6.5	19.2	3.4	2.8	0.4	2.0	-	-	-	-	-	-	-	-	-	1.3	-	-	-	-
SL-T2-Pit-Sed-24"	60.8	7.7	14.6	3.9	2.6	1.0	2.0	-	-	-	-	-	-	-	-	-	7.0	0.3	-	-	-
SL-T3-Stream-Org	49.4	5.4	16.1	4.1	-	1.7	1.5	-	-	-	-	-	-	-	-	-	20.3	1.6	-	-	-
SL-10-Stream-Surface	48.0	3.2	12.6	3.1	-	1.0	2.0	-	-	-	-	-	-	-	-	-	29.7	0.5	-	-	-
SL-5-Stream-Sed	61.6	8.7	19.0	3.2	2.5	2.5	1.9	-	-	-	-	0.2	-	-	-	-	0.3	-	-	-	-
SL-1-Stream-Sed	46.0	9.8	18.5	4.4	2.3	0.3	2.3	-	-	-	-	-	-	-	-	-	16.4	-	-	-	-
SL-7-Stream-Sed	52.9	4.6	13.9	4.0	1.6	8.0	1.6	-	-	-	-	1.2	-	-	-	-	12.1	-	-	-	-
SL-11-Sed-6"	48.2	4.8	10.9	2.3	-	-	-	-	-	-	-	-	-	-	-	-	31.9	1.9	-	-	-
SL-T4-Stream-Surface	64.1	10.8	16.0	3.9	2.8	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SL-9-Sed	59.3	4.1	11.2	3.4	1.4	1.9	1.7	-	-	-	-	0.4	-	-	-	-	16.0	0.7	-	-	-
SL-8-Stream-Sed	61.7	8.1	15.9	3.3	-	2.9	1.6	-	-	-	-	0.7	-	-	-	-	5.8	-	-	-	-
SL-6-Stream-Sed	57.5	9.2	23.4	3.3	1.5	1.5	1.8	-	-	-	-	0.3	-	-	-	0.9	0.6	-	-	-	-
SL-9-Sed-8"	43.4	4.5	9.2	1.7	-	3.8	-	-	-	-	-	-	-	-	-	-	35.8	1.5	-	-	-
SL-11-Sed-5"	44.9	2.1	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	40.7	3.5	-	-	-
SL-2-Tails	38.9	1.8	7.8	-	-	1.3	-	-	-	-	1.1	-	-	-	-	-	46.1	2.9	-	-	-