INVESTIGATION ON ZINC CONTROLS AT THE CROSS VALLEY POND – FARO MINE COMPLEX

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EXECUTIVE SUMMARY

The Faro Mine Complex is a decommissioned lead-zinc mine property located 15 km north of the Town of Faro and approximately 200 km northeast of the City of Whitehorse. Currently, the Government of Yukon manages the Site and care and maintenance are provided by Denison Environmental Services. Closure planning for the Faro Mine Complex commenced in 2003 and closure activities are currently on-going.

EcoMetrix Incorporated was retained by the Government of Yukon to investigate the controls on zinc concentrations in the Cross Valley Pond (CVP) and to provide recommendations for short- and long-term mitigation strategies for zinc concentrations.

Sampling was conducted at five stations in the CVP to obtain representative samples of pond water, sludge and porewater. Sludge samples were transported to the EcoMetrix Laboratory for sludge stability tests that consisted of 3 cells maintained at pH values of 6, 8 and 9, as well as a control cell. Geochemical modeling was performed for pH-solubility relationships for zinc oxide and zinc hydroxide, as well as for pH-sorption relations for zinc on hydrous ferric oxide sorption sites.

Results from the chemical characterization of the pond water, sludge and porewater exhibited trends of low zinc concentrations associated with high pH values, while higher zinc concentrations coincided with lower pH values. The results from the sludge stability tests supported this observation and showed that when pH values in the overlying water were near 8, zinc concentrations remained below the discharge criteria of 0.5 mg/L. When pH values were adjusted to 6 in the overlying water, zinc concentrations were in the range of 0.65 to 7 mg/L. Geochemical modeling showed that the concentrations of zinc could be explained by zinc desorption from hydrous ferric oxide sorption sites, a phenomena that is known to be controlled by pH. Together, these results indicated that pH is the master variable that controls zinc concentrations in the CVP.

During the sludge stability tests daily pH adjustments with hydrochloric acid were required to maintain a pH value of 6. A control cell that did not receive any pH adjustments maintained a pH value of about 8 over the test period. These observations, together with pH values in the sludge porewater of approximately 8.5, indicate that the pH values in the CVP should remain close to 8. However, pH values of approximately 6.5 have been measured in the pond. The observed low pH values suggest that there is likely an on-going input of acidity that has resulted in depressed pH values and elevated zinc concentrations in the CVP.

As part of the investigation potential sources of acidity that may control pH in the pond were investigated and include oxidation of dissolved manganese, seepage flows from the Rose Creek Diversion Ditch, seepage below the Intermediate Dam and under-ice carbon dioxide

accumulation. Seepage of historic tailings porewater that contains ferrous iron below the Intermediate Dam appears to be the most plausible source of acidity to the CVP.

If seepage below the Intermediate Dam is responsible for the observed depressed pH values, it is expected that low pH values and elevated zinc concentrations will persist in the future. It is also likely that the movement of zinc through the tailings porewater is being retarded at this time and that in the future seepage containing high zinc concentrations will release higher zinc concentrations to the CVP. However, further investigation of subsurface flow below the Intermediate Dam is required to verify if seepage of tailings porewater is the source of acidity in the CVP.

For short-term mitigation of the pH and zinc concentrations in the CVP a lime demand of 210 t-CaO/Mm^3 of water was calculated. This amount of lime would be required to raise the pH of the pond water above 8, resulting in zinc concentrations below the discharge criteria of 0.5 mg/L. However, if an on-going source of acidity in the pond does exist, it is expected that depressed pH values and elevated zinc concentrations will recur within a year and that annual lime additions to the CVP may be required. The addition of lime to the CVP may be challenging because the even distribution of lime throughout the pond may not be easily attainable in this shallow pond with a large surface area.

Potential long-term mitigation options included isolation of sludge from the water column using a thin bentonite layer as a diffusion barrier, removal of sludge from the CVPand placement of a clean base layer, construction of a polishing pond cell within the existing CVP and discontinued use of the CVP as polishing pond.

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1.0 INTRODUCTION

The Faro Mine Complex (the Site) is a decommissioned lead-zinc mine property located 15 km north of the Town of Faro and approximately 200 km northeast of the City of Whitehorse (**Figure 1.1**). The Faro Mine operated intermittently between 1969 and 1998, producing approximately 55 millions tonnes of tailings that were deposited into the Rose Creek Tailings Area. After closure, the Faro Mine was placed into receivership. Currently, the Government of Yukon manages the Site and care and maintenance are provided by Denison Environmental Services (DES). Closure planning for the Faro Mine Complex commenced in 2003 and closure activities are currently on-going.

EcoMetrix Incorporated (EcoMetrix) was retained by the Government of Yukon to investigate the controls on zinc concentrations in the Cross Valley Pond (CVP) and to provide recommendations for short- and long-term mitigation strategies for zinc control in the CVP.

Water treatment is a major aspect of care and maintenance for the Site with pH control to remove metals. The CVP is used as a polishing pond for treated water from the Faro Mill, as well as treated water from the Intermediate Pond via the Down Valley Treatment Plant. The CVP is the final clarification for water prior to release to the environment that discharges into Rose Creek.

The allowable discharge concentration for zinc in treated water is 0.5 mg/L. The concentrations of zinc in the CVP have been variable in the past and vary with depth in the pond. Concentrations of zinc have trended up at times and there is a concern that the values may consistently exceed the discharge criteria if not appropriately controlled.

1.1 Objectives and Scope of Work

The objectives of the study were to investigate zinc concentrations in pond water, sludge and porewater in the CVP to develop an understanding on the controls of zinc concentrations in the pond water and to provide recommendations for short- and long-term mitigation of zinc concentrations.

The scope of work for this investigation included the following:

- collection of sludge solids, porewater and pond water from representative areas in the CVP;
- data assessment of constituent concentrations in the solids, porewater and pond water to understand controls on zinc concentrations; and
- recommendations for controlling zinc concentrations in the CVP.

2.0 METHODS

The following section presents the methodologies used for sample collection and processing, as well as for the laboratory sludge stability and manganese oxidation tests.

2.1 Sample Collection and Processing

Sampling was conducted at five stations in the CVP to obtain representative samples of pond water, sludge, (hereafter referred to as solids) and porewater. Pond water, solids and porewater were sampled to gain an understanding of the controls on the observed elevated zinc concentrations in the CVP. The locations of the five stations are presented in **Figure 2.1**.

2.1.1 Pond Water Samples

Pond water samples were collected at all five stations from the top, middle and bottom of the water column using a Beta Van Dorn Bottle.

The pH of the pond water samples were measured in the field and recorded. The pond water samples for alkalinity and dissolved metals were field filter through 0.45 µm nylon filters. Samples for metals analyses were preserved with nitric acid. Water samples were collected in samples bottles supplied by ALS.

Pond water samples were sent to ALS for chemical analysis that included metals, major ions and alkalinity.

2.1.2 Solids Samples

Solids samples for porewater extraction and depth profiling were collected at three (CVP10-1, CVP10-2 and CVP10-5) of the five stations using a 2-inch K-B coring device. At each location a total of five cores were collected to achieve sufficient sample volume for porewater extraction from the solids.

The cores were sectioned at 5 cm intervals to a depth of 15 cm. The intervals from the core sets from each station were composited and placed into dedicated Ziploc bags. The samples were transported to the EcoMetrix Laboratory for porewater extraction.

After the porewater extraction process (described in **Section 2.1.3**) the solids samples were placed into dedicated Ziploc bags. Samples were submitted to ALS Environmental Laboratories (ALS) for chemical analyses that included metals.

Solids samples for sludge stability testing at the EcoMetrix Laboratory were collected at all five stations using an Ekman dredge. The solids from each station were placed into

dedicated buckets and transported back to the EcoMetrix Laboratory to be used for sludge stability tests.

2.1.3 Porewater Samples

Porewater samples were extracted from the core samples at the EcoMetrix Laboratory. Each 5 cm interval from the composited core sets at each sampling station was transferred into 750 mL centrifuge bottles. The samples were centrifuged at approximately 3,500 rmp for 20 to 30 minutes. After centrifugation, the porewater was decanted and filtered through a 0.45 µm nylon filter. The pH of the filtered porewater samples was measured and recorded. The samples were transferred into sample bottles supplied by ALS. Samples for metals analyses were preserved with nitric acid.

Porewater samples were submitted to ALS for chemical analysis that included metals, major ions and alkalinity.

2.2 Laboratory Tests

This section describes the methods used for the sludge stability and manganese oxidation tests conducted in the EcoMetrix Laboratory.

2.2.1 Sludge Stability Tests

Four test cells were assembled using approximately 0.5 kg of sludge and 1 L of pond water collected from the CVP (**Figure 2.2**). The pond water was decanted off the top of the sludge from the buckets of sludge collected for laboratory testing.

Three cells were maintained at pH values of 6, 8 and 9 using either hydrochloric acid or a lime solution. The lime solution was created using distilled water and a small amount of quick lime (calcium oxide – CaO). The pH in one cell was not adjusted to serve as a control.

The cells were sampled daily for 8 days. Prior to sampling, the pH of the test cells were modified accordingly and left for at least 30 minutes to stabilize. Sampling consisted of removal of 100 mL of solution and replacement with an equal amount of pond water. The pH in the test cells was then adjusted accordingly. The overlying water samples were filtered through a 0.45 µm nylon filter and the pH of the samples was measured and recorded. The samples were acidified with nitric acid and submitted to ALS for metals analyses.

Two samples of pond water were sampled on Days 0 and 6. The pH values at the time of sample collection were measured and recorded. The samples were filtered through 0.45 µm nylon filters, preserved with nitric and submitted to ALS for metals analysis.

2.2.2 Manganese Oxidation Tests

A titration using 3% hydrogen peroxide, a strong oxidant, was performed on the CVP water used for the sludge stability tests. The water used to assess whether the oxidation of manganese would alter the pH of the water contained about 33 mg/L of manganese. Hydrogen peroxide was added to the water at 1 to 5 mL increments to a total volume of 60 mL. The same titration was completed on distilled water that does not contain significant amounts of manganese. The changes in pH values were measured and recorded for each incremental hydrogen peroxide addition.

3.0 RESULTS

The results from the field program and laboratory tests are presented in the following Section. The primary Constituents of Concern (COCs) in the CVP are zinc, manganese and iron, with pH as an important parameter. Therefore, the focus of this Section is on these parameters. Summaries of the data are provided in **Tables 3.1 to 3.4**. Complete analytical results are provided in **Appendix 1**.

3.1 Field Program

The field program focused on the collection of representative samples for characterization and chemical analysis. The results revealed important trends and characteristics for pond water, solids and the porewater within the solids. Specifically, the results showed low zinc concentrations associated with high pH values, while higher zinc concentrations coincided with lower pH values. Trends for pH together with zinc concentrations in pond water and solids porewater can provide important insight into the potential release of zinc into the pond water.

3.1.1 Pond Water

A summary of the results from the pond water analyses is presented in **Table 3.1**. Depth profiles of dissolved concentrations for select constituents in pond water are presented **Figure 3.1**.

The pH values measured in the pond water were consistent among sampling stations at each depth. The trend for pH values at each location showed decreasing values with depth. At the top of the water column pH values ranged from 7.38 to 7.83. At depths below 2 metres, pH values decreased and remained consistent at values ranging from 6.36 and 6.51.

Alkalinity (as $CaCO_3$) concentrations measured in the pond water were consistent among sampling stations at each depth. The trend for alkalinity at each location showed increasing values with depth. At the top of the water column (0 to 1 m) alkalinity concentrations ranged from 88 to 139 mg/L. At depths below 2 metres, alkalinity concentrations increased and ranged between 208 and 342 mg/L.

Zinc concentrations in the pond water were also consistent among sampling stations at each depth. The trend for zinc exhibited increasing concentrations with depth in the water column. At the top of the water column (0 to 1 m), zinc concentrations were in the range of 0.21 to 0.23 mg/L for dissolved zinc and 0.22 to 0.24 mg/L for total zinc. Below a depth of approximately 2 metres, dissolved zinc concentrations ranged from 0.37 to 0.61 mg/L and total zinc concentrations were in the range of 0.39 to 0.60 mg/L.

Similar trends to those observed for zinc were also observed for manganese concentrations in the pond water. Manganese concentrations were consistent with depth among sampling stations and manganese concentrations increase with depth in the water column. Dissolved manganese concentrations ranged from 6.47 to 14.1 mg/L in the top of the water column (0 to 1 m). Total manganese at the top of the water column ranged from 7.39 to 13.4 mg/L. Below depths of approximately 2 metres, dissolved and total manganese concentrations were in the ranges of 22.0 to 47.6 mg/L and 25.2 to 53.6 mg/L, respectively.

In general, dissolved iron concentrations in the pond water were below the detection limit of 0.03 mg/L. The dissolved iron concentrations that were detected ranged from 0.03 to 0.73 mg/L, with the highest concentrations measured at CVP10-5 at a depth of about 2 metres. Total iron concentrations exhibited similar concentrations among the sample stations and generally increased with depth. The total iron concentrations in the top 1 metre of the water column ranged from 0.34 to 0.72 mg/L. At depths below approximately 2 metres, total iron concentrations ranged from 0.45 to 1.4 mg/L.

3.1.2 Solids

A summary of the results from the solids analyses is presented in **Table 3.2**. The concentrations of select constituents as a function of depth are provided **Figure 3.2**.

The results from the solids analyses at CVP10-1 showed different chemistry in the solids compared to CVP10-2 and CVP10-5 (**Figure 3.2**). At the time of sampling it was recognized that the solids collected from this location were tailings, with minor amounts of sludge in the upper most section (0 to 5 cm).

The zinc concentrations at CVP10-1 ranged from 2,130 to 5,560 mg/kg and showed an increasing trend with depth. Manganese concentrations ranged from 2,870 to 9,050 mg/kg and exhibited a decreasing trend with depth. Iron concentrations ranged from 21,700 to 98,500 mg/kg and showed an increasing trend over the depth profile.

The results for CVP10-2 and CVP10-5 exhibited similar concentrations that were consistent with depth (**Figure 3.2**). Zinc concentrations were in the range of 8,800 to 9,730 mg/kg. Manganese concentrations ranged from 26,200 to 37,700 mg/kg and iron concentrations ranged from 42,000 to 55,900 mg/kg.

3.1.3 Porewater

A summary of the results from the porewater analyses is presented in **Table 3.3**. Depth profiles for select constituents in the porewater are shown in **Figure 3.3**. **Figure 3.3** also illustrates the concentrations of constituents in the pond water as a function of depth at the respective porewater sample stations. The pond water samples in this figure represent dissolved constituent concentrations from the top, middle and bottom of the water column

and are not plotted to scale. The depths at which the samples were collected are provided in **Table 3.1**.

Because the solids collected at CVP10-1 were considered to be tailings, the porewater results at this location are discussed separately.

The pH values measured in the porewater at CVP10-1 ranged from 8.49 to 11.90, with the highest value measured in the 5 to 10 cm interval. The dissolved zinc concentrations in the porewater ranged from 0.004 to 0.263 mg/L. Dissolved manganese concentrations ranged from 0.003 to 0.032 mg/L and dissolved iron concentrations ranged from less than 0.05 to 0.10 mg/L. The highest zinc and iron concentrations and the lowest manganese concentration were measured in the 5 to 10 cm interval.

The results for CVP10-2 and CVP10-5 exhibited similar concentrations and consistent trends with depth (**Figure 3.3**). The lowest pH values in the porewater were measured in the 0 to 5 cm intervals and were about 8. The pH values increased with depth and ranged from 8.73 to 8.87 at depths of 5 to 15 cm. Dissolved zinc concentrations exhibited an inverse trends to that noted for pH. The highest zinc concentrations were measured in the 0 to 5 cm interval with values of approximately 0.16 mg/L. Lower zinc concentrations were observed at depths between 5 and 15 cm that were in the range of 0.02 to 0.03 mg/L. Dissolved manganese concentrations showed similar trends to those for zinc with values approximately 0.02 in the top 5 cm that decreased to less the detection limit of 0.001 mg/L at depths between 5 and 15 cm. Dissolved iron concentrations in the porewater were consistent below the detection limit of 0.05 mg/L.

3.2 Laboratory Tests

This section describes the results from sludge stability tests and manganese oxidation test completed at the EcoMetrix Laboratory.

3.2.1 Sludge Stability Tests

A summary of the results from the sludge stability tests is presented in **Table 3.4**. The results for select constituents are also presented as time trend plots in **Figure 3.4**.

Time trend plots for pH values measured from the samples submitted for testing are shown in **Figure 3.4**. The pH values were maintained consistent with time for the cells with pH adjustments that include CVP10-ST-6, CVP10-ST-8 and CVP10-ST-9. At the time the tests were initiated (Day 0), the control cell, CVP10-ST-C, that did not receive any pH adjustment exhibited an initial pH of 7.2. This cell was to represent sludge stability at a pH value of about 7. However, by Day 1 the pH in this cell had increased to approximately 8 and remained between 7.8 and 8 for the rest of the test period. The pH in the pond water that was used to replace sample volumes was sampled twice in the eight day period and the pH values of the water were 7.0 and 7.1 on Days 0 and 6, respectively.

The time trend plots for zinc showed an increase in zinc concentrations with decreasing pH. The cell that was maintained at a pH value of about 6 exhibited the highest zinc concentrations that ranged from 0.65 to 7 mg/L. The cells maintained at pH 8 and 9 exhibited zinc concentrations that ranged from 0.02 to 1 mg/L and from less than the detection limit of 0.003 to 1 mg/L, respectively. The zinc concentrations in the control cell ranged from 0.02 to 3. mg/L. The pond water used to replace the sampled water volume maintained constant zinc concentrations of about 1 mg/L over the test period.

Manganese displayed behaviour similar to that of zinc, with the highest manganese concentrations in the cell maintained at pH 6 and lower manganese concentrations with increasing pH. Manganese concentrations in the cell maintain at pH 6 ranged from 9.7 to 32 mg/L. The cells maintained at pH 8 and 9 had manganese concentrations that ranged from 5 to 25 mg/L and 0.4 to 9.5 mg/L, respectively. The manganese concentrations in the control cell ranged from 5 to 32 mg/L. The pond water used to replace the sampled water volume maintained constant manganese concentrations of approximately 32 mg/L over the test period.

3.2.2 Manganese Oxidation Tests

Results from the manganese oxidation test showed that after the addition of 60 mL of the hydrogen peroxide solution, the pH of the water had decreased from 7.8 to 6.8. The same titration on distilled water that does not contain significant amounts of manganese exhibited similar changes in pH from 7.5 to 6.9 with the addition of 60 mL of hydrogen peroxide.

4.0 DISCUSSION

Results from the chemical characterization of the pond water, sludge and porewater exhibited trends of low zinc concentrations associated with high pH values, while higher zinc concentrations coincided with lower pH values.

The trends for pH together with zinc concentrations in pond water and sludge porewater provide important insight into the potential release of zinc into the pond water.

One mechanism for release of soluble constituents is via diffusive flux from porewater to surface water. Diffusion is controlled by concentration gradients, whereby, higher zinc concentrations in the porewater can result in higher concentrations of this constituent in the water column. However, the results from the porewater and pond water exhibited zinc concentrations in the ranges of 0.02 to 0.16 mg/L and 0.21 to 0.61 mg/L, respectively. The lower zinc concentrations measured in the porewater compared to those measured in the pond water indicate that diffusion as a potential mechanism for the release of zinc into the pond water was not supported by the results from this study.

A second mechanism for the release of soluble zinc relates to pH controls on the solubility of constituents. For many metals, including zinc, solubility theory suggests that lower metal concentrations are associated with higher pH values. The results from the field study support this relationship because samples that exhibited the highest constituent concentrations also exhibited the lowest pH values.

Sludge stability tests were completed to test the hypothesis that the release of soluble zinc could be controlled by the pH of the pond water. The results from the sludge stability tests also demonstrated that pH exhibited a strong influence on zinc concentrations. When the pH of the overlying water was maintained at a pH value of 6, zinc concentrations were range of 0.65 to 7 mg/L. However, when the overlying water was maintained at pH values near 8 lower zinc concentrations in the range of 0.02 to 1 mg/L were measured.

The results from the field study and the sludge tests showed that elevated zinc concentrations are related to low pH values, suggesting that there is a pH control on the solubility of zinc in the CVP.

4.1 pH Controls on Zinc Concentrations

A conceptual model for the precipitation of zinc as a function of pH was developed to investigate the relationships between pH and zinc concentrations. Theoretical solubility for two common solid phases of zinc, zinc oxide ($ZnO_{(s)}$) and zinc hydroxide ($Zn(OH)_{2(s)}$), were calculated using aqueous thermodynamic data provided in the Visual MINTEQ v.3 database (Gustafsson, 2010). All available data for dissolved zinc concentrations in pond water and porewater from the CVP together with the data for the overlying water from the sludge stability tests were plotted as zinc concentration in mg/L vs. pH in **Figure 4.1**. The

data were compared to the theoretical solubility $ZnO_{(s)}$ and $Zn(OH)_{2(s)}$ as a function of pH in **Figure 4.1** to determine if the data conformed to a pH-solubility relationship. All measured zinc concentrations were below the theoretical saturation concentrations indicating that the dissolution of zinc from the solid phases does not represent a control on the zinc concentrations within the CVP.

Further consideration of the relationships between pH and zinc indicated that adsorption of zinc onto precipitating hydrous ferric oxides (HFO, or commonly referred to as ferric hydroxide) could represent a potential control on zinc concentrations in the CVP. Metal concentrations can be controlled by sorption reactions onto HFO surfaces that involve the coordination of metal ions with oxygen atoms and the release of protons from the solid surface via the following reaction:

$$Fe\text{-}OH + Me^{2+} = Fe\text{-}O\text{-}Me^{+} + H^{+}$$

This reaction indicates that the sorption of a metal onto HFO is pH dependant. Because the H^+ ions compete for sorption sites, higher metal sorption takes place at higher pH values.

Geochemical calculations using the program Visual MINTEQ v.3 (Gustafsson, 2010) were completed using reasonable HFO surface properties from the literature (Dzombak and Morel, 1990). Initial concentrations of 0.38 mg/L and 0.61 mg/L for zinc and iron, respectively were used and represent the average pond water concentrations measured in the CVP (**Table 3.1**).

The results from the adsorption calculations together with zinc data from the pond water, porewater and sludge stability tests are presented in **Figure 4.2**. The data are plotted as zinc concentrations in mg/L vs. pH. The data were compared to the theoretical sorption of zinc onto HFO as a function of pH in **Figure 4.2** to verify if the data conform to a pH-sorption relationship. The data show an excellent fit to the theoretical adsorption curve for zinc sorption onto HFO and indicate that zinc concentrations in the CVP are controlled by sorption reactions onto ferric hydroxide precipitates. Therefore, lower pH values in the pond water result in desorption of zinc from ferric hydroxide sorption sites, thereby resulting in higher zinc concentrations in the pond water.

Results from chemical characterization of the pond water showed similar concentrations of total zinc compared to dissolved zinc concentrations (**Table 3.1**) indicating that the source of zinc in the CVP is primarily in the dissolved form. The results also showed higher zinc concentrations at the bottom of the water column. Together, these results suggest that the source of the zinc is desorption of zinc at the sludge-water interface from HFO present in the sludge and its subsequent diffusion into the water column.

The results from the field study, sludge stability tests and geochemical modeling indicate that pH is the master variable that controls the zinc concentrations in the CVP.

4.2 Potential pH Controls on CVP Water

Observations from the sludge stability tests, together with pH values of approximately 8.5 measured in the sludge porewater, suggest that the pH values in the CVP water should remain close to 8. During the sludge stability tests daily pH adjustments were required to maintain desired pH values in the overlying water. Test cell CVP10-ST-6 required daily pH adjustment using hydrochloric acid to maintain a pH of 6 indicating that on-going acidity consumption was occurring. The control test cell that did not receive any pH adjustments maintained a pH of about 8 over the test period. These observations suggest that the pond water in contact with the sludge, with no inputs of acidity or alkalinity should remain at a pH value near 8. This is reasonable for lime generated sludge that typically contains $CaCO_3$ solids as a result of raising the pH of water containing dissolved carbonate. However, pH values of approximately 6.5 were measured during the field study at depths near the sludge-water interface and similar pH values have been measured during routine monitoring by DES (2010). These observations suggest that there is most likely a source of acidity that has depressed the pH in the water in the CVP at depth below 2 metres. Because zinc concentrations in the CVP are dependent on pH, potential sources of acidity that control the pH of the pond were considered in this study.

4.2.1 Manganese Oxidation

Results from the field study showed manganese concentrations as high as 48 mg/L in the pond water. It was hypothesized that the oxidation of manganese within the CVP could be a source of acidity and therefore responsible for the low pH values at depths below 2 metres. Manganese is oxidized in water according to the following equation:

$$Mn^{2+} + 2H_2O = MnO_{2(s)} + 4H^+ + 2e^-$$

This equation indicates that when manganese oxidizes it precipitates as manganese oxide ($MnO_{2(s)}$). During precipitation acidity is generated in the form of hydrogen ions.

A titration using 3% hydrogen peroxide, a strong oxidant, was performed on the CVP water used for the sludge stability tests. The water used to assess whether the oxidation of manganese would alter its pH contained about 33 mg/L of manganese. The results from the titration showed that after the addition of 60 mL of the hydrogen peroxide solution, the pH of the water had decreased from 7.8 to 6.8. However, the same titration on distilled water that does not contain significant amounts of manganese exhibited similar changes in pH from 7.5 to 6.9 with the addition of 60 mL of hydrogen peroxide. These results do not support the assumption that manganese oxidation is a source of acidity in the CVP.

If manganese oxidation and precipitation were responsible for the depressed pH values in the CVP the expected trends for the pond water should exhibit lower pH values that correspond with lower manganese concentrations. Instead, the highest manganese

concentrations were associated with lower pH values in the CVP (**Figure 3.1**) and indicate that this control on pH is not supported by the data.

The results from the titration and the field study suggest that manganese oxidation does not control the pH in the CVP. Instead the results suggest that pH controls the concentrations of dissolved manganese.

The theoretical solubility of manganese carbonate ($MnCO_{3(s)}$) was calculated as a function of pH to validate the assumption that manganese concentrations are controlled by a pH-solubility relationship. Theoretical $MnCO_{3(s)}$ solubility was calculated using the aqueous thermodynamic data provided in the Visual MINTEQ v.3 database (Gustafsson, 2010). All available data for dissolved manganese concentrations from the pond water, porewater and the overlying water from the sludge stability tests are plotted as manganese concentration in mg/L vs. pH in **Figure 4.3**. The data were compared to the theoretical solubility of $MnCO_{3(s)}$ as a function of pH in **Figure 4.3**. The results shows that manganese concentrations measured in the pond water and from the sludge stability tests were in agreement with the trends for the theoretical solubility curve for $MnCO_{3(s)}$ indicating that dissolution of $MnCO_{3(s)}$ at lower pH values is the dominant control on the concentrations of manganese in the CVP.

4.2.2 Dilution from the Rose Creek Diversion Ditch Seepage

Another potential source of acidity and low pH in the CVP that was investigated was the dilution of CVP water by seepage from Rose Creek Diversion Canal (RCDC). Geochemical calculations using the program PHREEQC (Parkhurst and Appelo, 1999) were completed to assess the potential mixing and dilution of CVP water with seepage from the RCDC.

The model inputs for the seepage volume and chemistry from the RCDC were obtained from the CVP operational report completed by DES (2010). Routine monitoring data at station X2 (North fork of Rose Creek at access road) were considered representative of the chemistry of the seepage (**Table 4.1**). The maximum seepage rate of 5,800 m^3 calculated by DES (2010) was used in the model as it was considered to be a conservative estimate. The model input for the volume of water in the CVP was assumed to be $1x10^6$ m^3. The inputs for the CVP water chemistry were average constituents concentrations measured in the pond water samples collected during field sampling in August 2010 (**Table 4.1**).

The results of the modeling calculations indicated that the initial pH of 6.89 in the CVP did not change when mixed with seepage water from the RCDC. This result suggests that another mechanism is responsible for depressed pH values with depth in the CVP.

4.2.3 Seepage Beneath the Intermediate Dam

A fourth potential source for depressed pH values in the CVP could be seepage of historical tailings porewater beneath the Intermediate Dam. The change in elevation between the

Rose Creek Tailings Area and the CVP has likely induced sub-surface flow (seepage) below or through the Intermediate Dam. Downward seepage on the upstream side of the Intermediate Dam could result in upward flow on the downstream side, thereby displacing the tailings porewater into the water column in the CVP. Seepage would generally be concentrated near the toe of the dam because the shortest travel path for sub-surface water flow represents the highest hydraulic gradients that control flow. A schematic for the flow conditions beneath the Intermediate Dam are shown is **Figure 4.4**.

The Faro tailings were exposed for many years during mine operation and post-closure. Therefore, the tailings generated acid and other oxidation products that resided in the tailings porewater and overtime have been transported slowly downward in the tailings. At depth, it is likely that tailings porewater contains iron in the ferrous (Fe^{2+}) form. This form of iron is stable under the anoxic conditions that would exist at depth in the tailings and is relatively mobile. If seepage water containing ferrous iron daylights in the CVP it would come into contact with oxygen. When ferrous iron comes into contact with oxygen at neutral pH, it oxidizes rapidly to ferric iron (Fe^{3+}) and then precipitates as ferric hydroxide solid ($Fe(OH)_3$). During precipitation, acid, in the form of hydrogen ions, is released and water that has precipitated ferric hydroxide typically exhibits pH values between 3 and 4. The pH values measured at depth in the CVP of about 6.5 suggest that the acidity generated by ferric iron precipitation is being neutralized by the dissolution of sludge at the sludge-water interface. The neutralization of acidity in the CVP is consistent with sludge stability tests whereby daily adjustments using hydrochloric acid were necessary to maintain a pH of 6 in the overlying water.

Ferrous iron (Fe^{2+}) is a highly mobile constituent and if seepage of historical tailings porewater beneath the Intermediate Dam is occurring, it is expected that Fe^{2+} would be one of the first constituents that would daylight in the CVP. It is likely that the movement of other constituents, such as zinc, through the tailings porewater at this time is retarded via neutralization reactions. However, in the future, zinc in the tailings porewater may be released to the CVP resulting in higher zinc concentrations in the pond water.

Further investigation of the seepage flow and chemistry would be needed to verify if seepage of tailings porewater containing ferrous iron is the source of the depressed pH values measured at depth in the CVP. A mass balance on acidity inputs to the pond could be used to infer acid inputs rather than a more costly hydrogeologic study.

4.2.4 Under-Ice Carbon Dioxide Accumulation

During the winter months the accumulation of carbon dioxide (CO_2) under the ice in the CVP has been observed. It has been suggested that the accumulation of CO_2 in the pond may be linked to the depressed pH values (John Brodie, pers. Comm., 2010).

When water is in equilibrium with the atmosphere, CO_2 dissolves in water to form carbonic acid (H_2CO_3). Carbonic acid is a weak acid that dissociates in water to form bicarbonate

(HCO_3^-), carbonate (CO_3^{2-}) and hydrogen ions (H^+). The dissociation of CO_2 and the carbon species present depend on the pH of the water. At pH values of less than 6.4, H_2CO_3 is the dominant carbonate species, while at pH values between 6.4 and 10.3 carbonate is primarily in the form of HCO_3^-. Above pH values of 10.3 carbonate is predominantly in the form of CO_3^{2-}.

Chemical equilibrium theory for carbonate in water suggests that the pH of pure water in equilibrium with atmospheric CO_2 will be about 5.7. Equilibrium theory also suggests that increases in CO_2 concentrations result in decreases in pH. However, water in the CVP contains alkalinity that acts to buffer H_2CO_3 resulting in pH values greater than 5.6 in the pond water.

The observed accumulation of CO_2 under the ice during the winter indicates that a source of CO_2 must exist in the CVP. There are two potential sources that include bacterial respiration related to a source of organic carbon and/or dissolution of carbonate solids in the sludge. Carbon dioxide is a by-product of bacterial respiration of organic carbon and could be a potential source for CO_2 under the ice in the CVP. However, for respiration to occur a source of organic carbon must be present to support bacterial respiration. Because no data are available for organic carbon concentrations in the CVP solids, further investigation is warranted before any conclusions can be made as to whether bacterial respiration is a potential source for CO_2 accumulation under the ice.

Results from this investigation have provided evidence for an on-going source of acidity that has resulted in depressed pH values and is effectively dissolving sludge in the CVP. Dissolution of lime generated sludge that contains $CaCO_3$ results in the liberation of CO_2 into the water column. Therefore, the dissolution of sludge resulting from inputs of acidity to the CVP is a potential source for the observed accumulation of CO_2 under the ice.

During the ice-free period, any CO_2 that may be generated in the pond will readily de-gas to the atmosphere and will not be observable.

4.3 Implications of On-going Acidity Loads to the CVP

Observations relating to the control cell that maintained a pH of 8 in the sludge stability tests, together with pH values of approximately 8.5 measured in the sludge porewater suggest that the pH values in the CVP water should be maintained at values near 8 by equilibrium reactions with the carbonate sludge. However, pH values of approximately 6.5 were measured during the field study at depths near the sludge-water interface and similar pH values have been measured during routine monitoring by DES (2010). These results suggest that there is an on-going source of acidity loads to the CVP that is acting to lower pH and to raise zinc concentrations. The acidity being added to the pond is effectively dissolving the sludge and this process neutralizes the acidity and maintains the pH at values close to 6.5.

During the sludge stability tests approximately 72 mg of acidity as $CaCO_3$ per litre of water was required each day, on average, to maintain a pH of 6. The acidity load required to maintain the pH of 6 from the sludge stability tests was scaled up to estimate the amount of acidity needed to maintain the water in the CVP at a pH of 6, assuming a volume of 1 million cubic metres. The calculated acidity load is equivalent to a lime demand of 148 tonnes of CaO per Mm^3 per annum.

For illustration purposes, this acidity load was converted to an equivalent load of dissolved ferrous iron that is known to be an important product of sulphide oxidation in the tailings. The acidity load is also equivalent to seepage containing 1,000 mg/L flowing into the pond at a rate of 7 L per second. This appears to be a plausible iron concentration and flow rate for seepage beneath the Intermediate Dam.

If seepage from the intermediate dam is responsible for the observed depressed pH values in the CVP, it is expected that low pH values and elevated zinc concentrations will persist in the future. The sludge in the pond will be an on-going source of alkalinity to buffer the acidity from the seepage well into the future. Therefore, pH values likely will not decrease much below current values of approximately 6.5. However, if sufficient acidity is added to the CVP, the zinc concentrations can increase to values near 1 mg/L as shown in the sludge stability test maintained at a pH of 6.

4.4 Lime Demand Calculations

The results from the field program and sludge stability tests indicated that pH is the major control on the zinc concentrations in the CVP and that zinc concentrations less than the discharge criteria of 0.5 mg/L can be attained when the pH of the overlying water is maintained at pH values of 8 or more. A lime demand for the CVP was completed to estimate the amount of lime required to overcome the carbonate alkalinity and to raise the pH of the water to a target value of 8.5 and is presented in **Table 4.2**.

The lime demand was calculated using the minimum, maximum and average values for the constituent concentrations measured in the pond water (**Table 3.1**) that are expected to contribute to alkalinity consumption and the lime demand.

The estimated average lime demand was calculated to be 150 tonnes of CaO per million cubic metres to raise the pH of the CVP water from an average pH of 6.9 to approximately 8.5. A safety factor of 1.4 was applied to the lime demand because experience with in-situ lime treatments at other sites has shown that to increase pH in a pit or pond usually requires more lime than that estimated from a lime demand using analytical data. Therefore, an effective lime demand would be approximately 210 tonnes of CaO per million cubic metres of water in the CVP.

4.5 Potential Mitigation Options for Zinc Control

The following section provides potential mitigation options to control zinc concentrations in the CVP.

4.5.1 In-Situ pH Adjustment

One mitigation option for the elevated zinc concentrations would be to control the pH in the CVP by the addition of lime (CaO). The lime demand calculated in **Section 4.4** indicated that an initial addition of approximately 210 t-CaO/Mm^3 of water would be required to raise the pH to 8.5 and attain zinc concentrations below the discharge criteria of 0.5 mg/L. The addition of 210 t-CaO/Mm^3 of water would represent a short-term mitigation strategy and would address the current zinc issue in the pond.

However, results from the sludge stability tests, the field study and routine monitoring have indicated the strong likelihood that there is a persistent input of acidity that results in on-going depression of pH. Calculations of acidity loads required to maintain a pH of 6 indicated that an acidity load equivalent to 148 tonnes-CaO per Mm^3 per year may be entering the CVP. It is anticipated that most of this acidity will be consumed by a combination of alkalinity in the pond water and dissolution of the sludge. Nevertheless, if there is an on-going acidity load to the CVP is present, it is expected that low pH values and elevated zinc concentrations will persist in the future, resulting in the need for annual lime additions to maintain pH values of about 8.5 and to attain zinc concentrations below the discharge criteria of 0.5 mg/L.

For short-term mitigation in the pond in-situ pH adjustment using lime would be an appropriate mitigation strategy. It is expected that if a source of acidity in the pond does exist, depressed pH values and elevated zinc concentrations would recur within one year. This exercise could provide important evidence to develop a strategy to mitigate the CVP in the long-term.

If in-situ lime addition was chosen as a mitigation option, lime would have to be evenly distributed through out the pond to be effective. However, even distributing lime to the pond water may be difficult. Turnover of a water body is dependent on an aspect ratio, whereby the extent of a convection cell is a function of the ratio of its horizontal dimension to its vertical one. Because the CVP is a relatively shallow pond it does not effectively turnover or mix as one large cell. Instead, turnover in the CVP would occur as several smaller cells. Therefore, the addition of lime to one area of the pond would not necessarily result in distribution of the lime to all areas of the pond and lime would have to be added to the water column throughout the entire pond.

The addition of a dense lime slurry to cover the sludge in the CVP was suggested as a potential in-situ pH adjustment method (John Brodie, pers. Comm., 2010). The lime would neutralize the added acidity with the effect that lime would dissolve rather than sludge.

However, even distribution of the lime slurry cover to the bottom of the entire CVP would be challenging. As well, the addition of excess lime to pond may result in pH values that are above 8.5 resulting in pond water that is not suitable for discharge.

4.5.2 Isolation of Sludge from the Water Column with a Bentonite Barrier

A suggested potential mitigation option to control zinc concentrations in the CVP was to isolate the sludge from the water column using a bentonite barrier (John Brodie, pers. Comm., 2010). The bentonite could act as a diffusion barrier between the sludge and the overlying CVP water. If the sludge is isolated from the water column, any low pH values in the bottom of the water should not be in direct contact with the sludge and will therefore prevent the instantaneous dissolution or de-sorption of zinc from the sludge. In effect, the zinc concentrations in the CVP should remain low and close to values of 0.02 mg/L that are measured in the outflow from the Faro Mill Treatment Plant.

The placement of the diffusion barrier could be accomplished by adding a bentonite slurry to the water column and allowing the bentonite to settle on top of the sludge. Care should be taken so that the bentonite settles on top of the sludge and does not displace it. Further testing and verification on the feasibility and effectiveness of this treatment option should be completed if this option is carried forward. Testing may include bench-scale laboratory studies on the settling rate for the bentonite, together with varying thickness applications to determine the thickness of bentonite required to isolate the sludge from interacting with the water column.

4.5.3 Removal of Sludge from the CVP

Results from the sludge chemical characterization provide an indication of the zinc inventory in the solids. The zinc concentrations in the sludge ranged from 8,880 to 9,710 mg/kg indicating that there is sufficient inventory of zinc that could be released for many years. Because the primary source of the zinc concentrations is likely related to the concentrations of zinc adsorbed to ferric hydroxides, the removal of the sludge from the pond may be a viable mitigation option. This option would include dewatering of the CVP and the physical removal of the sludge. A clean layer of sand or till should be considered for placement at the bottom of the CVP to isolate any residual sludge from the water column when the pond is refilled. However, if seepage beneath the dam is a source of on-going acidity, water in the CVP may require periodic treatment for acidity.

4.5.4 Construction of a Polishing Pond Cell within the CVP

A polishing pond cell that provides an appropriate volume and residence time for settling could be constructed within the existing CVP. The cell should be constructed away from the Intermediate Dam so that seepage from the tailings would not influence water quality in the cell. This option would require less effort for sludge removal because sludge would only

have to be removed from the settling cell. However, water quality on the outside of the cell may still have elevated zinc concentrations that would require treatment.

4.5.5 Discontinue Use of the CVP as a Polishing Pond

Because the results from this study suggest that there is an on-going source of acidity to the CVP that has resulted in depressed pH values and elevated zinc concentrations in the pond water, the discontinued use of the CVP as a polishing pond should be considered as a mitigation option. This investigation has provided evidence that suggests that elevated zinc concentrations in the CVP may persist into the future, if the sludge is in contact with the pond water. Therefore, water quality issues in the CVP would not be resolved with this mitigation option and periodic treatment of the pond water for zinc would be required. The on-going acidity loads to the CVP warrant further investigation before discontinuing use of the CVP for polishing purposes.

5.0 SUMMARY OF CONCLUSIONS

The objectives of the study were to investigate zinc concentrations in pond water, sludge and porewater in the CVP to develop an understanding on the controls of zinc concentrations in the pond water and to provide recommendations for short- and long-term mitigation of zinc concentrations.

The key conclusions from this investigation are as follows:

- Results from the chemical characterization of the pond water and sludge porewater together with results from the sludge stability tests indicated that there is a pH control on the zinc concentrations in the CVP.
- Geochemical modeling indicated that the dissolution of zinc oxide or zinc hydroxide does not represent a control on the zinc concentrations, and indicated that zinc concentrations in the CVP are controlled by sorption reactions onto hydrous ferric oxide.
- Results from the field study, sludge stability testing and geochemical modeling indicated that pH is the master variable controlling zinc concentrations in the CVP.
- Observations from the sludge stability tests together with the pH values measured in the sludge porewater suggested that pH values in the CVP should remain close to 8. However, pH values of 6.5 have consistently been measured in the pond water. These observations suggest that there is most likely an on-going input of acidity that has depressed the pH in the CVP.
- The oxidation of dissolved manganese was investigated but was not considered to be a source of acidity in the CVP and therefore is not responsible for the low pH values.
- Dilution from seepage water from the Rose Creek Diversion Ditch was considered but does not appear to be responsible for the depressed pH values at depth in the CVP.
- Seepage of tailings porewater below the Intermediate Dam that contains ferrous iron appears to be a plausible source of acidity to the CVP and may be responsible for the observed depressed pH values measured in the pond water. If seepage from the Intermediate Dam is responsible for the observed depressed pH values, it is expected that low pH values and elevated zinc concentrations will persist in the future.
- Further investigation of the seepage flow and chemistry is required to verify if seepage of tailings porewater is the source acidity and depressed pH values in the

CVP. A mass balance investigation on acidity inputs to the pond could be used to infer acid inputs in place of a more costly hydrogeologic study.

- A lime demand of 210 t- CaO/Mm^3 of water was estimated to address the short-term mitigation of the pH and zinc concentrations in the CVP. This amount of lime would be required to raise the pH of the pond water to values above 8. At pH values at or above 8, zinc concentrations below the discharge criteria of 0.5 mg/L could be attained.

- If an on-going source of acidity in the pond does exist, it is expected that depressed pH values and elevated zinc concentrations would recur. Therefore, the addition of lime and subsequent acidity mass balance investigation could provide important evidence to develop a strategy to mitigate the CVP in the long-term.

- Addition of lime to the CVP, however, may be challenging because the even distribution of lime throughout the pond will be limited by the degree of mixing that is achievable in the pond.

- Long-term mitigation options included the isolation of sludge from the water column using a thin layer of settled bentonite as a diffusion barrier, removal of the sludge from the CVP and placement of a clean base layer, construction of polishing pond cell within the existing CVP and discontinued use of the CVP as a polishing pond.

6.0 REFERENCES

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TABLES

ed Constituents in Pond Water

eld pH	Alkalinity	Zinc		Manganese		Iron	
		Dissolved	Total	Dissolved	Total	Dissolved	Total
Units)	(mg/L as $CaCO_3$)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
.43	109	0.217	0.226	8.02	9.77	<0.030	0.419
6.46	247	0.549	0.549	34.1	37.5	0.030	0.501
.36	332	0.504	0.474	47.6	48.2	<0.030	0.526
.83	87.5	0.223	0.225	6.74	7.39	<0.030	0.340
6.70	139	0.268	0.240	14.1	13.4	0.429	0.721
.40	208	0.605	0.600	44.2	48.6	0.060	0.530
.38	109	0.230	0.243	8.61	10.7	<0.030	0.389
6.37	333	0.566	0.603	44.1	50.9	<0.030	0.449
.36	333	0.470	0.488	47.6	53.6	0.039	0.884
.59	105	0.213	0.223	7.87	8.64	<0.030	0.397
6.36	327	0.501	0.482	43.3	46.2	<0.030	0.564
6.36	342	0.475	0.484	46.6	52.7	0.153	1.24
.59	105	0.215	0.231	7.89	8.97	<0.030	0.409
.60	101	0.210	0.228	7.83	8.61	<0.030	0.407
6.51	324	0.369	0.387	22.0	25.2	0.727	1.37
.83	***87.5***	***0.210***	***0.223***	***6.74***	***7.39***	***<0.030***	***0.340***
.36	***342***	***0.605***	***0.603***	***47.6***	***53.6***	***0.727***	***1.37***
6.89	***213***	***0.374***	***0.379***	***26.0***	***28.7***	***0.114***	***0.610***

...verse to represent minimum and maximum hydrogen ions present in solution

Table 3.2: Summary of Selected Constituents in Sludge Solids

Sample ID	Zinc	Manganese	Iron
	(mg/kg)	(mg/kg)	(mg/kg)
CVP10-1 (0-5)	2,130	9,050	21,700
CVP10-1 (5-10)	3,400	7,480	60,100
CVP10-1 (10-15)	5,560	2,870	98,500
CVP10-2 (0-5)	8,880	37,700	55,900
CVP10-2 (5-10)	9,090	33,500	54,400
CVP10-2 (10-15)	9,070	35,000	42,700
CVP10-5 (0-5)	9,320	35,000	50,600
CVP10-5 (5-10)	9,580	36,200	42,700
CVP10-5 (10-15)	9,730	26,200	42,000

Table 3.3: Summary of Selected Constituents in Sludge Porewater

Sample ID	pH	Alkalinity	Zinc	Manganese	Iron
	(pH units)	(mg/L as $CaCO_3$)	(mg/L)	(mg/L)	(mg/L)
CVPPW10-1 (0-5)	9.32	61	0.004	0.0259	<0.050
CVPPW10-1 (5-10)	11.90	1610	0.263	0.0033	0.103
CVPPW10-1 (10-15)	8.49	37	0.005	0.0315	<0.050
CVPPW10-2 (0-5)	8.00	192	0.162	0.0386	<0.050
CVPPW10-2 (5-10)	8.73	60	0.022	<0.0010	<0.050
CVPPW10-2 (10-15)	8.74	34	0.015	<0.0010	<0.050
CVPPW10-5 (0-5)	7.99	164	0.164	0.0091	<0.050
CVPPW10-5 (5-10)	8.87	52	0.025	<0.0010	<0.050
CVPPW10-5 (10-15)	8.76	39	0.025	<0.0010	<0.050

Notes:
PW - Porewater

Table 3.4: Summary of Selected Constituents in Overlying Water from the Sludge Stability Tests

Sample ID	pH	Calcium	Manganese	Zinc	Sulphate
	(pH units)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
CVP10-ST-PW					
Day 0	7.01	354	33.8	1.46	1,710
Day 6	7.11	321	31.5	1.24	1,662
CVP10-ST-6					
Day 0	6.34	339	32.3	6.95	1,650
Day 1	6.06	325	26.9	5.58	1,590
Day 2	5.98	360	22.5	4.08	2,070
Day 3	5.89	343	21.1	3.19	1,821
Day 6	5.77	278	9.66	0.868	1,626
Day 7	6.01	289	9.90	0.755	1,602
Day 8	6.00	290	9.87	0.646	1,590
CVP10-ST-C					
Day 0	7.24	344	32.4	3.03	1,650
Day 1	7.96	304	22.3	0.98	1,530
Day 2	7.86	301	15.9	0.387	1,845
Day 3	7.95	294	13.6	0.224	1,851
Day 6	7.86	227	5.00	0.023	1,641
Day 7	7.74	237	5.88	0.075	1,656
Day 8	7.77	229	5.80	0.066	1,644
CVP10-ST-8					
Day 0	7.91	331	25.2	1.01	1,710
Day 1	7.98	300	15.5	0.033	1,764
Day 2	7.86	295	11.3	<0.030	1,767
Day 3	7.99	288	10.2	0.055	1,764
Day 6	8.00	238	5.06	0.015	1,620
Day 7	7.97	247	6.20	0.038	1,617
Day 8	7.92	240	6.34	0.044	1,596
CVP10-ST-9					
Day 0	8.65	310	9.55	0.992	1,698
Day 1	8.89	252	0.546	0.0045	1,542
Day 2	8.88	277	0.863	0.0064	1,557
Day 3	8.99	276	1.21	<0.0030	1,521
Day 6	9.05	225	0.371	<0.015	1,509
Day 7	8.93	251	1.00	0.028	1,518
Day 8	8.88	240	0.859	<0.015	1,506

Notes:
PW - Pond Water used to replenish water column in test cells

Table 4.1: Summary of Select Constiuents in the CVP and Rose Creek

Parameter	Units	CVP[a]	Rose Creek (X2)[b]
pH	pH units	6.89	7.8
Alkalinity	mg/L, as $CaCO_3$	213	101
Ca	mg/L	413	31.8
Fe	mg/L	0.11	0.10
Mg	mg/L	90.2	7.48
Mn	mg/L	26.0	0.084
Na	mg/L	27.2	2.41
Si	mg/L	5.24	4.99
Sr	mg/L	1.15	0.14
SO_4	mg/L	1,313	23.8
Zn	mg/L	0.374	0.068
Volume of Water	m^3	1,000,000[c]	5,300[d]

Notes:

[a] The values for the CVP represent an average of all samples

[b] The values from Rose Creek site X2 were taken as an average from DES (2010)

[c] The volume of water for the CVP was estimated from the dimensions of the pond and the average water depth measured in August 2010

[d] The volume of seepage from Rose Creek is equal to the maximum seepage rate reported by DES (2010)

Table 4.2: Calculated Lime Demand for the Faro CVP

	Lime Demand	Lime Demand With 40% Contingency
	(t-CaO/Mm^3)	(t-CaO/Mm^3)
Minimum	56	79
Maximum	254	356
Average	150	210

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FIGURES

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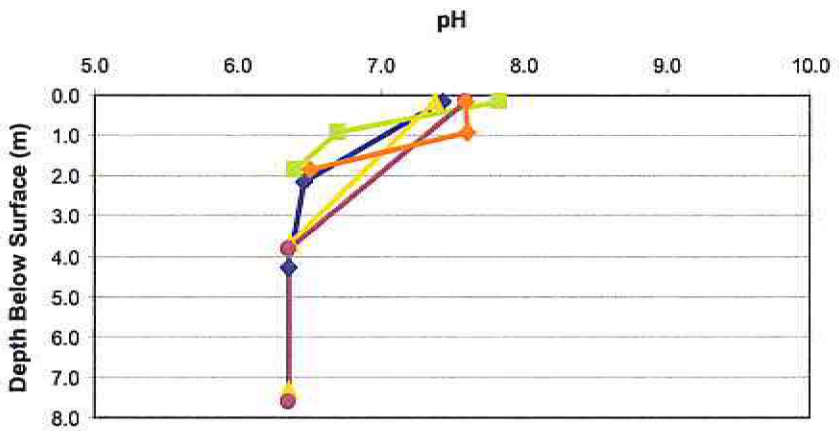
Site Map and General Location of the Faro Mine Complex			
Yukon	EcoMetrix INCORPORATED	December 2010	Figure 1.1

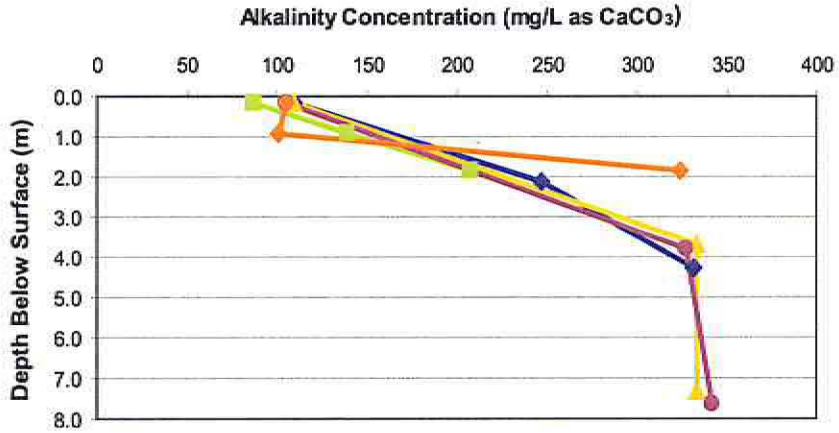

N
CVP10-3
CVP10-5
CVP10-2
CVP10-4
CVP10-1
Intermediate Dam
Tailings Impoundment
Beaufort Sea
NU
Northwest Territories
Alaska
Yukon Territory
Faro
Whitehorse
British Columbia
0
500 m
Government of Yukon
Sampling Station Locations
Yukon
EcoMetrix INCORPORATED
December 2010
Figure 2.1

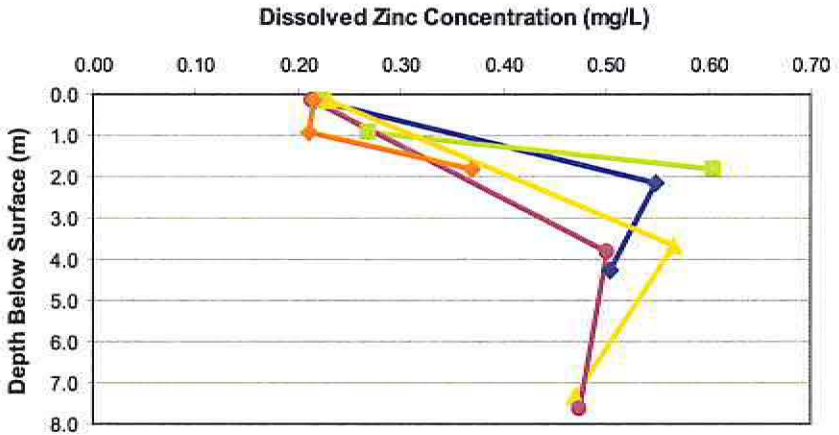
Government of Yukon

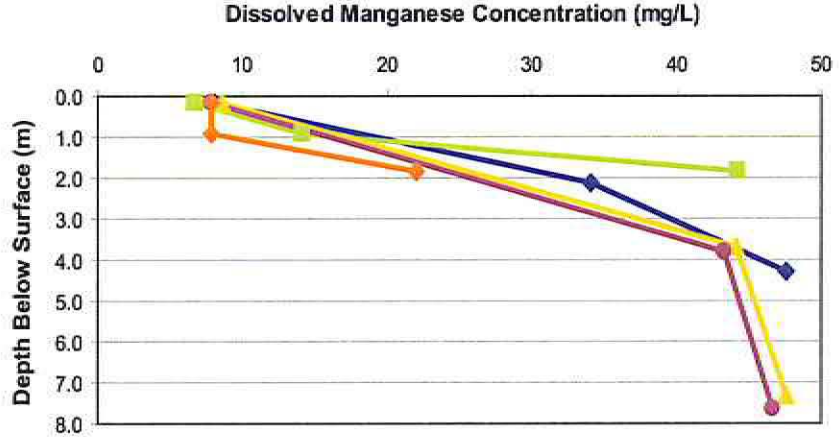
Test Cell Set-Up for the Sludge Stability Tests

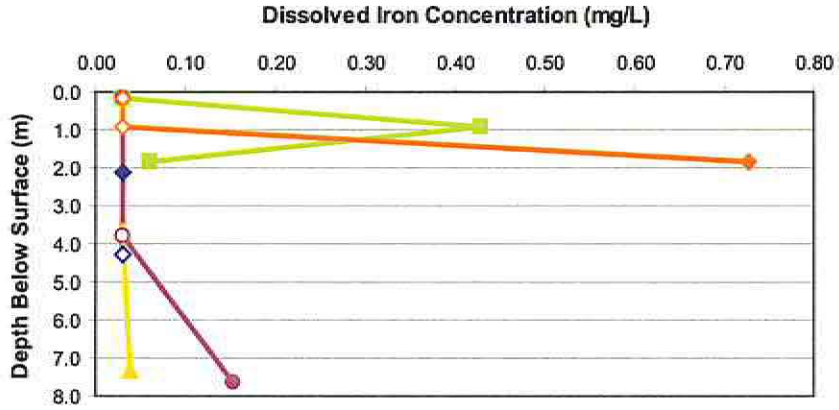
Yukon | EcoMetrix INCORPORATED | December 2010 | **Figure 2.2**





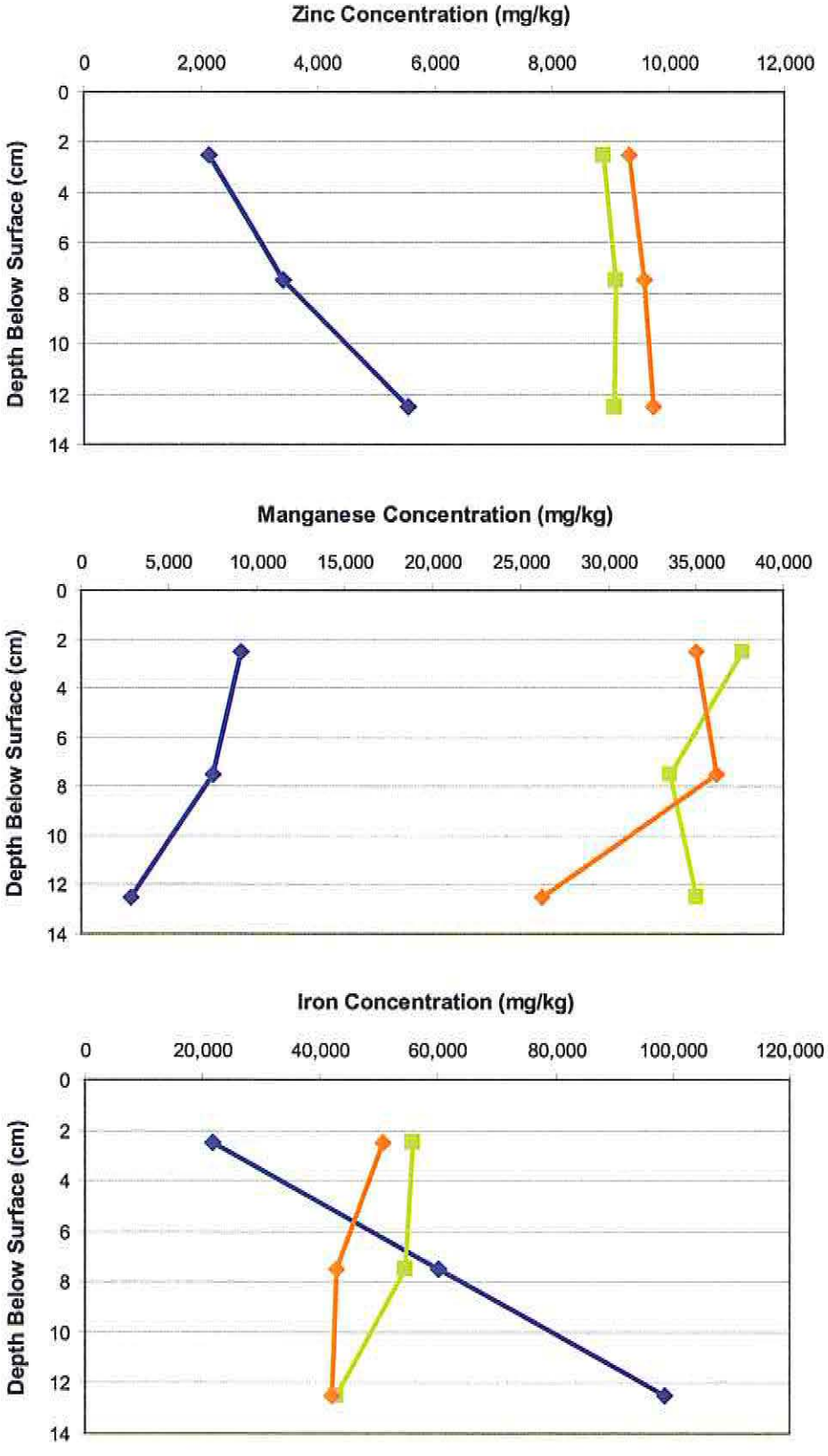






Notes: Open symbols represent values below detection limits.

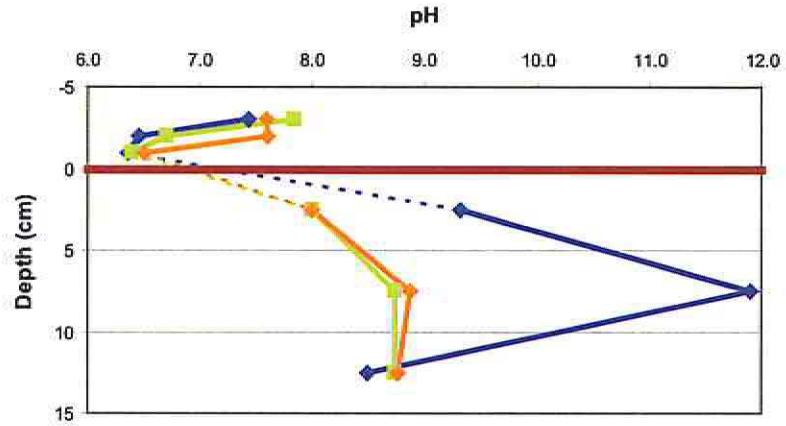
Government of Yukon		
Depth Profiles for Selected Constituents Pond Water		
EcoMetrix INCORPORATED	December 2010	Figure 3.1

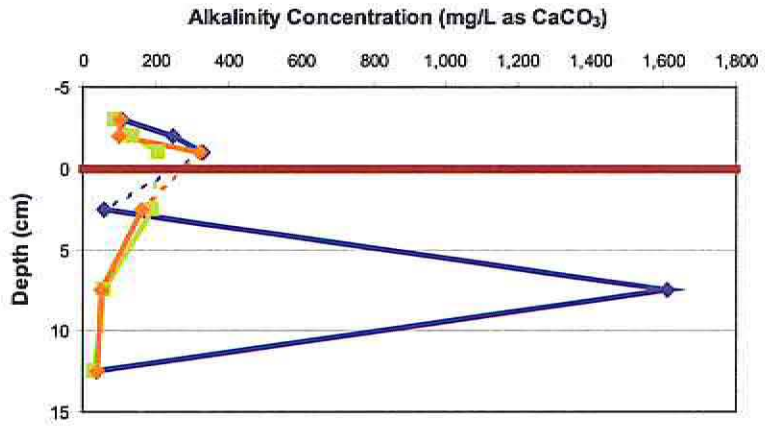


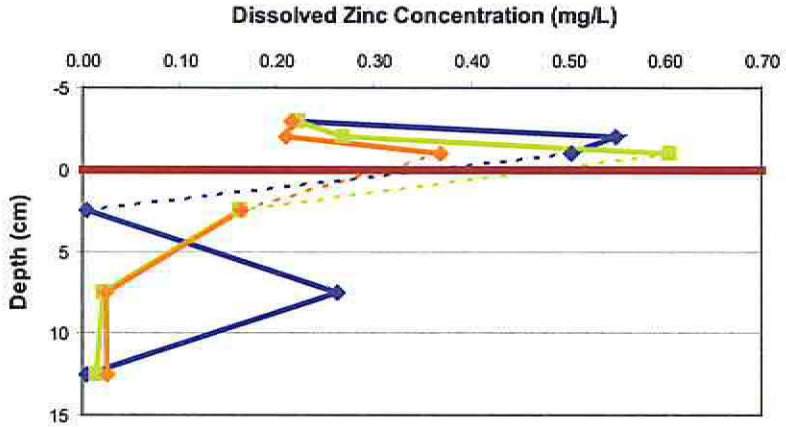
Government of Yukon

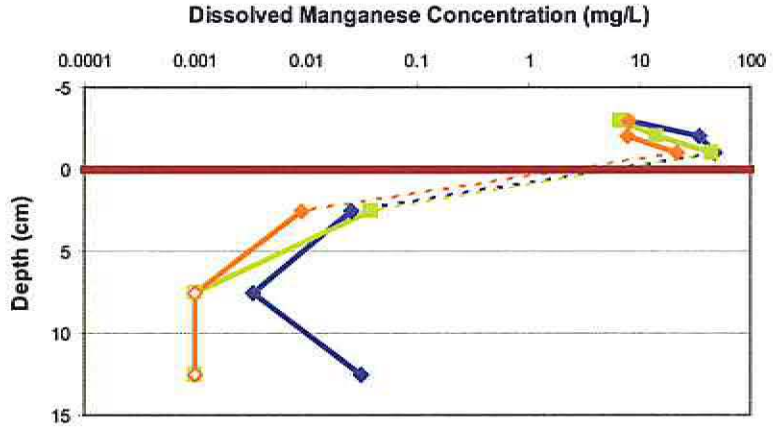
Depth Profiles for Selected Constituents in Sludge Solids

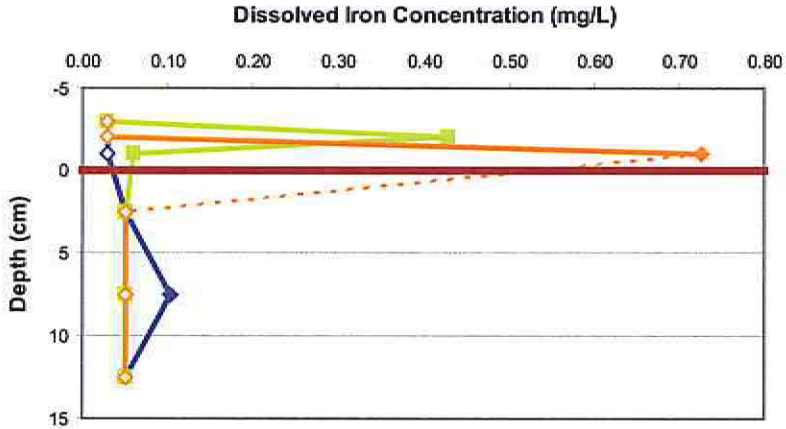
EcoMetrix INCORPORATED | December 2010 | **Figure 3.2**









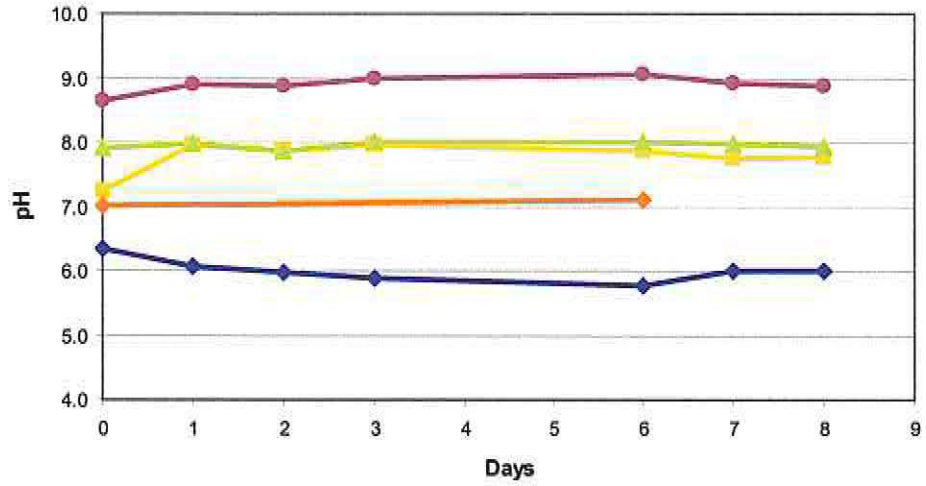


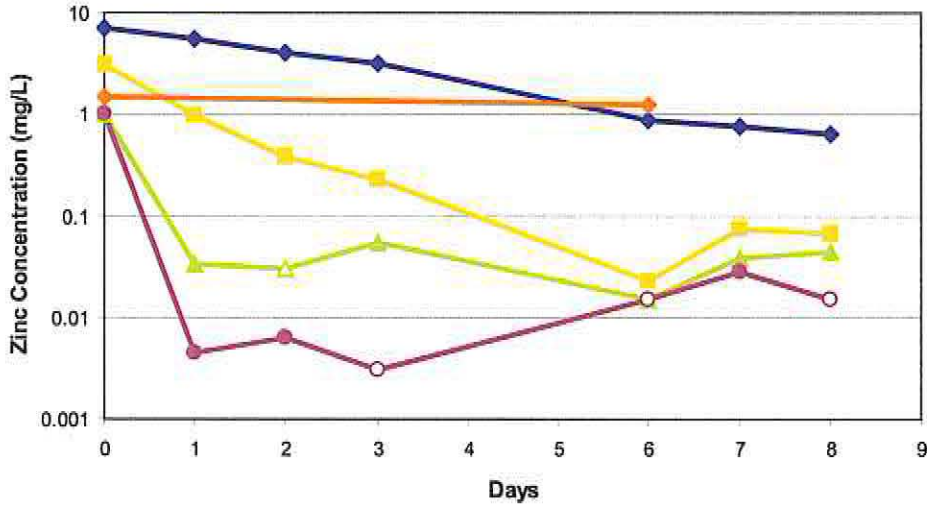
Notes: Data points above the surface water interface represent Top and Bottom water samples.
See Table 4.2 for actual depth values.
Open symbols represent values below detection limits.
Dashed lines represent extrapolation from porewater to surface water.

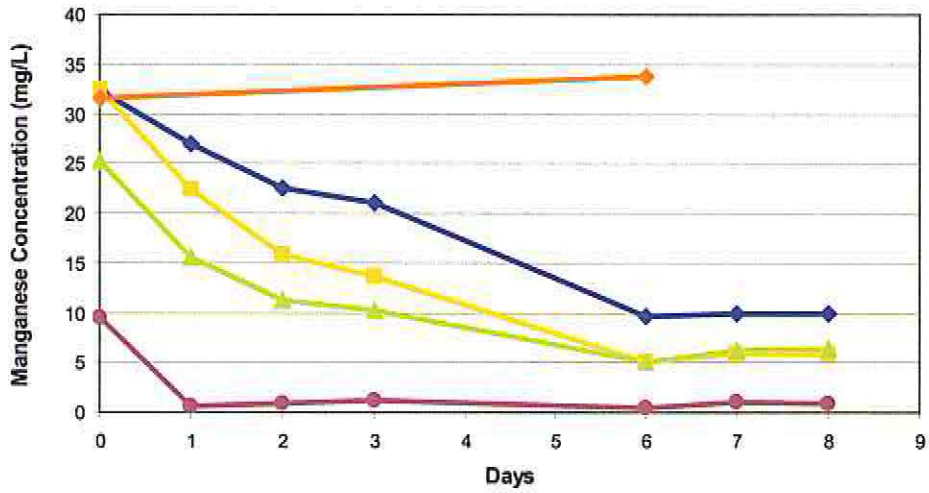
Government of Yukon

Depth Profiles for Selected Constituents in Porewater and Pond Water

EcoMetrix INCORPORATED	December 2010	**Figure 3.3**







Legend - Design pH

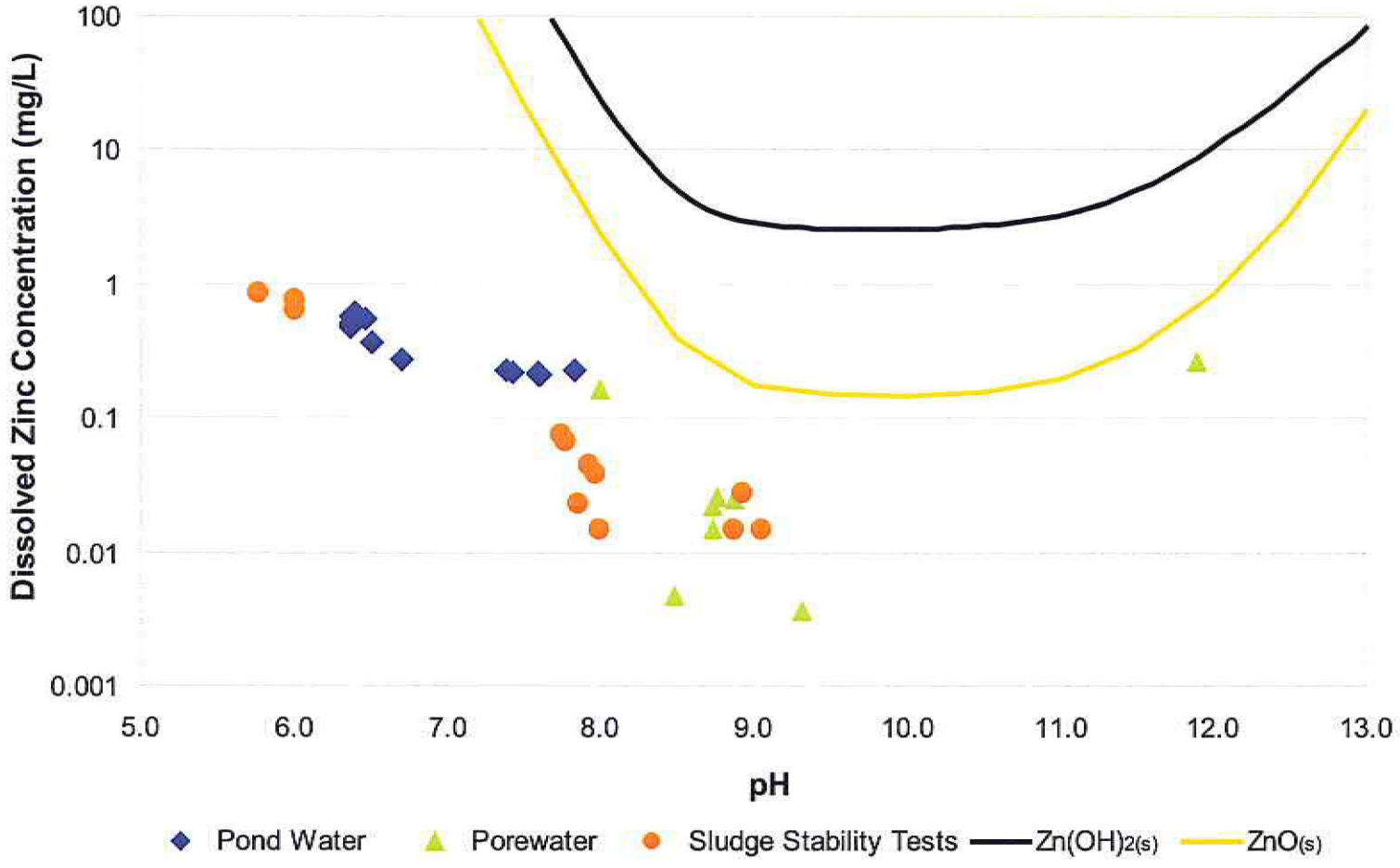
- pH = 6
- Control Cell
- pH = 8
- pH = 9
- Pond Water

Notes: Orange Line represents Pond Water used to replenished water column in tests.
Open symbols represent values below detection limits.

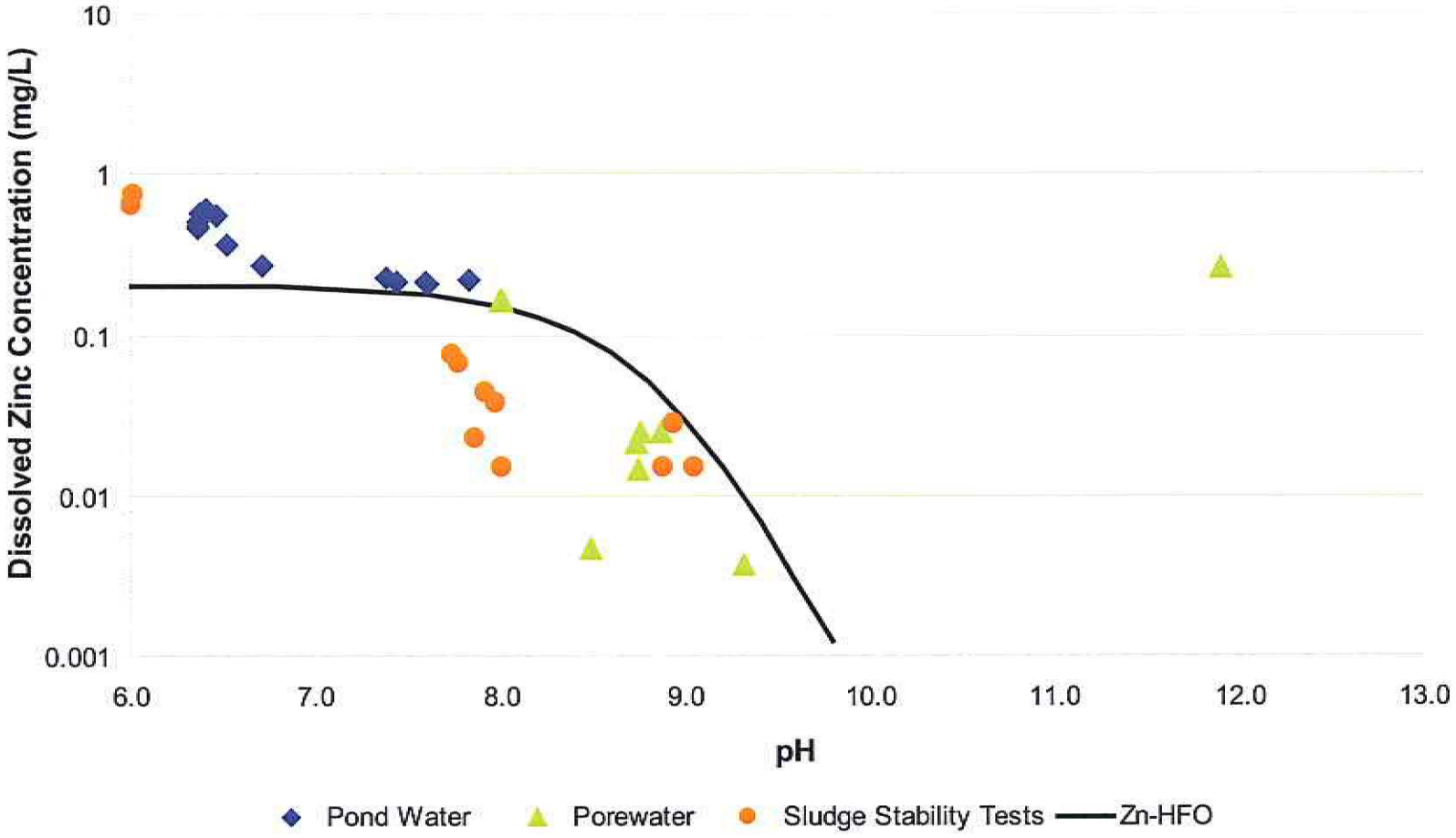
Government of Yukon

Time Trend Plots for Selected Constituent from the Sludge Stability Tests

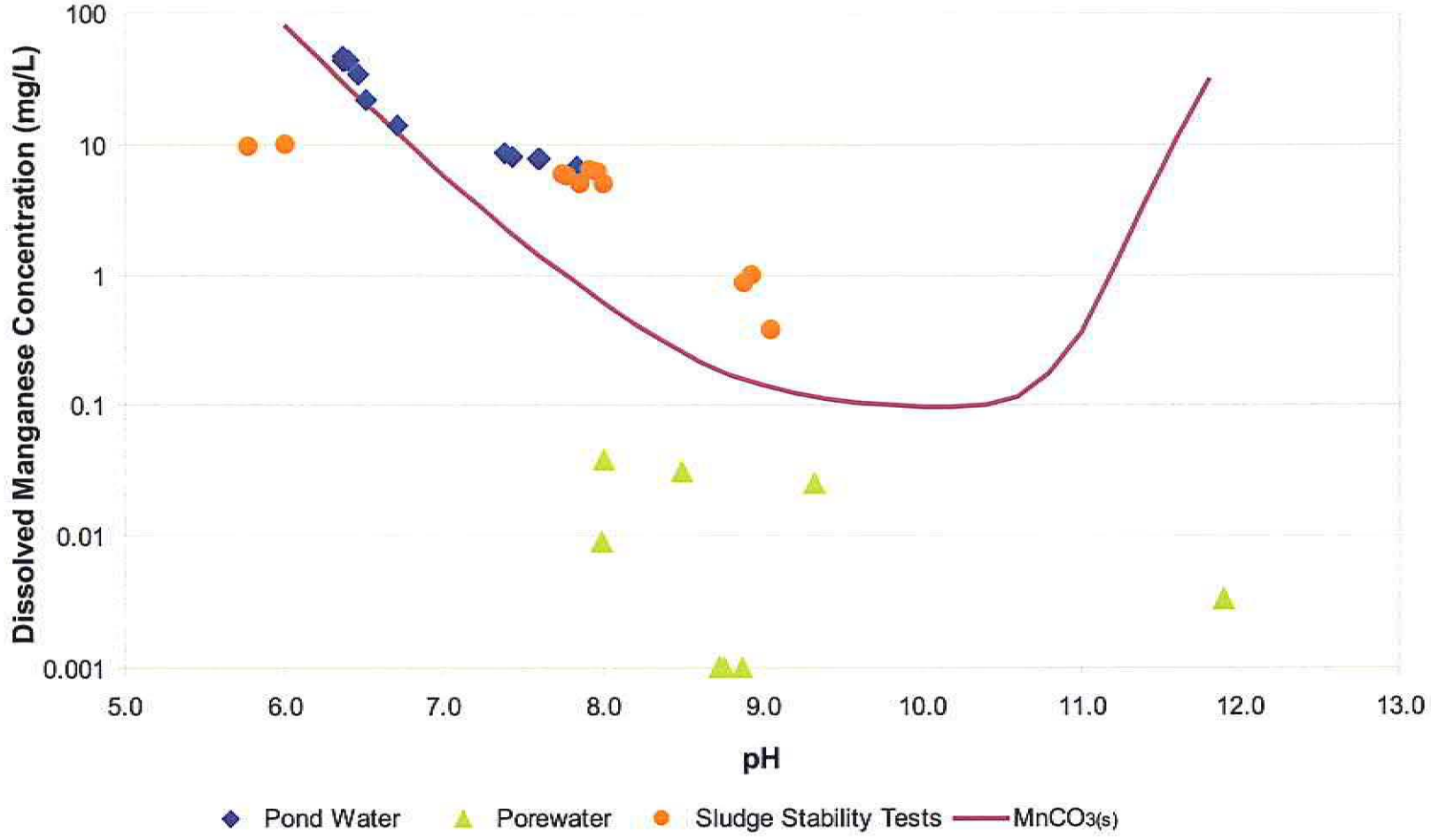
EcoMetrix INCORPORATED | December 2010 | **Figure 3.4**



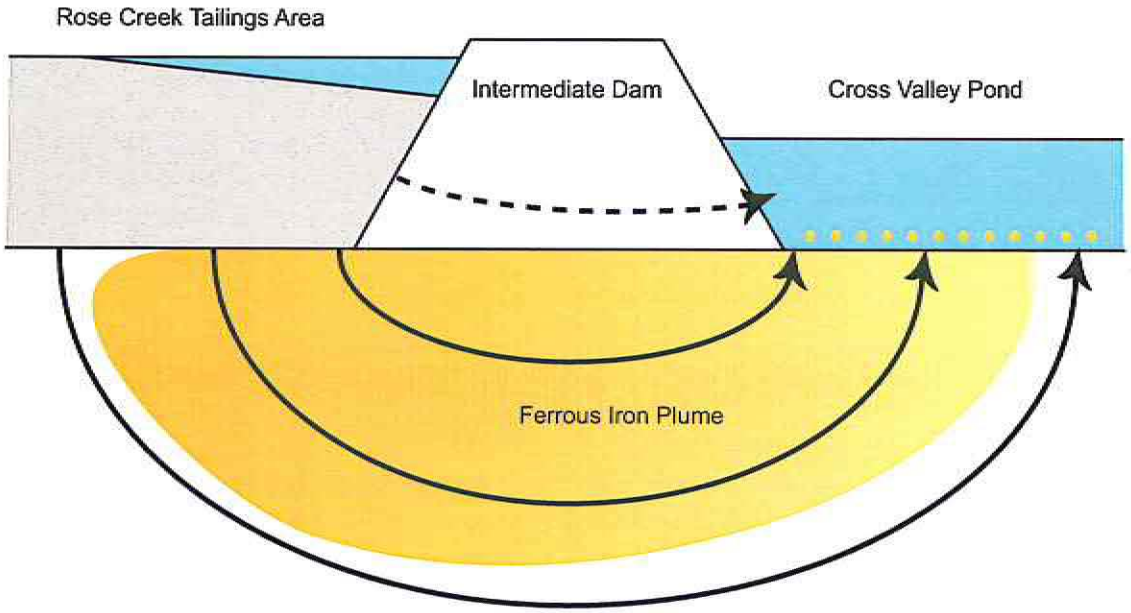
Government of Yukon		
Zinc Concentrations in Waters and Theoretical Solubility of $ZnO_{(s)}$ and $Zn(OH)_{2(s)}$		
EcoMetrix INCORPORATED	December 2010	Figure 4.1



Government of Yukon			
Zinc Concentrations in Waters and Theoretical Sorption of Zinc onto Hydrous Ferric Oxides (HFO)			
Yukon	EcoMetrix INCORPORATED	December 2010	Figure 4.2



Government of Yukon		
Manganese Concentrations in Waters and Theoretical Solubility of $MnCO_{3(s)}$		
EcoMetrix INCORPORATED	December 2010	Figure 4.3



Government of Yukon

Schematic of Pontential Flow Paths
Beneath the Intermediate Dam

Yukon | EcoMetrix INCORPORATED | December 2010 | **Figure 4.4**

EcoMetrix

APPENDIX 1

Laboratory Certificates of Analysis

ECOMETRIX INCORPORATED
ATTN: Erin Clyde
6800 CAMPOBELLO ROAD
MISSISSAUGA ON L5N 2L8
Phone: 905-794-2325

Date Received: 17-AUG-10
Report Date: 20-SEP-10 17:05 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L920954
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-040123, 10-040124

Comments:

20-SEP-10: Alkalinity and dissolved metals included in this version of the report.

Bryan Mark
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L920954-1	L920954-2	L920954-3	L920954-4	L920954-5
	Description					
	Sampled Date	10-AUG-10	10-AUG-10	10-AUG-10	10-AUG-10	10-AUG-10
	Sampled Time					
	Client ID	CVP10-1A	CVP10-1B	CVP10-1C	CVP10-2A	CVP10-2B
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1050	1500	1580	950	1110
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	109	247	332	87.5	139
Total Metals	Aluminum (Al)-Total (mg/L)	0.0052	<0.010 DLA	<0.010 DLA	0.0073	<0.0050 DLA
	Antimony (Sb)-Total (mg/L)	<0.00050 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA
	Arsenic (As)-Total (mg/L)	<0.00050 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA
	Barium (Ba)-Total (mg/L)	0.0159	0.0217	0.0233	0.0156	0.0173
	Beryllium (Be)-Total (mg/L)	<0.0025 DLA	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA
	Bismuth (Bi)-Total (mg/L)	<0.0025 DLA	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA
	Boron (B)-Total (mg/L)	<0.050 DLA	<0.10 DLA	<0.10 DLA	<0.050 DLA	<0.050 DLA
	Cadmium (Cd)-Total (mg/L)	<0.00025 DLA	<0.00050 DLA	<0.00050 DLA	<0.00025 DLA	<0.00025 DLA
	Calcium (Ca)-Total (mg/L)	301	435	460	277	323
	Chromium (Cr)-Total (mg/L)	<0.0025 DLA	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA
	Cobalt (Co)-Total (mg/L)	0.0169	0.0658	0.0837	0.0135	0.0244
	Copper (Cu)-Total (mg/L)	0.00109	<0.0010 DLA	<0.0010 DLA	0.00091	0.00078
	Iron (Fe)-Total (mg/L)	0.419	0.501	0.526	0.340	0.721
	Lead (Pb)-Total (mg/L)	0.00313	0.00264	0.00211	0.00401	0.00330
	Lithium (Li)-Total (mg/L)	0.038	<0.050 DLA	<0.050 DLA	0.044	0.041
	Magnesium (Mg)-Total (mg/L)	71.5	101	104	63.0	74.4
	Manganese (Mn)-Total (mg/L)	9.77	37.5	48.2	7.39	13.4
	Molybdenum (Mo)-Total (mg/L)	0.00056	<0.00050 DLA	0.00051	0.00054	0.00065
	Nickel (Ni)-Total (mg/L)	0.0231	0.0935	0.115	0.0180	0.0312
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	7.2	6.4	6.4	6.7	7.2
	Selenium (Se)-Total (mg/L)	<0.0050 DLA	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA
	Silicon (Si)-Total (mg/L)	2.84	6.57	8.05	2.16	3.30
	Silver (Ag)-Total (mg/L)	<0.000050 DLA	<0.00010 DLA	<0.00010 DLA	<0.000050 DLA	<0.000050 DLA
	Sodium (Na)-Total (mg/L)	22.1	31.3	32.8	19.6	22.8
	Strontium (Sr)-Total (mg/L)	0.960	1.26	1.33	1.02	1.07
	Sulfur (S)-Total (mg/L)	339	441	474	312	368
	Thallium (Tl)-Total (mg/L)	0.00062	<0.0010 DLA	<0.0010 DLA	0.00075	0.00062
	Tin (Sn)-Total (mg/L)	<0.00050 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA
	Titanium (Ti)-Total (mg/L)	<0.010	0.015	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00152	0.00436	0.00500	0.00118	0.00197
	Vanadium (V)-Total (mg/L)	<0.0050 DLA	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA
	Zinc (Zn)-Total (mg/L)	0.226	0.549	0.474	0.225	0.240
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0050 DLA	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA
	Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLA	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L920954-6	L920954-7	L920954-8	L920954-9	L920954-10
	Description					
	Sampled Date	10-AUG-10	11-AUG-10	11-AUG-10	11-AUG-10	11-AUG-10
	Sampled Time					
	Client ID	CVP10-2C	CVP10-3A	CVP10-3B	CVP10-3C	CVP10-4A
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1700	975	1610	1640	1030
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	208	109	333	333	105
Total Metals	Aluminum (Al)-Total (mg/L)	DLA <0.010	0.0054	DLA <0.010	DLA <0.010	DLA <0.0050
	Antimony (Sb)-Total (mg/L)	DLA <0.0010	DLA <0.00050	DLA <0.0010	DLA <0.0010	DLA <0.00050
	Arsenic (As)-Total (mg/L)	DLA <0.0010	DLA <0.00050	DLA <0.0010	DLA <0.0010	DLA <0.00050
	Barium (Ba)-Total (mg/L)	0.0210	0.0177	0.0208	0.0199	0.0159
	Beryllium (Be)-Total (mg/L)	DLA <0.0050	DLA <0.0025	DLA <0.0050	DLA <0.0050	DLA <0.0025
	Bismuth (Bi)-Total (mg/L)	DLA <0.0050	DLA <0.0025	DLA <0.0050	DLA <0.0050	DLA <0.0025
	Boron (B)-Total (mg/L)	DLA <0.10	DLA <0.050	DLA <0.10	DLA <0.10	DLA <0.050
	Cadmium (Cd)-Total (mg/L)	DLA <0.00050	DLA <0.00025	DLA <0.00050	DLA <0.00050	DLA <0.00025
	Calcium (Ca)-Total (mg/L)	495	283	471	480	300
	Chromium (Cr)-Total (mg/L)	DLA <0.0050	DLA <0.0025	DLA <0.0050	DLA <0.0050	DLA <0.0025
	Cobalt (Co)-Total (mg/L)	0.0836	0.0190	0.0887	0.0970	0.0166
	Copper (Cu)-Total (mg/L)	DLA <0.0010	0.00351	DLA <0.0010	DLA <0.0010	0.00079
	Iron (Fe)-Total (mg/L)	0.530	0.389	0.449	0.884	0.397
	Lead (Pb)-Total (mg/L)	0.00249	0.00397	0.00187	0.00112	0.00315
	Lithium (Li)-Total (mg/L)	DLA <0.050	0.041	DLA <0.050	DLA <0.050	0.038
	Magnesium (Mg)-Total (mg/L)	113	64.9	106	107	69.4
	Manganese (Mn)-Total (mg/L)	48.6	10.7	50.9	53.6	8.64
	Molybdenum (Mo)-Total (mg/L)	0.00103	0.00060	0.00051	DLA <0.00050	0.00049
	Nickel (Ni)-Total (mg/L)	0.114	0.0272	0.125	0.128	0.0226
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	6.9	6.6	6.6	6.5	7.1
	Selenium (Se)-Total (mg/L)	DLA <0.010	DLA <0.0050	DLA <0.010	DLA <0.010	DLA <0.0050
	Silicon (Si)-Total (mg/L)	8.34	2.57	8.11	7.97	2.65
	Silver (Ag)-Total (mg/L)	DLA <0.00010	DLA <0.000050	DLA <0.00010	DLA <0.00010	DLA <0.000050
	Sodium (Na)-Total (mg/L)	34.6	20.3	33.4	33.2	21.4
	Strontium (Sr)-Total (mg/L)	1.36	1.05	1.39	1.43	0.982
	Sulfur (S)-Total (mg/L)	544	324	510	535	352
	Thallium (Tl)-Total (mg/L)	DLA <0.0010	0.00066	DLA <0.0010	DLA <0.0010	0.00065
	Tin (Sn)-Total (mg/L)	DLA <0.0010	DLA <0.00050	DLA <0.0010	DLA <0.0010	DLA <0.00050
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00504	0.00159	0.00528	0.00512	0.00145
	Vanadium (V)-Total (mg/L)	DLA <0.010	DLA <0.0050	DLA <0.010	DLA <0.010	DLA <0.0050
	Zinc (Zn)-Total (mg/L)	0.600	0.243	0.603	0.488	0.223
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	DLA <0.010	DLA <0.0050	DLA <0.010	DLA <0.010	DLA <0.0050
	Antimony (Sb)-Dissolved (mg/L)	DLA <0.0010	DLA <0.00050	DLA <0.0010	DLA <0.0010	DLA <0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L920954-11	L920954-12	L920954-13	L920954-14	L920954-15
	Description					
	Sampled Date	11-AUG-10	11-AUG-10	11-AUG-10	11-AUG-10	11-AUG-10
	Sampled Time					
	Client ID	CVP10-4B	CVP10-4C	CVP10-5A	CVP10-5B	CVP10-5C
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	1720	1860	1080	1100	1470
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	327	342	105	101	324
Total Metals	Aluminum (Al)-Total (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA
	Antimony (Sb)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA
	Arsenic (As)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA	0.00055
	Barium (Ba)-Total (mg/L)	0.0209	0.0193	0.0165	0.0159	0.0188
	Beryllium (Be)-Total (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA	<0.0025 DLA
	Bismuth (Bi)-Total (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA	<0.0025 DLA
	Boron (B)-Total (mg/L)	<0.10 DLA	<0.10 DLA	<0.050 DLA	<0.050 DLA	<0.050 DLA
	Cadmium (Cd)-Total (mg/L)	<0.00050 DLA	<0.00050 DLA	<0.00025 DLA	<0.00025 DLA	<0.00025 DLA
	Calcium (Ca)-Total (mg/L)	501	542	315	321	428
	Chromium (Cr)-Total (mg/L)	<0.0050 DLA	<0.0050 DLA	<0.0025 DLA	<0.0025 DLA	<0.0025 DLA
	Cobalt (Co)-Total (mg/L)	0.0862	0.100	0.0174	0.0167	0.0502
	Copper (Cu)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	0.00095	0.00081	0.00075
	Iron (Fe)-Total (mg/L)	0.564	1.24	0.409	0.407	1.37
	Lead (Pb)-Total (mg/L)	0.00120	<0.00050 DLA	0.00321	0.00310	0.00262
	Lithium (Li)-Total (mg/L)	<0.050 DLA	<0.050 DLA	0.039	0.039	0.030
	Magnesium (Mg)-Total (mg/L)	113	122	71.3	73.0	96.8
	Manganese (Mn)-Total (mg/L)	46.2	52.7	8.97	8.61	25.2
	Molybdenum (Mo)-Total (mg/L)	<0.00050 DLA	<0.00050 DLA	0.00057	0.00052	0.00053
	Nickel (Ni)-Total (mg/L)	0.117	0.131	0.0235	0.0225	0.0638
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	7.1	7.4	7.2	7.2	7.6
	Selenium (Se)-Total (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA
	Silicon (Si)-Total (mg/L)	8.55	8.96	2.73	2.72	5.83
	Silver (Ag)-Total (mg/L)	<0.00010 DLA	<0.00010 DLA	<0.000050 DLA	<0.000050 DLA	<0.000050 DLA
	Sodium (Na)-Total (mg/L)	35.4	36.9	21.7	21.6	27.8
	Strontium (Sr)-Total (mg/L)	1.33	1.47	1.02	0.990	1.14
	Sulfur (S)-Total (mg/L)	554	604	369	368	473
	Thallium (Tl)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	0.00068	0.00066	<0.00050 DLA
	Tin (Sn)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00491	0.00524	0.00152	0.00147	0.00338
	Vanadium (V)-Total (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA
	Zinc (Zn)-Total (mg/L)	0.482	0.484	0.231	0.228	0.387
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050 DLA	<0.0050 DLA	<0.0050 DLA
	Antimony (Sb)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050 DLA	<0.00050 DLA	<0.00050 DLA

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L920954-16
	Description	
	Sampled Date	11-AUG-10
	Sampled Time	
	Client ID	DUP 1
Grouping	**Analyte**	
WATER		
Dissolved Metals	Arsenic (As)-Dissolved (mg/L)	<0.0010 DLA
	Barium (Ba)-Dissolved (mg/L)	0.0206
	Beryllium (Be)-Dissolved (mg/L)	<0.0050 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.0050 DLA
	Boron (B)-Dissolved (mg/L)	<0.10 DLA
	Cadmium (Cd)-Dissolved (mg/L)	<0.00050 DLA
	Calcium (Ca)-Dissolved (mg/L)	519
	Chromium (Cr)-Dissolved (mg/L)	<0.0050 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.0783
	Copper (Cu)-Dissolved (mg/L)	<0.0010 DLA
	Iron (Fe)-Dissolved (mg/L)	<0.030
	Lead (Pb)-Dissolved (mg/L)	<0.00050 DLA
	Lithium (Li)-Dissolved (mg/L)	<0.050 DLA
	Magnesium (Mg)-Dissolved (mg/L)	109
	Manganese (Mn)-Dissolved (mg/L)	40.5
	Molybdenum (Mo)-Dissolved (mg/L)	0.00135
	Nickel (Ni)-Dissolved (mg/L)	0.106
	Phosphorus (P)-Dissolved (mg/L)	<0.30
	Potassium (K)-Dissolved (mg/L)	6.0
	Selenium (Se)-Dissolved (mg/L)	<0.010 DLA
	Silicon (Si)-Dissolved (mg/L)	7.91
	Silver (Ag)-Dissolved (mg/L)	<0.00010 DLA
	Sodium (Na)-Dissolved (mg/L)	32.6
	Strontium (Sr)-Dissolved (mg/L)	1.26
	Sulfur (S)-Dissolved (mg/L)	485
	Thallium (Tl)-Dissolved (mg/L)	<0.0010 DLA
	Tin (Sn)-Dissolved (mg/L)	<0.0010 DLA
	Titanium (Ti)-Dissolved (mg/L)	0.012
	Uranium (U)-Dissolved (mg/L)	0.00546
	Vanadium (V)-Dissolved (mg/L)	<0.010 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.581

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 2310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

S-TOT-ICP-VA	Water	Total Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-040123 10-040124

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

10-040123

Page 1 of 2

Report To Erin Clyde	**Report Format / Distribution**
Company: EcoMetrix	Standard: Other (specify):
Contact: Erin Clyde	Select: PDF X Excel X Digital Fax
Address: 6800 Campobello Rd Mississauga ON L5N 2L8	Email 1: eclyde@ecometrix.ca
	Email 2: usmith@ecometrix.ca
Phone: (905) 794-2325 Fax: (905) 794-2338	
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**
Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:	PO / AFE:
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:
	ALS Contact: Sampler:

Service Requested: (Rush subject to availability)

- Regular (Standard Turnaround Times)) X
- Priority, Date Req'd: _____ (Surcharges apply)
- Emergency (1 Business Day) - 100% Surcharge
- For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request

(Indicate Filtered or Preserved, F/P)

Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers
CVP10-1A	10-08-10		Water	
CVP10-1B				
CVP10-1C				
CVP10-2A				
CVP10-2B				
CVP10-2C				
CVP10-3A	11-08-10			
CVP10-3B				
CVP10-3C				
CVP10-4A				
CVP10-4B				
CVP10-4C				

Special Instructions / Regulations / Hazardous Details

Samples may contain elevated Zn. Please hold for instructions.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Erin Clyde	8-08-10			AUG 11	1135	X °C				

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

10-040124

Page 2 of 2

Report To	Erin Clyde
Company:	Ecometrix
Contact:	Erin Clyde
Address:	6800 Campobello Rd Mississauga ON L5N 2L8
Phone:	(905) 794-2325 Fax: (905) 794-2338
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)
	Copy of Invoice with Report? (circle) Yes or No
Company:	
Contact:	
Address:	
Phone:	Fax:

Report Format / Distribution	
Standard:	Other (specify):
Select: PDF X	Excel X Digital Fax
Email 1:	eclyde@ecometrix.ca
Email 2:	VSmith@ecometrix.ca
Client / Project Information	
Job #:	
PO / AFE:	
LSD:	
Quote #:	
ALS Contact:	**Sampler:**

Service Requested: (Rush subject to availability)
- Regular (Standard Turnaround Times)) X
- Priority, Date Req'd: _____ (Surcharges apply)
- Emergency (1 Business Day) - 100% Surcharge
- For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
(Indicate Filtered or Preserved, F/P)

Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers
CVP10-5A	11-08-10		Water	
CVP10-5B	↓		↓	
CVP10-5C	↓		↓	
DUP 1	↓		↓	

Special Instructions / Regulations / Hazardous Details

Samples may contain elevated Zn. Please hold for instructions.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Erin Clyde	13-08-10					°C				

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8

Report Date: 14-SEP-10 10:10 (MT)
Version: FINAL

Lab Work Order #: L929609 **Date Received:** 09-SEP-10

Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
CofC Numbers: 98050
Other Information:

Comments:

Emerson Iman Perez

Emerson Perez
Account Manager

Reference Information

'est Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AS,SB,SE-3050-MS-WT	Soil	As, Sb and Se by ICP/MS	SW846 3050B/6020A
MET-WT	Soil	Metal Scan (ICP)	EPA 3050/6010B
Sample is vigorously digested with nitric acid and hydrogen peroxide. Analysis is conducted by ICP/OES.			
S-WT	Soil	Sulfur (S)	EPA 3050

' ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

:hain of Custody Numbers:

98050

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L929609 Report Date: 14-SEP-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
AS,SB,SE-3050-MS-WT	Soil							
Batch R1464564								
WG1165513-2 CRM		**WT-SS-1**						
Arsenic (As)			102		%		10-155	13-SEP-10
WG1165513-7 LCS								
Antimony (Sb)			105		%		80-120	13-SEP-10
Arsenic (As)			94		%		80-120	13-SEP-10
Selenium (Se)			86		%		80-120	13-SEP-10
WG1165513-1 MB								
Antimony (Sb)			<1.0		mg/kg		1	13-SEP-10
Arsenic (As)			<1.0		mg/kg		1	13-SEP-10
Selenium (Se)			<1.0		mg/kg		1	13-SEP-10
WG1165513-6 MS		**WG1165513-4**						
Antimony (Sb)			109		%		80-120	13-SEP-10
Arsenic (As)			N/A	MS-B	%		-	13-SEP-10
Selenium (Se)			98		%		80-120	13-SEP-10
MET-WT	Soil							
Batch R1464449								
WG1165513-2 CRM		**WT-SS-1**						
Aluminum (Al)			118		%		70-130	13-SEP-10
Barium (Ba)			92		%		70-130	13-SEP-10
Cadmium (Cd)			88		%		70-130	13-SEP-10
Calcium (Ca)			92		%		70-130	13-SEP-10
Chromium (Cr)			89		%		70-130	13-SEP-10
Cobalt (Co)			101		%		70-130	13-SEP-10
Copper (Cu)			99		%		70-130	13-SEP-10
Iron (Fe)			109		%		70-130	13-SEP-10
Lead (Pb)			85		%		70-130	13-SEP-10
Magnesium (Mg)			106		%		70-130	13-SEP-10
Manganese (Mn)			93		%		70-130	13-SEP-10
Molybdenum (Mo)			93		%		70-130	13-SEP-10
Nickel (Ni)			92		%		70-130	13-SEP-10
Phosphorus (P)			94		%		70-130	13-SEP-10
Potassium (K)			122		%		70-130	13-SEP-10
Sodium (Na)			126		%		70-130	13-SEP-10
Strontium (Sr)			75		%		70-130	13-SEP-10
Vanadium (V)			102		%		70-130	13-SEP-10
WG1165561-2 CVS								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WT	Soil							
Batch R1464449								
WG1165561-2 CVS								
Aluminum (Al)			107		%		70-130	13-SEP-10
Barium (Ba)			102		%		60-140	13-SEP-10
Beryllium (Be)			100		%		80-120	13-SEP-10
Bismuth (Bi)			100		%		80-120	13-SEP-10
Boron (B)			99		%		80-120	13-SEP-10
Cadmium (Cd)			99		%		80-120	13-SEP-10
Calcium (Ca)			106		%		80-120	13-SEP-10
Chromium (Cr)			104		%		80-120	13-SEP-10
Cobalt (Co)			101		%		80-120	13-SEP-10
Copper (Cu)			102		%		80-120	13-SEP-10
Iron (Fe)			115		%		80-120	13-SEP-10
Lead (Pb)			91		%		80-120	13-SEP-10
Magnesium (Mg)			105		%		80-120	13-SEP-10
Manganese (Mn)			98		%		80-120	13-SEP-10
Molybdenum (Mo)			102		%		80-120	13-SEP-10
Nickel (Ni)			104		%		80-120	13-SEP-10
Phosphorus (P)			91		%		80-120	13-SEP-10
Potassium (K)			93		%		60-140	13-SEP-10
Silver (Ag)			96		%		80-120	13-SEP-10
Sodium (Na)			108		%		60-140	13-SEP-10
Strontium (Sr)			97		%		63-138	13-SEP-10
Thallium (Tl)			103		%		80-120	13-SEP-10
Uranium (U)			100		%		80-120	13-SEP-10
Vanadium (V)			95		%		80-120	13-SEP-10
Zinc (Zn)			100		%		80-120	13-SEP-10
WG1165513-1 MB								
Aluminum (Al)			<5.0		ug/g		5	13-SEP-10
Barium (Ba)			<1.0		ug/g		1	13-SEP-10
Beryllium (Be)			<0.50		ug/g		0.5	13-SEP-10
Bismuth (Bi)			<1.0		ug/g		1	13-SEP-10
Boron (B)			<5.0		ug/g		5	13-SEP-10
Cadmium (Cd)			<0.50		ug/g		0.5	13-SEP-10
Calcium (Ca)			<20		ug/g		20	13-SEP-10
Chromium (Cr)			<1.0		ug/g		1	13-SEP-10

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-WT	Soil							
Batch R1464449								
WG1165513-1 MB								
Cobalt (Co)			<1.0		ug/g		1	13-SEP-10
Copper (Cu)			<1.0		ug/g		1	13-SEP-10
Iron (Fe)			<20		ug/g		5	13-SEP-10
Lead (Pb)			<1.0		ug/g		1	13-SEP-10
Magnesium (Mg)			<20		ug/g		20	13-SEP-10
Manganese (Mn)			<1.0		ug/g		1	13-SEP-10
Molybdenum (Mo)			<1.0		ug/g		1	13-SEP-10
Nickel (Ni)			<1.0		ug/g		1	13-SEP-10
Phosphorus (P)			<10		ug/g		10	13-SEP-10
Potassium (K)			<10		ug/g		10	13-SEP-10
Silver (Ag)			<0.20		ug/g		0.2	13-SEP-10
Sodium (Na)			<20		ug/g		20	13-SEP-10
Strontium (Sr)			<1.0		ug/g		1	13-SEP-10
Thallium (Tl)			<0.50		ug/g		0.5	13-SEP-10
Tin (Sn)			<5.0		ug/g		5	13-SEP-10
Titanium (Ti)			<5.0		ug/g		5	13-SEP-10
Uranium (U)			<1.0		ug/g		1	13-SEP-10
Vanadium (V)			<1.0		ug/g		1	13-SEP-10
Zinc (Zn)			<1.0		ug/g		1	13-SEP-10
Zirconium (Zr)			<1.0		ug/g		1	13-SEP-10
S-WT	Soil							
Batch R1464449								
WG1165513-1 MB								
Sulfur (S)			<10		mg/kg		10	13-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 098050
PAGE 1 OF 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required | Service requested: 5 day (Regular) / 3-4 day TAT (25%) / 2 day TAT (50%) X / Next day TAT (100%) / Same day TAT (200%)

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 x285 FAX: (905) 794-2338
ACCOUNT #:
QUOTATION #: PO #:

CRITERIA: Criteria on report Yes [ ] No [ ]
Reg 153/04 Table 1 2 3
TCLP MISA PWQO
ODWS OTHER

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX BOTH
SELECT: PDF DIGITAL BOTH X
EMAIL 1: eclyde@ecometrix.ca
EMAIL 2: vsmith@ecometrix.ca

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)
SUBMISSION #: L929609
ENTERED BY: PBQ
DATE/TIME ENTERED: 09-Sep-10
BIN #: B977

SAMPLING INFORMATION

Date (dd-mm-yy)	Time (24 hr) (hh:mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	ICP-MS Metals (include Sulphur)	COMMENTS	LAB ID
08-09-10					X		CVP10-1 (0-5)	1	X		-1
08-09-10					X		CVP10-1 (5-10)	1	X		-2
08-09-10					X		CVP10-1 (10-15)	1	X		-3
08-09-10					X		CVP10-2 (0-5)	1	X		-4
08-09-10					X		CVP10-2 (5-10)	1	X		-5
08-09-10					X		CVP10-2 (10-15)	1	X		-6
08-09-10					X		CVP10-5 (0-5)	1	X		-7
08-09-10					X		CVP10-5 (5-10)	1	X		-8
08-09-10					X		CVP10-5 (10-15)	1	X		-9

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes No
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes No

SAMPLE CONDITION
✓ 9°C
OBSERVATIONS Yes [ ] No [ ]
If yes add SIF
INIT

SAMPLED BY: EC/VS DATE & TIME: 08-09-10
RELINQUISHED BY: Erin Clyde DATE & TIME: 08-09-10
RECEIVED BY: [signature]
RECEIVED BY: [signature] DATE & TIME: Sept 9/10 12:15
DATE & TIME: 09-Sep-10 13:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8

Report Date: 14-SEP-10 14:24 (MT)
Version: FINAL

Lab Work Order #: L929596 **Date Received:** 09-SEP-10

Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
CofC Numbers: 98049

Other Information:

Comments:

Emerson Iman Perez

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L929596-1 WATER 08-SEP-10 CVPPW10-1 (0-5)	L929596-2 WATER 08-SEP-10 CVPPW10-1 (5-10)	L929596-3 WATER 08-SEP-10 CVPPW10-1 (10-15)	L929596-4 WATER 08-SEP-10 CVPPW10-2 (0-5)	L929596-5 WATER 08-SEP-10 CVPPW10-2 (5-10)
WATER						
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	61	1610	37	192	60
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.010	0.041	0.019	<0.010	<0.010
	Antimony (Sb)-Dissolved (mg/L)	<0.0050	<0.0050	0.0366	<0.0050	<0.0050
	Arsenic (As)-Dissolved (mg/L)	0.0096	<0.0010	0.0051	<0.0010	<0.0010
	Barium (Ba)-Dissolved (mg/L)	0.048	1.78	0.725	<0.010	<0.010
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Boron (B)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Cadmium (Cd)-Dissolved (mg/L)	0.00034	<0.00010	0.00029	<0.00010	<0.00010
	Calcium (Ca)-Dissolved (mg/L)	256	664	69.0	114	85.1
	Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Cobalt (Co)-Dissolved (mg/L)	0.0176	<0.00050	<0.00050	0.00202	<0.00050
	Copper (Cu)-Dissolved (mg/L)	0.0201	0.0314	<0.0010	0.0013	0.0018
	Iron (Fe)-Dissolved (mg/L)	<0.050	0.103	<0.050	<0.050	<0.050
	Lead (Pb)-Dissolved (mg/L)	<0.0010	0.282	0.0071	<0.0010	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	3.41	<0.50	4.10	348 DLM	290 DLM
	Manganese (Mn)-Dissolved (mg/L)	0.0259	0.0033	0.0315	0.0386	<0.0010
	Molybdenum (Mo)-Dissolved (mg/L)	0.113	0.0645	0.0913	0.0023	<0.0010
	Nickel (Ni)-Dissolved (mg/L)	0.480	0.0662	0.0028	<0.0020	<0.0020
	Phosphorus (P)-Dissolved (mg/L)	0.062	0.066	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	8.9	13.0	20.3	5.9	5.8
	Selenium (Se)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Silicon (Si)-Dissolved (mg/L)	3.5	<1.0	<1.0	<1.0	<1.0
	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Sodium (Na)-Dissolved (mg/L)	17.3	10.8	19.5	26.7	25.1
	Strontium (Sr)-Dissolved (mg/L)	0.287	0.386	0.277	0.300	0.278
	Sulfur (S)-Dissolved (mg/L)	243	61.9	250	530	492
	Thallium (Tl)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	0.00147
	Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Titanium (Ti)-Dissolved (mg/L)	0.0103	<0.0020	0.0106	0.0257	0.0230
	Tungsten (W)-Dissolved (mg/L)	<0.010	0.078	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Vanadium (V)-Dissolved (mg/L)	0.0015	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0037	0.263	0.0047	0.162	0.0218
	Zirconium (Zr)-Dissolved (mg/L)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L929596-6	L929596-7	L929596-8	L929596-9	L929596-10
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	08-SEP-10	08-SEP-10	08-SEP-10	08-SEP-10	08-SEP-10
Sampled Time					
Client ID	CVPPW10-2 (10-15)	CVPPW10-5 (0-5)	CVPPW10-5 (5-10)	CVPPW10-5 (10-15)	BLANK
Grouping / **Analyte**					
WATER					
Anions and Nutrients					
Alkalinity, Total (as CaCO3) (mg/L)	34	164	52	39	<10
Dissolved Metals					
Aluminum (Al)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Antimony (Sb)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Arsenic (As)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Barium (Ba)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Bismuth (Bi)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron (B)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium (Cd)-Dissolved (mg/L)	<0.00010	<0.00010	0.00014	0.00015	<0.00010
Calcium (Ca)-Dissolved (mg/L)	140	108	76.1	98.1	<0.50
Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Copper (Cu)-Dissolved (mg/L)	0.0015	0.0018	0.0016	0.0019	0.0060
Iron (Fe)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)-Dissolved (mg/L)	187 DLM	319 DLM	313 DLM	283 DLM	<0.50
Manganese (Mn)-Dissolved (mg/L)	<0.0010	0.0091	<0.0010	<0.0010	<0.0010
Molybdenum (Mo)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Dissolved (mg/L)	5.9	5.7	5.7	6.1	<1.0
Selenium (Se)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silicon (Si)-Dissolved (mg/L)	<1.0	1.1	<1.0	<1.0	<1.0
Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium (Na)-Dissolved (mg/L)	22.4	25.6	25.6	27.0	<0.50
Strontium (Sr)-Dissolved (mg/L)	0.536	0.299	0.317	0.438	<0.0010
Sulfur (S)-Dissolved (mg/L)	425	564	546	539	<5.0
Thallium (Tl)-Dissolved (mg/L)	0.00165	<0.00030	0.00078	0.00131	<0.00030
Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium (Ti)-Dissolved (mg/L)	0.0189	0.0244	0.0243	0.0227	<0.0020
Tungsten (W)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved (mg/L)	0.0148	0.164	0.0251	0.0253	<0.0030
Zirconium (Zr)-Dissolved (mg/L)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	APHA 2320B
MET-DIS-FF-WT	Water	Metal Scan-Dissolved	EPA 200.8
-DIS-WT	Water	Sulfur (S) - Dissolved	EPA 200.8

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

98049

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L929596 Report Date: 14-SEP-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R1462867								
WG1164753-2 CVS								
Alkalinity, Total (as CaCO3)			94		%		85-115	10-SEP-10
WG1164753-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	10-SEP-10
MET-DIS-FF-WT	Water							
Batch R1464504								
WG1165637-1 CVS								
Aluminum (Al)-Dissolved			105		%		80-120	13-SEP-10
Antimony (Sb)-Dissolved			104		%		80-120	13-SEP-10
Arsenic (As)-Dissolved			101		%		80-120	13-SEP-10
Barium (Ba)-Dissolved			100		%		80-120	13-SEP-10
Beryllium (Be)-Dissolved			106		%		80-120	13-SEP-10
Bismuth (Bi)-Dissolved			107		%		80-120	13-SEP-10
Boron (B)-Dissolved			105		%		70-130	13-SEP-10
Cadmium (Cd)-Dissolved			107		%		80-120	13-SEP-10
Calcium (Ca)-Dissolved			109		%		80-120	13-SEP-10
Chromium (Cr)-Dissolved			114		%		80-120	13-SEP-10
Cobalt (Co)-Dissolved			114		%		80-120	13-SEP-10
Copper (Cu)-Dissolved			109		%		80-120	13-SEP-10
Iron (Fe)-Dissolved			104		%		80-120	13-SEP-10
Lead (Pb)-Dissolved			111		%		80-120	13-SEP-10
Magnesium (Mg)-Dissolved			105		%		80-120	13-SEP-10
Manganese (Mn)-Dissolved			110		%		80-120	13-SEP-10
Molybdenum (Mo)-Dissolved			108		%		80-120	13-SEP-10
Nickel (Ni)-Dissolved			113		%		80-120	13-SEP-10
Phosphorus (P)-Dissolved			103		%		70-130	13-SEP-10
Potassium (K)-Dissolved			106		%		80-120	13-SEP-10
Selenium (Se)-Dissolved			108		%		80-120	13-SEP-10
Silver (Ag)-Dissolved			104		%		80-120	13-SEP-10
Sodium (Na)-Dissolved			107		%		80-120	13-SEP-10
Strontium (Sr)-Dissolved			106		%		80-120	13-SEP-10
Thallium (Tl)-Dissolved			106		%		80-120	13-SEP-10
Uranium (U)-Dissolved			111		%		80-120	13-SEP-10
Vanadium (V)-Dissolved			110		%		80-120	13-SEP-10
Zinc (Zn)-Dissolved			111		%		80-120	13-SEP-10
WG1165637-2 CVS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1464504								
WG1165637-2 CVS								
Silicon (Si)-Dissolved			102		%		70-130	13-SEP-10
Tin (Sn)-Dissolved			89		%		80-120	13-SEP-10
Titanium (Ti)-Dissolved			100		%		80-120	13-SEP-10
Tungsten (W)-Dissolved			92		%		70-130	13-SEP-10
Zirconium (Zr)-Dissolved			98		%		80-120	13-SEP-10
WG1165637-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	13-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	13-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	13-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	13-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	13-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	13-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	13-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	13-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	13-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	13-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	13-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	13-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	13-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	13-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	13-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	13-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	13-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	13-SEP-10

Quality Control Report

Workorder: L929596 Report Date: 14-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1464504								
WG1165637-3 MB								
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	13-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	13-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	13-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	13-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	13-SEP-10
Batch R1465783								
WG1166370-2 CVS								
Tin (Sn)-Dissolved			94		%		80-120	14-SEP-10
Zirconium (Zr)-Dissolved			94		%		80-120	14-SEP-10
WG1166370-3 MB								
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	14-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	14-SEP-10
S-DIS-WT	Water							
Batch R1464504								
WG1165637-2 CVS								
Sulfur (S)-Dissolved			89		%		63-138	13-SEP-10
WG1165637-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	13-SEP-10
Batch R1465783								
WG1166370-2 CVS								
Sulfur (S)-Dissolved			92		%		63-138	14-SEP-10
WG1166370-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	14-SEP-10

egend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

ample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

old Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

LS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government equirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the JS EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

he ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-etermined data quality objectives to provide confidence in the accuracy of associated test results.

lease note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # 098049
PAGE 1 OF 1

Notes: all TAT quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm on Saturday/Sunday begin the next day.

Specify date required | Service requested: 2 day TAT (50%) x; Next day TAT (100%); Same day TAT (200%); 3-4 day TAT (25%); 5 day (Regular)

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 FAX: (905) 794-2338
ACCOUNT #:
QUOTATION #: PO #:

CRITERIA: Criteria on report: Yes [ ] No [ ]
Reg 153/04
Table 1 2 3
FCLP MISA PWQO
ODWS OTHER

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX BOTH
SELECT PDF DIGITAL BOTH X
EMAIL 1 eclyde@ecometrix.ca
EMAIL 2 vsmith@ecometrix.ca

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

SUBMISSION #: L929596
ENTERED BY: PTSO
DATE/TIME ENTERED: 09-Sep-10
BCL #: B977

SAMPLING INFORMATION

Sample Date/Time	TYPE	MATRIX	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P	F	COMMENTS	LAB ID
					F/P	F		
08-09-10		X	CVPPW10-1 (0-5)	2	X	X		-1
08-09-10		X	CVPPW10-1 (5-10)	2	X	X		-2
08-09-10		X	CVPPW10-1 (10-15)	2	X	X		-3
08-09-10		X	CVPPW10-2 (0-5)	2	X	X		-4
08-09-10		X	CVPPW10-2 (5-10)	2	X	X		-5
08-09-10		X	CVPPW10-2 (10-15)	2	X	X		-6
08-09-10		X	CVPPW10-5 (0-5)	2	X	X		-7
08-09-10		X	CVPPW10-5 (5-10)	2	X	X		-8
08-09-10		X	CVPPW10-5 (10-15)	2	X	X		-9
08-09-10		X	BLANK	2	X	X		-10

ICP-HS Metals (Include Sulphur)
Alkalinity

NOT CONSUMED

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)

Are any samples taken from a regulated DW System? Yes [ ] No X
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes [ ] No X

SAMPLE CONDITION

Frozen	[ ]
Chilled	[ ]
Cooling Method	[ ]
Ambient	[ ]
Observations Yes [ ] No [ ] If yes add SIF	[ ]

Custody Seal Intact: [ ]
Temperature: 9°C

SAMPLED BY: EC/VS
RELINQUISHED BY: Erin Clyde
DATE & TIME: 08-09-10
DATE & TIME: 08-09-10
RECEIVED AT LAB BY:
DATE & TIME: Sept 9/10 12:15
DATE & TIME: 09-Sep-10 13:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy

ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 15-SEP-10
Report Date: 20-SEP-10 14:05 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L931816
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98051

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L931816-1 WATER 14-SEP-10 CVP10 - ST - PW DAY 0	L931816-2 WATER 14-SEP-10 CVP10 - ST - 6 DAY 0	L931816-3 WATER 14-SEP-10 CVP10 - ST - C DAY 0	L931816-4 WATER 14-SEP-10 CVP10 - ST - 8 DAY 0	L931816-5 WATER 14-SEP-10 CVP10 - ST - 9 DAY 0
WATER						
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<1.0 DLM	<1.0 DLM	<0.10 DLM
	Antimony (Sb)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050 DLM
	Arsenic (As)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Barium (Ba)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<1.0 DLM	<1.0 DLM	<0.10 DLM
	Beryllium (Be)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Bismuth (Bi)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Boron (B)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<5.0 DLM	<5.0 DLM	<0.50 DLM
	Cadmium (Cd)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010 DLM
	Calcium (Ca)-Dissolved (mg/L)	354 DLM	339 DLM	344 DLM	331 DLM	310 DLM
	Chromium (Cr)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	0.024 DLM
	Cobalt (Co)-Dissolved (mg/L)	0.111 DLM	0.099 DLM	0.096 DLM	<0.050 DLM	0.0111 DLM
	Copper (Cu)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Iron (Fe)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<5.0 DLM	<5.0 DLM	<0.50 DLM
	Lead (Pb)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Magnesium (Mg)-Dissolved (mg/L)	216 DLM	216 DLM	218 DLM	224 DLM	209 DLM
	Manganese (Mn)-Dissolved (mg/L)	33.8 DLM	32.3 DLM	32.4 DLM	25.2 DLM	9.55 DLM
	Molybdenum (Mo)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Nickel (Ni)-Dissolved (mg/L)	<0.20 DLM	<0.20 DLM	<0.20 DLM	<0.20 DLM	0.035 DLM
	Phosphorus (P)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<5.0 DLM	<5.0 DLM	<0.50 DLM
	Potassium (K)-Dissolved (mg/L)	<100 DLM	<100 DLM	<100 DLM	<100 DLM	<10 DLM
	Selenium (Se)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050 DLM
	Silicon (Si)-Dissolved (mg/L)	<100 DLM	<100 DLM	<100 DLM	<100 DLM	<10 DLM
	Silver (Ag)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010 DLM
	Sodium (Na)-Dissolved (mg/L)	<50 DLM	<50 DLM	<50 DLM	<50 DLM	31.3 DLM
	Strontium (Sr)-Dissolved (mg/L)	1.03 DLM	0.96 DLM	1.01 DLM	0.95 DLM	0.878 DLM
	Sulfur (S)-Dissolved (mg/L)	570 DLM	550 DLM	550 DLM	570 DLM	566 DLM
	Thallium (Tl)-Dissolved (mg/L)	<0.030 DLM	<0.030 DLM	<0.030 DLM	<0.030 DLM	<0.0030 DLM
	Tin (Sn)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Titanium (Ti)-Dissolved (mg/L)	<0.20 DLM	<0.20 DLM	<0.20 DLM	<0.20 DLM	0.023 DLM
	Tungsten (W)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<1.0 DLM	<1.0 DLM	<0.10 DLM
	Uranium (U)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050 DLM
	Vanadium (V)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010 DLM
	Zinc (Zn)-Dissolved (mg/L)	1.46 DLM	6.95 DLM	3.03 DLM	1.01 DLM	0.992 DLM
	Zirconium (Zr)-Dissolved (mg/L)	<0.40 DLM	<0.40 DLM	<0.40 DLM	<0.40 DLM	<0.040 DLM

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DIS-FF-WT	Water	Metal Scan-Dissolved	EPA 200.8
S-DIS-WT	Water	Sulfur (S) - Dissolved	EPA 200.8

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

98051

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L931816 Report Date: 20-SEP-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1468424								
WG1167826-1 CVS								
Aluminum (Al)-Dissolved			100		%		80-120	16-SEP-10
Antimony (Sb)-Dissolved			100		%		80-120	16-SEP-10
Arsenic (As)-Dissolved			98		%		80-120	16-SEP-10
Barium (Ba)-Dissolved			98		%		80-120	16-SEP-10
Beryllium (Be)-Dissolved			103		%		80-120	16-SEP-10
Bismuth (Bi)-Dissolved			100		%		80-120	16-SEP-10
Boron (B)-Dissolved			93		%		70-130	16-SEP-10
Cadmium (Cd)-Dissolved			103		%		80-120	16-SEP-10
Calcium (Ca)-Dissolved			100		%		80-120	16-SEP-10
Chromium (Cr)-Dissolved			103		%		80-120	16-SEP-10
Cobalt (Co)-Dissolved			103		%		80-120	16-SEP-10
Copper (Cu)-Dissolved			103		%		80-120	16-SEP-10
Iron (Fe)-Dissolved			98		%		80-120	16-SEP-10
Lead (Pb)-Dissolved			105		%		80-120	16-SEP-10
Magnesium (Mg)-Dissolved			102		%		80-120	16-SEP-10
Manganese (Mn)-Dissolved			99		%		80-120	16-SEP-10
Molybdenum (Mo)-Dissolved			104		%		80-120	16-SEP-10
Nickel (Ni)-Dissolved			103		%		80-120	16-SEP-10
Phosphorus (P)-Dissolved			100		%		70-130	16-SEP-10
Potassium (K)-Dissolved			100		%		80-120	16-SEP-10
Selenium (Se)-Dissolved			99		%		80-120	16-SEP-10
Silver (Ag)-Dissolved			94		%		80-120	16-SEP-10
Sodium (Na)-Dissolved			103		%		80-120	16-SEP-10
Strontium (Sr)-Dissolved			100		%		80-120	16-SEP-10
Thallium (Tl)-Dissolved			102		%		80-120	16-SEP-10
Uranium (U)-Dissolved			102		%		80-120	16-SEP-10
Vanadium (V)-Dissolved			97		%		80-120	16-SEP-10
Zinc (Zn)-Dissolved			102		%		80-120	16-SEP-10
WG1167826-2 CVS								
Silicon (Si)-Dissolved			120		%		70-130	16-SEP-10
Tin (Sn)-Dissolved			93		%		80-120	16-SEP-10
Titanium (Ti)-Dissolved			98		%		80-120	16-SEP-10
Tungsten (W)-Dissolved			90		%		70-130	16-SEP-10
Zirconium (Zr)-Dissolved			97		%		80-120	16-SEP-10
WG1167826-3 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1468424								
WG1167826-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	16-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	16-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	16-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	16-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	16-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	16-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	16-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	16-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	16-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	16-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	16-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	16-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	16-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	16-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	16-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	16-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	16-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	16-SEP-10
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	16-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	16-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	16-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	16-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	16-SEP-10

ALS Environmental

Quality Control Report

Workorder: L931816 Report Date: 20-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1471246								
WG1168514-1 CVS								
Aluminum (Al)-Dissolved			103		%		80-120	17-SEP-10
Antimony (Sb)-Dissolved			104		%		80-120	17-SEP-10
Arsenic (As)-Dissolved			99		%		80-120	17-SEP-10
Barium (Ba)-Dissolved			100		%		80-120	17-SEP-10
Beryllium (Be)-Dissolved			105		%		80-120	17-SEP-10
Bismuth (Bi)-Dissolved			101		%		80-120	17-SEP-10
Boron (B)-Dissolved			104		%		70-130	17-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	17-SEP-10
Calcium (Ca)-Dissolved			100		%		80-120	17-SEP-10
Chromium (Cr)-Dissolved			103		%		80-120	17-SEP-10
Cobalt (Co)-Dissolved			101		%		80-120	17-SEP-10
Copper (Cu)-Dissolved			105		%		80-120	17-SEP-10
Iron (Fe)-Dissolved			99		%		80-120	17-SEP-10
Lead (Pb)-Dissolved			103		%		80-120	17-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	17-SEP-10
Manganese (Mn)-Dissolved			100		%		80-120	17-SEP-10
Molybdenum (Mo)-Dissolved			109		%		80-120	17-SEP-10
Nickel (Ni)-Dissolved			104		%		80-120	17-SEP-10
Phosphorus (P)-Dissolved			101		%		70-130	17-SEP-10
Potassium (K)-Dissolved			102		%		80-120	17-SEP-10
Selenium (Se)-Dissolved			102		%		80-120	17-SEP-10
Silver (Ag)-Dissolved			102		%		80-120	17-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	17-SEP-10
Strontium (Sr)-Dissolved			102		%		80-120	17-SEP-10
Thallium (Tl)-Dissolved			102		%		80-120	17-SEP-10
Uranium (U)-Dissolved			103		%		80-120	17-SEP-10
Vanadium (V)-Dissolved			97		%		80-120	17-SEP-10
Zinc (Zn)-Dissolved			105		%		80-120	17-SEP-10
WG1168514-2 CVS								
Silicon (Si)-Dissolved			107		%		70-130	17-SEP-10
Tin (Sn)-Dissolved			98		%		80-120	17-SEP-10
Titanium (Ti)-Dissolved			102		%		80-120	17-SEP-10
Tungsten (W)-Dissolved			93		%		70-130	17-SEP-10
Zirconium (Zr)-Dissolved			98		%		80-120	17-SEP-10
WG1168514-3 MB								

ALS Environmental

Quality Control Report

Workorder: L931816 Report Date: 20-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1471246								
WG1168514-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	17-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	17-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	17-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	17-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	17-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	17-SEP-10
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	17-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	17-SEP-10
S-DIS-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L931816 Report Date: 20-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-WT	Water							
Batch R1468424								
WG1167826-2 CVS								
Sulfur (S)-Dissolved			94		%		63-138	16-SEP-10
WG1167826-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	16-SEP-10
Batch R1471246								
WG1168514-2 CVS								
Sulfur (S)-Dissolved			103		%		63-138	17-SEP-10
WG1168514-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	17-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 098051
PAGE 1 OF 1

Note: all TAT quoted material is in business days which excludes statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested:
- 2 day TAT (50%) [X]
- Next day TAT (100%) [ ]
- Same day TAT (200%) [ ]
- 5 day (Regular) [ ]
- 3-4 day TAT (25%) [ ]

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 x225
FAX: (905) 764-2338
ACCOUNT #:
QUOTATION #:
PO #:

CRITERIA: Criteria on report Yes [ ] No [ ]
Reg 153/04
Table 1 2 3
TCLP ____ MISA ____ PWQO ____
ODWS ____ OTHER ____

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX ____ BOTH ____
SELECT: PDF X DIGITAL X BOTH ____
EMAIL1 eclyde@ecometrix.ca
EMAIL2 ____

SAMPLING INFORMATION

Sample Date/Time (dd-mm-yy)	Time (hh:mm)	TYPE: GRAB	TYPE: COMP	MATRIX: WATER	MATRIX: SOIL	MATRIX: SOLID	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P	ICP-MS Metals (Include Sulphur)	COMMENTS	LAB ID
14-09-10				X			CVP10-ST-PW Day 0	1	X			-1
14-09-10				X			CVP10-ST-12 Day 0	1	X			-2
14-09-10				X			CVP10-ST-C Day 0	1	X			-3
14-09-10				X			CVP10-ST-8 Day 0	1	X			-4
14-09-10				X			CVP10-ST-9 Day 0	1	X			-5

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, FP)

SUBMISSION #: L931816
ENTERED BY: MG1
DATE/TIME ENTERED: 15-SEP-10
BIN #: B157

SPECIAL INSTRUCTIONS/COMMENTS:
May contain high concentrations of Zn.

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes [ ] No [ ]
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes [ ] No [ ]

SAMPLE CONDITION
FROZEN [ ]
COLD [✓]
COOLING INITIATED [ ]
AMBIENT [ ]
MEAN TEMP: 2.3
OBSERVATIONS Yes [ ] No [✓] If yes add SIF
INIT: AP

SAMPLED BY	DATE & TIME	RECEIVED BY	DATE & TIME
EC	14-09-10		Sept. 15/10 1400
RELINQUISHED BY: EC	DATE & TIME: 15-09-10	RECEIVED AT LAB BY: Aesta Paterson	DATE & TIME: 15-Sep-10 15:50

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy

Reg COC Rev#4 09

ECOMETRIX INC
ATTN: Erin Clyde
6800 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 16-SEP-10
Report Date: 20-SEP-10 14:15 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L932342
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98055

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L932342-1	L932342-2	L932342-3	L932342-4
	Description	WATER	WATER	WATER	WATER
	Sampled Date	15-SEP-10	15-SEP-10	15-SEP-10	15-SEP-10
	Sampled Time				
	Client ID	CVP10-ST-6 DAY 1	CVP10-ST-C DAY 1	CVP10-ST-8 DAY 1	CVP10-ST-9 DAY 1
Grouping	**Analyte**				
WATER					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<0.10 DLM	0.028
	Antimony (Sb)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.050 DLM	<0.0050
	Arsenic (As)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Barium (Ba)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<0.10 DLM	<0.010
	Beryllium (Be)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Bismuth (Bi)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Boron (B)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<0.50 DLM	<0.050
	Cadmium (Cd)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.0010 DLM	<0.00010
	Calcium (Ca)-Dissolved (mg/L)	325 DLM	304 DLM	300 DLM	252
	Chromium (Cr)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Cobalt (Co)-Dissolved (mg/L)	0.080 DLM	0.054 DLM	0.0251 DLM	<0.00050
	Copper (Cu)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	0.0013
	Iron (Fe)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<0.50 DLM	<0.050
	Lead (Pb)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	229 DLM	235 DLM	235 DLM	203 DLM
	Manganese (Mn)-Dissolved (mg/L)	26.9 DLM	22.3 DLM	15.5 DLM	0.546
	Molybdenum (Mo)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	0.0035
	Nickel (Ni)-Dissolved (mg/L)	<0.20 DLM	<0.20 DLM	0.029 DLM	0.0045
	Phosphorus (P)-Dissolved (mg/L)	<5.0 DLM	<5.0 DLM	<0.50 DLM	<0.050
	Potassium (K)-Dissolved (mg/L)	<100 DLM	<100 DLM	<10 DLM	5.9
	Selenium (Se)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.050 DLM	<0.0050
	Silicon (Si)-Dissolved (mg/L)	<100 DLM	<100 DLM	<10 DLM	3.1
	Silver (Ag)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.0010 DLM	<0.00010
	Sodium (Na)-Dissolved (mg/L)	<50 DLM	<50 DLM	33.2 DLM	28.9
	Strontium (Sr)-Dissolved (mg/L)	0.95 DLM	0.89 DLM	0.859 DLM	0.701
	Sulfur (S)-Dissolved (mg/L)	530 DLM	510 DLM	588 DLM	514
	Thallium (Tl)-Dissolved (mg/L)	<0.030 DLM	<0.030 DLM	<0.0030 DLM	0.00053
	Tin (Sn)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Titanium (Ti)-Dissolved (mg/L)	<0.20 DLM	<0.20 DLM	0.025 DLM	0.0219
	Tungsten (W)-Dissolved (mg/L)	<1.0 DLM	<1.0 DLM	<0.10 DLM	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.050 DLM	<0.0050
	Vanadium (V)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.010 DLM	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	5.58 DLM	0.98 DLM	0.033 DLM	0.0045
	Zirconium (Zr)-Dissolved (mg/L)	<0.40 DLM	<0.40 DLM	<0.040 DLM	<0.0040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DIS-FF-WT	Water	Metal Scan-Dissolved	EPA 200.8
S-DIS-WT	Water	Sulfur (S) - Dissolved	EPA 200.8

ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

98055

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
ng/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
ng/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L932342 Report Date: 20-SEP-10

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Erin Clyde

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1471246								
WG1168514-1 CVS								
Aluminum (Al)-Dissolved			103		%		80-120	17-SEP-10
Antimony (Sb)-Dissolved			104		%		80-120	17-SEP-10
Arsenic (As)-Dissolved			99		%		80-120	17-SEP-10
Barium (Ba)-Dissolved			100		%		80-120	17-SEP-10
Beryllium (Be)-Dissolved			105		%		80-120	17-SEP-10
Bismuth (Bi)-Dissolved			101		%		80-120	17-SEP-10
Boron (B)-Dissolved			104		%		70-130	17-SEP-10
Cadmium (Cd)-Dissolved			105		%		80-120	17-SEP-10
Calcium (Ca)-Dissolved			100		%		80-120	17-SEP-10
Chromium (Cr)-Dissolved			103		%		80-120	17-SEP-10
Cobalt (Co)-Dissolved			101		%		80-120	17-SEP-10
Copper (Cu)-Dissolved			105		%		80-120	17-SEP-10
Iron (Fe)-Dissolved			99		%		80-120	17-SEP-10
Lead (Pb)-Dissolved			103		%		80-120	17-SEP-10
Magnesium (Mg)-Dissolved			104		%		80-120	17-SEP-10
Manganese (Mn)-Dissolved			100		%		80-120	17-SEP-10
Molybdenum (Mo)-Dissolved			109		%		80-120	17-SEP-10
Nickel (Ni)-Dissolved			104		%		80-120	17-SEP-10
Phosphorus (P)-Dissolved			101		%		70-130	17-SEP-10
Potassium (K)-Dissolved			102		%		80-120	17-SEP-10
Selenium (Se)-Dissolved			102		%		80-120	17-SEP-10
Silver (Ag)-Dissolved			102		%		80-120	17-SEP-10
Sodium (Na)-Dissolved			104		%		80-120	17-SEP-10
Strontium (Sr)-Dissolved			102		%		80-120	17-SEP-10
Thallium (Tl)-Dissolved			102		%		80-120	17-SEP-10
Uranium (U)-Dissolved			103		%		80-120	17-SEP-10
Vanadium (V)-Dissolved			97		%		80-120	17-SEP-10
Zinc (Zn)-Dissolved			105		%		80-120	17-SEP-10
WG1168514-2 CVS								
Silicon (Si)-Dissolved			107		%		70-130	17-SEP-10
Tin (Sn)-Dissolved			98		%		80-120	17-SEP-10
Titanium (Ti)-Dissolved			102		%		80-120	17-SEP-10
Tungsten (W)-Dissolved			93		%		70-130	17-SEP-10
Zirconium (Zr)-Dissolved			98		%		80-120	17-SEP-10
WG1168514-3 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1471246								
WG1168514-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	17-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	17-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	17-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	17-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	17-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	17-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	17-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	17-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	17-SEP-10
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	17-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	17-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	17-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	17-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	17-SEP-10
S-DIS-WT	Water							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-WT	Water							
Batch R1471246								
WG1168514-2 CVS								
Sulfur (S)-Dissolved			103		%		63-138	17-SEP-10
WG1168514-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	17-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 098055
PAGE 1 OF 1

Note: all TAT quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested
- 5 day (Regular)
- 3-4 day TAT (25%)
- 2 day TAT (50%) X
- Next day TAT (100%)
- Same day TAT (200%)

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 FAX: (905) 794-2338
ACCOUNT #:
QUOTATION#: PO#:

CRITERIA — Criteria on report: Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP ____ MISA ____ PWQO ____
ODWS ____ OTHER ____

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX ____ BOTH ____
SELECT PDF ____ DIGITAL ____ BOTH X
EMAIL1 eclyde@ecometrix.ca
EMAIL2 ____

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

SUBMISSION #: L932342
ENTERED BY: MG1
DATE/TIME ENTERED: 16-SEP-10
BIN #: 8172

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24 hr) (hh:mm)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P (TCP-HS, Metals (Include Sulphur))	COMMENTS	LAB ID
15-09-10				X			CVP10-ST-6 Day 1	1	X		-1
15-09-10				X			CVP10-ST-C Day 1	1	X		-2
15-09-10				X			CVP10-ST-8 Day 1	1	X		-3
15-09-10				X			CVP10-ST-9 Day 1	1	X		-4

SPECIAL INSTRUCTIONS/COMMENTS: May contain elevated Zn

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No ☒
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No ☒

SAMPLE CONDITION
FROZEN ☐ COLD ☒ COOLING INITIATED ☐ AMBIENT ☐
MEAN TEMP: 7°C
OBSERVATIONS Yes ☐ No ☒ If yes add SIF
INIT

SAMPLED BY	DATE & TIME	RECEIVED BY	DATE & TIME
EC	15-Sept-10		
RELINQUISHED BY: Erin Clyde	DATE & TIME: 16-Sept-10	RECEIVED AT LAB BY	DATE & TIME: Sept. 16/10 1340; 16/9/10 1330

NOTES AND CONDITIONS
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

ECOMETRIX INC
ATTN: Erin Clyde
6800 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 21-SEP-10
Report Date: 23-SEP-10 03:12 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L933667
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98059

Comments: Samples analyzed using lowest possible dilution. EP/MS

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L933667-1	L933667-2	L933667-3	L933667-4	
	Description	WATER	WATER	WATER	WATER	
	Sampled Date	16-SEP-10	16-SEP-10	16-SEP-10	16-SEP-10	
	Sampled Time					
	Client ID	CVP10-ST-6 DAY 2	CVP10-ST-C DAY 2	CVP10-ST-8 DAY 2	CVP10-ST-9 DAY 2	
Grouping	Analyte					
WATER						
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<1.0 DLM	<0.10 DLM	<0.10 DLM	0.045	
	Antimony (Sb)-Dissolved (mg/L)	<0.50 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
	Arsenic (As)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Barium (Ba)-Dissolved (mg/L)	<1.0 DLM	<0.10 DLM	<0.10 DLM	<0.010	
	Beryllium (Be)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Boron (B)-Dissolved (mg/L)	<5.0 DLM	<0.50 DLM	<0.50 DLM	<0.050	
	Cadmium (Cd)-Dissolved (mg/L)	<0.010 DLM	<0.0010 DLM	<0.0010 DLM	<0.00010	
	Calcium (Ca)-Dissolved (mg/L)	360 DLM	301 DLM	295 DLM	277	
	Chromium (Cr)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	0.064 DLM	0.0355 DLM	0.0212 DLM	<0.00050	
	Copper (Cu)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	0.0016	
	Iron (Fe)-Dissolved (mg/L)	<5.0 DLM	<0.50 DLM	<0.50 DLM	<0.050	
	Lead (Pb)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	239 DLM	237 DLM	232 DLM	204 DLM	
	Manganese (Mn)-Dissolved (mg/L)	22.5 DLM	15.9 DLM	11.3 DLM	0.863	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	0.0037	
	Nickel (Ni)-Dissolved (mg/L)	<0.20 DLM	0.037 DLM	0.026 DLM	0.0052	
	Phosphorus (P)-Dissolved (mg/L)	<5.0 DLM	<0.50 DLM	<0.50 DLM	<0.050	
	Potassium (K)-Dissolved (mg/L)	<100 DLM	<10 DLM	<10 DLM	6.2	
	Selenium (Se)-Dissolved (mg/L)	<0.50 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
	Silicon (Si)-Dissolved (mg/L)	<100 DLM	<10 DLM	<10 DLM	2.8	
	Silver (Ag)-Dissolved (mg/L)	<0.010 DLM	<0.0010 DLM	<0.0010 DLM	<0.00010	
	Sodium (Na)-Dissolved (mg/L)	70 DLM	33.2 DLM	32.6 DLM	27.2	
	Strontium (Sr)-Dissolved (mg/L)	0.95 DLM	0.858 DLM	0.826 DLM	0.752	
	Sulfur (S)-Dissolved (mg/L)	690 DLM	615 DLM	589 DLM	519	
	Thallium (Tl)-Dissolved (mg/L)	<0.030 DLM	<0.0030 DLM	<0.0030 DLM	0.00049	
	Tin (Sn)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Titanium (Ti)-Dissolved (mg/L)	<0.20 DLM	0.024 DLM	0.025 DLM	0.0230	
	Tungsten (W)-Dissolved (mg/L)	<1.0 DLM	<0.10 DLM	<0.10 DLM	<0.010	
	Uranium (U)-Dissolved (mg/L)	<0.50 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
	Vanadium (V)-Dissolved (mg/L)	<0.10 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	4.08 DLM	0.387 DLM	<0.030 DLM	0.0064	
	Zirconium (Zr)-Dissolved (mg/L)	<0.40 DLM	<0.040 DLM	<0.040 DLM	<0.0040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

98059

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L933667 Report Date: 23-SEP-10

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Erin Clyde

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1474416								
WG1170986-1 CVS								
Aluminum (Al)-Dissolved			98		%		80-120	22-SEP-10
Antimony (Sb)-Dissolved			102		%		80-120	22-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	22-SEP-10
Barium (Ba)-Dissolved			102		%		80-120	22-SEP-10
Beryllium (Be)-Dissolved			109		%		80-120	22-SEP-10
Bismuth (Bi)-Dissolved			104		%		80-120	22-SEP-10
Boron (B)-Dissolved			111		%		70-130	22-SEP-10
Cadmium (Cd)-Dissolved			107		%		80-120	22-SEP-10
Calcium (Ca)-Dissolved			109		%		80-120	22-SEP-10
Chromium (Cr)-Dissolved			106		%		80-120	22-SEP-10
Cobalt (Co)-Dissolved			104		%		80-120	22-SEP-10
Copper (Cu)-Dissolved			107		%		80-120	22-SEP-10
Iron (Fe)-Dissolved			96		%		80-120	22-SEP-10
Lead (Pb)-Dissolved			105		%		80-120	22-SEP-10
Magnesium (Mg)-Dissolved			107		%		80-120	22-SEP-10
Manganese (Mn)-Dissolved			104		%		80-120	22-SEP-10
Molybdenum (Mo)-Dissolved			115		%		80-120	22-SEP-10
Nickel (Ni)-Dissolved			114		%		80-120	22-SEP-10
Phosphorus (P)-Dissolved			97		%		70-130	22-SEP-10
Potassium (K)-Dissolved			106		%		80-120	22-SEP-10
Selenium (Se)-Dissolved			109		%		80-120	22-SEP-10
Silver (Ag)-Dissolved			100		%		80-120	22-SEP-10
Sodium (Na)-Dissolved			108		%		80-120	22-SEP-10
Strontium (Sr)-Dissolved			107		%		80-120	22-SEP-10
Thallium (Tl)-Dissolved			110		%		80-120	22-SEP-10
Uranium (U)-Dissolved			113		%		80-120	22-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	22-SEP-10
Zinc (Zn)-Dissolved			105		%		80-120	22-SEP-10
WG1170986-2 CVS								
Silicon (Si)-Dissolved			106		%		70-130	22-SEP-10
Tin (Sn)-Dissolved			92		%		80-120	22-SEP-10
Titanium (Ti)-Dissolved			108		%		80-120	22-SEP-10
Tungsten (W)-Dissolved			93		%		70-130	22-SEP-10
Zirconium (Zr)-Dissolved			104		%		80-120	22-SEP-10
WG1170986-3 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1474416								
WG1170986-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	22-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	22-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	22-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	22-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	22-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	22-SEP-10
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	22-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	22-SEP-10
S-DIS-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L933667 Report Date: 23-SEP-10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-WT	Water							
Batch R1474416								
WG1170986-2 CVS								
Sulfur (S)-Dissolved			106		%		63-138	22-SEP-10
WG1170986-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	22-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

T-493 P0002/0011 F-865

5198869047

09-21-'10 06:28 FROM-

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 098059
PAGE 1 OF 1

Note: all TAT Quoted internal is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested:
- 5 day (Regular)
- 3-4 day TAT (75%) X
- 2 day TAT (50%)
- Next day TAT (100%)
- Same day TAT (200%)

COMPANY NAME	EcoMetrix
OFFICE	
PROJECT MANAGER	Erin Clyde
PROJECT #	10-1753
PHONE	(905) 794-2325
FAX	
ACCOUNT #	
QUOTATION#	
PO#	

CRITERIA — Criteria on report: Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP ____ MISA ____ PWQO ____
ODWS ____ OTHER ____

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX ____ BOTH ____
SELECT PDF ____ DIGITAL ____ BOTH X
EMAIL1 eclyde@ecometrix.ca
EMAIL2 ____

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

SUBMISSION # L933667

ENTERED BY: MG1

DATE/TIME ENTERED 21-SEP-10

Bill # B225-

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24 hr) (hr:mm)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P ICP-MS Metals (Including Sulphur)	COMMENTS	LAB ID
16-09-10				X			CVP10-ST-6 DAY 2	1	X		-1
16-09-10				X			CVP10-ST-C DAY 2	1	X		-2
16-09-10				X			CVP10-ST-8 DAY 2	1	X		-3
16-09-10				X			CVP10-ST-9 DAY 2	1	X		-4

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No ☐
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No ☐

SAMPLE CONDITION
FROZEN ☐
COLD ☑
COOLING INITIATED ☐
AMBIENT ☐
MEAN TEMP 18
OBSERVATIONS Yes ☐ No ☑ If yes add SIF
INIT NR

SAMPLED BY:	EC	DATE & TIME:	16-09-10	RECEIVED BY:	DATE & TIME: Sept 20/10 15:15
RELINQUISHED BY:	Erin Clyde	DATE & TIME:	20-09-10	RECEIVED AT LAB: NR	DATE & TIME: 21/9/10 7:30

NOTES AND CONDITIONS
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analyses and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy

Reg COC Rev#4 09

ECOMETRIX INC
ATTN: Erin Clyde
6800 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 21-SEP-10
Report Date: 23-SEP-10 03:10 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L933657
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98060

Comments: Samples analyzed using lowest possible dilution. EP/MS

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L933657-1	L933657-2	L933657-3	L933657-4	
Description	WATER	WATER	WATER	WATER	
Sampled Date	17-SEP-10	17-SEP-10	17-SEP-10	17-SEP-10	
Sampled Time					
Client ID	CVP10-ST-6 DAY 3	CVP10-ST-C DAY 3	CVP10-ST-8 DAY 3	CVP10-ST-9 DAY 3	
Grouping **Analyte**					
WATER					
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	0.023	
Antimony (Sb)-Dissolved (mg/L)	<0.050 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
Arsenic (As)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Barium (Ba)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010	
Beryllium (Be)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Bismuth (Bi)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Boron (B)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050	
Cadmium (Cd)-Dissolved (mg/L)	0.0022 DLM	<0.0010 DLM	<0.0010 DLM	<0.00010	
Calcium (Ca)-Dissolved (mg/L)	343 DLM	294 DLM	288 DLM	276	
Chromium (Cr)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Cobalt (Co)-Dissolved (mg/L)	0.0562 DLM	0.0292 DLM	0.0215 DLM	0.00059	
Copper (Cu)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	0.0013	
Iron (Fe)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050	
Lead (Pb)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Magnesium (Mg)-Dissolved (mg/L)	239 DLM	248 DLM	236 DLM	20.3 DLM	
Manganese (Mn)-Dissolved (mg/L)	21.1 DLM	13.6 DLM	10.2 DLM	1.21	
Molybdenum (Mo)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	0.0039	
Nickel (Ni)-Dissolved (mg/L)	0.059 DLM	0.032 DLM	0.026 DLM	0.0052	
Phosphorus (P)-Dissolved (mg/L)	<0.50 DLM	<0.50 DLM	<0.50 DLM	<0.050	
Potassium (K)-Dissolved (mg/L)	<10 DLM	<10 DLM	<10 DLM	6.1	
Selenium (Se)-Dissolved (mg/L)	<0.050 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
Silicon (Si)-Dissolved (mg/L)	<10 DLM	<10 DLM	<10 DLM	2.5	
Silver (Ag)-Dissolved (mg/L)	<0.0010 DLM	<0.0010 DLM	<0.0010 DLM	<0.00010	
Sodium (Na)-Dissolved (mg/L)	32.6 DLM	34.0 DLM	31.8 DLM	27.8	
Strontium (Sr)-Dissolved (mg/L)	0.928 DLM	0.843 DLM	0.796 DLM	0.740	
Sulfur (S)-Dissolved (mg/L)	607 DLM	617 DLM	588 DLM	507	
Thallium (Tl)-Dissolved (mg/L)	<0.0030 DLM	<0.0030 DLM	<0.0030 DLM	0.00048	
Tin (Sn)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Titanium (Ti)-Dissolved (mg/L)	0.024 DLM	0.024 DLM	0.023 DLM	0.0224	
Tungsten (W)-Dissolved (mg/L)	<0.10 DLM	<0.10 DLM	<0.10 DLM	<0.010	
Uranium (U)-Dissolved (mg/L)	<0.050 DLM	<0.050 DLM	<0.050 DLM	<0.0050	
Vanadium (V)-Dissolved (mg/L)	<0.010 DLM	<0.010 DLM	<0.010 DLM	<0.0010	
Zinc (Zn)-Dissolved (mg/L)	3.19 DLM	0.224 DLM	0.055 DLM	<0.0030	
Zirconium (Zr)-Dissolved (mg/L)	<0.040 DLM	<0.040 DLM	<0.040 DLM	<0.0040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-DIS-FF-WT	Water	Metal Scan-Dissolved	EPA 200.8
S-DIS-WT	Water	Sulfur (S) - Dissolved	EPA 200.8

ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS LABORATORY GROUP - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

98060

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L933657 Report Date: 23-SEP-10

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Erin Clyde

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1474416								
WG1170986-1 CVS								
Aluminum (Al)-Dissolved			98		%		80-120	22-SEP-10
Antimony (Sb)-Dissolved			102		%		80-120	22-SEP-10
Arsenic (As)-Dissolved			102		%		80-120	22-SEP-10
Barium (Ba)-Dissolved			102		%		80-120	22-SEP-10
Beryllium (Be)-Dissolved			109		%		80-120	22-SEP-10
Bismuth (Bi)-Dissolved			104		%		80-120	22-SEP-10
Boron (B)-Dissolved			111		%		70-130	22-SEP-10
Cadmium (Cd)-Dissolved			107		%		80-120	22-SEP-10
Calcium (Ca)-Dissolved			109		%		80-120	22-SEP-10
Chromium (Cr)-Dissolved			106		%		80-120	22-SEP-10
Cobalt (Co)-Dissolved			104		%		80-120	22-SEP-10
Copper (Cu)-Dissolved			107		%		80-120	22-SEP-10
Iron (Fe)-Dissolved			96		%		80-120	22-SEP-10
Lead (Pb)-Dissolved			105		%		80-120	22-SEP-10
Magnesium (Mg)-Dissolved			107		%		80-120	22-SEP-10
Manganese (Mn)-Dissolved			104		%		80-120	22-SEP-10
Molybdenum (Mo)-Dissolved			115		%		80-120	22-SEP-10
Nickel (Ni)-Dissolved			114		%		80-120	22-SEP-10
Phosphorus (P)-Dissolved			97		%		70-130	22-SEP-10
Potassium (K)-Dissolved			106		%		80-120	22-SEP-10
Selenium (Se)-Dissolved			109		%		80-120	22-SEP-10
Silver (Ag)-Dissolved			100		%		80-120	22-SEP-10
Sodium (Na)-Dissolved			108		%		80-120	22-SEP-10
Strontium (Sr)-Dissolved			107		%		80-120	22-SEP-10
Thallium (Tl)-Dissolved			110		%		80-120	22-SEP-10
Uranium (U)-Dissolved			113		%		80-120	22-SEP-10
Vanadium (V)-Dissolved			101		%		80-120	22-SEP-10
Zinc (Zn)-Dissolved			105		%		80-120	22-SEP-10
WG1170986-2 CVS								
Silicon (Si)-Dissolved			106		%		70-130	22-SEP-10
Tin (Sn)-Dissolved			92		%		80-120	22-SEP-10
Titanium (Ti)-Dissolved			108		%		80-120	22-SEP-10
Tungsten (W)-Dissolved			93		%		70-130	22-SEP-10
Zirconium (Zr)-Dissolved			104		%		80-120	22-SEP-10
WG1170986-3 MB								

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DIS-FF-WT	Water							
Batch R1474416								
WG1170986-3 MB								
Aluminum (Al)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Antimony (Sb)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Barium (Ba)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Beryllium (Be)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Bismuth (Bi)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Boron (B)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Cadmium (Cd)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-10
Calcium (Ca)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	22-SEP-10
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Lead (Pb)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Magnesium (Mg)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Molybdenum (Mo)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Nickel (Ni)-Dissolved			<0.0020		mg/L		0.002	22-SEP-10
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	22-SEP-10
Potassium (K)-Dissolved			<1.0		mg/L		1	22-SEP-10
Selenium (Se)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Silicon (Si)-Dissolved			<1.0		mg/L		1	22-SEP-10
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-10
Sodium (Na)-Dissolved			<0.50		mg/L		0.5	22-SEP-10
Strontium (Sr)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Thallium (Tl)-Dissolved			<0.00030		mg/L		0.0003	22-SEP-10
Tin (Sn)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Titanium (Ti)-Dissolved			<0.0020		mg/L		0.002	22-SEP-10
Tungsten (W)-Dissolved			<0.010		mg/L		0.01	22-SEP-10
Uranium (U)-Dissolved			<0.0050		mg/L		0.005	22-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	22-SEP-10
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	22-SEP-10
Zirconium (Zr)-Dissolved			<0.0040		mg/L		0.004	22-SEP-10
S-DIS-WT	Water							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-WT	Water							
Batch R1474416								
WG1170986-2 CVS								
Sulfur (S)-Dissolved			106		%		63-138	22-SEP-10
WG1170986-3 MB								
Sulfur (S)-Dissolved			<5.0		mg/L		5	22-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

T-493 P0001/0011 F-865

5198869047

09-21-'10 06:28 FROM-

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 098060
PAGE 1 OF 1

Note: All TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received post 2:00 pm on Saturday/Sunday begin the next day.

Specify date required

Service requested		
5 day (Regular)		
3-4 day TAT (25%)	X	

2 day TAT (50%)	
Next day TAT (100%)	
Same day TAT (200%)	

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 FAX:
ACCOUNT #:
QUOTATION #: PO#:

CRITERIA: Criteria on report Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP ___ NiSA ___ PWQO ___
ODWS ___ OTHER ___

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX ___ BOTH ___
SELECT PDF ___ DIGITAL ___ BOTH X
EMAIL1 eclyde@ecometrix.ca
EMAIL2

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX					
Date (dd-mm-yy)	Time (24 hr) (hh:mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P (ICP-MS Metals (Incl. dr Sulphur))	COMMENTS	LAB ID
---	---	---	---	---	---	---	---	---	---	---	---
17-09-10				X			CVP10-ST-6 Day3	1	X		-1
17-09-10				X			CVP10-ST-C Day3	1	X		-2
17-09-10				X			CVP10-ST-8 Day3	1	X		-3
17-09-10				X			CVP10-ST-9 Day3	1	X		-4

ANALYSIS REQUEST
PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

SUBMISSION #: L933657
ENTERED BY: MG1
DATE/TIME ENTERED: 21-SEP-10
BIN #: B225

SPECIAL INSTRUCTIONS/COMMENTS:

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No ☐
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No ☐

SAMPLE CONDITION

		MEAN TEMP
FROZEN	☐	
COLD	☑	1°8
COOLING INITIATED	☐	
AMBIENT	☐	

OBSERVATIONS Yes ☐ No ☐ If yes add SIF
KNIT

SAMPLED BY	DATE & TIME	RECEIVED	DATE & TIME
EC	17-09-10		Sept 20/10 15:15
RELINQUISHED BY	DATE & TIME	RECEIVED AT LAB BY	DATE
Erin Clyde	20-09-10	RR	Sept 21/10 7:30

NOTES AND CONDITIONS
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section

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Reg COC Rev#4 09

ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 23-SEP-10
Report Date: 07-OCT-10 17:24 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L935026
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98061

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L935026-1	L935026-2	L935026-3	L935026-4	L935026-5
		Description	WATER	WATER	WATER	WATER	WATER
		Sampled Date	20-SEP-10	20-SEP-10	20-SEP-10	20-SEP-10	20-SEP-10
		Sampled Time					
		Client ID	CVP10-ST-6 DAY 6	CVP10-ST-C DAY 6	CVP10-ST-8 DAY 6	CVP10-ST-9 DAY 6	CVP10-ST-PW DAY 6
WATER							
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)		DLM <0.015	0.029	0.024	0.024	0.556
	Antimony (Sb)-Dissolved (mg/L)		DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050	0.00181
	Arsenic (As)-Dissolved (mg/L)		DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Barium (Ba)-Dissolved (mg/L)		0.0153	0.0111	0.0121	0.00871	0.0127
	Beryllium (Be)-Dissolved (mg/L)		DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025
	Bismuth (Bi)-Dissolved (mg/L)		DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025
	Boron (B)-Dissolved (mg/L)		DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050
	Cadmium (Cd)-Dissolved (mg/L)		0.00101	DLM <0.000050	DLM <0.000050	DLM <0.000050	0.000434
	Calcium (Ca)-Dissolved (mg/L)		278	227	238	225	321
	Chromium (Cr)-Dissolved (mg/L)		DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Cobalt (Co)-Dissolved (mg/L)		0.0286	0.0139	0.0147	0.00209	0.104
	Copper (Cu)-Dissolved (mg/L)		DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025	0.0026
	Iron (Fe)-Dissolved (mg/L)		DLM <0.15	DLM <0.15	DLM <0.15	DLM <0.15	DLM <0.15
	Lead (Pb)-Dissolved (mg/L)		DLM <0.00025	DLM <0.00025	DLM <0.00025	DLM <0.00025	DLM <0.00025
	Lithium (Li)-Dissolved (mg/L)		DLM <0.025	DLM <0.025	DLM <0.025	DLM <0.025	DLM <0.025
	Magnesium (Mg)-Dissolved (mg/L)		220	229	230	196	185
	Manganese (Mn)-Dissolved (mg/L)		9.66	5.00	5.06	0.371	31.5
	Molybdenum (Mo)-Dissolved (mg/L)		0.00298	0.00394	0.00425	0.00407	0.00541
	Nickel (Ni)-Dissolved (mg/L)		0.0311	0.0269	0.0161	0.0051	0.102
	Phosphorus (P)-Dissolved (mg/L)		DLM <1.5	DLM <1.5	DLM <1.5	DLM <1.5	DLM <1.5
	Potassium (K)-Dissolved (mg/L)		6.06	6.28	6.44	6.05	6.52
	Selenium (Se)-Dissolved (mg/L)		DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Silicon (Si)-Dissolved (mg/L)		1.91	1.93	2.10	2.01	3.91
	Silver (Ag)-Dissolved (mg/L)		DLM <0.000050	DLM <0.000050	DLM <0.000050	DLM <0.000050	DLM <0.000050
	Sodium (Na)-Dissolved (mg/L)		26.8	28.0	28.2	25.7	29.2
	Strontium (Sr)-Dissolved (mg/L)		0.817	0.677	0.703	0.650	0.939
	Sulfur (S)-Dissolved (mg/L)		542	547	540	503	554
	Thallium (Tl)-Dissolved (mg/L)		0.00057	0.00055	0.00054	DLM <0.00050	DLM <0.00050
	Tin (Sn)-Dissolved (mg/L)		DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Titanium (Ti)-Dissolved (mg/L)		DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050
	Uranium (U)-Dissolved (mg/L)		0.00222	0.00599	0.00549	0.00321	0.0132
	Vanadium (V)-Dissolved (mg/L)		DLM <0.0050	DLM <0.0050	DLM <0.0050	DLM <0.0050	DLM <0.0050
	Zinc (Zn)-Dissolved (mg/L)		0.868	0.023	0.015	DLM <0.015	1.24

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

LS Test Code	Matrix	Test Description	Method Reference**
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

98061

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L935026 Report Date: 07-OCT-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R1480945								
WG1172989-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Beryllium (Be)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Bismuth (Bi)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Boron (B)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	27-SEP-10
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	27-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Lithium (Li)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	27-SEP-10
Potassium (K)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Thallium (Tl)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
S-DIS-ICP-VA	Water							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	Water							
Batch R1480883								
WG1172989-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10
WG1172989-5 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

COC # 093061
PAGE 1 OF 1

Note: all TAT quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm on Saturday/Sunday begin the next day.

Specify date required:

Service requested
- 5 day (Regular) X
- 3-4 day TAT (25 %)
- 2 day TAT (50 %)
- Next day TAT (100%)
- Same day TAT (200 %)

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794 2325 FAX:
ACCOUNT #:
QUOTATION #: PO #:

CRITERIA Criteria on report: Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP MISA PWQO
CCME SUB OTHER

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX BOTH
SELECT PDF DIGITAL BOTH X
EMAIL1 eclyde@ecometrix.ca
EMAIL2

ANALYSIS REQUEST

SUBMISSION # L935026
ENTERED BY: DBQ
DATE/TIME ENTERED: 23-SEP-10
BIN # B287

SAMPLING INFORMATION

Sample Date Time: Date (dd-mmm-yy)	Time (24 hr) (hh:mm)	TYPE: GRAB	COMP	MATRIX: WATER	SOIL	Other	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P (ICP-MS Metals (Include Sulphur))	COMMENTS	LAB ID
20-09-10				X			CVP10-ST-6 DAY 6	1	X		-1
20-09-10				X			CVP10-ST-C DAY 6	1	X		-2
20-09-10				X			CVP10-ST-8 DAY 6	1	X		-3
20-09-10				X			CVP10-ST-9 DAY 6	1	X		-4
20-09-10				X			CVP10-ST-PW DAY 6	1	X		-5

SPECIAL INSTRUCTIONS/COMMENTS
Samples contain elevated Zn.

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No X
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No X

SAMPLE CONDITION
PROPER ☐ MEAN TEMP
COOLED ☐
FROZEN ☐
ABNORMAL ☐
OBSERVATIONS Yes ☐ No ☐
If yes, add SIF ☐

SAMPLED BY: EC
RELINQUISHED BY: Erin Clyde
DATE & TIME: 20-09-10
DATE & TIME: 23-09-10
RECEIVED BY:
RECEIVED AT LAB BY:
DATE & TIME: 23/10 12:30
DATE & TIME: 23 Sep 10 13:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analyses and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any knowns or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

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ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 23-SEP-10
Report Date: 08-OCT-10 01:38 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L935060
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98062

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L935060-1	L935060-2	L935060-3	L935060-4
	Description	WATER	WATER	WATER	WATER
	Sampled Date	21-SEP-10	21-SEP-10	21-SEP-10	21-SEP-10
	Sampled Time				
	Client ID	CVP10-ST-6 DAY 7	CVP10-ST-C DAY 7	CVP10-ST-8 DAY 7	CVP10-ST-9 DAY 7
Grouping	Analyte				
WATER					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.150	0.266	0.055	0.684
	Antimony (Sb)-Dissolved (mg/L)	DLM <0.00050	DLM <0.00050	DLM <0.00050	0.00055
	Arsenic (As)-Dissolved (mg/L)	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Barium (Ba)-Dissolved (mg/L)	0.0150	0.0111	0.0120	0.00948
	Beryllium (Be)-Dissolved (mg/L)	DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025
	Bismuth (Bi)-Dissolved (mg/L)	DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025
	Boron (B)-Dissolved (mg/L)	DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050
	Cadmium (Cd)-Dissolved (mg/L)	0.000959	0.000064	DLM <0.000050	DLM <0.000050
	Calcium (Ca)-Dissolved (mg/L)	289	237	247	251
	Chromium (Cr)-Dissolved (mg/L)	DLM <0.00050	DLM <0.00050	DLM <0.00050	0.00055
	Cobalt (Co)-Dissolved (mg/L)	0.0302	0.0174	0.0185	0.00332
	Copper (Cu)-Dissolved (mg/L)	DLM <0.0025	DLM <0.0025	DLM <0.0025	DLM <0.0025
	Iron (Fe)-Dissolved (mg/L)	DLM <0.15	DLM <0.15	DLM <0.15	DLM <0.15
	Lead (Pb)-Dissolved (mg/L)	DLM <0.00025	DLM <0.00025	DLM <0.00025	DLM <0.00025
	Lithium (Li)-Dissolved (mg/L)	DLM <0.025	DLM <0.025	DLM <0.025	DLM <0.025
	Magnesium (Mg)-Dissolved (mg/L)	226	240	238	216
	Manganese (Mn)-Dissolved (mg/L)	9.90	5.88	6.20	1.00
	Molybdenum (Mo)-Dissolved (mg/L)	0.00311	0.00413	0.00433	0.00439
	Nickel (Ni)-Dissolved (mg/L)	0.0324	0.0315	0.0194	0.0063
	Phosphorus (P)-Dissolved (mg/L)	DLM <1.5	DLM <1.5	DLM <1.5	DLM <1.5
	Potassium (K)-Dissolved (mg/L)	6.30	6.68	6.70	6.92
	Selenium (Se)-Dissolved (mg/L)	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Silicon (Si)-Dissolved (mg/L)	2.06	2.09	2.26	2.32
	Silver (Ag)-Dissolved (mg/L)	DLM <0.000050	DLM <0.000050	DLM <0.000050	DLM <0.000050
	Sodium (Na)-Dissolved (mg/L)	27.7	29.2	29.3	28.5
	Strontium (Sr)-Dissolved (mg/L)	0.838	0.710	0.723	0.704
	Sulfur (S)-Dissolved (mg/L)	534	552	539	506
	Thallium (Tl)-Dissolved (mg/L)	0.00057	0.00055	0.00054	DLM <0.00050
	Tin (Sn)-Dissolved (mg/L)	DLM <0.00050	DLM <0.00050	DLM <0.00050	DLM <0.00050
	Titanium (Ti)-Dissolved (mg/L)	DLM <0.050	DLM <0.050	DLM <0.050	DLM <0.050
	Uranium (U)-Dissolved (mg/L)	0.00260	0.00634	0.00620	0.00383
	Vanadium (V)-Dissolved (mg/L)	DLM <0.0050	DLM <0.0050	DLM <0.0050	DLM <0.0050
	Zinc (Zn)-Dissolved (mg/L)	0.755	0.075	0.038	0.028

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

98062

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L935060 Report Date: 08-OCT-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R1480945								
WG1172989-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Beryllium (Be)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Bismuth (Bi)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Boron (B)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	27-SEP-10
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	27-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Lithium (Li)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	27-SEP-10
Potassium (K)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Thallium (Tl)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
S-DIS-ICP-VA	Water							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	Water							
Batch R1480883								
WG1172989-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10
WG1172989-5 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # 098062
PAGE 1 OF 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required | Service requested: 5 day (Regular) X | 2 day TAT (50%) | Next day TAT (100%) | 3-4 day TAT (25%) | Same day TAT (200%)

COMPANY NAME / OFFICE: EcoMetrix

CRITERIA: Criteria on report Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP MISA PWQO
ODWS OTHER

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH (F, P, F/P)

PROJECT MANAGER: Erin Clyde

PROJECT #: 10-1753

PHONE: (905) 794-2325 FAX:

ACCOUNT #:

QUOTATION #: PO #:

SUBMISSION #: L935060

ENTERED BY: RBQ

DATE/TIME ENTERED: 23-SEP-10

BN #:

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX BOTH
SELECT: PDF DIGITAL BOTH X
EMAIL: eclyde@ecometrix.ca
EMAIL2

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24 hr) (hh:mm)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	SOLID	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P	ICP-MS Metals (Include Silpher)	COMMENTS	LAB ID
21-09-10				X			CUP10-ST-6 DAY 7	1	X			-1
21-09-10				X			CUP10-ST-C DAY 7	1	X			-2
21-09-10				X			CUP10-ST-8 DAY 7	1	X			-3
21-09-10				X			CUP10-ST-9 DAY 7	1	X			-4

SPECIAL INSTRUCTIONS/COMMENTS
Samples contain elevated Zn.

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No X
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No X

SAMPLE CONDITION
MEAN TEMP: 7°C
COOLING INITIATED ☐
OBSERVATIONS Yes ☐ No ☐
If yes add SIF

RELINQUISHED BY	DATE & TIME	RECEIVED AT LAB BY	DATE & TIME
EC	21-09-10		Sept 23/10 12:30
Erin Clyde	23-09-10		23 Sep 10 13:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analyses and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy

ECOMETRIX INC
ATTN: ERIN CLYDE
6000 Campobello Road
Mississauga ON L5N 2L8
Phone: 905-794-2325

Date Received: 23-SEP-10
Report Date: 08-OCT-10 01:40 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L935069
Project P.O. #: NOT SUBMITTED
Job Reference: 10-1753
Legal Site Desc:
C of C Numbers: 98063

Emerson Perez
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L935069-1	L935069-2	L935069-3	L935069-4
Description	WATER	WATER	WATER	WATER
Sampled Date	22-SEP-10	22-SEP-10	22-SEP-10	22-SEP-10
Sampled Time				
Client ID	CVP10-ST-6 DAY 8	CVP10-ST-C DAY 8	CVP10-ST-8 DAY 8	CVP10-ST-9 DAY 8
Grouping / **Analyte**				
WATER				
Dissolved Metals				
Aluminum (Al)-Dissolved (mg/L)	<0.015 DLM	0.017	0.296	0.068
Antimony (Sb)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	0.00058
Arsenic (As)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
Barium (Ba)-Dissolved (mg/L)	0.0150	0.0108	0.0120	0.00881
Beryllium (Be)-Dissolved (mg/L)	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM
Bismuth (Bi)-Dissolved (mg/L)	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM
Boron (B)-Dissolved (mg/L)	<0.050 DLM	<0.050 DLM	<0.050 DLM	<0.050 DLM
Cadmium (Cd)-Dissolved (mg/L)	0.000882	0.000074	<0.000050 DLM	<0.000050 DLM
Calcium (Ca)-Dissolved (mg/L)	290	229	240	240
Chromium (Cr)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
Cobalt (Co)-Dissolved (mg/L)	0.0309	0.0177	0.0199	0.00265
Copper (Cu)-Dissolved (mg/L)	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM	<0.0025 DLM
Iron (Fe)-Dissolved (mg/L)	<0.15 DLM	<0.15 DLM	<0.15 DLM	<0.15 DLM
Lead (Pb)-Dissolved (mg/L)	<0.00025 DLM	<0.00025 DLM	<0.00025 DLM	<0.00025 DLM
Lithium (Li)-Dissolved (mg/L)	<0.025 DLM	<0.025 DLM	<0.025 DLM	<0.025 DLM
Magnesium (Mg)-Dissolved (mg/L)	232	236	232	207
Manganese (Mn)-Dissolved (mg/L)	9.87	5.80	6.34	0.859
Molybdenum (Mo)-Dissolved (mg/L)	0.00316	0.00412	0.00435	0.00426
Nickel (Ni)-Dissolved (mg/L)	0.0331	0.0290	0.0208	0.0055
Phosphorus (P)-Dissolved (mg/L)	<1.5 DLM	<1.5 DLM	<1.5 DLM	<1.5 DLM
Potassium (K)-Dissolved (mg/L)	6.35	6.55	6.69	6.52
Selenium (Se)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
Silicon (Si)-Dissolved (mg/L)	2.16	2.07	2.26	2.28
Silver (Ag)-Dissolved (mg/L)	<0.000050 DLM	<0.000050 DLM	<0.000050 DLM	<0.000050 DLM
Sodium (Na)-Dissolved (mg/L)	28.1	28.6	28.9	27.4
Strontium (Sr)-Dissolved (mg/L)	0.852	0.693	0.720	0.679
Sulfur (S)-Dissolved (mg/L)	530	548	532	502
Thallium (Tl)-Dissolved (mg/L)	0.00058	0.00057	0.00055	<0.00050 DLM
Tin (Sn)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
Titanium (Ti)-Dissolved (mg/L)	<0.050 DLM	<0.050 DLM	<0.050 DLM	<0.050 DLM
Uranium (U)-Dissolved (mg/L)	0.00303	0.00638	0.00638	0.00384
Vanadium (V)-Dissolved (mg/L)	<0.0050 DLM	<0.0050 DLM	<0.0050 DLM	<0.0050 DLM
Zinc (Zn)-Dissolved (mg/L)	0.646	0.066	0.044	<0.015 DLM

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

LS Test Code	Matrix	Test Description	Method Reference**
..ET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

' ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

..aboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

ıain of Custody Numbers:

98063

LOSSARY OF REPORT TERMS

urrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
ıg/kg wwt milligrams per kilogram based on wet weight of sample.
ıg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
' 'NLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
nalytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L935069 Report Date: 08-OCT-10

Client: ECOMETRIX INC
6000 Campobello Road
Mississauga ON L5N 2L8
Contact: ERIN CLYDE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R1480945								
WG1172989-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Beryllium (Be)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Bismuth (Bi)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Boron (B)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	27-SEP-10
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Copper (Cu)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Iron (Fe)-Dissolved			<0.030		mg/L		0.03	27-SEP-10
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Lithium (Li)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	27-SEP-10
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	27-SEP-10
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	27-SEP-10
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	27-SEP-10
Potassium (K)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	27-SEP-10
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Thallium (Tl)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	27-SEP-10
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	27-SEP-10
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	27-SEP-10
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	27-SEP-10
S-DIS-ICP-VA	Water							

ALS Environmental

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
S-DIS-ICP-VA	Water							
Batch R1480883								
WG1172989-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10
WG1172989-5 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	27-SEP-10

Legend:

Limit	99% Confidence Interval (Laboratory Control Limits)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # 098063
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Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required | Service requested
5 day (Regular) X
3-4 day TAT (25%)
2 day TAT (50%)
Next day TAT (100%)
Same day TAT (200%)

COMPANY NAME: EcoMetrix
OFFICE:
PROJECT MANAGER: Erin Clyde
PROJECT #: 10-1753
PHONE: (905) 794-2325 FAX:
ACCOUNT #:
QUOTATION #: PO #:

CRITERIA: Criteria on report: Yes ☐ No ☐
Reg 153/04
Table 1 2 3
TCLP MISA PWQO
ODWS OTHER

REPORT FORMAT / DISTRIBUTION
EMAIL X FAX BOTH
SELECT: PDF DIGITAL BOTH X
EMAIL 1: erlyde@ecometrix.ca
EMAIL 2:

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH
(F, P, F/P)

SUBMISSION #: L935069
ENTERED BY: PBQ
DATE/TIME ENTERED: 23-SEP-10
BIN #:

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mmm-yy)	Time (24 hr) (hh:mm)	TYPE: GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P	ICP-MS Metals (Include Sulphur)	COMMENTS	LAB ID
22-09-10			X			CVP10-ST-6 DAY 8	1	X			-1
22-09-10			X			CVP10-ST-C DAY 8	1	X			-2
22-09-10			X			CVP10-ST-8 DAY 8	1	X			-3
22-09-10			X			CVP10-ST-9 DAY 8	1	X			-4

SPECIAL INSTRUCTIONS/COMMENTS
Samples Contain Elevated Zn.

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ☐ No X
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No X

SAMPLE CONDITION
(FIELD) ☐ MEAN TEMP: 7°
COOLING MEDIUM: ☐
OF CONTAINERS:
CUSTODY SEAL: Yes ☐ No ☐ If yes, add SIF
INTACT ✓

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME	RECEIVED BY LAB:	DATE & TIME
EC	22-09-10				
RELINQUISHED BY: Erin Clyde	DATE & TIME 23-09-10				

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact lab for confirmed TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - Report copy YELLOW - File copy PINK - Customer copy