Thompson Divide
Baseline Water Quality Report

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Executive Summary

This report provides and describes an initial database of representative water quality and flow data for both surface and ground waters, collected prior to the onset of any significant oil and gas development in portions of Pitkin and Garfield counties. Sampling efforts focused on the Fourmile Creek and Thompson Creek Watersheds.

Water quality sampling and flow measurement were conducted at four surface water and four ground water sites selected to be representative of potential impacts from proposed oil and gas drilling and development activities. Samples were collected between late September 2009 and late August 2010, during all seasons to represent the range of normal hydrologic conditions.

This study demonstrates that surface waters at the monitored sites were cold, highly oxygenated, largely sediment-free, with low concentrations of dissolved chemical constituents. Most major chemical constituents were present at concentrations below reporting limits or at low concentrations. Chemical constituents that are often indicators of industrial, agricultural or human waste contamination were reported at very low concentrations [i.e. ammonia, nitrate, sulfate, sulfide, chloride, orthophosphate, dissolved organic carbon]. Most minor metals, metal-like elements and radiation were not detected in these surface waters [i.e. they were reported at concentrations below detection limits]. Low concentrations of aluminum, barium, iron, manganese and uranium were detected in some surface waters. Such low concentrations are normal given local geology and do not indicate contamination.

All organic compounds investigated were below reporting limits. The only exception is dissolved organic carbon (DOC), a general measure of the presence of both natural and introduced carbon compounds. DOC concentrations were within expected ranges for uncontaminated surface waters.

Ground water data show these waters to be generally cold, sediment-free, and well oxygenated. These ground waters contained low or non-detectable concentrations of most minor or trace constituents. Only barium had a *median* concentration that was above the detection limit. Several other metals and metal-like elements (boron, aluminum, iron, manganese, copper, antimony, selenium, uranium, and zinc) were detected at low concentrations, but their statistical median concentrations were below detection. The presence of these elements at low concentrations is common in such geologic formations and does not indicate any form of unusual contamination. No regulated water contaminants were detected at unacceptable concentrations in any samples.

These baseline water quality results are consistent with the conclusions presented in the studies of bottom-dwelling organisms and sediment by Miller (2010). Samples collected for the present study and the Miller (2010) study were collected at the same locations. This report together with Miller (2010) indicate that the baseline waters are healthy, uncontaminated and support significant populations of benthic aquatic organisms.

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Separate Data File

Compilations of all laboratory and field data are presented in the separate data file accompanying this report or are available by contacting Thompson Divide Coalition. The accompanying file includes all data from all stations plus summary statistics for all data at each sampling location.

1.0 Introduction

Purpose and Scope

This study is intended to provide an initial database of representative water quality data, both surface waters and ground waters, collected prior to the onset of any significant oil and gas development in the areas of interest. These pre-development data are referred to as "baseline" water quality data. Such data are exceptionally important for identifying and defining any impacts to water quality as a result of future industrial activities. The focus of this study, however, has been predominantly on natural gas exploration and development activities, which have become significant environmental factors within the region. This baseline data set will act as a water quality "yardstick" against which future changes in water quality can be measured.

Natural gas drilling and development activities have expanded drastically in the last few years in Garfield and Pitkin counties, areas in which Thompson Divide Coalition and Roaring Fork Conservancy have a mandate to protect water quality and habitat characteristics. Historically, adequate, reliable baseline water quality data have not been collected by State, county or other public agencies, prior to initiation of such drilling or other potentially-contaminating activities. In many areas of western Colorado and much of the rest of the United States, the role of monitoring water quality and quantity has been ceded to industry, in this case the drilling companies themselves, and their contractors. This, in many ways, amounts to self-regulation. Such industry generated monitoring data are often incomplete, inadequately collected and analyzed, and are often not readily available to the public. Most importantly, civil society frequently mistrusts the reliability of such industry-generated data.

Without reliable baseline (pre-exploration and pre-operational) data, the public lacks strong technical and legally-defensible bases on which to argue that degradation of water quality has or has not occurred. The present report is an attempt to correct that situation.

This study involved collection of surface and ground water quality samples from sites in both Pitkin and Garfield Counties. Monitoring locations together with gas exploration lease boundaries are shown on Figure 1. Sampling efforts focused on the Fourmile Creek and Thompson Creek Watersheds.

The overall water quality sampling and analytical program was designed by: Dr. Robert Moran (hydrogeologist/geochemist), Dr. John Huntington (environmental chemist), Mr. Thomas Glibota (resource and environmental geologist), Mr. Chad Rudow (biologist), in conjunction with members of Roaring Fork Conservancy and Thompson Divide Coalition.

All field activities (water quality sampling, flow measurement, measurement of field parameters) were conducted by Mr. Chad Rudow of Roaring Fork Conservancy, with oversight in the field by Dr. Moran. The sampling team utilized professionally-recognized procedures (see descriptions below) and operated with the assistance and direction of the independent consultants mentioned above: Moran, Glibota and Huntington.

Water quality sampling and flow measurement were conducted at *four surface water and four ground water sites* selected to be representative of baseline water conditions and suitable for

detecting potential impacts from proposed oil and gas drilling and development activities. These baseline data are also useful to indicate changes to natural water quality resulting from changes in other activities (i.e. increased agriculture, industrial, municipal, etc.) in addition to those of oil and gas drilling and production. *Monitoring locations are shown on Figure 1.*

Surface Water Sites

Surface water sampling sites are identified by the creek initials. Site names, listed below, include a short description of each location based on map landmarks. Figure 1 (next page) shows the surface water sample site locations as circles. Site IDs, names, and descriptions are as follows:

ID	Name	Site Description
FC	Fourmile Creek above Sunlight	above Sunlight Ski area just upstream of FR 300 culvert
NTC	North Thompson Creek above NTC Mine	above reclaimed North Thompson Creek Mine off FR 304
MTC	Middle Thompson Creek at FR 306	upstream of where FR 306 crosses Middle Thompson Creek
SMTC	South Middle Thompson Creek off FR 306	above Middle Thompson Creek confluence off FR 306

Ground Water Sites

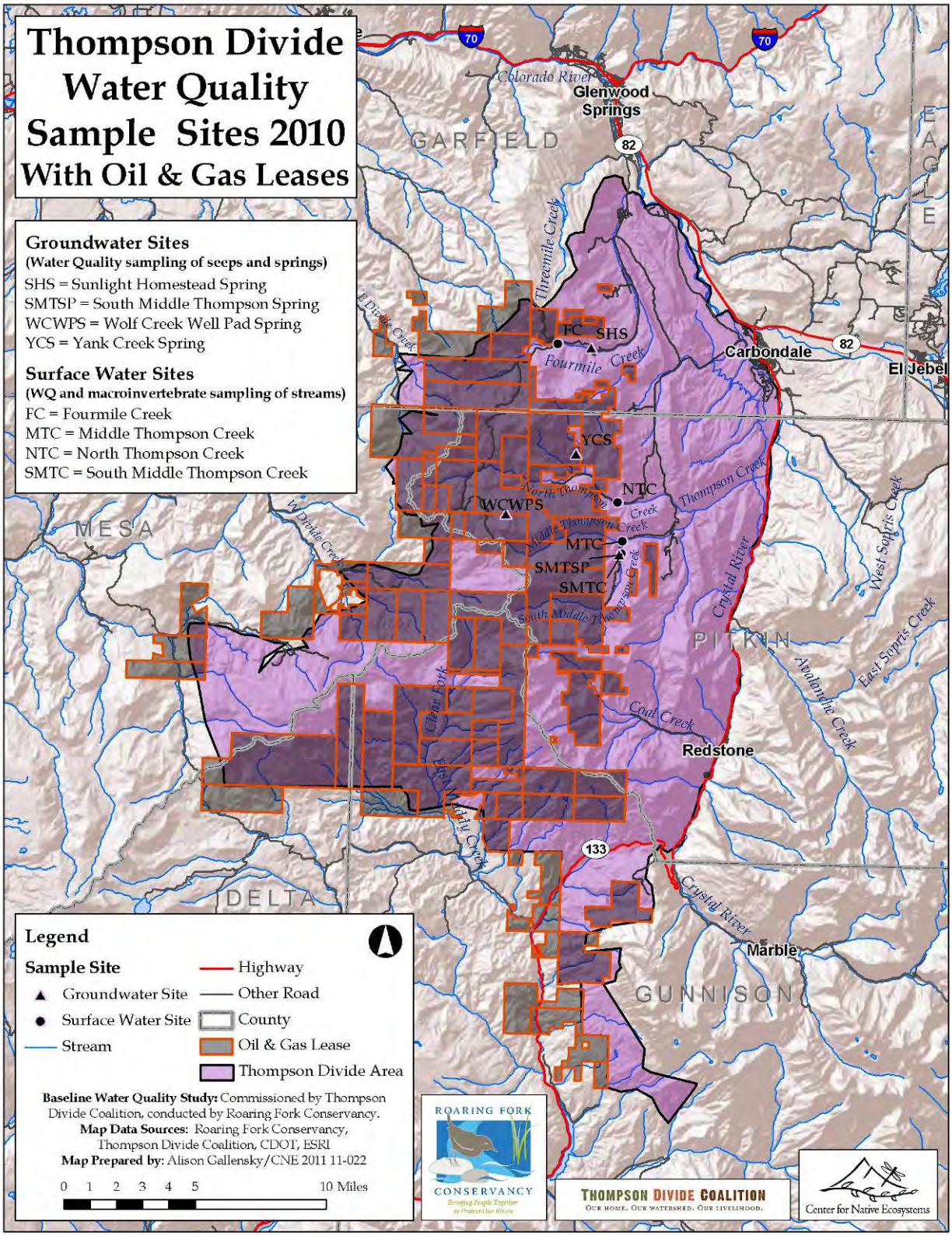
Ground water sampling sites consist of seeps and springs. Ground water sampling sites are identified by site name initials. Site names, listed below, include a short description of each location based on map landmarks. Figure 1 (next page) shows the ground water sample site locations as triangles. Site IDs, names, and descriptions are as follows:

ID	Name	Site Description
SHS	Sunlight Homestead Spring	across Fourmile Creek from Sunlight Ski Area
YCS	Yank Creek Spring at Cow Camp	above Yank Creek Cow Camp cabin
SMTSP	South Branch Middle Thompson Spring	near S Branch Middle Thompson Creek off FR 306
WCWPS	Wolf Creek Well Pad Spring	just off FR 321 near Wolf Creek storage well pad

Samples were collected between late September 2009 and late August 2010, with dates representing all seasons and the normal range of hydrologic conditions. Sampling activities occurred during the following time periods:
-late September to early-mid October, 2009
-early February, 2010
-late March to early April, 2010
-early June, 2010
-late August, 2010 (field measurements only).

Documentary photos were taken at all monitoring sites and can be obtained by contacting Thompson Divide Coalition. An overview of these data is presented in Appendix 1.0 using summary statistics, while compilations of all laboratory and field data are available in the separate data file accompanying this report or by contacting Thompson Divide Coalition.

Figure 1.0 Thompson Divide Sampling Area Map



2.0 Methods

Sampling and Handling Methods

Detailed sampling, sample handling, and methods for making field measurements were developed by the independent consultants [Moran, Glibota and Huntington] and have been discussed in detail in the Roaring Fork Conservancy, 2010 [Field Sampling Plan (FSP)]. Appropriate sections from that document are presented in Appendix 2.0.

All samples were collected with strict adherence to the protocols outlined in the Field Sampling Plan (FSP) developed using the following guidance documents:

- [USGS] United States Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at: http://pubs.water.usgs.gov/twri9A.
- [CDPHE] Colorado Department of Public Health and Environment (US). Standard Operating Procedures for the Collection of Water Samples Colorado: Water Quality Control Division. Environmental Data Unit. (Oct. 2008).
- [CDPHE] Colorado Department of Public Health and Environment (US). Standard Operating Procedures for the Planning of and Field Procedures for Conducting Monitoring. Colorado: Water Quality Control Division. Environmental Data Unit. (Apr. 2007 Revision 04).

Detailed procedures are described in the 2010 Field Sampling Plan (FSP), Roaring Fork Conservancy, 2010, and in Appendix 2.0 of this report.

Field Measurements

The following field measurements were recorded at each field site.

- Stream Discharge
- Dissolved Oxygen
- Electrical Conductivity
- Oxidation Reduction Potential
- pH
- Temperature

Stream (and ground water) discharge rates were measured to allow future calculation of the mass (sometimes called "loads") of the chemical constituents carried by the streams and springs at any one time. [For example: discharge rate x chemical constituent concentration = load]. Such data will allow the public to note trends (changes) in both water flow rates and chemical loads through time. Stream discharge was calculated using the procedures listed in the FSP (see Appendix 2.0.) All other field measurements were taken with a YSI Professional Plus Field Meter. Water Quality (WQ) field meter detection limits and specifications are presented in the FSP.

Laboratory Methods: Water Quality Constituents

Water quality samples were analyzed by ALS Laboratory Group, Fort Collins, Colorado. In general, most metals were determined utilizing inductively coupled plasma spectroscopy (ICP) techniques; most metalloids (metal-like elements, such as antimony, arsenic, cadmium, lead, molybdenum, selenium, thallium, uranium) were determined using inductively coupled plasma-mass spectroscopy (ICP-MS) techniques. Mercury was determined using cold vapor atomic absorption procedures. Common anions were determined via ion chromatography.

Gross alpha and gross beta (radiation) activity were determined using gas flow proportional counting. Dissolved gases were determined using gas chromatography procedures. Organic compounds were determined utilizing gas chromatograph-mass spectrographic (GC/MS) procedures.

The chemical constituents determined for each sample and the laboratory analytical methods (US EPA method designations) employed are listed below. Analytical reporting limits for these constituents are presented in Appendix 3.0.

Dissolved Gases

- Ethane — Method RSK 175
- Ethene — Method RSK 175
- Methane — Method RSK 175

General Chemistry

- Alkalinity — Method 310.1
- Ammonia as N — Method 4500-NH3
- Bicarbonate as $CaCO_3$ — Method 310.1
- Carbonate as $CaCO_3$ — Method 310.1
- Chloride — Method 300.0
- Fluoride — Method 300.0
- Nitrogen, Nitrate — Method 300.0
- Nitrogen, Nitrite — Method 300.0
- pH — Method 150.1
- Phosphate — Method 300.0
- Specific Conductance — Method 120.1
- Sulfate — Method 300.0
- Sulfide (total) — Method 376.1
- Total Dissolved Solids — Method 160.1
- Total Suspended Solids — Method 160.2

Metals & Metalloids

- Aluminum — Methods 200.7 for total recoverable and dissolved
- Barium — Methods 200.7 for total recoverable and dissolved
- Beryllium — Methods 200.7 for total recoverable and dissolved
- Boron — Methods 200.7 for total recoverable and dissolved
- Calcium — Methods 200.7 for total recoverable and dissolved

- Chromium Methods 200.7 for total recoverable and dissolved
- Cobalt Methods 200.7 for total recoverable and dissolved
- Copper Methods 200.7 for total recoverable and dissolved
- Iron Methods 200.7 for total recoverable and dissolved
- Magnesium Methods 200.7 for total recoverable and dissolved
- Manganese Methods 200.7 for total recoverable and dissolved
- Nickel Methods 200.7 for total recoverable and dissolved
- Potassium Methods 200.7 for total recoverable and dissolved
- Silver Methods 200.7 for total recoverable and dissolved
- Sodium Methods 200.7 for total recoverable and dissolved
- Tin Methods 200.7 for total recoverable and dissolved
- Zinc Methods 200.7 for total recoverable and dissolved

- Antimony Methods 200.8 for total recoverable and dissolved
- Arsenic Methods 200.8 for total recoverable and dissolved
- Cadmium Methods 200.8 for total recoverable and dissolved
- Lead Methods 200.8 for total recoverable and dissolved
- Molybdenum Methods 200.8 for total recoverable and dissolved
- Selenium Methods 200.8 for total recoverable and dissolved
- Thallium Methods 200.8 for total recoverable and dissolved
- Uranium Methods 200.8 for total recoverable and dissolved

- Mercury Methods 245.1 for total recoverable and dissolved

Organic Compounds

- Dissolved organic carbon — Method 415.1
- Semi-volatile organic compounds — GC/MS Method 8270 including polynuclear aromatic compounds and phenols.
- Volatile organic compounds — GC/MS Method 8260 including BTEX and evaluation of raw data for tentatively identified compounds.

Radiological

- Gross Alpha and Beta EPA 900.0

Quality Analysis/Quality Control Procedures

In order to ensure the quality of the data collected, a Quality Assurance/Quality Control (QA/QC) Plan was designed and followed and is described in Appendix 4.0. This involved collection and analysis of water quality samples in triplicate at one site as a check on data precision. *Appendix 4.0 presents these replicate data and their statistical summary.* All replicate data were within acceptable ranges of precision. The only exceptions were the replicates for gross alpha and beta radiation. These showed excessive ranges of error. It is unclear if these errors resulted from problems in sampling or laboratory procedures, or a combination. It is common for such radiation constituents to be mobile in particulate form (or micro-particles)

hence the number of particles entering each replicate sample bottle (or in each laboratory sub-sample) may vary.

In addition numerous other quality procedures were employed using trip blanks and laboratory samples spiked with known concentrations of chemical constituents, taken to the field and then analyzed to evaluate analytical accuracy and potential field contamination. ALS Laboratory subjected all samples to its internal precision and accuracy checks. Details concerning these ALS QA/QC procedures and results, together with chain-of-custody documents are available for public review at the offices of Thompson Divide Coalition and Roaring Fork Conservancy. Finally, the analytical data were screened by the independent consultants using numerous checks for internal consistency to locate potential errors (sampling, analytical, reporting).

All such QA/QC data indicated that these study data were of excellent quality for determining the water quality baseline.

3.0 Results

Compilations of all laboratory and field data are presented in the separate data file accompanying this report or are available by contacting Thompson Divide Coalition. This separate file contains all data for each monitoring location and sampling date.

An overview of these data is presented in Appendix 1.0 using summary statistics.
This appendix presents summary statistics for:

- *all surface water stations*
- *all ground water stations*

The accompanying file includes all data from all stations plus summary statistics for all data at each sampling location. For example, for each monitoring site, the statistical summaries present the number of samples or measurements, the minimum and maximum concentrations measured, the average (mean) concentration, and the median concentration, which is the middle value between the minimum and the maximum. The *median* value is often a better indicator of a characteristic than the average where population sizes are relatively small. Hence median values are discussed below when characterizing these waters.

This study collected both filtered (0.45-micrometer pore-size filters) and unfiltered water quality samples, results for which are reported as dissolved and total concentrations, respectively. Procedure details are presented in Appendices 2 and 3.

Discussion

Study data demonstrate that *surface waters* at the monitored sites had the following general characteristics (based on *median* concentrations presented in Appendix 1.0): waters are cold (median temperature = 6.1 degrees C or 43 degrees F); highly oxygenated (median = 77% saturation), which is adequate to support healthy cold-water fish populations; largely sediment-free, even during spring runoff periods; slightly alkaline (median total alkalinity = 100 mg/L),

with a median field pH of 8.4. Consistently, all surface waters had low concentrations of dissolved contents [median total dissolved solids (TDS) = 115 to 127 mg/L].

In general, these surface waters can be characterized as calcium-bicarbonate-rich waters, common for uncontaminated waters with this type of geology. Most major chemical constituents were present at concentrations *below reporting limits* or at low concentrations. Most minor metals and metal-like elements and radiation were not detected in these surface waters [i.e. they were reported at concentrations below detection limits.]

The only exceptions were aluminum, barium, iron, manganese and uranium. The *median* concentrations of aluminum, barium, dissolved iron and manganese for these surface waters were all below detection. A few samples contained low concentrations of detectable aluminum and barium, and Total iron and manganese. Uranium was detected in a few surface water samples, having a median concentration of 0.3 micrograms / L. Aluminum, barium, iron, and manganese are common components in rocks and minerals and are detected in most analyses of natural waters (Hem, 1985). Uranium is also commonly detected at such concentrations in Colorado waters and those of surrounding states. The presence of these metals at such concentrations is routine and does not indicate any form of contamination.

Note that the uranium analyses report the mass of the chemical element uranium, not radioactivity associated with uranium. Reported radioactivity is indicated by the measurements of gross alpha and gross beta radioactivity, and may be due to numerous naturally-radioactive constituents such as uranium, radium, thorium, and potassium-40.

All organic compounds investigated were below reporting limits. The only exception is dissolved organic carbon (DOC), a general measure of the presence of both natural and introduced carbon compounds. In summary, these surface waters show no indication of detectable contamination.

Ground water data show these ground waters to be generally cold, sediment-free, oxygenated, and free of any form of detectable contamination. No water quality constituents having regulatory standards or criteria were detected at unacceptable concentrations in any samples.

All study ground waters had near-neutral or slightly alkaline pHs (median field pH = 7.6), with low to moderate concentrations of dissolved minerals (median TDS = 240 mg/L). Thus, the study area ground waters had slightly lower pHs and slightly higher TDS concentrations than the study surface waters.

Study ground waters contained low or non-detectable concentrations of most minor or trace constituents. Only barium had a *median* concentration that was above the detection limit. Several other metals and metal-like elements (boron, aluminum, iron, manganese, copper, antimony, selenium, uranium, and zinc) were detected at low concentrations, but their statistical median concentrations were below detection. The presence of these elements at low concentrations is common in such geologic formations and does not indicate any form of unusual contamination.

Because ground waters move through the subsurface in contact with the local rock over long periods of time, it is common that such waters have higher TDS and minor element concentrations than local surface waters (Hem, 1989).

Sampled ground waters contained no detectable organic compounds. That is, for the organic compounds determined, all concentrations were below reporting limits. The only exception is dissolved organic carbon (DOC), a general measure of the presence of both natural and introduced carbon compounds. Reported DOC concentrations were within normal ranges. Sampling sites likely to contain cattle fecal waste (i.e. SMTC) had somewhat elevated DOC concentrations, but were still within expected ranges. In summary, these ground waters show no indication of unusual, detectable contamination.

These baseline water quality results are consistent with the conclusions presented in the studies of benthic macroinvertebrate organisms and sediments by Miller (2010). Samples collected for this study and the Miller (2010) study were collected at the same locations. This report together with Miller (2010) indicate that the baseline waters are healthy, uncontaminated and support significant populations of benthic aquatic organisms.

Additional Interpretive Comments

Elevated concentrations of ammonia, nitrate, sulfate, sulfide, chloride, and orthophosphate, dissolved and total organic carbon are often indicators of industrial, agricultural or human waste contamination. All of the study surface and ground waters *contained very low concentrations* of these chemical constituents.

Evidence for contamination from oil and gas drilling and development activities is often indicated by rising concentrations of the chemical constituents described above, frequently associated with increasing concentrations of various organic compounds often associated with hydrocarbons and often in gaseous form. Increases in the concentrations of numerous metals and metal-like elements may also indicate contamination from oil and gas drilling and development, especially elements that are commonly mobile at alkaline pHs such as arsenic, molybdenum, selenium, chromium, nickel, uranium, other natural radioactive elements, etc. (Collins, 1975).

Normal Data Error/Limitations

All environmental data contain a range of expected error. Such routine error is due to a combination of the variability in sampling and sample handling procedures, laboratory procedures, and reporting errors. Such errors are always present in similar studies. Hence it is important to attempt to gather data on the extent of the error (i.e. replicate precision data) so that investigators may know how to reasonably use the data when making interpretations. The data presented in this report comply with accepted quality checks and are clearly suitable to define the water quality baseline. Nevertheless, readers should be cautioned not to assume that because, for example, the nitrate concentration at a site changes from 4.5 to 5.5 mg/L between two successive sample episodes, that a true increase has occurred. Such an increase may actually be the result of the errors mentioned above. Real changes would need to be verified by collection of additional data over time, to reveal the actual trends. All such data should be added to the existing data base and evaluated statistically---as has been done in this report.

The statistical summaries presented (Appendix 1.0) allow the reader to evaluate trends in a population of data rather than looking at only individual data points.

Standards and Criteria

Table 1.0 (next page) is a summary of the most important federal (US EPA) and Colorado water quality standards and guidelines. They are by no means all-inclusive.
This information is presented merely to allow the reader a general picture of how the site baseline water quality compares to these "yardsticks". Standards are considered to be legally-enforceable while criteria are generally treated as technical "recommendations".

Because the site surface waters are used for multiple purposes, including cold-water fisheries, agriculture, potential water supplies, etc., we have included both the federal drinking water standards, and the U.S. and Colorado aquatic life criteria and standards. Readers should be cautioned that the regulatory guidance documents for the Colorado Aquatic Life Standards differ for each drainage basin within Colorado, and are complicated, and often confusing. It should be understood that the Colorado Aquatic Life standards are partly the result of technical toxicity information, which have then been altered / revised by complicated regulatory negotiations with the larger industries and stakeholders in each drainage basin.

Table 1.0 US EPA & Colorado Water Quality Standards & Criteria

Parameter	Units	US EPA	US EPA	US EPA Aquatic Life Criteria[1]		Colorado Aquatic Life Standards[2]	
		Drinking Water MCL[3]	Secondary Drinking Water[3]	Acute	Chronic	Acute	Chronic
INORGANICS							
pH	Units	---	6.5 to 8.5	---	6.5 to 9	---	6.5 to 9
TDS	mg/l	---	500	250	250	---	---
Phosphorous	mg/l	---	---	---	---	---	---
Sodium	mg/l	---	30 to 60	---	---	---	---
Chloride	mg/l	---	250	860	230	250	250
Chlorine	mg/l	4	---	0.019	0.011	0.019	0.011
Sulfate	mg/l	250	250	---	---	250	250
Sulfide	mg/l	---	---	---	0.002	0.002	0.002
Nitrate (as N)	mg/l	10	---	---	---	10	10
Nitrite (as N)	mg/l	1	---	---	---	0.05	0.05
Total N	mg/l	10	---	---	---	---	---
Ammonia (as N)	mg/l	----	30	0.002 to 0.325	0.032 to 0.049	0.002 to 0.325	0.032 to 0.049
Fluoride	mg/l	4.0	2.0	---	---	---	---
METALS							
Aluminum	mg/l	---	0.05 to 0.2	0.75	0.087	---	---
Antimony	mg/l	0.006	---	---	---	---	---
Arsenic	mg/l	0.01	---	0.34	0.15	0.34	0.02 (total rec)
Barium	mg/l	2	---	---	---	---	---
Beryllium	mg/l	0.004	---	---	---	---	---
Boron	mg/l	---	---	---	---	0.75	0.75
Cadmium	mg/l	0.005	---	0.002	0.00025	0.0024	0.00037
Chromium III	mg/l	---	---	0.57	0.074	0.050	0.064 (total rec)
Chromium VI	mg/l	---	---	0.016	0.011	0.016	0.011
Chromium (tot)	mg/l	0.1	---	---	---	0.050	0.050
Cobalt	mg/l	---	---	---	---	---	---
Copper	mg/l	1.3	1.0	0.013	0.009	0.0113	0.0077
Iron (tot)	mg/l	---	0.3	---	1	0.30	0.30
Lead	mg/l	0.015	---	0.065	0.0025	0.053	0.0021
Manganese	mg/l	---	0.05	---	---	0.05	0.05
Mercury	mg/l	0.002	---	0.0014	0.00077	0.01(Total)	0.01(Total)
Molybdenum	mg/l	---	---	---	---	---	---
Nickel	mg/l	---	---	0.47	0.052	0.403	0.045
Selenium	mg/l	0.05	---	---	0.005	0.0184	0.0046
Silver	mg/l	---	0.1	0.0032	---	0.0015	0.00023
Thallium	mg/l	0.002	---	---	---	---	---
Tin		---	---	---	---	---	---
Uranium	mg/l	0.030	---	---	---	0.030	0.030
Zinc	mg/l	---	5	0.12	0.12	0.14	0.10
Alpha, Gross	picoCi/L	15	---	---	---	---	---

1 US EPA National Recommended Water Quality Criteria, 2009 http://www.epa.gov/OST/criteria/wqctable.
US EPA Freshwater criteria for metals are expressed in terms of the dissolved metal in the water column with the exception of selenium that is expressed in terms of total recoverable metal in the water column.

2 Colorado Aquatic Life Standards based on Roaring Fork Stream Segments 1 and 3a and Thompson Creek Segment 10, Colorado Department of Public Health and Environment Water Quality Control Commission 5 CCR 1002-33 Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12). These segments are classified for Aquatic Cold Life 1, Recreation E, Water Supply and Agriculture.

3 US EPA 2009 Edition of the Drinking Water Standards and Health Advisories, EPA 822-R-09-011, Office of Water, U.S. Environmental Protection Agency Washington, DC, Fall 2009, Date of update: October, 2009.

Calculated values based on mean hardness value of 83.9 mg/l. [Derived from reported lab calcium and magnesium concentrations in the following equation: Hardness (total) = 2.5 Ca conc. + 4.1 Mg conc. [Freeze & Cherry, 1979].

Metals are stated as dissolved concentrations unless specified as total recoverable (total rec) or total.

4.0 Recommendations

It is recommended that Thompson Divide Coalition or some allied group continue to make field measurements of the field parameters previously collected [as a minimum: temperature, specific conductance (S.C.), and pH]. The present baseline data allows calculation of the numeric relationships between field S.C. and laboratory TDS. Continued collection of these measurements would allow the estimation of future TDS concentrations, to note changing data trends and have an on-going picture of the general site water quality at relatively little additional cost.

It may also be beneficial to collect periodic samples for laboratory analysis of selected constituents. These should be analyzed at a laboratory utilizing techniques capable of reporting the constituents to below drinking water standards and / or aquatic life criteria reporting levels.

It is also recommended that on-going baseline activities attempt to obtain any other regional water quality and flow data collected by other State, federal or local groups and integrate them into the present baseline database. This would include integration of other on-going water quality data presently being generated by Roaring Fork Conservancy's Water Quality program.

5.0 Summary

The ground and surface waters sampled during this baseline study indicate that these waters are presently uncontaminated by any human activities. Furthermore, the baseline data presented in this report provide an excellent "yardstick" against which any future changes in water quality may be compared.

6.0 References

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Appendices

Appendix 1.0 Laboratory and Field Data Statistical Summaries

Table A1.0 Surface Water Quality Data

Surface Water Site Statistics							
Stations: FC, MTC, NTC, SMTC							
(For explanations see footnotes below)							
Parameter	**Units**	**n**	**# of < values**	**minimum**	**maximum**	**average**	**median**
General Field Data							
Discharge (field)	ft^3/sec	16		1.4	152.5		
pH (field)	pH	19	0	7.8	8.7	8.4	8.4
pH (lab)	pH	20	0	7.6	8.4	8.1	8.1
Specific Conductance (field)	µS/cm	20	0	57	355	199	195
Specific Conductance (lab)	µS/cm	16	0	45	341	180	189
Dissolved Oxygen (field)	mg/L	20	0	7.9	11.0	9.5	9.6
Dissolved Oxygen % Saturation (field)	%	20	0	56	80	75	77
Total Dissolved Solids (field)	mg/L	19	0	37	231	130	127
Total Dissolved Solids (lab)	mg/L	16	0	66	200	118	115
Total Suspended Solids (lab)	mg/L	16	14	**20**	23	20	**20**
Water Temperature (field)	° C	20	0	0.1	12.4	5.7	6.1
Oxidation-Reduction Potential (field)	mV	17	0	113	324	185	174
Major Cations							
Calcium T	mg/L	16	0	7.3	100.0	32.2	26.5
Calcium D	mg/L	16	0	7.0	57.0	28.2	26.0
Magnesium T	mg/L	16	0	1.4	13	5.3	4.3
Magnesium D	mg/L	16	0	1.3	8.8	4.8	4.2
Potassium T	mg/L	16	11	**1**	2.3	1.2	**1**
Potassium D	mg/L	16	12	**1**	2.3	1.1	**1**
Sodium T	mg/L	16	0	1.4	13	6.2	7.4
Sodium D	mg/L	16	0	1.3	8.7	5.9	7.5
Major Anions							
Ammonia as N	mg/L	16	16	**0.1**	**0.1**	**0.1**	**0.1**
Bicarbonate	mg/L	16	0	22	190	102	100
Carbonate	mg/L	16	16	**5**	**20**	**14**	**15**
Chloride	mg/L	16	0	0.3	0.99	0.63	0.53
Fluoride	mg/L	16	4	**0.1**	0.16	0.13	0.12
Nitrate as N	mg/L	16	15	**0.2**	0.2	**0.2**	**0.2**
Nitrite as N	mg/L	16	16	**0.1**	**0.1**	**0.1**	**0.1**
Sulfate	mg/L	16	0	1.9	8.1	4.7	5.7
Other Non-metals and nutrients							
Alkalinity	mg/L	20	0	22	200	105	100
Carbon, Dissolved Organic	mg/L	16	0	1.4	8.9	3.5	2.1
Hardness	mg/L	4	0	72	180	109	92
Orthophosphate as P	mg/L	16	16	**0.5**	**0.5**	**0.5**	**0.5**
Sulfide, Total	mg/L	16	16	**2**	**2**	**2**	**2**
Metals and Metalloids							
Aluminum T	mg/L	16	10	**0.1**	1.1	0.35	**0.1**
Aluminum D	mg/L	16	12	**0.1**	0.45	0.16	**0.1**
Antimony T	mg/L	16	16	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Antimony D	mg/L	16	16	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Arsenic T	mg/L	16	16	**0.002**	**0.002**	**0.002**	**0.002**
Arsenic D	mg/L	16	16	**0.002**	**0.002**	**0.002**	**0.002**
Barium T	mg/L	16	11	**0.1**	0.74	0.17	**0.1**
Barium D	mg/L	16	13	**0.1**	0.27	0.13	**0.1**
Beryllium T	mg/L	16	16	**0.005**	**0.005**	**0.005**	**0.005**
Beryllium D	mg/L	16	16	**0.005**	**0.005**	**0.005**	**0.005**
Boron T	mg/L	16	16	**0.1**	**0.1**	**0.1**	**0.1**
Boron D	mg/L	16	16	**0.1**	**0.1**	**0.1**	**0.1**

Parameter	Units	n	# of < values	minimum	maximum	average	median
Cadmium T	mg/L	16	16	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Cadmium D	mg/L	16	16	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Chromium T	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Chromium D	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Cobalt T	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Cobalt D	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Copper T	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Copper D	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Iron T	mg/L	16	5	**0.1**	1.00	0.39	0.20
Iron D	mg/L	16	11	**0.1**	0.32	0.15	**0.1**
Lead T	mg/L	16	13	**0.0005**	0.00072	0.00052	**0.0005**
Lead D	mg/L	16	15	**0.0005**	0.00074	0.00052	**0.0005**
Manganese T	mg/L	16	7	**0.01**	0.039	0.019	0.016
Manganese D	mg/L	16	12	**0.01**	0.021	0.013	**0.01**
Mercury T	mg/L	16	16	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Mercury D	mg/L	16	16	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Molybdenum T	mg/L	16	16	**0.001**	**0.001**	**0.001**	**0.001**
Molybdenum D	mg/L	16	16	**0.001**	**0.001**	**0.001**	**0.001**
Nickel T	mg/L	16	16	**0.02**	**0.02**	**0.02**	**0.02**
Nickel D	mg/L	16	16	**0.02**	**0.02**	**0.02**	**0.02**
Selenium T	mg/L	16	16	**0.001**	**0.001**	**0.001**	**0.001**
Selenium D	mg/L	16	16	**0.001**	**0.001**	**0.001**	**0.001**
Silver T	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Silver D	mg/L	16	16	**0.01**	**0.01**	**0.01**	**0.01**
Thallium T	mg/L	16	16	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Thallium D	mg/L	16	16	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Tin T	mg/L	16	16	**0.05**	**0.05**	**0.05**	**0.05**
Tin D	mg/L	16	16	**0.05**	**0.05**	**0.05**	**0.05**
Uranium T	mg/L	16	2	**0.0001**	0.00340	0.00057	0.00030
Uranium D	mg/L	16	2	**0.0001**	0.00095	0.00038	0.00028
Zinc T	mg/L	16	16	**0.020**	**0.020**	**0.020**	**0.020**
Zinc D	mg/L	16	15	**0.02**	0.026	0.020	**0.02**
Radiation							
Gross Alpha	pCi/L	16	16	**-0.39**	**1.70**	**0.55**	**0.58**
Gross Beta	pCi/L	16	16	**-0.6**	**2.8**	**1.4**	**1.6**
Organics (dissoved gases)							
Ethane	µg/L	16	16	**2**	**2**	**2**	**2**
Ethene	µg/L	16	16	**1**	**1**	**1**	**1**
Methane	µg/L	16	13	**1**	2.5	1.2	**1**
Organics (SVOCs)							
1-METHYLNAPHTHALENE	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,3,4,6-TETRACHLOROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,4,5-TRICHLOROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,4,6-TRICHLOROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,4-DICHLOROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,4-DIMETHYLPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2,4-DINITROPHENOL	µg/L	16	16	**19**	**20**	**20**	**20**
2-CHLOROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2-METHYLNAPHTHALENE	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2-METHYLPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
2-NITROPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
3+4-METHYLPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**
4,6-DINITRO-2-METHYLPHENOL	µg/L	16	16	**19**	**20**	**20**	**20**
4-CHLORO-3-METHYLPHENOL	µg/L	16	16	**9.5**	**10**	**9.8**	**9.8**

Parameter	Units	n	# of < values	minimum	maximum	average	median
4-NITROPHENOL	µg/L	16	16	19	20	20	20
ACENAPHTHENE	µg/L	16	16	9.5	10	9.8	9.8
ACENAPHTHYLENE	µg/L	16	16	9.5	10	9.8	9.8
ANTHRACENE	µg/L	16	16	9.5	10	9.8	9.8
BENZO(A)ANTHRACENE	µg/L	16	16	9.5	10	9.8	9.8
BENZO(A)PYRENE	µg/L	16	16	9.5	10	9.8	9.8
BENZO(B)FLUORANTHENE	µg/L	16	16	9.5	10	9.8	9.8
BENZO(G,H,I)PERYLENE	µg/L	16	16	9.5	10	9.8	9.8
BENZO(K)FLUORANTHENE	µg/L	16	16	9.5	10	9.8	9.8
CHRYSENE	µg/L	16	16	9.5	10	9.8	9.8
DIBENZO(A,H)ANTHRACENE	µg/L	16	16	9.5	10	9.8	9.8
FLUORANTHENE	µg/L	16	16	9.5	10	9.8	9.8
FLUORENE	µg/L	16	16	9.5	10	9.8	9.8
INDENO(1,2,3-CD)PYRENE	µg/L	16	16	9.5	10	9.8	9.8
NAPHTHALENE	µg/L	16	16	9.5	10	9.8	9.8
PENTACHLOROPHENOL	µg/L	16	16	19	20	20	20
PHENANTHRENE	µg/L	16	16	9.5	10	9.8	9.8
PHENOL	µg/L	16	16	9.5	10	9.8	9.8
PYRENE	µg/L	16	16	9.5	10	9.8	9.8
SVOC Tentatively Identified Compounds	µg/L	None detected for all samples					
Organics (VOCs)							
1,1,1,2-TETRACHLOROETHANE	µg/L	16	16	1	1	1	1
1,1,1-TRICHLOROETHANE	µg/L	16	16	1	1	1	1
1,1,2,2-TETRACHLOROETHANE	µg/L	16	16	1	1	1	1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	µg/L	16	16	1	1	1	1
1,1,2-TRICHLOROETHANE	µg/L	16	16	1	1	1	1
1,1-DICHLOROETHANE	µg/L	16	16	1	1	1	1
1,1-DICHLOROETHENE	µg/L	16	16	1	1	1	1
1,1-DICHLOROPROPENE	µg/L	16	16	1	1	1	1
1,2,3-TRICHLOROBENZENE	µg/L	16	16	1	1	1	1
1,2,3-TRICHLOROPROPANE	µg/L	16	16	1	1	1	1
1,2,4-TRICHLOROBENZENE	µg/L	16	16	1	1	1	1
1,2,4-TRIMETHYLBENZENE	µg/L	16	16	1	1	1	1
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	16	16	2	2	2	2
1,2-DIBROMOETHANE	µg/L	16	16	1	1	1	1
1,2-DICHLOROBENZENE	µg/L	16	16	1	1	1	1
1,2-DICHLOROETHANE	µg/L	16	16	1	1	1	1
1,2-DICHLOROPROPANE	µg/L	16	16	1	1	1	1
1,3,5-TRIMETHYLBENZENE	µg/L	16	16	1	1	1	1
1,3-DICHLOROBENZENE	µg/L	16	16	1	1	1	1
1,3-DICHLOROPROPANE	µg/L	16	16	1	1	1	1
1,4-DICHLOROBENZENE	µg/L	16	16	1	1	1	1
1-CHLOROHEXANE	µg/L	16	16	1	1	1	1
2,2-DICHLOROPROPANE	µg/L	16	16	1	1	1	1
2-BUTANONE	µg/L	16	16	10	10	10	10
2-CHLOROTOLUENE	µg/L	16	16	1	1	1	1
2-HEXANONE	µg/L	16	16	10	10	10	10
4-CHLOROTOLUENE	µg/L	16	16	1	1	1	1
4-METHYL-2-PENTANONE	µg/L	16	16	10	10	10	10
ACETONE	µg/L	16	16	3.8	10	9.2	10
BENZENE	µg/L	16	16	1	1	1	1
BROMOBENZENE	µg/L	16	16	1	1	1	1
BROMOCHLOROMETHANE	µg/L	16	16	1	1	1	1
BROMODICHLOROMETHANE	µg/L	16	16	1	1	1	1

Parameter	Units	n	# of < values	minimum	maximum	average	median
BROMOFORM	µg/L	16	16	1	1	1	1
BROMOMETHANE	µg/L	16	16	1	1	1	1
CARBON DISULFIDE	µg/L	16	16	1	1	1	1
CARBON TETRACHLORIDE	µg/L	16	16	1	1	1	1
CHLOROBENZENE	µg/L	16	16	1	1	1	1
CHLOROETHANE	µg/L	16	16	1	1	1	1
CHLOROFORM	µg/L	16	16	1	1	1	1
CHLOROMETHANE	µg/L	16	16	1	1	1	1
CIS-1,2-DICHLOROETHENE	µg/L	16	16	1	1	1	1
CIS-1,3-DICHLOROPROPENE	µg/L	16	16	1	1	1	1
DIBROMOCHLOROMETHANE	µg/L	16	16	1	1	1	1
DIBROMOMETHANE	µg/L	16	16	1	1	1	1
DICHLORODIFLUOROMETHANE	µg/L	16	16	1	1	1	1
ETHYLBENZENE	µg/L	16	16	1	1	1	1
HEXACHLOROBUTADIENE	µg/L	16	16	1	1	1	1
IODOMETHANE	µg/L	16	16	1	1	1	1
ISOPROPYLBENZENE	µg/L	16	16	1	1	1	1
M+P-XYLENE	µg/L	16	16	1	1	1	1
METHYL TERTIARY BUTYL ETHER	µg/L	16	16	1	1	1	1
METHYLENE CHLORIDE	µg/L	16	16	1	1	1	1
NAPHTHALENE	µg/L	16	16	1	1	1	1
N-BUTYLBENZENE	µg/L	16	16	1	1	1	1
N-PROPYLBENZENE	µg/L	16	16	1	1	1	1
O-XYLENE	µg/L	16	16	1	1	1	1
P-ISOPROPYLTOLUENE	µg/L	16	16	1	1	1	1
SEC-BUTYLBENZENE	µg/L	16	16	1	1	1	1
STYRENE	µg/L	16	16	1	1	1	1
TERT-BUTYLBENZENE	µg/L	16	16	1	1	1	1
TETRACHLOROETHENE	µg/L	16	16	1	1	1	1
TOLUENE	µg/L	16	16	**0.34**	1	**0.96**	1
TRANS-1,2-DICHLOROETHENE	µg/L	16	16	1	1	1	1
TRANS-1,3-DICHLOROPROPENE	µg/L	16	16	1	1	1	1
TRICHLOROETHENE	µg/L	16	16	1	1	1	1
TRICHLOROFLUOROMETHANE	µg/L	16	16	1	1	1	1
VINYL ACETATE	µg/L	16	16	**2**	**2**	**2**	**2**
VINYL CHLORIDE	µg/L	16	16	1	1	1	1
VOC Tentatively Identified Compounds	µg/L	None detected for all samples					
Footnotes							
• Parameters with a T denote Total Recoverable concentrations, those with a D denote Dissolved concentrations.							
• The column heading "n" refers to the number of total measurements.							
• All **bolded** statistics represent "less than" (<) values and are based on the numeric value of the qualified concentration (i.e. <20 was converted to 20).							
• Gross alpha and beta detection limits depend partly on radiation back-calculations of net activity and can therefore result in positive or negative values. All **bolded** numbers represent "less than" values as noted above.							

Table A2.0 Ground Water Quality Data

Ground Water Site Statistics							
Stations: SHS, SMTSp, WCWPS, YCS							
(For explanations see footnotes below)							
Parameter	**Units**	**n**	**# of < values**	**minimum**	**maximum**	**average**	**median**
General Field Data							
Discharge (field)	gal/min	13		0.04	4.28		
pH (field)	pH	16	0	7.0	8.1	7.6	7.6
pH (lab)	pH	16	0	6.8	7.9	7.5	7.4
Specific Conductance (field)	µS/cm	16	0	61	620	363	392
Specific Conductance (lab)	µS/cm	12	0	53	567	379	428
Dissolved Oxygen (field)	mg/L	16	0	3.0	8.7	6.5	6.1
Dissolved Oxygen % Saturation (field)	%	15	0	26	68	51	50
Total Dissolved Solids (field)	mg/L	15	0	40	403	240	263
Total Dissolved Solids (lab)	mg/L	12	0	61	320	222	240
Total Suspended Solids (lab)	mg/L	12	12	**20**	**20**	**20**	**20**
Water Temperature (field)	° C	16	0	0.9	10.0	6.3	6.8
Oxidation-Reduction Potential (field)	mV	15	0	63	225	138	129
Major Cations							
Calcium T	mg/L	12	0	7.2	100	55.3	59
Calcium D	mg/L	12	0	7.5	100	60.4	59
Magnesium T	mg/L	12	1	**1**	19	11.0	12
Magnesium D	mg/L	12	1	**1**	19	11.4	12
Potassium T	mg/L	12	6	**1**	1.7	1.2	1.1
Potassium D	mg/L	12	5	**1**	1.6	1.1	1.1
Sodium T	mg/L	12	0	3.0	14	7.8	7.2
Sodium D	mg/L	12	0	3.1	14	8.3	7.3
Major Anions							
Ammonia as N	mg/L	12	12	**0.1**	**0.1**	**0.1**	**0.1**
Bicarbonate	mg/L	12	0	27	320	209	225
Carbonate	mg/L	12	12	**5**	**20**	**17**	**20**
Chloride	mg/L	12	0	0.4	2.2	1.3	1.4
Fluoride	mg/L	12	2	**0.1**	0.22	0.15	0.15
Nitrate as N	mg/L	12	10	**0.2**	0.3	0.2	**0.2**
Nitrite as N	mg/L	12	12	**0.1**	**0.1**	**0.1**	**0.1**
Sulfate	mg/L	12	0	2	15	7.5	5.0
Other Non-metals and nutrients							
Alkalinity	mg/L	16	0	27	320	202	221
Carbon, Dissolved Organic	mg/L	12	5	**1**	8.9	2.2	1.3
Hardness	mg/L	4	0	42	228	138	140
Orthophosphate as P	mg/L	12	12	**0.5**	**0.5**	**0.5**	**0.5**
Sulfide, Total	mg/L	12	12	**2**	**2**	**2**	**2**
Metals and Metalloids							
Aluminum T	mg/L	12	10	**0.1**	0.19	0.11	**0.1**
Aluminum D	mg/L	12	11	**0.1**	0.15	0.10	**0.1**
Antimony T	mg/L	12	11	**0.0003**	0.00071	0.00033	**0.0003**
Antimony D	mg/L	12	10	**0.0003**	0.00130	0.00039	**0.0003**
Arsenic T	mg/L	12	12	**0.002**	**0.002**	**0.002**	**0.002**
Arsenic D	mg/L	12	12	**0.002**	**0.002**	**0.002**	**0.002**
Barium T	mg/L	12	3	**0.1**	0.78	0.28	0.13
Barium D	mg/L	12	2	**0.1**	0.77	0.33	0.13
Beryllium T	mg/L	12	12	**0.005**	**0.005**	**0.005**	**0.005**
Beryllium D	mg/L	12	12	**0.005**	**0.005**	**0.005**	**0.005**
Boron T	mg/L	12	11	**0.1**	0.63	0.14	**0.1**
Boron D	mg/L	12	12	**0.1**	**0.1**	**0.1**	**0.1**

Parameter	Units	n	# of < values	minimum	maximum	average	median
Cadmium T	mg/L	12	12	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Cadmium D	mg/L	12	12	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Chromium T	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Chromium D	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Cobalt T	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Cobalt D	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Copper T	mg/L	12	11	**0.01**	0.011	0.010	**0.01**
Copper D	mg/L	12	12	**0.010**	**0.010**	**0.010**	**0.010**
Iron T	mg/L	12	10	**0.1**	0.19	0.11	**0.1**
Iron D	mg/L	12	10	**0.1**	0.44	0.13	**0.1**
Lead T	mg/L	12	12	**0.0005**	**0.0005**	**0.0005**	**0.0005**
Lead D	mg/L	12	12	**0.0005**	**0.0005**	**0.0005**	**0.0005**
Manganese T	mg/L	12	10	**0.01**	0.020	0.011	**0.01**
Manganese D	mg/L	12	11	**0.01**	0.033	0.012	**0.01**
Mercury T	mg/L	12	12	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Mercury D	mg/L	12	12	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Molybdenum T	mg/L	12	12	**0.001**	**0.001**	**0.001**	**0.001**
Molybdenum D	mg/L	12	12	**0.001**	**0.001**	**0.001**	**0.001**
Nickel T	mg/L	12	12	**0.02**	**0.02**	**0.02**	**0.02**
Nickel D	mg/L	12	12	**0.02**	**0.02**	**0.02**	**0.02**
Selenium T	mg/L	12	10	**0.001**	0.0024	0.0012	**0.001**
Selenium D	mg/L	12	10	**0.001**	0.0024	0.0011	**0.001**
Silver T	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Silver D	mg/L	12	12	**0.01**	**0.01**	**0.01**	**0.01**
Thallium T	mg/L	12	12	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Thallium D	mg/L	12	12	**0.0002**	**0.0002**	**0.0002**	**0.0002**
Tin T	mg/L	12	12	**0.05**	**0.05**	**0.05**	**0.05**
Tin D	mg/L	12	12	**0.05**	**0.05**	**0.05**	**0.05**
Uranium T	mg/L	12	2	**0.0001**	0.0034	0.00134	0.00110
Uranium D	mg/L	12	2	**0.0001**	0.0034	0.00156	0.00110
Zinc T	mg/L	12	10	**0.02**	0.11	0.029	**0.02**
Zinc D	mg/L	12	11	**0.02**	0.03	0.021	**0.02**
Radiation							
Gross Alpha	pCi/L	12	11	**-0.54**	2.7	**1.16**	**1.24**
Gross Beta	pCi/L	12	12	**0.8**	**3.0**	**1.68**	**1.30**
Organics (dissoved gases)							
Ethane	µg/L	12	12	**2**	**2**	**2**	**2**
Ethene	µg/L	12	12	**1**	**1**	**1**	**1**
Methane	µg/L	12	10	**1**	7.1	1.7	**1**
Organics (SVOCs)							
1-METHYLNAPHTHALENE	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,3,4,6-TETRACHLOROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,4,5-TRICHLOROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,4,6-TRICHLOROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,4-DICHLOROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,4-DIMETHYLPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2,4-DINITROPHENOL	µg/L	12	12	**19**	**20**	**19**	**19**
2-CHLOROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2-METHYLNAPHTHALENE	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2-METHYLPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
2-NITROPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
3+4-METHYLPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**
4,6-DINITRO-2-METHYLPHENOL	µg/L	12	12	**19**	**20**	**19**	**19**
4-CHLORO-3-METHYLPHENOL	µg/L	12	12	**9.5**	**10**	**9.7**	**9.6**

Parameter	Units	n	# of < values	minimum	maximum	average	median
4-NITROPHENOL	µg/L	12	12	19	20	19	19
ACENAPHTHENE	µg/L	12	12	9.5	10	9.7	9.6
ACENAPHTHYLENE	µg/L	12	12	9.5	10	9.7	9.6
ANTHRACENE	µg/L	12	12	9.5	10	9.7	9.6
BENZO(A)ANTHRACENE	µg/L	12	12	9.5	10	9.7	9.6
BENZO(A)PYRENE	µg/L	12	12	9.5	10	9.7	9.6
BENZO(B)FLUORANTHENE	µg/L	12	12	9.5	10	9.7	9.6
BENZO(G,H,I)PERYLENE	µg/L	12	12	9.5	10	9.7	9.6
BENZO(K)FLUORANTHENE	µg/L	12	12	9.5	10	9.7	9.6
CHRYSENE	µg/L	12	12	9.5	10	9.7	9.6
DIBENZO(A,H)ANTHRACENE	µg/L	12	12	9.5	10	9.7	9.6
FLUORANTHENE	µg/L	12	12	9.5	10	9.7	9.6
FLUORENE	µg/L	12	12	9.5	10	9.7	9.6
INDENO(1,2,3-CD)PYRENE	µg/L	12	12	9.5	10	9.7	9.6
NAPHTHALENE	µg/L	12	12	9.5	10	9.7	9.6
PENTACHLOROPHENOL	µg/L	12	12	19	20	19	19
PHENANTHRENE	µg/L	12	12	9.5	10	9.7	9.6
PHENOL	µg/L	12	12	9.5	10	9.7	9.6
PYRENE	µg/L	12	12	9.5	10	9.7	9.6
SVOC Tentatively Identified Compounds	µg/L	None detected for all samples					
Organics (VOCs)							
1,1,1,2-TETRACHLOROETHANE	µg/L	12	12	1	1	1	1
1,1,1-TRICHLOROETHANE	µg/L	12	12	1	1	1	1
1,1,2,2-TETRACHLOROETHANE	µg/L	12	12	1	1	1	1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	µg/L	12	12	1	1	1	1
1,1,2-TRICHLOROETHANE	µg/L	12	12	1	1	1	1
1,1-DICHLOROETHANE	µg/L	12	12	1	1	1	1
1,1-DICHLOROETHENE	µg/L	12	12	1	1	1	1
1,1-DICHLOROPROPENE	µg/L	12	12	1	1	1	1
1,2,3-TRICHLOROBENZENE	µg/L	12	12	1	1	1	1
1,2,3-TRICHLOROPROPANE	µg/L	12	12	1	1	1	1
1,2,4-TRICHLOROBENZENE	µg/L	12	12	1	1	1	1
1,2,4-TRIMETHYLBENZENE	µg/L	12	12	1	1	1	1
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	12	12	2	2	2	2
1,2-DIBROMOETHANE	µg/L	12	12	1	1	1	1
1,2-DICHLOROBENZENE	µg/L	12	12	1	1	1	1
1,2-DICHLOROETHANE	µg/L	12	12	1	1	1	1
1,2-DICHLOROPROPANE	µg/L	12	12	1	1	1	1
1,3,5-TRIMETHYLBENZENE	µg/L	12	12	1	1	1	1
1,3-DICHLOROBENZENE	µg/L	12	12	1	1	1	1
1,3-DICHLOROPROPANE	µg/L	12	12	1	1	1	1
1,4-DICHLOROBENZENE	µg/L	12	12	1	1	1	1
1-CHLOROHEXANE	µg/L	12	12	1	1	1	1
2,2-DICHLOROPROPANE	µg/L	12	12	1	1	1	1
2-BUTANONE	µg/L	12	12	10	10	10	10
2-CHLOROTOLUENE	µg/L	12	12	1	1	1	1
2-HEXANONE	µg/L	12	12	10	10	10	10
4-CHLOROTOLUENE	µg/L	12	12	1	1	1	1
4-METHYL-2-PENTANONE	µg/L	12	12	10	10	10	10
ACETONE	µg/L	12	12	10	10	10	10
BENZENE	µg/L	12	12	1	1	1	1
BROMOBENZENE	µg/L	12	12	1	1	1	1
BROMOCHLOROMETHANE	µg/L	12	12	1	1	1	1
BROMODICHLOROMETHANE	µg/L	12	12	1	1	1	1

Parameter	Units	n	# of < values	minimum	maximum	average	median
BROMOFORM	µg/L	12	12	1	1	1	1
BROMOMETHANE	µg/L	12	12	1	1	1	1
CARBON DISULFIDE	µg/L	12	12	1	1	1	1
CARBON TETRACHLORIDE	µg/L	12	12	1	1	1	1
CHLOROBENZENE	µg/L	12	12	1	1	1	1
CHLOROETHANE	µg/L	12	12	1	1	1	1
CHLOROFORM	µg/L	12	12	1	1	1	1
CHLOROMETHANE	µg/L	12	12	1	1	1	1
CIS-1,2-DICHLOROETHENE	µg/L	12	12	1	1	1	1
CIS-1,3-DICHLOROPROPENE	µg/L	12	12	1	1	1	1
DIBROMOCHLOROMETHANE	µg/L	12	12	1	1	1	1
DIBROMOMETHANE	µg/L	12	12	1	1	1	1
DICHLORODIFLUOROMETHANE	µg/L	12	12	1	1	1	1
ETHYLBENZENE	µg/L	12	12	1	1	1	1
HEXACHLOROBUTADIENE	µg/L	12	12	1	1	1	1
IODOMETHANE	µg/L	12	12	1	1	1	1
ISOPROPYLBENZENE	µg/L	12	12	1	1	1	1
M+P-XYLENE	µg/L	12	12	1	1	1	1
METHYL TERTIARY BUTYL ETHER	µg/L	12	12	1	1	1	1
METHYLENE CHLORIDE	µg/L	12	12	1	1	1	1
NAPHTHALENE	µg/L	12	12	1	1	1	1
N-BUTYLBENZENE	µg/L	12	12	1	1	1	1
N-PROPYLBENZENE	µg/L	12	12	1	1	1	1
O-XYLENE	µg/L	12	12	1	1	1	1
P-ISOPROPYLTOLUENE	µg/L	12	12	1	1	1	1
SEC-BUTYLBENZENE	µg/L	12	12	1	1	1	1
STYRENE	µg/L	12	12	1	1	1	1
TERT-BUTYLBENZENE	µg/L	12	12	1	1	1	1
TETRACHLOROETHENE	µg/L	12	12	1	1	1	1
TOLUENE	µg/L	12	12	**0.35**	1	**0.95**	1
TRANS-1,2-DICHLOROETHENE	µg/L	12	12	1	1	1	1
TRANS-1,3-DICHLOROPROPENE	µg/L	12	12	1	1	1	1
TRICHLOROETHENE	µg/L	12	12	1	1	1	1
TRICHLOROFLUOROMETHANE	µg/L	12	12	1	1	1	1
VINYL ACETATE	µg/L	12	12	**2**	**2**	**2**	**2**
VINYL CHLORIDE	µg/L	12	12	1	1	1	1
VOC Tentatively Identified Compounds	µg/L	None detected for all samples					
Footnotes							
• Parameters with a T denote Total Recoverable concentrations, those with a D denote Dissolved concentrations.							
• The column heading "n" refers to the number of total measurements.							
• All **bolded** statistics represent "less than" (<) values and are based on the numeric value of the qualified concentration (i.e. <20 was converted to 20).							
• Gross alpha and beta detection limits depend partly on radiation back-calculations of net activity and can therefore result in positive or negative values. All **bolded** numbers represent "less than" values as noted above.							

Appendix 2.0 Field Sampling and Measurement Procedures

[excerpted from Roaring Fork Conservancy 2010 Field Sampling Plan (FSP)]

Surface Water Sampling

A 100-foot reach representative of the characteristics of the stream was selected. Whenever possible, the area was upstream from any road or bridge crossing to minimize its effect on stream quality, velocity, depth, and overall habitat quality. The following procedures were employed to at each sample site prior to and during sampling:

- Review and understand the protocols for collecting and processing samples before field work begins.
- Complete the chemical/physical field data sheets to document site description, weather conditions, and land use.
- Record a description of site conditions and any anomalies at the time of sampling. Be aware of and record potential sources of contamination at each field site.
- Draw a map of the sampling reach. This map should include in-stream attributes (e.g., riffles, falls, fallen trees, pools, bends, etc.) and important structures, plants, and attributes of the bank and near stream areas. Use an arrow to indicate the direction of flow.
- Use hand-held Global Positioning System (GPS) for latitude and longitude determination taken at the exact sampling location within the reach.
- Use camera to thoroughly document sample location from multiple angles and surrounding area including landmarks.
- Use flagging and stakes to thoroughly mark site for easy identification during subsequent sampling (especially in winter).
- Wear appropriate equipment:
    - Avoid hand contact with contaminating surfaces (such as equipment, coins, food) while sampling.
    - Gloved as well as ungloved hands must not contact the water sample.
- Use equipment constructed of materials that are relatively inert with respect to the analytes of interest.
- Use only equipment that has been cleaned according to prescribed procedures.
- Field rinse equipment, but only as directed.
- Collect a sufficient number of quality-control samples.
- Use correct sample-handling procedures:
    - Minimize the number of sample-handling steps.
    - Follow a prescribed order for collecting samples.

Field sampling activities were conducted in a prescribed order to minimize disturbance of sediment, foliage, detritus, etc. on the bed and banks of the stream which could potentially affect the samples measure. Procedures started with the most delicate constituents and finished with measurements which were least affected by disturbance. The prescribed order was as follows:

1. Collect all water quality samples.
    a. Collect samples in bottles containing preservative including QC samples when applicable.

b. Collect samples in bottles without preservative including QC samples when applicable.
c. Collect samples requiring field filtration using appropriate equipment and including QC samples when applicable.

2. Conduct field measurements requiring multi-parameter probe.
3. Conduct flow measurements.
4. Conduct any photography, GPS measurements, etc. that requires wading in the stream.

Surface Water Sampling Procedures

Surface water sample collection was conducted according to the Colorado Department of Public Health and Environment Water Quality Control Division Standard Operating Procedures for the Collection of Water Samples. Sections 3.0 General Sample Procedures and 4.0 Sample Collection (10/2008). For a complete citation refer to FSP Section 2.0.

- Stream samples were collected as "grab" samples. A grab sample is collected by filling each sample bottle directly in the stream. Alternatively, an appropriate collection container may be used to collect sample water and immediately transfer to sample bottles. The grab sample should be collected from the main channel thalweg[1], just below the water surface incorporating the top half of the water column.
- To minimize sample contamination, the area around the sample site should be disturbed as little as possible until sampling is complete.
    - The area upstream of the sample site shall not be disturbed by any of the sample team prior to collecting samples.
    - Samples will always be collected upstream of where the sampler is standing.
    - When rinsing collection equipment, bottles will always be filled upstream and dumped downstream of where the sampler is standing.
- Samples collected include preserved (acid preserved), neutral (unpreserved), and field-filtered (acid preserved) samples in both plastic (high density polyethylene) and glass containers. Sample collection procedures for each bottle type are as follows:
    - Volatile Organic Compounds and Dissolved Gases (glass volatile organic analysis (VOA) vials)
        1. Rinse pre-cleaned collection container with sample source water three times before collecting sample.
        2. Fill with grab sample.
        3. Carefully pour sample water into 40ml VOA vials to fill. Vials must be filled very slowly but steadily so as to not lose any preservative or cause excessive oxygen mixing. Vials must also be filled completely and should slightly overflow when capped so that no air remains in the vial.
    - Preserved (glass and polyethylene bottles)

[1] The thalweg of a stream is a line drawn to join the lowest points along the entire length of the streambed in its downward slope, defining its deepest channel. It thus marks the natural direction of a watercourse and is almost always the line of fastest flow in any stream. Due to the above definition the thalweg often denotes the best mixed section of a stream for sampling purposes.

1. Rinse pre-cleaned collection container with sample source water three times before collecting sample.
2. Fill with grab sample.
3. Carefully pour sample water into appropriate sample bottles as they contain acid for preserving the sample and should be handled with care. Do not rinse and do not over-fill container as this it will affect the preservative. Leave approximately ½ inch headspace to allow for mixing and expansion.

- Neutral (glass and polyethylene bottles)
    1. Rinse with sample source water three times before collecting sample.
    2. Fill with grab sample.
    3. Alternatively neutral sample containers can be filled from collection container following procedures listed for preserved containers.
- Field-filtered (preserved glass and polyethylene bottles)
    1. Set up and test field pump according to manufacturer's instructions. Pump should be loaded with appropriate tubing specific to each sampling site. Input end of tubing should be located in the main channel thalweg, just below the water surface.
    2. According to manufacturer's instructions, run pump for at least 30 seconds to flush/rinse tubing.
    3. Attach field filter cartridge to output end of tubing and run pump to "seed" cartridge until sample water is flowing out of cartridge.
    4. Start pump and slowly fill sample container directly from output end of filter cartridge. Do not rinse and do not over-fill container as this will affect the preservative.

- Samples were collected into appropriate bottles (FSP Section 2.6.1). Immediately after a sample is collected it will be sealed, labeled, logged onto a chain of custody form and placed into an ice filled cooler until shipped to ALS Laboratory Group located in Fort Collins, CO for analysis. Due to short holding times (FSP Appendix 4) on some of the constituents, samples will be shipped the same day they are collected.

Measurement of Surface Water Field Parameters

Stream discharge measurements were taken at each surface water site. Efforts were made to measure and log as much pertinent information as possible to estimate discharge. Multiple measurements were taken to do error analysis and calculate the degree of uncertainty in those estimates. Measurement and calculation of steam discharge included the following procedures:

- Select section of stream that is approximately 10-20 foot in length and is a free flowing glide/run without a braided channel and is representative of the overall sampling stream reach and speed.
- Document this section well with photographs and drawings specifically focusing on the cross section and shape of the stream channel.
- Measure and document the exact length of the selected section.
- Measure and document the wetted width of the streambed at the start, middle, and end of selected segment.
- Measure and document the wetted perimeter of the selected segment.

- Measure and document the channel depth across the stream in 1-foot intervals. Do this at the upper, middle, and lower end of selected segment.
- Measure by the travel time of a floatable object (an orange) over the known distance. Do this 10 times, documenting each measurement.
- Determine the stream bottom type for the section: rough (cobble, loose rocks, coarse gravel) or smooth (mud, sand, hardpan rock).
- Use the Stream Discharge Data Sheet (Appendix 3) to calculate stream velocity and discharge in cubic feet per second.

All other field parameters were collected and measured according to U.S. Geological Survey National field manual for the collection of water-quality data. Chapter A6.8 Use of Multi-parameter Instruments for Routine Field Measurements (8/2007). For a complete citation refer to FSP Section 2.0.

The following steps were followed during the measurement of field parameters:
- Conduct appropriate calibration of field meters and parameters.
- Allow time for the readings on the display to stabilize within the appropriate criteria.
- Record all required and targeted field measurements on the appropriate field forms, laboratory analytical request forms, project log books, chain-of-custody logs, etc.

Field Measurements for surface water sites were measured in situ and included the following procedures:
- Wait for the sensors to reach thermal equilibrium with the water temperature at each location.
- At each location, allow the field-measurement values on the instrument display to stabilize within the established criterion before recording final field measurements.
- Measure in the main channel thalweg (the line of fastest flow in the stream channel and often the deepest), just below the water surface.

Additionally, the first time at each sample location, the multi-parameter probe was used to build a profile of the stream in terms of basic field measurements. Measurements were taken across a stream in transects and appropriately documented. This information was logged for comparison with the official measurements collected in the thalweg by the procedures above, to conduct error analysis and calculate margin of error.

Ground Water Sampling

Ground water sampling consisted of collecting water from seeps and/or springs as they emerge from the ground. An effort was made to collect samples as near the point of emergence as possible while still in an area with enough flow to collect water while minimizing sediment disturbance. The following procedures were adhered to at each sample site prior to and during sampling:
- Review and understand the protocols for collecting and processing samples before field work begins.
- Complete the physical/chemical field sheet to document site description, weather conditions, and land use.

- Record a description of site conditions and any anomalies at the time of sampling. Be aware of and record potential sources of contamination at each field site.
- Draw a map of the sampling area. This map should include relevant attributes (e.g., spring emergence, number of springs, proximity to nearby streams, etc.) and important structures, plants, and attributes of the immediate area. Use an arrow to indicate the direction of flow.
- Use hand-held Global Positioning System (GPS) for latitude and longitude determination taken at the exact sampling location within the reach.
- Use camera to thoroughly document sample location from multiple angles and surrounding area including landmarks.
- Use flagging and stakes to thoroughly mark site (especially springs) for easy identification during subsequent sampling (especially in winter).
- Wear appropriate equipment:
    - Avoid hand contact with contaminating surfaces (such as equipment, coins, food) while sampling.
    - Gloved as well as ungloved hands must not contact the water sample.
- Use equipment constructed of materials that are relatively inert with respect to the analytes of interest.
- Use only equipment that has been cleaned according to prescribed procedures (FSP Section 2.7.1).
- Field rinse equipment, but only as directed.
- Collect a sufficient number of quality-control samples.
- Use correct sample-handling procedures:
    - Minimize the number of sample-handling steps.
    - Follow a prescribed order for collecting samples.

Seep and Spring Sampling Procedures

Seep and spring sample collection were conducted according the following procedures:

- Samples are collected as "grab" samples. The grab sample is collected by filling each sample bottle directly from the spring as near to the point of emergence as possible while still in an area with enough flow to collect water while minimizing sediment disturbance. Alternatively, an appropriate collection container may be used to collect sample water and immediately transfer to sample bottles.
- To minimize sample contamination, the area around the sample site should be disturbed as little as possible until sampling is complete.
    - The area around the point of emergence shall not be disturbed by any of the sample team prior to collecting samples.
    - Samples will always be collected from points of the spring where sediment disturbance will be minimal.
    - When rinsing collection equipment, bottles will always be dumped away and downhill from the sample area.
- Samples collected include preserved (acid preserved), neutral (unpreserved), and field-filtered (acid preserved) samples in both plastic (high density polyethylene) and glass containers. Sample collection procedures for each bottle type are as follows:
    - Volatile Organic Compounds and Dissolved Gases (glass volatile organic analysis (VOA) vials)

1. Rinse pre-cleaned collection container with sample source water three times before collecting sample.
2. Fill with grab sample.
3. Carefully pour sample water into 40ml VOA vials to fill. Vials must be filled very slowly but steadily so as to not lose any preservative or cause excessive oxygen mixing. Vials must also be filled completely and should slightly overflow when capped so that no air remains in the vial.

- Preserved (glass and polyethylene bottles)
    1. Rinse pre-cleaned collection container with sample source water three times before collecting sample.
    2. Fill with grab sample.
    3. Carefully pour sample water into appropriate sample bottles as they contain acid for preserving the sample and should be handled with care. Do not rinse and do not over-fill container as this it will affect the preservative. Leave approximately ½ inch headspace to allow for mixing and expansion.
- Neutral (glass and polyethylene bottles)
    1. Rinse with sample source water three times before collecting sample.
    2. Fill with grab sample.
    3. Alternatively neutral sample containers can be filled from collection container following procedures listed for preserved containers.
- Field-filtered (preserved glass and polyethylene bottles)
    1. Set up and test field pump according to manufacturer's instructions. Pump should be loaded with appropriate tubing specific to each sampling site.
    2. An appropriate collection container should be placed in the spring in such a way that it is constantly being refilled by the spring. Input end of tubing should then be placed in filled collection container so as to minimize disturbance of the sediment in the spring.
    3. According to manufacturer's instructions, run pump for at least 30 seconds to flush/rinse tubing.
    4. Attach field filter cartridge to output end of tubing and run pump to "seed" cartridge until sample water is flowing out of cartridge.
    5. Start pump and slowly fill sample container directly from output end of filter cartridge. Do not rinse and do not over-fill container as this will affect the preservative.

- The samples were collected into appropriate bottles (FSP Section 2.6.1). Immediately after a sample was collected it was sealed, labeled, logged onto a chain of custody form and placed into an ice filled cooler until shipped to ALS Laboratory Group located in Fort Collins, Colorado for analysis. Due to short holding times (FSP Appendix 4) on some of the constituents, samples were shipped the same day they were collected.

Measurement of Ground Water Field Parameters

Spring discharge measurements were made at each site. Multiple measurements were taken to do error analysis and calculate the degree of uncertainty in those estimates. Measurement and calculation of steam discharge included the following procedures:

- After all samples and other field measurements have been taken, select section of the spring where all the flow goes over a small pour-over.
- Document this section with photographs.
- Insert measuring container and begin timing. Measure the exact amount the container filled in a given period of time and document.
- Perform this at least three times to get an average discharge and conduct error analysis.
- Use the following to convert results: liters/second X 15.85 = gallons/minute.

Field parameters were collected and measured according to U.S. Geological Survey National field manual for the collection of water-quality data. Chapter A6.8 Use of Multi-parameter Instruments for Routine Field Measurements (8/2007). For a complete citation refer to FSP Section 2.0.

The following steps were followed during the measurement of field parameters:
- Conduct appropriate calibration of field meters and parameters.
- Allow time for the readings on the display to stabilize within the appropriate criteria.
- Record all required and targeted field measurements on the appropriate field forms, laboratory analytical request forms, project log books, chain-of-custody logs, etc.

Field measurements for ground water sites were measured in situ if depth and flow allowed. In these circumstances, the following steps were used:
- Wait for the sensors to reach thermal equilibrium with the water temperature at each location.
- At each location, allow the field-measurement values on the instrument display to stabilize within the established criterion before recording final field measurements.
- Measure the spring as near to the point of emergence as possible while still in an area with enough flow to minimize sediment disturbance.

Alternately, if depth and flow were too low to permit submersion of the probes without sediment disturbance, the following steps were used:
- Field rinse an appropriate sample collection container with spring water.
- Collect a grab sample by filling the collection container directly from the spring as near to the point of emergence as possible while still in an area with enough flow to minimize sediment disturbance.
- Immediately place the probe into the container to conduct measurements. Container will need to be swirled during DO measurement to ensure accurate readings.
- Wait for the sensors to reach thermal equilibrium with the water temperature but record temperature as soon as stabilized to minimize sample warming.
- Allow the field-measurement values on the instrument display to stabilize within the established criterion before recording final field measurements.

Sample Handling, Identification, and Test Methods
Sample Containers and Preservation

Containers

Water Quality (WQ) samples were placed in clean containers provided by ALS Laboratory Group. ALS Laboratory Group, Fort Collins provides EPA certified Level 3 clean (I-Chem 300™, Eagle Pitcher Level 1, or equivalent) sample bottles for sample collection. The Sample Receiving Department maintains certificates of cleanliness that are provided by the vendor for all sample bottles. These certificates are provided to the client upon request. Table A2.0 (below) lists all containers used for sample collection.

Table A2.0 Sampling Containers and Preservatives

Analytes	# of Containers per sample	Container Type	Preservative
Alkalinity, Chloride, Fluoride, Nitrate, Nitrite, pH, Phosphate, Specific Conductance, Sulfate, TDS, TSS	2	1L polyethylene	none
Ammonia as N	1	250mL polyethylene	H2SO4
Dissolved metals	1	500mL polyethylene	none
Dissolved organic carbon	1	125mL amber glass jars	none
Gross Alpha/Beta	1	1L polyethylene	HNO3
Methane, ethane, ethene	3	40mL VOA glass vials	HCL
Semivolatile organic compounds	2	1L amber glass jars	none
Total recoverable metals	1	500mL polyethylene	HNO3
Total Sulfide	1	250mL polyethylene	ZnAc/NaOH
Volatile organic compounds	3	40mL VOA glass vials	HCL

Sample Preservatives

WQ samples were preserved with chemical additives, as required by the analytical method. Correct preservatives were provided in the sample container by the laboratory. Table A2.0 (above) lists containers and associated preservatives.

Temperature Control

WQ samples were stored in coolers with ice. Samples were placed in the coolers as soon as possible after sample collection and remained in the coolers during transport from the field and until shipment to the lab for analysis. Prior to shipment coolers may be re-packed with new ice to ensure proper temperature levels of 4° C or less (FSP Appendix 3).

Sample Identification/Labels

All samples were identified by sticker-labels affixed to the container. The information was recorded in waterproof ink. The information recorded on the labels included:

- Sample identification
- Initials of sampler
- Sample location
- Analysis to be conducted
- Date and time of collection
- Preservatives, if any
- Client

Sample Packing and Shipping

Water-Quality Samples were shipped to ALS Laboratory Group in Ft Collins, Colorado via FedEx. ALS covered return shipping costs and provided shipping labels for next day delivery. Samples were shipped in coolers provided by ALS using absorbent and packaging material also provided by ALS. The following procedures were used to assure the integrity of sample containers during shipping:

- Double check tightening of all container lids.
- Careful packing of sample containers in coolers to prevent breakage (e.g., use of packing materials).
- Use of bags and absorbent materials to prevent cross contamination and/or water damage to labels in case of leaks.
- Placement of each sample container in an upright position to help assure containment.
- Double bagging of ice to minimize potential for water damage to labels and/or seepage into containers.

Chain of Custody

Once sample labels were placed on sample containers, the containers were documented on a chain-of-custody form. The chain-of-custody forms accompanied the samples to the laboratory. The form was sealed in a plastic bag and taped to the inside lid of the sample cooler.

The appropriate laboratories will provide the blank chain-of-custody forms with carbon copies and will return the forms with the analytical results. A blank copy of the chain-of-custody form is provided in FSP Appendix 4.

Field Equipment

A YSI Professional Plus WQ Field Meter was used to collect field measurement data. The following probes were used in connection with the meter:

- Dissolved Oxygen probe
- Electrical Conductivity probe
- Oxidation Reduction Potential probe
- pH probe
- Temperature probe

Equipment manuals for these meters were provided with the equipment in the field including calibration procedures, operation procedures, and maintenance procedures.
Water quality field meter detection limits and specifications are presented in the FSP.

Sampling Equipment Decontamination

Any equipment in contact with sample water, such as field meter probes, was thoroughly decontaminated before each use. Decontamination was performed on site, in an area located away from the sampling activities.

Decontamination of field sampling equipment was performed in the following steps prior to sampling:

- Wash/scrub with distilled water and Liquinox (non-phosphate soap). (Field meter probes will skip this step).
- Distilled water rinse.
- Deionized water rinse (2-3 times).
- Sample water rinse (at next site).

Sampling-Derived Waste Management

The following general guidelines were followed for management of sampling-derived waste:

Water

Due to the baseline nature of this sample plan, all wastewater is expected to have very low levels of contamination. For this reason, wastewater generated through surface and groundwater sampling procedures will be discharged onto the ground in non-erosive areas.

Solid Waste

Disposable sampling supplies and personal protective equipment will be placed in plastic bags and transported from the field to a waste container for proper disposal.

Documentation

Field documentation will include field book notes, field sampling forms, and chain-of-custody forms. For examples of Field Forms refer to FSP Appendix 3. The field book and forms will document the following:

- Project identification
- Dates and time
- Sample locations, maps and related information
- Sample site information and conditions
- Potential anomalies and contaminants affecting sample
- Weather conditions at time of sampling
- Names of personnel involved
- Activities performed and order in which they are performed
- Field measurement data
- Samples collected
- Equipment type, calibration and maintenance
- Chain-of-Custody

Reporting

Laboratory results for chemical analyses as well as data collected from the field sampling activities will be logged according to the above plan. Results and data will be provided to the Water Quality consultants (listed in Section 1.0 Introduction) for review. Consultants will compile the data, provide data validation, and then interpret the results. Using the results, consultants will produce a final report that provides baseline results and key findings specific to the overall Sampling and Analysis Plan goals.

Appendix 3.0 Laboratory Test Methods and Reporting Limits

ALS Laboratory Group located in Fort Collins, Colorado analyzed all water quality samples. Lab water quality parameters and their associated reporting limits are presented below.

Table A3.0 ALS Reporting Limits

Analyte	Matrix	Anal Meth	LCS Limts	MS Limits	MDL	MDL Exp Date	MDC pCi/L or RL (ppb	Test Type	Surro-gate Limits	DER	RPD
TOTAL DISSOLVED SOLIDS	LIQUID	EPA160.1	85-115	85-115			20000.0	TA			15
TOTAL SUSPENDED SOLIDS	LIQUID	EPA160.2	85-115	85-115			20000	TA			15
pH	LIQUID	EPA150.1					0.1 pH units	TA			
FLUORIDE	LIQUID	EPA300.0	90-110	85-115	33.3	1/11/2009	100	TA			15
AMMONIA	LIQUID	EPA350.1	90-110	75-125	18.6	12/10/2003	100	TA			20
SPECIFIC CONDUCTANCE	LIQUID	EPA120.1					1 umhos/cm	TA			
POTASSIUM	LIQUID	WPA200.7	85-115	70-130	90.3	5/1/2010	1000	TA			20
ALUMINUM	LIQUID	EPA200.7	85-115	70-130	5.66	1/12/2010	200.0	TA			30
BARIUM	LIQUID	EPA200.7	85-115	70-130	0.22	1/12/2010	100.0	TA			30
BERYLLIUM	LIQUID	EPA200.7	85-115	70-130	0.194	1/12/2010	5.0	TA			30
BORON	LIQUID	EPA200.7	85-115	70-130	1.8	1/12/2010	100.0	TA			30
CALCIUM	LIQUID	EPA200.7	85-115	70-130	10.6	1/12/2010	1000.0	TA			30
CHROMIUM	LIQUID	EPA200.7	85-115	70-130	0.429	1/12/2010	10.0	TA			30
COBALT	LIQUID	EPA200.7	85-115	70-130	0.699	1/12/2010	10.0	TA			30
COPPER	LIQUID	EPA200.7	85-115	70-130	0.651	1/12/2010	10.0	TA			30
IRON	LIQUID	EPA200.7	85-115	70-130	3.9	1/12/2010	100.0	TA			30
MAGNESIUM	LIQUID	EPA200.7	85-115	70-130	6.61	1/12/2010	1000.0	TA			30
MANGANESE	LIQUID	EPA200.7	85-115	70-130	0.164	1/12/2010	10.0	TA			30
NICKEL	LIQUID	EPA200.7	85-115	70-130	0.651	1/12/2010	20.0	TA			30
SILVER	LIQUID	EPA200.7	85-115	70-130	0.93	1/12/2010	10.0	TA			30
SODIUM	LIQUID	EPA200.7	85-115	70-130	6.91	1/12/2010	1000.0	TA			30
TIN	LIQUID	EPA200.7	85-115	70-130	2.61	1/12/2010	50.0	TA			30
ZINC	LIQUID	EPA200.7	85-115	70-130	2.59	1/12/2010	20.0	TA			30
ANTIMONY	LIQUID	EPA200.8	85-115	70-130	0.08160943	2/1/2010	0.3	TA			30
ARSENIC	LIQUID	EPA200.8	85-115	70-130	0.04835239	2/1/2010	2	TA			30
CADMIUM	LIQUID	EPA200.8	85-115	70-130	0.01933301	2/1/2010	0.3	TA			30
LEAD	LIQUID	EPA200.8	85-115	70-130	0.02474729	2/1/2010	0.5	TA			30
MOLYBDENUM	LIQUID	EPA200.8	85-115	70-130	0.04519424	2/1/2010	1	TA			30
SELENIUM	LIQUID	EPA200.8	85-115	70-130	0.08216019	2/1/2010	1	TA			30
THALLIUM	LIQUID	EPA200.8	85-115	70-130	0.01212135	2/1/2010	0.2	TA			30
URANIUM	LIQUID	EPA200.8	85-115	70-130	0.00447278	2/1/2010	0.1	TA			30
MERCURY	LIQUID	EPA245.1	85-115	70-130	0.00809	11/29/2009	0.2	TA			20
CHLORIDE	LIQUID	EPA300.0	90-110	85-115	91.4	9/15/2009	200.0	TA			15
NITRATE AS N	LIQUID	EPA300.0	90-110	85-115	25.5	9/15/2009	200.0	TA			15
NITRITE AS N	LIQUID	EPA300.0	90-110	85-115	38	9/15/2009	100.0	TA			15
ORTHOPHOSPHATE AS P	LIQUID	EPA300.0	90-110	85-115	130	9/15/2009	500.0	TA			15
SULFATE	LIQUID	EPA300.0	90-110	85-115	228	9/15/2009	1000.0	TA			15
BICARBONATE AS CACO3	LIQUID	EPA310.1			546	10/3/2003	5000.0	TA			15
CARBONATE AS CACO3	LIQUID	EPA310.1			546	10/3/2003	5000.0	TA			15
SULFIDE	LIQUID	EPA376.1	80-120	80-120	520	3/2/2006	2000.0	TA			20
DISSOLVED ORGANIC CARBON	LIQUID	EPA415.1	85-115	80-120	149	11/21/2009	1000.0	TA			20
GROSS ALPHA	LIQUID	PAI 724	80-120	80-120			3	TA		2.13	
GROSS BETA	LIQUID	PAI 724	80-120	80-120			4	TA		2.13	
ETHANE	LIQUID	RSK175	80-120	70-130	1.02	5/25/2010	2.0	TA			25
ETHENE	LIQUID	RSK175	80-120	70-130	0.867	5/25/2010	1.0	TA			25
METHANE	LIQUID	RSK175	80-120	70-130	0.897	5/25/2010	1.0	TA			25
1,1,1,2-TETRACHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,1,1-TRICHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			

Analyte	Matrix	Anal Meth	LCS Limts	MS Limits	MDL	MDL Exp Date	MDC pCi/L or RL (ppb	Test Type	Surro-gate Limits	DER	RPD
1,1,2,2-TETRACHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,1,2-TRICHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,1-DICHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,1-DICHLOROETHENE	LIQUID	SW8260_25	75-126	75-126	0.167	8/20/2010	1.0	TA			
1,1-DICHLOROPROPENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2,3-TRICHLOROBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2,3-TRICHLOROPROPANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2,4-TRICHLOROBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2,4-TRIMETHYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2-DIBROMO-3-CHLOROPROPANE	LIQUID	SW8260_25			0.667	8/20/2010	2.0	TA			
1,2-DIBROMOETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2-DICHLOROBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2-DICHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,2-DICHLOROPROPANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,3,5-TRIMETHYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,3-DICHLOROBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,3-DICHLOROPROPANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1,4-DICHLOROBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
1-CHLOROHEXANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
2,2-DICHLOROPROPANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
2-BUTANONE	LIQUID	SW8260_25			1.67	8/20/2010	10.0	TA			
2-CHLOROTOLUENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
2-HEXANONE	LIQUID	SW8260_25			1.67	8/20/2010	10.0	TA			
4-BROMOFLUOROBENZENE	LIQUID	SW8260_25					1.0	SU	78-129		
4-CHLOROTOLUENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
4-METHYL-2-PENTANONE	LIQUID	SW8260_25			1.67	8/20/2010	10.0	TA			
ACETONE	LIQUID	SW8260_25			3.33	8/20/2010	10.0	TA			
BENZENE	LIQUID	SW8260_25	82-122	82-122	0.167	8/20/2010	1.0	TA			
BROMOBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
BROMOCHLOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
BROMODICHLOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
BROMOFORM	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
BROMOMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CARBON DISULFIDE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CARBON TETRACHLORIDE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CHLOROBENZENE	LIQUID	SW8260_25	82-121	82-121	0.167	8/20/2010	1.0	TA			
CHLOROETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CHLOROFORM	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CHLOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CIS-1,2-DICHLOROETHENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
CIS-1,3-DICHLOROPROPENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
DIBROMOCHLOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
DIBROMOFLUOROMETHANE	LIQUID	SW8260_25					1.0	SU	80-124		
DIBROMOMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
DICHLORODIFLUOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
ETHYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
HEXACHLOROBUTADIENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
IODOMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
ISOPROPYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
M+P-XYLENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
METHYL TERTIARY BUTYL ETHER	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
METHYLENE CHLORIDE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
NAPHTHALENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
N-BUTYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
N-PROPYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
O-XYLENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
P-ISOPROPYLTOLUENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			

Analyte	Matrix	Anal Meth	LCS Limts	MS Limits	MDL	MDL Exp Date	MDC pCi/L or RL (ppb	Test Type	Surro-gate Limits	DER	RPD
SEC-BUTYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
STYRENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
TERT-BUTYLBENZENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
TETRACHLOROETHENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
TOLUENE	LIQUID	SW8260_25	83-121	83-121	0.167	8/20/2010	1.0	TA			
TOLUENE-D8	LIQUID	SW8260_25					1.0	SU	81-119		
TRANS-1,2-DICHLOROETHENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
TRANS-1,3-DICHLOROPROPENE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
TRICHLOROETHENE	LIQUID	SW8260_25	82-121	82-121	0.167	8/20/2010	1.0	TA			
TRICHLOROFLUOROMETHANE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
VINYL ACETATE	LIQUID	SW8260_25			0.667	8/20/2010	2.0	TA			
VINYL CHLORIDE	LIQUID	SW8260_25			0.167	8/20/2010	1.0	TA			
2-FLUOROBIPHENYL	LIQUID	SW8270					10.0	SU	21-106		
2-FLUOROPHENOL	LIQUID	SW8270					10.0	SU	21-100		
NITROBENZENE-D5	LIQUID	SW8270					10.0	SU	34-111		
PHENOL-D5	LIQUID	SW8270					10.0	SU	15-104		
TERPHENYL-D14	LIQUID	SW8270					10.0	SU	33-111		
2-METHYLNAPHTHALENE	LIQUID	SW8270	46-104	46-104	2	9/30/2009	10.0	TA			
ACENAPHTHENE	LIQUID	SW8270	47-108	47-108	2	9/30/2009	10.0	TA			
ACENAPHTHYLENE	LIQUID	SW8270	50-107	50-107	2	9/30/2009	10.0	TA			
ANTHRACENE	LIQUID	SW8270	54-112	54-112	2	9/30/2009	10.0	TA			
BENZO(A)PYRENE	LIQUID	SW8270	53-110	53-110	2	9/30/2009	10.0	TA			
BENZO(B)FLUORANTHENE	LIQUID	SW8270	46-118	45-118	2	9/30/2009	10.0	TA			
BENZO(G,H,I)PERYLENE	LIQUID	SW8270	38-123	38-123	2	9/30/2009	10.0	TA			
BENZO(K)FLUORANTHENE	LIQUID	SW8270	45-124	45-124	2	9/30/2009	10.0	TA			
DIBENZO(A,H)ANTHRACENE	LIQUID	SW8270	42-127	42-127	2	9/30/2009	10.0	TA			
FLUORANTHENE	LIQUID	SW8270	54-116	54-116	2	9/30/2009	10.0	TA			
FLUORENE	LIQUID	SW8270	50-112	50-112	2	9/30/2009	10.0	TA			
INDENO(1,2,3-CD)PYRENE	LIQUID	SW8270	43-125	43-125	2	9/30/2009	10.0	TA			
NAPHTHALENE	LIQUID	SW8270	39-102	39-102	2	9/30/2009	10.0	TA			
PHENANTHRENE	LIQUID	SW8270	51-117	51-117	2	9/30/2009	10.0	TA			
PHENOL	LIQUID	SW8270	49-101	49-101	2	9/30/2009	10.0	TA			
PYRENE	LIQUID	SW8270	49-128	49-128	2	9/30/2009	10.0	TA			

Table A4.0 ALS Sample Handling Guidelines

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Fort Collins, CO

Sample Handling Guidelines

General Inorganic Parameters

		Water			Soil/Sludge		
Parameters	**Method**	**Preservative**	**Container**	**Holding Time**	**Preservative**	**Container**	**Holding Time**
Acidity	E305.1	4°C	250 mL / P	14 Days		Matrix Not Applicable	
Alkalinity (Total; Carbonate, Bicarbonate, Hydroxide)	E310.1, SM2320B	4°C	250 mL / P	14 Days		Matrix Not Applicable	
Ammonia	E350.1, SM4500	4°C, H_2SO_4 to pH <2	125 mL / P	28 Days	4°C	4 oz WMG	28 Days
Anions: Br, Cl, F, SO4 / NO2, NO3, o-PO4	E300.0, SW9056	4°C	125 mL / P	28 Days / 48 Hours	4°C	4 oz WMG	28 D / 48 H from Prep
Chloride	E325.3	4°C	125 mL / P	28 Days	4°C	4 oz WMG	28 Days from Prep
Fluoride	E340.2, SM4500, SW9214	4°C	125 mL / P	28 Days	4°C	4 oz WMG	28 Days from Prep
Nitrite	E354.1	4°C	125 mL / P	48 Hours	4°C	4 oz WMG	48 Hours from Prep
Chromium VI (Hexavalent Cr)	SW7196A(aq, so), SW7196A/3060A (so)	4°C	125 mL / P	24 Hours	4°C	4 oz WMG	24 Hours from Prep
Cyanide (Total)	E335.2, SW9010B, SW9013B, SW9014	4°C, NaOH to pH >12	125 mL / P	14 Days	4°C	4 oz WMG	14 Days
Cyanide (Amenable to Chlorination)	E335.2, SW9010B, SW9013B, SW9014	4°C, NaOH to pH >12	125 mL / P	14 Days		Matrix Not Applicable	
Cyanide (Weak and Dissociable)	SM4500	4°C, NaOH to pH >12	125 mL / P	14 Days	4°C	4 oz WMG	14 Days
Nitrate + Nitrite as N	E353.2	4°C, H_2SO_4 to pH <2	125 mL / P	28 Days	4°C	4 oz WMG	28 Days
Oxyanions (bromate, chlorate, chlorite, iodate)	SW8321	4°C, 1 µL 5% EDA/1 mL sample	40 mL / TLC-Amb G	14 Days		Matrix Not Applicable	
Perchlorate	E314.0, SW9058, SW6850, E331.0, DoD Handbook	4°C, 1/3 headspace	250 mL / P	28 Days	4°C	4 oz WMG	28 Days
Phosphorous, Total	E365.2, SM4500	4°C, H_2SO_4 to pH <2	125 mL / P	28 Days	4°C	4 oz WMG	28 Days
Phosphate, Ortho	E365.2, SM4500	4°C	125 mL / P	48 Hours	4°C	4 oz WMG	48 Hours from Prep
pH	E150.1, SW9040, SW9045	4°C	125 mL / P	4 Days from Receipt	4°C	4 oz WMG	4 Days from Receipt
Solids, Dissolved (TDS)	E160.1	4°C	250 mL / P	7 Days		Matrix Not Applicable	
Solids, Suspended (TSS)	E160.2	4°C	250 mL / P	7 Days		Matrix Not Applicable	
Solids, Total (TS)	E160.3	4°C	250 mL / P	7 Days		Matrix Not Applicable	
Solids, Volatile (TVS)	E160.4	4°C	250 mL / P	7 Days		Matrix Not Applicable	
Specific Conductance	E120.1, SW9050, SM2510B	4°C	125 mL / P	4 Days from Receipt		Matrix Not Applicable	
Sulfide	E376.1 (aq)	4°C, ZnAc, NaOH to pH >9	250 mL / P	7 Days		Matrix Not Applicable	
Total Organic Carbon (TOC)	E415.1 (aq), 9060 (aq), Walkley Black (so)	4°C, H_2SO_4 to pH<2	125 mL / Amb G	28 Days	4°C	4 oz WMG	28 Days
Turbidity	E180.1	4°C	125 mL / P	48 Hours		Matrix Not Applicable	

Metals Parameters

		Water			Soil/Sludge		
Parameters	**Method**	**Preservative**	**Container**	**Holding Time**	**Preservative**	**Container**	**Holding Time**
Metals	E200.7, SW6010B, E200.8, SW6020A	4°C, HNO_3 to pH<2	250 mL / P	6 Months	4°C	4 oz WMG	6 Months
Mercury	E245.1, SW7470 (aq), SW7471 (so)	4°C, HNO_3 to pH<2	250 mL / P	28 Days	4°C	4 oz WMG	28 Days
Hardness	Calculation from Ca & Mg Results	4°C, HNO_3 to pH<2	250 mL / P	6 Months		Matrix Not Applicable	
Sodium Adsorption Ratio (SAR)	Calculation from Ca, Mg, & Na Results	4°C, HNO_3 to pH<2	250 mL / P	6 Months		Matrix Not Applicable	

Organic Parameters

		Water			Soil/Sludge		
Parameters	**Method**	**Preservative**	**Container**	**Holding Time***	**Preservative**	**Container**	**Holding Time***
Chlorinated Herbicides	SW8151A	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
EDB and/or DBCP	SW8011	4°C, HCl to pH<2, ZH	3 x 40 mL / V-TLS	14 Days	4°C	4oz WMG / TLC	14 Days
Explosives	SW8330A, SW8330B, SW8332, SW8321	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
Glycols (ethylene and propylene)	SW8015D	4°C	3 x 40 mL / V-TLS	7 / 14 Days	4°C	4oz WMG / TLC	14 Days
Lipids	SOP 672	Matrix Not Applicable			Frozen	8oz WMG / TLC	28 Days
Methane, Ethane, Ethene	RSK175	4°C, HCl to pH<2, ZH	3 x 40 mL / V-TLS	14 Days		Matrix Not Applicable	
Moisture	ASTM 2216	Matrix Not Applicable			4°C	4oz WMG / TLC	14 Days
Organochlorine Pesticides	E608, SW8081A	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
Organophosphorous Pesticides	SW8141	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
PCBs	E608, SW8082	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
Polynuclear Aromatic Hydrocarbons	SW8270D, SW8270D-SIM	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
Semivolatile Organics (Base/Neutrals/Acids)	E625, SW8270D , SW8270D-SIM	4°C	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
Total Petroleum Hydrocarbons							
TRPH (C8-C40)	FL-PRO	4°C, H_2SO_4/HCl to pH<2	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4 oz WMG	14 / 40 Days
DRO and/or MO	SW8015M, CAL-LUFT	4°C, H_2SO_4/HCl to pH<2	1000 mL / TLC-Amb G	7 / 40 Days	4°C	4oz WMG / TLC	14 / 40 Days
GRO	SW8015, CAL-LUFT	4°C, H_2SO_4/HCl to pH<2, ZH	3 x 40 mL / V-TLS	14 Days	4°C	4oz WMG / TLC	14 Days
Oil and Grease	E1664 (aq), SW9071 (so)	4°C, H_2SO_4/HCl to pH<2	1000 mL / TLC-Amb G	28 Days	4°C	4 oz WMG	28 Days
Volatile Organics	E524.2, E624, SW8260B	4°C, HCl to pH <2, ZH	3 x 40 mL / V-TLS	14 Days	4°C	4oz WMG / TLC	14 Days
BTEX and/or MTBE	E524.2, E624, SW8260B	4°C, HCl to pH <2, ZH	3 x 40 mL / V-TLS	14 Days	4°C	4oz WMG / TLC	14 Days
Volatile Organics	5035A/SW8260B	Matrix Not Applicable			4°C	3 ENCORE Samplers	48 H to Analysis or Freezing
Volatile Organics	5035A/SW8260B	Matrix Not Applicable			4°C / sodium bisulfate	1 Tetra Core Sampler	14 Days

*Where two holding times are provided, the first value indicates holding time to extraction, the second value indicates holding time between extraction and analysis.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Fort Collins, CO

Sample Handling Guidelines

RCRA Characterization

		Water			Soil/Sludge		
Parameters	**Method**	**Preservative**	**Container**	**Holding Time***	**Preservative**	**Container**	**Holding Time***
Corrosivity (pH)	SW9040B, SW9045C	4°C	125 mL / P,G	4 Days from Receipt	4°C	4 oz WMG	4 Days from Receipt
Ignitability	E1010, ASTM 93-80	4°C	1000 mL / TLC-Amb G	7 Days	4°C	4oz WMG / TLC	14 Days
Paint Filter Liquids	SW9095A	N/A	1000 mL / P, G	N/A	N/A	8oz WMG, P	N/A
Reactivity - Cyanide & Sulfide	SW846 7.3	4°C	125 mL / P, G	14 Days	4°C	4 oz WMG	14 Days
TCLP / SPLP Parameters	**Method**	**Preservative**	**Container**	**Holding Time** Collection to Leaching / Leaching to Prep / Prep to Analysis	**Preservative**	**Container**	**Holding Time** Collection to Leaching / Leaching to Prep / Prep to Analysis
Metals	SW1311 / SW1312 / SW6010B	4°C	1000 mL / P	180D / NA / 180D	4°C	4 oz WMG	180D / NA / 180D
Mercury	SW1311 / SW1312 / SW7470	4°C	1000 mL / P	28D / NA / 28D	4°C	4 oz WMG	28D / NA / 28D
Chlorinated Herbicides	SW1311 / SW1312 / SW8151A	4°C	1000 mL / TLC-Amb G	14D / 7D / 40D	4°C	8oz WMG	14D / 7D / 40D
Organochlorine Pesticides	SW1311 / SW1312 / SW8081A	4°C	1000 mL / TLC-Amb G	14D / 7D / 40D	4°C	8oz WMG	14D / 7D / 40D
Organophosphorous Pesticides	SW1311 / SW1312 / SW8141A	4°C	1000 mL / TLC-Amb G	14D / 7D / 40D	4°C	8oz WMG	14D / 7D / 40D
Semivolatiles	SW1311 / SW1312 / SW8270D	4°C	1000 mL / TLC-Amb G	14D / 7D / 40D	4°C	8oz WMG	14D / 7D / 40D
Volatiles	SW1311 / SW1312 / SW8260B	4°C	1000 mL / TLC-Amb G	14D / NA / 14D	4°C	4 oz WMG	14D / NA / 14D

*Where two holding times are provided, the first value indicates holding time to extraction, the second value indicates holding time between extraction and analysis.

Radiochemistry

		Water			Soil/Sludge		
Parameters	**Method**	**Preservative**	**Container**	**Holding Time**	**Preservative**	**Container**	**Holding Time**
Americium-241	ASTM D3972	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Carbon-14	EERF C-01M	N/A	250 mL / Amb G	N/A	N/A	4oz WMG, WMP	N/A
Chlorine-36	ALS SOP 753	N/A	2000 mL / Amb G	N/A	N/A	4oz WMG, WMP	N/A
Curium-244	ASTM D3972	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Gamma Emitters (Stock FANP Library*)	E901.1	HNO3 to pH <2	1000 mL / P	N/A	N/A	16oz WMG, WMP	N/A
Gross Alpha/Beta	E900.0, SW9310	HNO3 to pH <2	500 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Iodine-129	E902.0	N/A	2000 mL / Amb G	N/A	N/A	4oz WMG, WMP	N/A
Iron-55	RESL Fe-01M	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Lead-210	ALS SOP 704	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Neptunium-237	ASTM D3972	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Nickel-59	ASTM D3972	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Nickel-63	RESL Ni-01M	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Plutonium-238, 239	ASTM D3972	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Plutonium-241	ASTM D3972	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Plutonium-242	ASTM D3972	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Polonium-210	ASTM D3972	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Promethium-147	ALS SOP 758	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Radium, Total Alpha Emitting	E903.0, SW9315	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Radium-226	E903.0	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Radium-226	E903.1, Alpha Spec ALS SOP 701	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Radium-228	E904.0, SW9320	HNO_3 to pH <2	2000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Radon-222 (Water)	SM 7500-Rn B	N/A, ZH	3 x 40 mL / V-TLS	4 Days	Matrix Not Applicable		
Radon-222 (Air)	E903.1M	N/A	500 mL Tedlar Bag	4 Days	Matrix Not Applicable		
Strontium-89	ASTM D5811	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Strontium-90 (Total Radiostrontium)	ASTM D5811	HNO_3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Technetium-99	EICHROM	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Thorium-228, 230, 232	ASTM D3972	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A
Tritium (H-3)	E906.0	4°C	250 mL / Amb G	6 Months	4°C	8oz WMG	N/A
Uranium-234, 235, 238	ASTM D3972	HNO3 to pH <2	1000 mL / P	N/A	N/A	4oz WMG, WMP	N/A

*Fission Activation and Natural Products Library

Acronym Definitions			Preservative
G - Glass	H - Hours	**ALS Laboratory Group**	H_2SO_4 - Sulfuric acid
P - Polyethylene	D - Days	225 Commerce Drive	HNO_3 - Nitric acid
Amb - Amber	M - Months	Fort Collins, CO 80524	HCl - Hydrochloric acid
WMG, WMP - Wide Mouth Glass or Poly Jar	E - EPA		NaOH - Sodium hydroxide
V-TLC - Glass Vial Teflon-lined Cap	SW - EPA SW846		ZnAc - Zinc acetate
V-TLS - Glass Vial Teflon-lined Septum	SM - Standard Methods		$NaHSO_4$ - Sodium bisulfate
ZH - Zero Headspace	ASTM - ASTM International	PH: 970.490.1522 FX: 970.490.1522 www.alsenviro.com	EDA - Ethylene diamine

Appendix 4.0 Quality Assurance/Quality Control Data

In order to ensure the quality of the data collected, a Quality Assurance/Quality Control (QA/QC) Plan, was designed which included collection and/or analysis of the following samples:

- One set of trip blanks for Volatile Organic Compounds (VOCs) was included with each cooler containing VOCs.
- One set of matrix spike and matrix spike duplicates [MSMSD] was collected every 8 samples for all constituents. Thus one MSMSD set was collected during each quarterly sampling event.
- At Middle Thompson Creek on June 3, 2010, water quality samples were collected three times (three replicate samples) at the exact same location and time using the same procedures. Such replicate sampling provides a check on the precision of the data. *A statistical summary of these replicate are shown in Table A 5.0.*

In addition, all data were evaluated using the following internal checks:

- Field and lab measurements were compared for consistency and changes (within any one sample);
- Dissolved versus Total concentrations (within any one sample) were compared for errors;
- Specific conductance measurements were compared to laboratory total dissolved solids (TDS) determinations to detect possible outliers or suspicious data (within any one sample);
- Evaluation of cation-anion balances;
- Trends in data from different sampling dates for all sites were compared for consistency.
- All data were analyzed statistically to summarize simple patterns.

Lastly, all samples were subject to and complied with additional internal ALS laboratory QA/QC procedures. Details concerning these ALS QA/QC procedures and results, together with chain-of-custody documents are available for public review at the offices of the Thompson Divide Coalition and Roaring Fork Conservancy.

Table A5.0 Replicate Data and Statistical Summary

TDC Replicate Water Quality Data										
Station Name: Middle Thompson Creek Replicate Data										
Station ID: MTC										
Sample Date: 6/3/2010										
(For explanations see footnotes below)										
Parameter	**Units**	**Replicate 1**	**Replicate 2**	**Replicate 3**	**n**	**# of < values**	**minimum**	**maximum**	**average**	**median**
General Field Data										
pH (lab)	pH	7.69	7.72	7.74	3	0	7.69	7.74	7.72	7.72
Specific Conductance (lab)	µS/cm	57.7	55.5	53.1	3	0	53.1	57.7	55.4	55.5
Total Dissolved Solids (lab)	mg/L	66	65	63	3	0	63	66	65	65
Total Suspended Solids (lab)	mg/L	**20**	**20**	**20**	3	3	**20**	**20**	**20**	**20**
Major Cations										
Calcium T	mg/L	8.6	8.6	8.6	3	0	8.6	8.6	8.6	8.6
Calcium D	mg/L	8.5	8.4	8.5	3	0	8.4	8.5	8.5	8.5
Magnesium T	mg/L	2.1	2.1	2.1	3	0	2.1	2.1	2.1	2.1
Magnesium D	mg/L	2	2	2	3	0	2	2	2	2
Potassium T	mg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
Potassium D	mg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
Sodium T	mg/L	1.4	1.5	1.4	3	0	1.4	1.5	1.4	1.4
Sodium D	mg/L	1.4	1.4	1.4	3	0	1.4	1.4	1.4	1.4
Major Anions										
Ammonia as N	mg/L	**0.1**	**0.1**	**0.1**	3	3	**0.1**	**0.1**	**0.1**	**0.1**
Bicarbonate	mg/L	29	29	29	3	0	29	29	29	29
Carbonate	mg/L	**5**	**5**	**5**	3	3	**5**	**5**	**5**	**5**
Chloride	mg/L	0.28	0.28	0.27	3	0	0.27	0.28	0.28	0.28
Fluoride	mg/L	**0.1**	**0.1**	**0.1**	3	3	**0.1**	**0.1**	**0.1**	**0.1**
Nitrate as N	mg/L	**0.2**	**0.2**	**0.2**	3	3	**0.2**	**0.2**	**0.2**	**0.2**
Nitrite as N	mg/L	**0.1**	**0.1**	**0.1**	3	3	**0.1**	**0.1**	**0.1**	**0.1**
Sulfate	mg/L	1.9	1.9	1.9	3	0	1.9	1.9	1.9	1.9
Other Non-metals and nutrients										
Alkalinity	mg/L	29	29	29	3	0	29	29	29	29
Carbon, Dissolved Organic	mg/L	6.9	7.3	7	3	0	6.9	7.3	7.1	7
Orthophosphate as P	mg/L	**0.5**	**0.5**	**0.5**	3	3	**0.5**	**0.5**	**0.5**	**0.5**
Sulfide, Total	mg/L	**2**	**2**	**2**	3	3	**2**	**2**	**2**	**2**
Metals and Metalloids										
Aluminum T	mg/L	0.68	0.7	0.71	3	0	0.68	0.71	0.70	0.7
Aluminum D	mg/L	0.45	0.39	0.38	3	0	0.38	0.45	0.41	0.39
Antimony T	mg/L	**0.0003**	**0.0003**	**0.0003**	3	3	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Antimony D	mg/L	**0.0003**	**0.0003**	**0.0003**	3	3	**0.0003**	**0.0003**	**0.0003**	**0.0003**
Arsenic T	mg/L	**0.002**	**0.002**	**0.002**	3	3	**0.002**	**0.002**	**0.002**	**0.002**
Arsenic D	mg/L	**0.002**	**0.002**	**0.002**	3	3	**0.002**	**0.002**	**0.002**	**0.002**
Barium T	mg/L	**0.1**	**0.1**	**0.1**	3	3	**0.1**	**0.1**	**0.1**	**0.1**
Barium D	mg/L	**0.1**	**0.1**	**0.1**	3	3	**0.1**	**0.1**	**0.1**	**0.1**

Parameter	Units	Replicate 1	Replicate 2	Replicate 3	n	# of < values	minimum	maximum	average	median
Beryllium T	mg/L	0.005	0.005	0.005	3	3	0.005	0.005	0.005	0.005
Beryllium D	mg/L	0.005	0.005	0.005	3	3	0.005	0.005	0.005	0.005
Boron T	mg/L	0.1	0.1	0.1	3	3	0.1	0.1	0.1	0.1
Boron D	mg/L	0.1	0.1	0.1	3	3	0.1	0.1	0.1	0.1
Cadmium T	mg/L	0.0003	0.0003	0.0003	3	3	0.0003	0.0003	0.0003	0.0003
Cadmium D	mg/L	0.0003	0.0003	0.0003	3	3	0.0003	0.0003	0.0003	0.0003
Chromium T	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Chromium D	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Cobalt T	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Cobalt D	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Copper T	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Copper D	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Iron T	mg/L	0.5	0.52	0.52	3	0	0.5	0.52	0.51	0.52
Iron D	mg/L	0.32	0.28	0.25	3	0	0.25	0.32	0.28	0.28
Lead T	mg/L	0.0005	0.0005	0.0005	3	3	0.0005	0.0005	0.0005	0.0005
Lead D	mg/L	0.0005	0.0005	0.0005	3	3	0.0005	0.0005	0.0005	0.0005
Manganese T	mg/L	0.01	0.01	0.011	3	0	0.01	0.011	0.010	0.01
Manganese D	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Mercury T	mg/L	0.0002	0.0002	0.0002	3	3	0.0002	0.0002	0.0002	0.0002
Mercury D	mg/L	0.0002	0.0002	0.0002	3	3	0.0002	0.0002	0.0002	0.0002
Molybdenum T	mg/L	0.001	0.001	0.001	3	3	0.001	0.001	0.001	0.001
Molybdenum D	mg/L	0.001	0.001	0.001	3	3	0.001	0.001	0.001	0.001
Nickel T	mg/L	0.02	0.02	0.02	3	3	0.02	0.02	0.02	0.02
Nickel D	mg/L	0.02	0.02	0.02	3	3	0.02	0.02	0.02	0.02
Selenium T	mg/L	0.001	0.001	0.001	3	3	0.001	0.001	0.001	0.001
Selenium D	mg/L	0.001	0.001	0.001	3	3	0.001	0.001	0.001	0.001
Silver T	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Silver D	mg/L	0.01	0.01	0.01	3	3	0.01	0.01	0.01	0.01
Thallium T	mg/L	0.0002	0.0002	0.0002	3	3	0.0002	0.0002	0.0002	0.0002
Thallium D	mg/L	0.0002	0.0002	0.0002	3	3	0.0002	0.0002	0.0002	0.0002
Tin T	mg/L	0.05	0.05	0.05	3	3	0.05	0.05	0.05	0.05
Tin D	mg/L	0.05	0.05	0.05	3	3	0.05	0.05	0.05	0.05
Uranium T	mg/L	0.0001	0.0001	0.0001	3	3	0.0001	0.0001	0.0001	0.0001
Uranium D	mg/L	0.0001	0.0001	0.0001	3	3	0.0001	0.0001	0.0001	0.0001
Zinc T	mg/L	0.02	0.02	0.02	3	3	0.02	0.02	0.02	0.02
Zinc D	mg/L	0.02	0.02	0.02	3	3	0.02	0.02	0.02	0.02
Radiation										
Gross Alpha	pCi/L	0.34	0.45	1.01	3	3	0.34	1.01	0.60	0.45
Gross Beta	pCi/L	0.1	1.7	1.2	3	3	0.1	1.7	1.0	1.2
Organics (dissoved gases)										
Ethane	µg/L	2	2	2	3	3	2	2	2	2
Ethene	µg/L	1	1	1	3	3	1	1	1	1
Methane	µg/L	1	1	1	3	3	1	1	1	1

Parameter	Units	Replicate 1	Replicate 2	Replicate 3	n	# of < values	minimum	maximum	average	median
Organics (SVOCs)										
1-METHYLNAPHTHALENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,3,4,6-TETRACHLOROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,4,5-TRICHLOROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,4,6-TRICHLOROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,4-DICHLOROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,4-DIMETHYLPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2,4-DINITROPHENOL	µg/L	20	19	19	3	3	19	20	19	19
2-CHLOROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2-METHYLNAPHTHALENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2-METHYLPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
2-NITROPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
3+4-METHYLPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
4,6-DINITRO-2-METHYLPHENOL	µg/L	20	19	19	3	3	19	20	19	19
4-CHLORO-3-METHYLPHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
4-NITROPHENOL	µg/L	20	19	19	3	3	19	20	19	19
ACENAPHTHENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
ACENAPHTHYLENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
ANTHRACENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
BENZO(A)ANTHRACENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
BENZO(A)PYRENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
BENZO(B)FLUORANTHENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
BENZO(G,H,I)PERYLENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
BENZO(K)FLUORANTHENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
CHRYSENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
DIBENZO(A,H)ANTHRACENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
FLUORANTHENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
FLUORENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
INDENO(1,2,3-CD)PYRENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
NAPHTHALENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
PENTACHLOROPHENOL	µg/L	20	19	19	3	3	19	20	19	19
PHENANTHRENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
PHENOL	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
PYRENE	µg/L	9.8	9.5	9.6	3	3	9.5	9.8	9.6	9.6
SVOC Tentatively Identified Compounds	µg/L	None detected	None detected	None detected						
Organics (VOCs)										
1,1,1,2-TETRACHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1,1-TRICHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1,2,2-TETRACHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1,2-TRICHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1-DICHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,1-DICHLOROETHENE	µg/L	1	1	1	3	3	1	1	1	1

Parameter	Units	Replicate 1	Replicate 2	Replicate 3	n	# of < values	minimum	maximum	average	median
1,1-DICHLOROPROPENE	µg/L	1	1	1	3	3	1	1	1	1
1,2,3-TRICHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,2,3-TRICHLOROPROPANE	µg/L	1	1	1	3	3	1	1	1	1
1,2,4-TRICHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,2,4-TRIMETHYLBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,2-DIBROMO-3-CHLOROPROPANE	µg/L	2	2	2	3	3	2	2	2	2
1,2-DIBROMOETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,2-DICHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,2-DICHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
1,2-DICHLOROPROPANE	µg/L	1	1	1	3	3	1	1	1	1
1,3,5-TRIMETHYLBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,3-DICHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1,3-DICHLOROPROPANE	µg/L	1	1	1	3	3	1	1	1	1
1,4-DICHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
1-CHLOROHEXANE	µg/L	1	1	1	3	3	1	1	1	1
2,2-DICHLOROPROPANE	µg/L	1	1	1	3	3	1	1	1	1
2-BUTANONE	µg/L	10	10	10	3	3	10	10	10	10
2-CHLOROTOLUENE	µg/L	1	1	1	3	3	1	1	1	1
2-HEXANONE	µg/L	10	10	10	3	3	10	10	10	10
4-CHLOROTOLUENE	µg/L	1	1	1	3	3	1	1	1	1
4-METHYL-2-PENTANONE	µg/L	10	10	10	3	3	10	10	10	10
ACETONE	µg/L	10	3.6	10	3	3	3.6	10	7.9	10
BENZENE	µg/L	1	1	1	3	3	1	1	1	1
BROMOBENZENE	µg/L	1	1	1	3	3	1	1	1	1
BROMOCHLOROMETHANE	µg/L	1	1	1	3	3	1	1	1	1
BROMODICHLOROMETHANE	µg/L	1	1	1	3	3	1	1	1	1
BROMOFORM	µg/L	1	1	1	3	3	1	1	1	1
BROMOMETHANE	µg/L	1	1	1	3	3	1	1	1	1
CARBON DISULFIDE	µg/L	1	1	1	3	3	1	1	1	1
CARBON TETRACHLORIDE	µg/L	1	1	1	3	3	1	1	1	1
CHLOROBENZENE	µg/L	1	1	1	3	3	1	1	1	1
CHLOROETHANE	µg/L	1	1	1	3	3	1	1	1	1
CHLOROFORM	µg/L	1	1	1	3	3	1	1	1	1
CHLOROMETHANE	µg/L	1	1	1	3	3	1	1	1	1
CIS-1,2-DICHLOROETHENE	µg/L	1	1	1	3	3	1	1	1	1
CIS-1,3-DICHLOROPROPENE	µg/L	1	1	1	3	3	1	1	1	1
DIBROMOCHLOROMETHANE	µg/L	1	1	1	3	3	1	1	1	1
DIBROMOMETHANE	µg/L	1	1	1	3	3	1	1	1	1
DICHLORODIFLUOROMETHANE	µg/L	1	1	1	3	3	1	1	1	1
ETHYLBENZENE	µg/L	1	1	1	3	3	1	1	1	1
HEXACHLOROBUTADIENE	µg/L	1	1	1	3	3	1	1	1	1
IODOMETHANE	µg/L	1	1	1	3	3	1	1	1	1
ISOPROPYLBENZENE	µg/L	1	1	1	3	3	1	1	1	1

Parameter	Units	Replicate 1	Replicate 2	Replicate 3	n	# of < values	minimum	maximum	average	median
M+P-XYLENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
METHYL TERTIARY BUTYL ETHER	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
METHYLENE CHLORIDE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
NAPHTHALENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
N-BUTYLBENZENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
N-PROPYLBENZENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
O-XYLENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
P-ISOPROPYLTOLUENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
SEC-BUTYLBENZENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
STYRENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TERT-BUTYLBENZENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TETRACHLOROETHENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TOLUENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TRANS-1,2-DICHLOROETHENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TRANS-1,3-DICHLOROPROPENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TRICHLOROETHENE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
TRICHLOROFLUOROMETHANE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
VINYL ACETATE	µg/L	**2**	**2**	**2**	3	3	**2**	**2**	**2**	**2**
VINYL CHLORIDE	µg/L	**1**	**1**	**1**	3	3	**1**	**1**	**1**	**1**
VOC Tentatively Identified Compounds	µg/L	None detected	None detected	None detected						
Footnotes:										
• Parameters with a T denote Total Recoverable concentrations while those with a D denote Dissolved concentrations.										
• The column heading "n" refers to the number of total measurements.										
• All **bolded** numbers represent "less than" (<) values: where the constituent was determined but was below some laboratory reporting limit (i.e <20).										
• All **bolded** statistics represent "less than" (<) values and are based on the numeric value of the qualified concentration: (i.e. <20 was converted to 20).										
• These replicate samples were collected at the same location (MTC) on the same day (06-03-2010) during the same sampling event. Samples were given different labels (MTC=Replicate 1, DC=Replicate 2, RC=Replicate 3) and times ensuring the lab would treat them as separate samples. In actuality like constituents for all three sets were collected within 1/2 hour of each other.										

Table A6.0 Cation-Anion Balances

Fall 2009: SMTC, SMTSp

Anion / Cation Summary Report

Lab ID: **0909281-1** QC Type: SMP
Field ID: SMTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	87.07469	MG/L	1.74
CHLORIDE	0.5090621	MG/L	0.01
FLUORIDE	0.1625594	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	6.244327	MG/L	0.13
Anion Result Sum	94.29		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	22.88682	MG/L	1.14
IRON	0.8321012	MG/L	0.04
MAGNESIUM	4.200904	MG/L	0.35
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.051562	MG/L	0.03
SODIUM	7.700634	MG/L	0.33
Cation Result Sum	36.88		

Total Result:	**131.17**	MG/L	Anion mEq Sum:	**1.89**
TDS Result:	**92.000008**	MG/L	Cation mEq Sum:	**1.89**
RPD:	35.11%		RPD:	0.06%

Lab ID: **0909281-3** QC Type: SMP
Field ID: SMTSP

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	135.6699	MG/L	2.71
CHLORIDE	0.4592989	MG/L	0.01
FLUORIDE	0.1572916	MG/L	0.01
NITRATE AS N	0.2999592	MG/L	0.02
NITRITE AS N	0.1	MG/L	0.00
SULFATE	4.609308	MG/L	0.10
Anion Result Sum	141.30		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	41.42885	MG/L	2.07
IRON	0.1900814	MG/L	0.01
MAGNESIUM	7.07632	MG/L	0.58
MANGANESE	0.01078978	MG/L	0.00
POTASSIUM	1.340612	MG/L	0.03
SODIUM	5.567104	MG/L	0.24
Cation Result Sum	55.81		

Total Result:	**197.11**	MG/L	Anion mEq Sum:	**2.85**
TDS Result:	**140**	MG/L	Cation mEq Sum:	**2.94**
RPD:	33.88%		RPD:	2.99%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0909281-1 0909281-2 0909281-3 0909281-4

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Fall 2009: FC

Anion / Cation Summary Report

Lab ID: **0909301-1** QC Type: SMP
Field ID: Four Mile Creek

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	194.3692	MG/L	3.88
CHLORIDE	0.9503896	MG/L	0.03
FLUORIDE	0.1592698	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	2.199717	MG/L	0.05
Anion Result Sum	197.98		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	52.32428	MG/L	2.61
IRON	0.2745596	MG/L	0.01
MAGNESIUM	8.412569	MG/L	0.69
MANGANESE	0.02867812	MG/L	0.00
POTASSIUM	2.259897	MG/L	0.06
SODIUM	8.548619	MG/L	0.37
Cation Result Sum	72.05		

Total Result: **270.03** MG/L
TDS Result:
RPD:

Anion mEq Sum: **3.97**
Cation mEq Sum: **3.75**
RPD: 5.62%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0909301-1 0909301-2

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Fall 2009: MTC, NTC

Anion / Cation Summary Report

Lab ID: **0910026-1** QC Type: SMP
Field ID: MTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	106.9229	MG/L	2.14
CHLORIDE	0.4424432	MG/L	0.01
FLUORIDE	0.1210548	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.993288	MG/L	0.12
Anion Result Sum	113.78		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	26.40485	MG/L	1.32
IRON	0.1	MG/L	0.00
MAGNESIUM	6.134587	MG/L	0.50
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.550996	MG/L	0.04
SODIUM	4.857642	MG/L	0.21
Cation Result Sum	39.26		

Total Result: **153.04** MG/L
TDS Result:
RPD:

Anion mEq Sum: **2.28**
Cation mEq Sum: **2.07**
RPD: 9.52%

Lab ID: **0910026-4** QC Type: SMP
Field ID: NTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	117.655	MG/L	2.35
CHLORIDE	0.9227465	MG/L	0.03
FLUORIDE	0.1127136	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.543923	MG/L	0.12
Anion Result Sum	124.53		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	31.20425	MG/L	1.56
IRON	0.1344936	MG/L	0.01
MAGNESIUM	4.187055	MG/L	0.34
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.370977	MG/L	0.04
SODIUM	7.823253	MG/L	0.34
Cation Result Sum	44.93		

Total Result: **169.46** MG/L
TDS Result:
RPD:

Anion mEq Sum: **2.50**
Cation mEq Sum: **2.28**
RPD: 8.97%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0910026-1 0910026-2 0910026-4 0910026-5

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Fall 2009: YCS

Anion / Cation Summary Report

Lab ID: **0910050-1** QC Type: SMP
Field ID: YCSC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	317.3565	MG/L	6.34
CHLORIDE	1.786771	MG/L	0.05
FLUORIDE	0.2155785	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	4.599127	MG/L	0.10
Anion Result Sum	324.26		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	99.76416	MG/L	4.98
IRON	0.1	MG/L	0.00
MAGNESIUM	12.62125	MG/L	1.04
MANGANESE	0.02024143	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	13.8466	MG/L	0.60
Cation Result Sum	127.55		

Total Result: **451.81** MG/L
TDS Result:
RPD:

Anion mEq Sum: **6.50**
Cation mEq Sum: **6.62**
RPD: 1.83%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0910050-1 0910050-2

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Fall 2009: WCWPS

Anion / Cation Summary Report

Lab ID: **0910141-1** QC Type: SMP
Field ID: WCWPS MS/MSD

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	47.16127	MG/L	0.94
CHLORIDE	0.9406	MG/L	0.03
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	3.041698	MG/L	0.06
Anion Result Sum	51.54		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	12.39531	MG/L	0.62
IRON	0.4374051	MG/L	0.02
MAGNESIUM	1.637231	MG/L	0.13
MANGANESE	0.03333187	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	5.516414	MG/L	0.24
Cation Result Sum	21.22		

Total Result: **72.76** MG/L
TDS Result:
RPD:

Anion mEq Sum: **1.03**
Cation mEq Sum: **1.02**
RPD: 1.41%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0910141-1 0910141-2

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Fall 2009: SHS

Anion / Cation Summary Report

Lab ID: **0910171-1** QC Type: SMP
Field ID: SHS

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	224.0899	MG/L	4.48
CHLORIDE	1.483648	MG/L	0.04
FLUORIDE	0.1755897	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	14.73573	MG/L	0.31
Anion Result Sum	240.78		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	58.99354	MG/L	2.94
IRON	0.1	MG/L	0.00
MAGNESIUM	17.63801	MG/L	1.45
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.243868	MG/L	0.03
SODIUM	6.531986	MG/L	0.28
Cation Result Sum	84.72		

Total Result: **325.50** MG/L
TDS Result:
RPD:

Anion mEq Sum: **4.84**
Cation mEq Sum: **4.71**
RPD: 2.63%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

0910171-1 0910171-3

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Anion / Cation Summary Report

Lab ID: **1002035-1** QC Type: SMP
Field ID: SHS

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	225.7855	MG/L	4.51
CHLORIDE	1.158384	MG/L	0.03
FLUORIDE	0.1654984	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	13.85267	MG/L	0.29
Anion Result Sum	241.26		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	59.10007	MG/L	2.95
IRON	0.1	MG/L	0.00
MAGNESIUM	17.88037	MG/L	1.47
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.454276	MG/L	0.04
SODIUM	7.300859	MG/L	0.32
Cation Result Sum	86.05		

Total Result: **327.31** MG/L
TDS Result:
RPD:

Anion mEq Sum: **4.84**
Cation mEq Sum: **4.77**
RPD: 1.40%

Lab ID: **1002035-4** QC Type: SMP
Field ID: FC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	193.1939	MG/L	3.86
CHLORIDE	0.9142914	MG/L	0.03
FLUORIDE	0.1255097	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	3.470948	MG/L	0.07
Anion Result Sum	198.00		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	55.06482	MG/L	2.75
IRON	0.1685154	MG/L	0.01
MAGNESIUM	8.226967	MG/L	0.68
MANGANESE	0.02541313	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	8.461669	MG/L	0.37
Cation Result Sum	73.15		

Total Result: **271.15** MG/L
TDS Result:
RPD:

Anion mEq Sum: **3.97**
Cation mEq Sum: **3.80**
RPD: 4.19%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1002035-1 1002035-2 1002035-4 1002035-5

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Winter 2010: YCS, NTC

Anion / Cation Summary Report

Lab ID: **1002037-1** QC Type: SMP
Field ID: YCSs

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	321.5971	MG/L	6.43
CHLORIDE	1.946624	MG/L	0.05
FLUORIDE	0.1272936	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.464499	MG/L	0.11
Anion Result Sum	329.44		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	33.73761	MG/L	1.68
IRON	0.1	MG/L	0.00
MAGNESIUM	4.52917	MG/L	0.37
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	7.900157	MG/L	0.34
Cation Result Sum	47.48		

Total Result:	**376.91**	MG/L	Anion mEq Sum:	**6.60**
TDS Result:	**325.00003**	MG/L	Cation mEq Sum:	**2.40**
RPD:	14.79%		RPD:	93.37%

Lab ID: **1002037-3** QC Type: SMP
Field ID: NTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	120.9425	MG/L	2.42
CHLORIDE	0.9876777	MG/L	0.03
FLUORIDE	0.1465138	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	7.241666	MG/L	0.15
Anion Result Sum	129.62		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	101.3003	MG/L	5.05
IRON	0.1346028	MG/L	0.01
MAGNESIUM	12.62754	MG/L	1.04
MANGANESE	0.03253584	MG/L	0.00
POTASSIUM	1.11368	MG/L	0.03
SODIUM	12.53912	MG/L	0.55
Cation Result Sum	127.95		

Total Result:	**257.57**	MG/L	Anion mEq Sum:	**2.60**
TDS Result:	**134**	MG/L	Cation mEq Sum:	**6.68**
RPD:	63.11%		RPD:	87.78%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1002037-1 1002037-3 1002037-5 1002037-6

Winter 2010: MTC, SMTC

Anion / Cation Summary Report

Lab ID: **1002053-1** QC Type: SMP
Field ID: MTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	103.2723	MG/L	2.06
CHLORIDE	0.5375945	MG/L	0.02
FLUORIDE	0.1123518	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	6.278537	MG/L	0.13
Anion Result Sum	110.50		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	27.74692	MG/L	1.38
IRON	0.1	MG/L	0.00
MAGNESIUM	6.53878	MG/L	0.54
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	4.996381	MG/L	0.22
Cation Result Sum	40.59		

Total Result:	**151.09**	MG/L	
TDS Result:	**122.00001**	MG/L	
RPD:	21.31%		
Anion mEq Sum:	**2.22**		
Cation mEq Sum:	**2.14**		
RPD:	3.48%		

Lab ID: **1002053-4** QC Type: SMP
Field ID: SMTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	96.59695	MG/L	1.93
CHLORIDE	0.4724115	MG/L	0.01
FLUORIDE	0.1358945	MG/L	0.01
NITRATE AS N	0.2034253	MG/L	0.01
NITRITE AS N	0.1	MG/L	0.00
SULFATE	6.681052	MG/L	0.14
Anion Result Sum	104.19		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	22.82496	MG/L	1.14
IRON	0.1	MG/L	0.00
MAGNESIUM	4.249605	MG/L	0.35
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	8.099727	MG/L	0.35
Cation Result Sum	36.48		

Total Result:	**140.67**	MG/L	
TDS Result:	**105.00001**	MG/L	
RPD:	29.04%		
Anion mEq Sum:	**2.10**		
Cation mEq Sum:	**1.84**		
RPD:	13.36%		

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1002053-1 1002053-2 1002053-4 1002053-5

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Spring 2010: NTC, MTC, SMTC

Anion / Cation Summary Report

Lab ID: **1003317-1** QC Type: SMP
Field ID: NTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	109.1455	MG/L	2.18
CHLORIDE	0.9287528	MG/L	0.03
FLUORIDE	0.146924	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	8.115089	MG/L	0.17
Anion Result Sum	118.64		

Analyte	Final Result	Report Units	mEq
ALUMINUM	1.055242	MG/L	0.12
CALCIUM	33.15264	MG/L	1.65
IRON	0.6988318	MG/L	0.04
MAGNESIUM	4.328597	MG/L	0.36
MANGANESE	0.02231777	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	7.879031	MG/L	0.34
Cation Result Sum	48.14		

Total Result:	**166.77**	MG/L	Anion mEq Sum:	**2.38**
TDS Result:	**124.00001**	MG/L	Cation mEq Sum:	**2.51**
RPD:	29.42%		RPD:	5.10%

Lab ID: **1003317-2** QC Type: SMP
Field ID: MTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	98.64696	MG/L	1.97
CHLORIDE	0.4759223	MG/L	0.01
FLUORIDE	0.1191225	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.970944	MG/L	0.12
Anion Result Sum	105.51		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	26.86173	MG/L	1.34
IRON	0.1	MG/L	0.00
MAGNESIUM	6.424129	MG/L	0.53
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	4.722322	MG/L	0.21
Cation Result Sum	39.32		

Total Result:	**144.83**	MG/L	Anion mEq Sum:	**2.12**
TDS Result:	**113.00001**	MG/L	Cation mEq Sum:	**2.07**
RPD:	24.69%		RPD:	1.96%

Lab ID: **1003317-4** QC Type: SMP
Field ID: SMTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	85.37518	MG/L	1.71
CHLORIDE	0.4316076	MG/L	0.01
FLUORIDE	0.1484167	MG/L	0.01

Anion / Cation Summary Report

NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.930383	MG/L	0.12
Anion Result Sum	92.19		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	21.07091	MG/L	1.05
IRON	0.1	MG/L	0.00
MAGNESIUM	4.01142	MG/L	0.33
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	7.639771	MG/L	0.33
Cation Result Sum	34.03		

Total Result:	**126.22**	MG/L	Anion mEq Sum:	**1.85**
TDS Result:	**87.000008**	MG/L	Cation mEq Sum:	**1.71**
RPD:	36.79%		RPD:	7.62%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1003317-1 1003317-2 1003317-4 1003317-6 1003317-7 1003317-8

Anion / Cation Summary Report

Lab ID: **1004020-1** QC Type: SMP
Field ID: FC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	165.9963	MG/L	3.32
CHLORIDE	0.8542448	MG/L	0.02
FLUORIDE	0.1108972	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	3.397229	MG/L	0.07
Anion Result Sum	170.66		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	46.88816	MG/L	2.34
IRON	0.2187751	MG/L	0.01
MAGNESIUM	6.911707	MG/L	0.57
MANGANESE	0.02787443	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	7.144548	MG/L	0.31
Cation Result Sum	62.39		

Total Result: **233.05** MG/L
TDS Result: **168.00002** MG/L
RPD: 32.44%

Anion mEq Sum: **3.42**
Cation mEq Sum: **3.23**
RPD: 5.60%

Lab ID: **1004020-4** QC Type: SMP
Field ID: SHS

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	222.6489	MG/L	4.45
CHLORIDE	1.275503	MG/L	0.04
FLUORIDE	0.1609404	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	13.33725	MG/L	0.28
Anion Result Sum	237.72		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	60.83315	MG/L	3.04
IRON	0.1	MG/L	0.00
MAGNESIUM	18.71181	MG/L	1.54
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1.349598	MG/L	0.03
SODIUM	7.031147	MG/L	0.31
Cation Result Sum	88.24		

Total Result: **325.96** MG/L
TDS Result: **239.00002** MG/L
RPD: 30.78%

Anion mEq Sum: **4.77**
Cation mEq Sum: **4.92**
RPD: 2.97%

Lab ID: **1004020-7** QC Type: SMP
Field ID: YCSs

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	317.3342	MG/L	6.34
CHLORIDE	2.165137	MG/L	0.06
FLUORIDE	0.1368809	MG/L	0.01

Anion / Cation Summary Report

NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	5.14565	MG/L	0.11
Anion Result Sum	325.08		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.2	MG/L	0.00
CALCIUM	98.20918	MG/L	4.90
IRON	0.1	MG/L	0.00
MAGNESIUM	12.41937	MG/L	1.02
MANGANESE	0.01	MG/L	0.00
POTASSIUM	1	MG/L	0.00
SODIUM	11.73516	MG/L	0.51
Cation Result Sum	123.67		

Total Result:	**448.76**	MG/L
TDS Result:	**321**	MG/L
RPD:	33.19%	

Anion mEq Sum:	**6.52**
Cation mEq Sum:	**6.43**
RPD:	1.30%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1004020-1 1004020-2 1004020-4 1004020-5 1004020-7 1004020-8

Summer 2010: FC, SHS

Anion / Cation Summary Report

Lab ID: **1006015-1** QC Type: SMP
Field ID: FC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	64.21491	MG/L	1.28
CHLORIDE	0.5656987	MG/L	0.02
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	2.235359	MG/L	0.05
Anion Result Sum	67.42		

Analyte	Final Result	Report Units	mEq
ALUMINUM	1.138507	MG/L	0.13
CALCIUM	20.3999	MG/L	1.02
IRON	0.989859	MG/L	0.05
MAGNESIUM	3.237162	MG/L	0.27
MANGANESE	0.03910439	MG/L	0.00
POTASSIUM	0.7582052	MG/L	0.02
SODIUM	2.944108	MG/L	0.13
Cation Result Sum	29.51		

Total Result:	**96.92**	MG/L	Anion mEq Sum:	**1.35**
TDS Result:	**96.000008**	MG/L	Cation mEq Sum:	**1.61**
RPD:	0.96%		RPD:	18.06%

Lab ID: **1006015-3** QC Type: SMP
Field ID: SHS

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	226.4999	MG/L	4.53
CHLORIDE	1.728903	MG/L	0.05
FLUORIDE	0.1587997	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	14.19597	MG/L	0.30
Anion Result Sum	242.88		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.05252626	MG/L	0.01
CALCIUM	63.28811	MG/L	3.16
IRON	0.01385379	MG/L	0.00
MAGNESIUM	18.82496	MG/L	1.55
MANGANESE	0.000766335	MG/L	0.00
POTASSIUM	1.652447	MG/L	0.04
SODIUM	7.73214	MG/L	0.34
Cation Result Sum	91.56		

Total Result:	**334.45**	MG/L	Anion mEq Sum:	**4.88**
TDS Result:	**229.00002**	MG/L	Cation mEq Sum:	**5.09**
RPD:	37.43%		RPD:	4.27%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1006015-1 1006015-3 1006015-5 1006015-6

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Summer 2010: MTC and Replicates (labeled DC and RC)

Anion / Cation Summary Report

Lab ID: **1006030-1** QC Type: SMP
Field ID: MTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	28.86176	MG/L	0.58
CHLORIDE	0.277159	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	1.894995	MG/L	0.04
Anion Result Sum	31.43		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.6134501	MG/L	0.07
CALCIUM	8.566739	MG/L	0.43
IRON	0.474	MG/L	0.03
MAGNESIUM	2.060182	MG/L	0.17
MANGANESE	0.01019891	MG/L	0.00
POTASSIUM	0.329751	MG/L	0.01
SODIUM	1.436034	MG/L	0.06
Cation Result Sum	13.49		

Total Result:	**44.92**	MG/L	Anion mEq Sum:	**0.62**
TDS Result:	**66**	MG/L	Cation mEq Sum:	**0.76**
RPD:	38.00%		RPD:	19.89%

Lab ID: **1006030-3** QC Type: SMP
Field ID: DC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	29.16136	MG/L	0.58
CHLORIDE	0.2829698	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	1.882588	MG/L	0.04
Anion Result Sum	31.73		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.7001793	MG/L	0.08
CALCIUM	8.582409	MG/L	0.43
IRON	0.5197123	MG/L	0.03
MAGNESIUM	2.082221	MG/L	0.17
MANGANESE	0.01034884	MG/L	0.00
POTASSIUM	0.3581434	MG/L	0.01
SODIUM	1.46419	MG/L	0.06
Cation Result Sum	13.72		

Total Result:	**45.44**	MG/L	Anion mEq Sum:	**0.63**
TDS Result:	**65**	MG/L	Cation mEq Sum:	**0.78**
RPD:	35.41%		RPD:	21.10%

Lab ID: **1006030-5** QC Type: SMP
Field ID: RC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	29.3611	MG/L	0.59
CHLORIDE	0.2702643	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00

Anion / Cation Summary Report

NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	1.903211	MG/L	0.04
Anion Result Sum	31.93		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.7053843	MG/L	0.08
CALCIUM	8.593102	MG/L	0.43
IRON	0.5176541	MG/L	0.03
MAGNESIUM	2.064719	MG/L	0.17
MANGANESE	0.01057374	MG/L	0.00
POTASSIUM	0.3598258	MG/L	0.01
SODIUM	1.44807	MG/L	0.06
Cation Result Sum	13.70		

Total Result:	**45.63**	MG/L	Anion mEq Sum:	**0.63**
TDS Result:	**63.000004**	MG/L	Cation mEq Sum:	**0.78**
RPD:	31.97%		RPD:	20.33%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1006030-1 1006030-3 1006030-5 1006030-7 1006030-8 1006030-9

Summer 2010: YCS, NTC

Anion / Cation Summary Report

Lab ID: **1006057-1** QC Type: SMP
Field ID: YCSs

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	300.0025	MG/L	6.00
CHLORIDE	1.701527	MG/L	0.05
FLUORIDE	0.1270558	MG/L	0.01
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	4.891976	MG/L	0.10
Anion Result Sum	307.02		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.0161	MG/L	0.00
CALCIUM	92.04265	MG/L	4.59
IRON	0.00716	MG/L	0.00
MAGNESIUM	11.67352	MG/L	0.96
MANGANESE	0.001248253	MG/L	0.00
POTASSIUM	1.156476	MG/L	0.03
SODIUM	12.95634	MG/L	0.56
Cation Result Sum	117.85		

Total Result:	**424.88**	MG/L	Anion mEq Sum:	**6.15**
TDS Result:	**313**	MG/L	Cation mEq Sum:	**6.15**
RPD:	30.32%		RPD:	0.09%

Lab ID: **1006057-3** QC Type: SMP
Field ID: NTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	45.14019	MG/L	0.90
CHLORIDE	0.3880782	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	2.070923	MG/L	0.04
Anion Result Sum	48.00		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.8427098	MG/L	0.09
CALCIUM	13.72926	MG/L	0.69
IRON	0.7563307	MG/L	0.04
MAGNESIUM	1.961436	MG/L	0.16
MANGANESE	0.02471508	MG/L	0.00
POTASSIUM	0.4120083	MG/L	0.01
SODIUM	2.687719	MG/L	0.12
Cation Result Sum	20.41		

Total Result:	**68.41**	MG/L	Anion mEq Sum:	**0.96**
TDS Result:	**82.000008**	MG/L	Cation mEq Sum:	**1.11**
RPD:	18.07%		RPD:	14.81%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

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Summer 2010: SMTC, SMTSp

Anion / Cation Summary Report

Lab ID: **1006086-1** QC Type: SMP
Field ID: SMTC

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	22.48055	MG/L	0.45
CHLORIDE	0.3952594	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	2.401025	MG/L	0.05
Anion Result Sum	25.68		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.8417616	MG/L	0.09
CALCIUM	7.324284	MG/L	0.37
IRON	1.019493	MG/L	0.05
MAGNESIUM	1.388958	MG/L	0.11
MANGANESE	0.02215589	MG/L	0.00
POTASSIUM	0.3149644	MG/L	0.01
SODIUM	1.393581	MG/L	0.06
Cation Result Sum	12.31		

Total Result:	**37.98**	MG/L	Anion mEq Sum:	**0.51**
TDS Result:	**69**	MG/L	Cation mEq Sum:	**0.70**
RPD:	57.99%		RPD:	30.99%

Lab ID: **1006086-3** QC Type: SMP
Field ID: SMTSp

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	130.5066	MG/L	2.61
CHLORIDE	0.502465	MG/L	0.01
FLUORIDE	0.1083919	MG/L	0.01
NITRATE AS N	0.3045043	MG/L	0.02
NITRITE AS N	0.1	MG/L	0.00
SULFATE	4.471834	MG/L	0.09
Anion Result Sum	135.99		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.06562223	MG/L	0.01
CALCIUM	37.15404	MG/L	1.85
IRON	0.1067471	MG/L	0.01
MAGNESIUM	6.454059	MG/L	0.53
MANGANESE	0.003756908	MG/L	0.00
POTASSIUM	0.7835966	MG/L	0.02
SODIUM	4.436652	MG/L	0.19
Cation Result Sum	49.00		

Total Result:	**185.00**	MG/L	Anion mEq Sum:	**2.74**
TDS Result:	**147**	MG/L	Cation mEq Sum:	**2.61**
RPD:	22.89%		RPD:	4.92%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

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Summer 2010: WCWPS

Anion / Cation Summary Report

Lab ID: **1006105-1** QC Type: SMP
Field ID: WCWPS

Analyte	Final Result	Report Units	mEq
BICARBONATE AS CaCO3	26.55889	MG/L	0.53
CHLORIDE	0.4283106	MG/L	0.01
FLUORIDE	0.1	MG/L	0.00
NITRATE AS N	0.2	MG/L	0.00
NITRITE AS N	0.1	MG/L	0.00
SULFATE	1.962088	MG/L	0.04
Anion Result Sum	29.35		

Analyte	Final Result	Report Units	mEq
ALUMINUM	0.07081212	MG/L	0.01
CALCIUM	7.224989	MG/L	0.36
IRON	0.0500594	MG/L	0.00
MAGNESIUM	0.8885789	MG/L	0.07
MANGANESE	0.001398022	MG/L	0.00
POTASSIUM	0.1695862	MG/L	0.00
SODIUM	2.961707	MG/L	0.13
Cation Result Sum	11.37		

Total Result:	**40.72**	MG/L
TDS Result:	**61.000004**	MG/L
RPD:	39.88%	

Anion mEq Sum:	**0.58**
Cation mEq Sum:	**0.58**
RPD:	1.08%

Below is a list of Lab IDs for this Order Number that were logged in for metals analyses. Note: if this area is empty then either no metals analyses were requested or the cations of interest were not requested.

1006105-1 1006105-3

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