ENVIRONMENTAL DYNAMICS INC.

2195 – 2ND Ave
Whitehorse, YT Y1A 3T8
P: (867) 393-4882 ▪ F: (867) 393-4883

February 24, 2014

EDI Job Number: 13-Y-0452

Assessment and Abandoned Mines
Yukon Government
Box 2703, K-419
Whitehorse, YT Y1A 2C6

Attention: Adrienne Turcotte, Project Officer

Re: Faro Rose Creek Surface and Groundwater Sampling Field Program – Trip 12

In response to an urgent request by Assessment and Abandoned Mines (AAM), EDI Environmental Dynamics Inc. (EDI) has been conducting on-going water quality sampling and fish telemetry surveys at the Faro Mine Site since November 2013. Table 1, attached, summarizes the field trips completed. The intent of this memo is to summarize field data obtained during the February 11 & 13, 2014 field program, referred to as Trip 12.

The objective of Trip 12 was to complete the following tasks:

- Surface water sampling at 11 regular monitoring sites, including QA/QC samples; and,
- Surface water sampling in Rose Creek downstream from the mine at Site R3.

The field program conducted February 11 and 13, 2014 experienced extreme cold weather conditions (i.e., air temperatures between -27˚C and -35˚C) that limited the field crew and the equipment abilities. The equipment used to measure in-situ water quality parameters cannot withstand extreme cold temperatures; therefore, in-situ parameters were not measured. Turbidity samples were collected at all sites on February 11, 2014 and measured in the truck. The cold temperatures were also not favorable for water filtration; therefore, samples were processed (i.e., filtering and preserving) within the cab of the truck. Water samples were not collected at NF2-A and NF2-B, which were frozen to bed. Samples were not collected at sites R8 and NF1 due to cold temperatures.

On February 13, 2014, a downstream site, R3, was accessed via helicopter. For comparison, site X14 was resampled the same day. Due to extreme cold temperatures, in-situ data was not collected at either of these sites.

Field data collected at each surface water sampling site is summarized in Table 2, attached. Figure 1 provides the locations of all water quality sampling. Representative photos of each site and the ALS laboratory analytical reports for all water chemistry samples submitted during this field trip are also attached.

If you have any questions or concerns, please do not hesitate to contact Pat Tobler or myself at (867) 393-4882 or through email at mkearns@edynamics.com.

Yours truly,

EDI Environmental Dynamics Inc.

Submitted via email

Meighan Kearns, B.Sc., R.P.Bio.
Aquatic Biologist

Attachments:

- Table 1. Summary of Trips 1 to 12, Faro Mine Site.
- Table 2. Surface water sampling field data, Trip 12, February 11 & 13, 2014.
- Figure 1. Location of surface water sampling, Faro Mine Site, February 11 & 13, 2014.
- Photos 1 – 11. Representative site photos.
- ALS Laboratory Analytical Reports

Table 1. Summary of Trips 1 to 12, Faro Mine Site.

Trip No.	Dates	General Tasks
1	Nov 12 – 14, 2013	• Fish telemetry • Piezometer water depth measurements • Ground water sampling • Surface water sampling
2	Nov 27 – 30, 2013	• Fish telemetry • Surface water sampling
3	Dec 10, 2013	• Fish telemetry
4	Dec 19 – 20, 2013	• Surface water sampling
5	Dec 27, 2013	• Surface water sampling
6	Jan 2, 2014	• Surface water sampling
7	Jan 7 – 8, 2014	• Fish telemetry • Surface water sampling
8	Jan 14 – 15, 2014	• Surface water sampling • Fish telemetry
9	Jan 21, 2014	• Surface water sampling
10	Jan 28 – 29, 2014	• Surface water sampling • Fish telemetry
11	Feb 5, 2014	• Surface water sampling
12	Feb 11 & 13, 2014	• Surface water sampling

Table 2. Surface water sampling field data, February 11 & 13, 2014.

Site Name	UTM Location (NAD83/ Zone 8)		Sample		QA/ QC Rep. ID	In-situ Parameters			
	Easting	Northing	Date	Time		Temp (°C)	SPC (µS/cm)	pH	Turbidity (NTU)
X14	579343	6915079	11-Feb-14	14:25	X14-r	-	-	-	3.24
X10	579445	6914882	11-Feb-14	14:50	-	-	-	-	1.47
X3A	583154	6912539	11-Feb-14	15:05	-	-	-	-	1.27
X2	584070	6912767	11-Feb-14	15:25	-	-	-	-	1.37
NF2-A	584706	6913031	11-Feb-14	15:39	-	- [(a)]	- [(a)]	- [(a)]	- [(a)]
NF2-B	584724	6913019	11-Feb-14	15:40	-	- [(a)]	- [(a)]	- [(a)]	- [(a)]
NF2	584690	6913012	11-Feb-14	15:50	-	-	-	-	1.16
NF1	584840	6913219	11-Feb-14	-	-	- [(b)]	- [(b)]	- [(b)]	- [(b)]
R10	585107	6913479	11-Feb-14	16:35	-	-	-	-	1.02
R9	585229	6913662	11-Feb-14	16:20	-	-	-	-	1.09
R8	586302	6914401	11-Feb-14	-	-	- [(b)]	- [(b)]	- [(b)]	- [(b)]
R3	575295	6916834	13-Feb-14	9:50	-	-	-	-	-
X14	579341	6915082	13-Feb-14	11:10	-	-	-	-	-

Where, UTM = Universal Transverse Mercator;
QA/QC Rep = Quality Assurance/ Quality Control Replicate;
Temp = water temperature; and,
SPC = specific conductance.

Notes: [(a)] Site frozen to bottom substrate; and,
[(b)] Extreme cold prevented sampling.

Location of surface water sampling, Faro Mine Site, February 11 and 13, 2014

Legend

Surface Water Sampling Site

- Surface Water Sample Collected
- Site Not Sampled
- Frozen To Bed
- Road (Mine Access/Haul)
- Topographic Contour (30 m Interval)

N
W E
S

0 500 1,000 1,500 2,000
metres

Map Scale = 1:30,000 (printed on 11 x 17)
Map Projection: North American Datum 1983 UTM Zone 8N

Data sources

1:50,000 topographic spatial data provided by Geomatics - Yukon Government via online source (Corporate Spatial Warehouse) www.geomaticsyukon.ca.

National Road Network courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Detailed toppgraphic features of the Faro, Grum and Vangorda mine sites were provided by Yukon Government - Energy, Mines and Resources - Assessment and Abandoned Mines Branch (March 2012).

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. was obtained using Garmin GPS technology.

This document is not an official land survey and the spatial data presented is subject to change.

Drawn:	Checked:	FIGURE 1	Date: 24/02/2014
LG	MK		

Map Area
Town of Faro

EDI

Map Prepared by
EDI Environmental Dynamics Inc.

Path: J:\Yukon\Projects\2013\13_Y_0452_AAM_NF_Sampling\Mapping\February\Fig1_WaterSamplingSites_Feb11_13.mxd

Site Photos

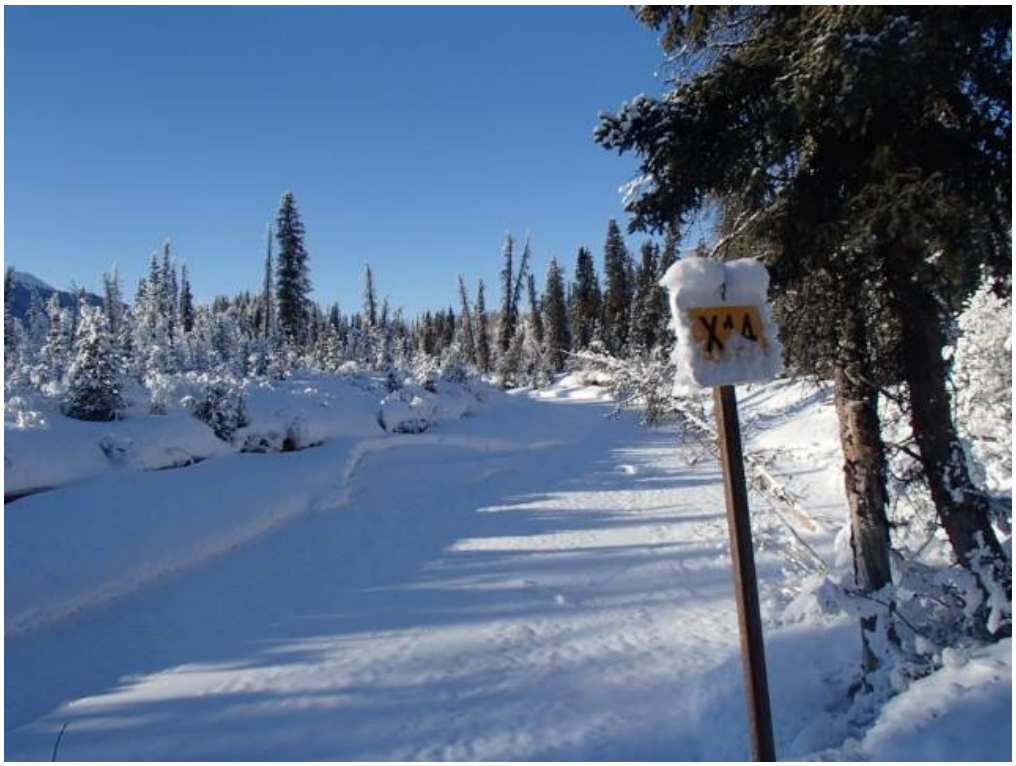

Photo 1. Downstream view at surface water sampling site X14, February 11, 2014.

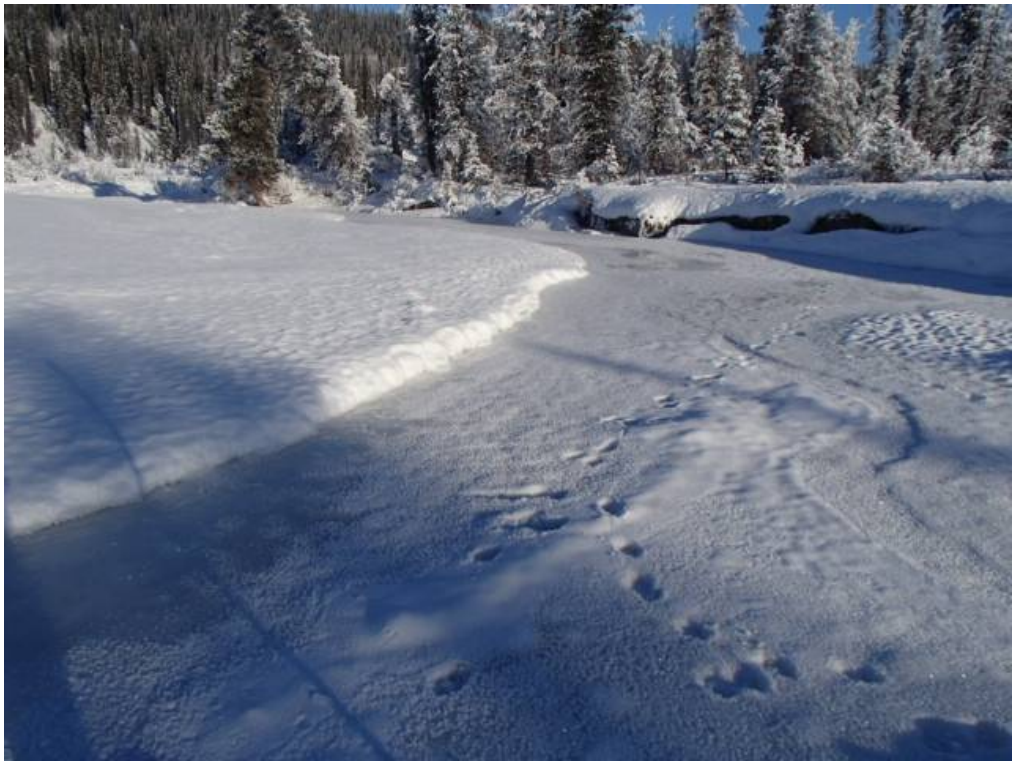

Photo 2. Downstream view at surface water sampling site at X10, February 11, 2014.

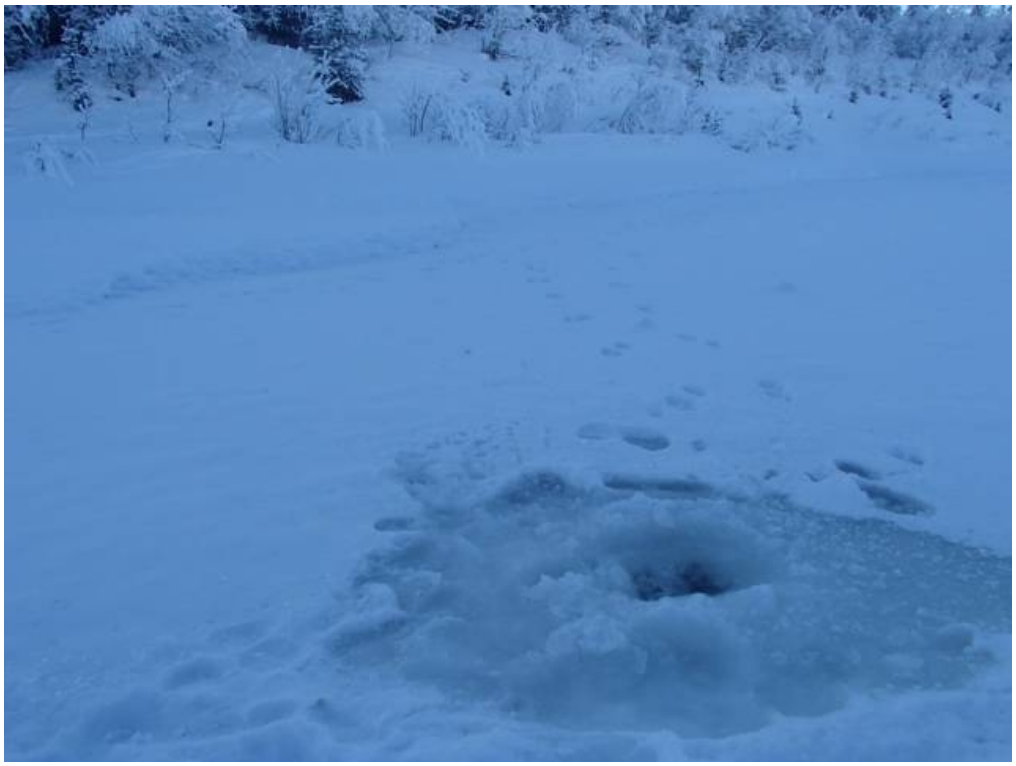

Photo 3. Overview at surface water sampling site at X3A, February 11, 2014.

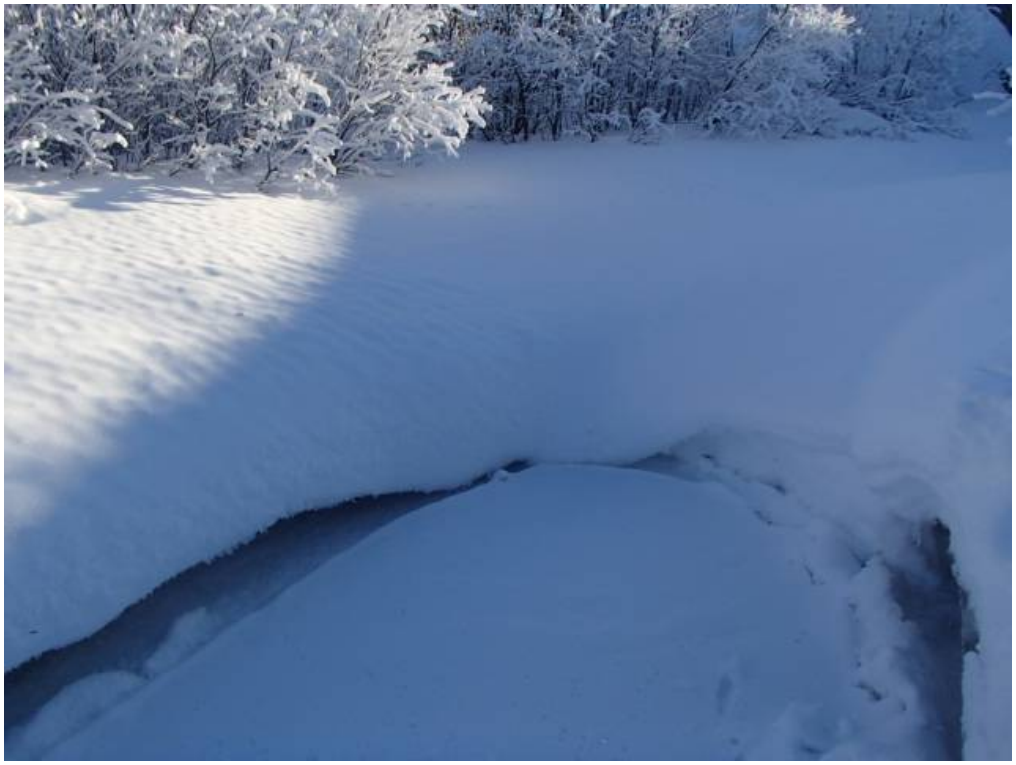

Photo 4. Downstream view at surface water sampling site at X2, February 11, 2014.

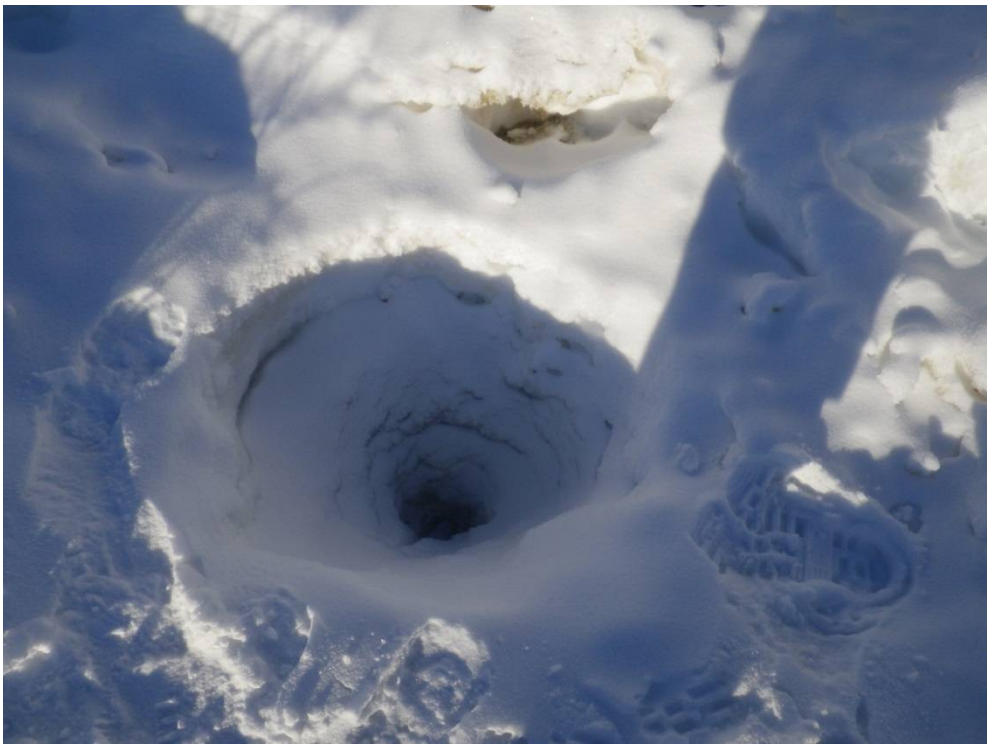

Photo 5. Overview at surface water sampling site at NF2-A Frozen to Bed, February 11, 2014.

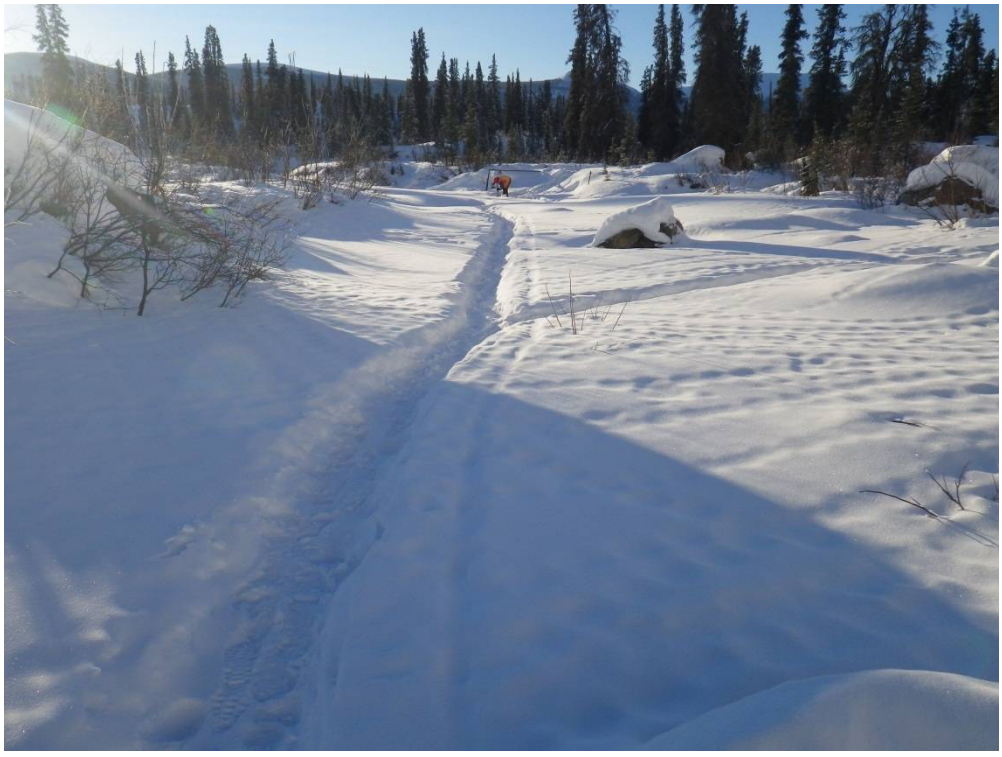

Photo 6. Downstream view at surface water sampling site at NF2-B, February 11, 2014.

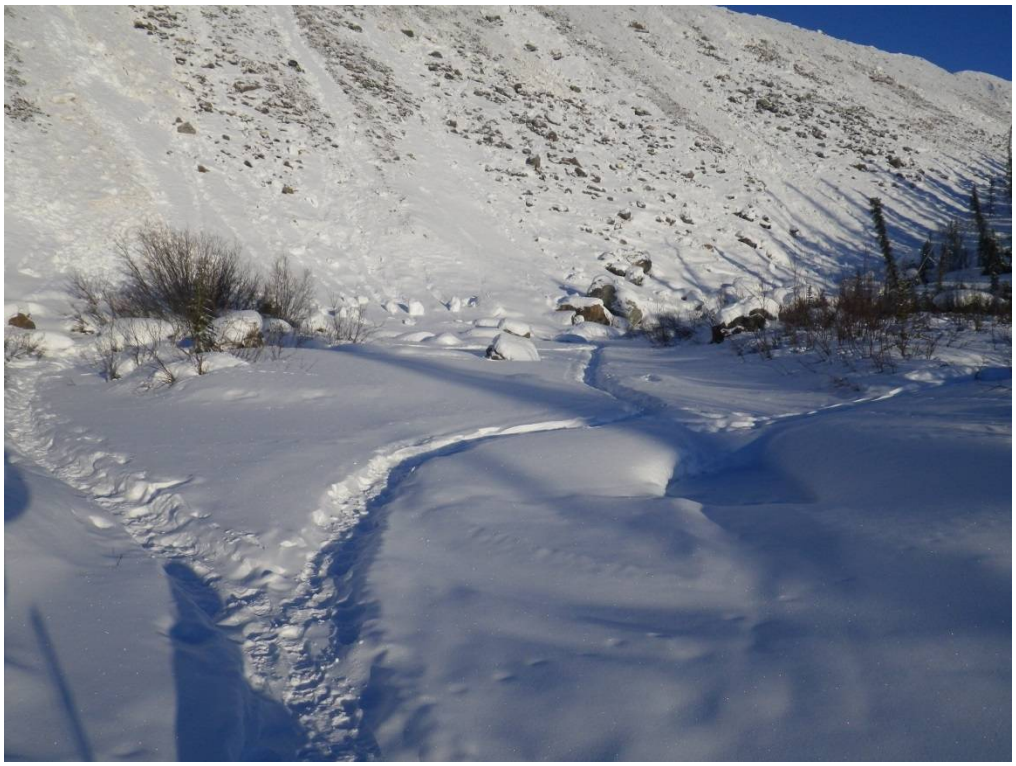

Photo 7. Upstream view at surface water sampling site at NF2, February 11, 2014.

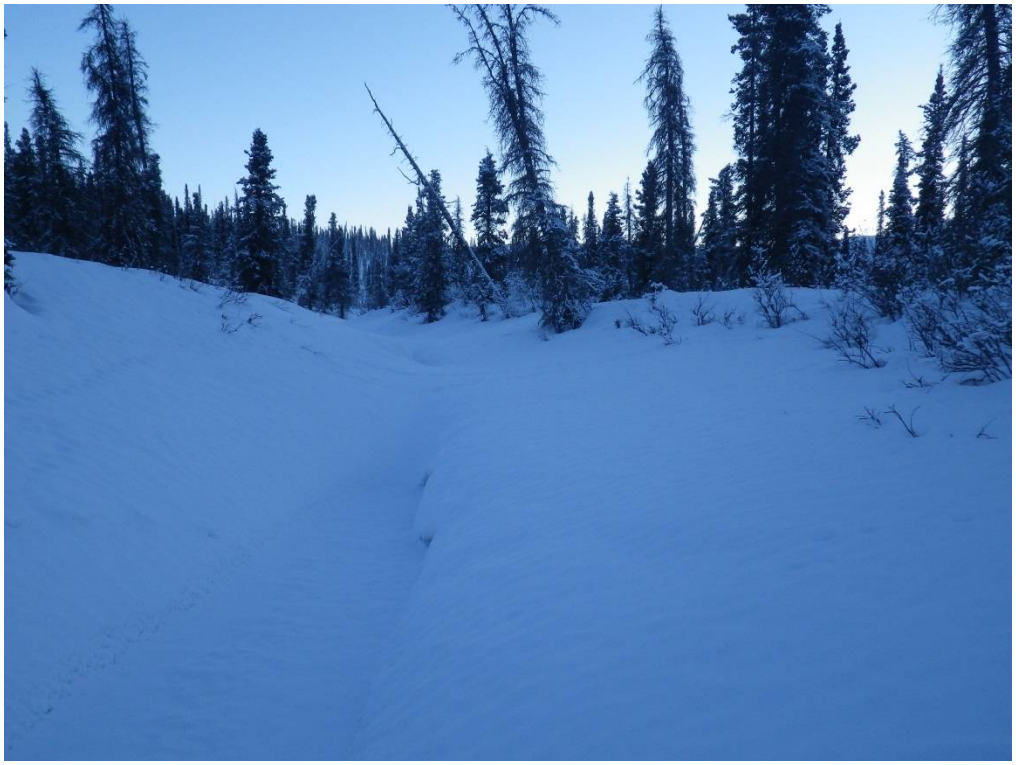

Photo 8. Downstream view at surface water sampling site at R10, February 11, 2014.

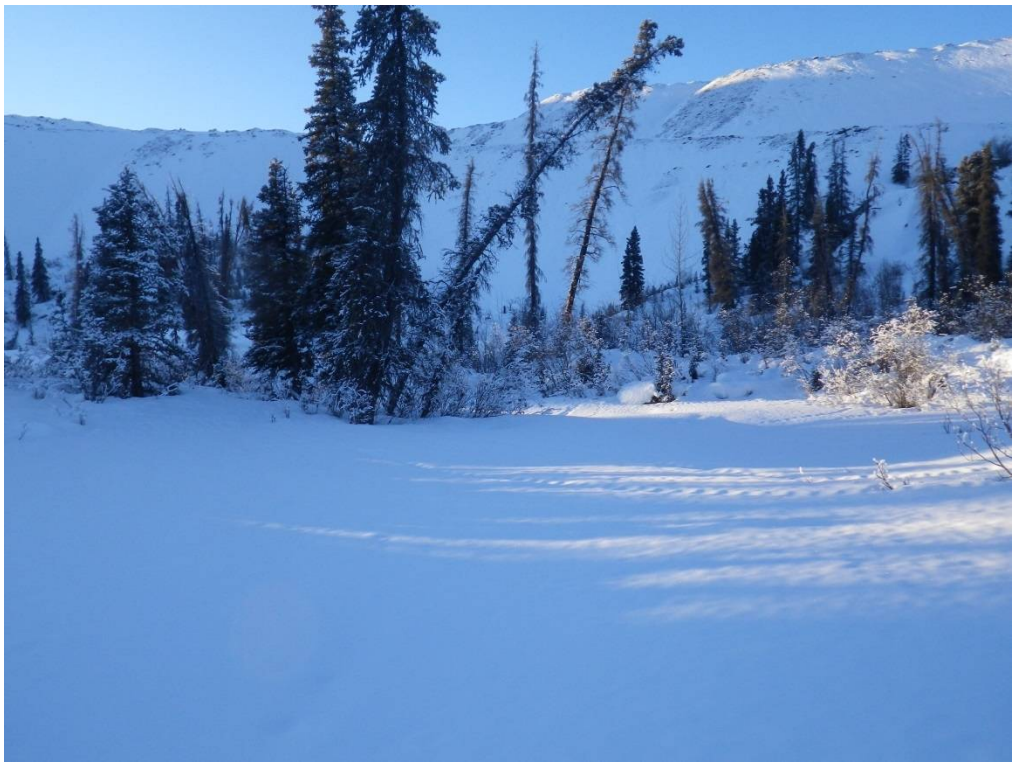

Photo 9. Downstream view at surface water sampling site R9, February 11, 2014.

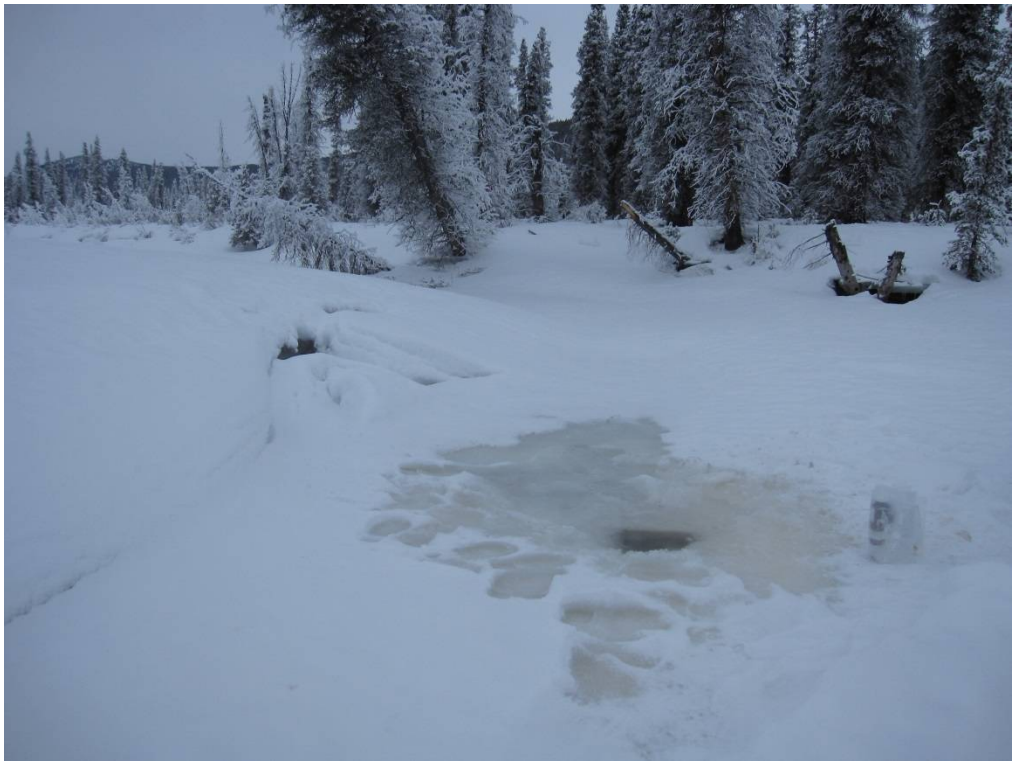

Photo 10. Downstream view at surface water sampling site R3, February 13, 2014.

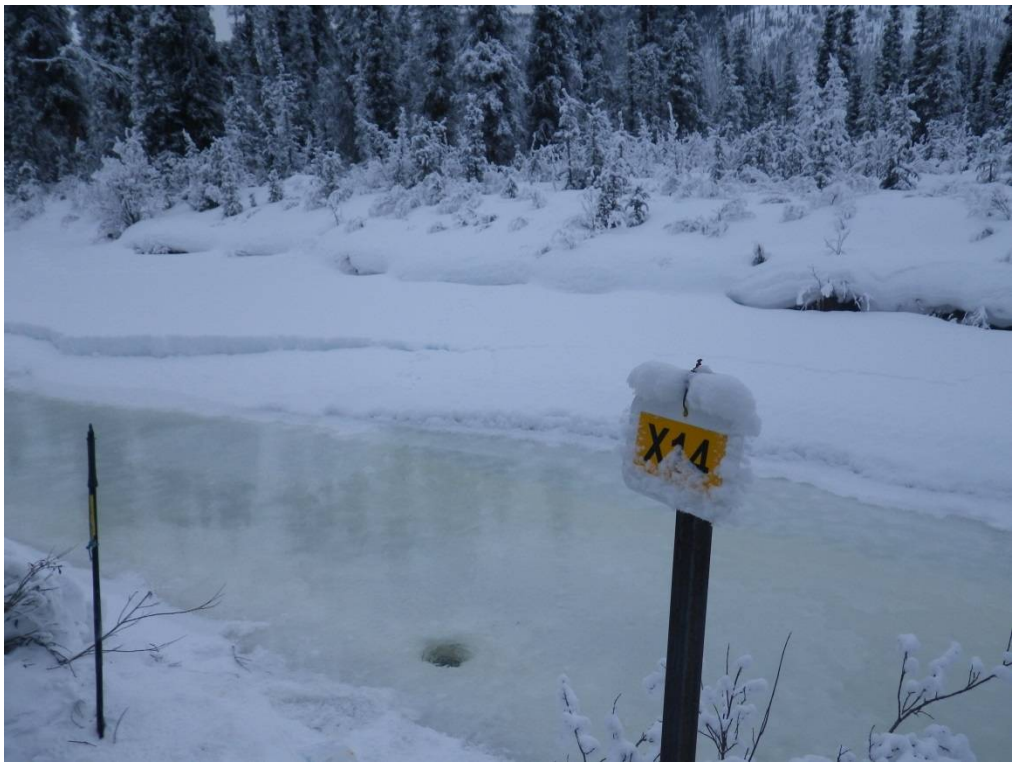

Photo 11. Overview at surface water sampling site X14, February 13, 2014.

ENVIRONMENTAL DYNAMICS INC.
ATTN: Meighan Kearns
2195 - 2nd Avenue
Whitehorse YT Y1A 3T8

Date Received: 12-FEB-14
Report Date: 17-FEB-14 16:39 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1421713

Project P.O. #: NOT SUBMITTED
Job Reference: 13-Y-0452
C of C Numbers: 1, 2
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1421713-1 Surface Water 12-FEB-14 13:00 TRAVEL BLANK	L1421713-2 Surface Water 11-FEB-14 15:25 X2	L1421713-3 Surface Water 11-FEB-14 14:50 X10	L1421713-4 Surface Water 11-FEB-14 19:20 FIELD BLANK	L1421713-5 Surface Water 11-FEB-14 15:50 NF2
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	297	301	<2.0	289
	Hardness (as CaCO3) (mg/L)	<0.50	148	161	<0.50	149
	pH (pH)	5.71	7.48	7.73	5.85	7.42
	Total Suspended Solids (mg/L)	<1.0	1.2	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	<1.0	176	181	<1.0	173
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	128	134	<2.0	129
	Ammonia, Total (as N) (mg/L)	<0.0050	0.0061	0.0086	<0.0050	0.0083
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	<0.020	0.186	0.173	<0.020	0.184
	Nitrate (as N) (mg/L)	<0.0050	0.270	0.258	<0.0050	0.299
	Nitrite (as N) (mg/L)	<0.0010	0.0012	<0.0010	<0.0010	0.0011
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0023	<0.0020	<0.0020	0.0024
	Sulfate (SO4) (mg/L)	<0.50	39.4	36.3	<0.50	34.5
	Anion Sum (meq/L)	<0.10	3.41	3.46	<0.10	3.33
	Cation Sum (meq/L)	<0.10	3.17	3.42	<0.10	3.18
	Cation - Anion Balance (%)	0.0	-3.7	-0.6	0.0	-2.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		1.36	1.37	<0.50	1.33
	Total Organic Carbon (mg/L)	<0.50	1.38	1.29	<0.50	1.32
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	0.0238	0.0063	<0.0030	0.0189
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	0.00042	0.00026	<0.00010	0.00043
	Barium (Ba)-Total (mg/L)	<0.000050	0.0736	0.0709	<0.000050	0.0723
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	<0.000010	0.000573	0.000266	<0.000010	0.000654
	Calcium (Ca)-Total (mg/L)	<0.020	39.1	44.7	<0.020	43.1
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00387	0.00117	<0.00010	0.00440
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	0.270	0.207	<0.010	0.237
	Lead (Pb)-Total (mg/L)	<0.000050	0.000326	0.000150	<0.000050	0.000301
	Lithium (Li)-Total (mg/L)	<0.00050	0.00764	0.00649	<0.00050	0.00788
	Magnesium (Mg)-Total (mg/L)	<0.0050	10.8	11.0	<0.0050	10.7
	Manganese (Mn)-Total (mg/L)	<0.000050	0.257	0.111	<0.000050	0.249
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000756	0.000702	<0.000050	0.000877

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1421713-6 Surface Water 11-FEB-14 14:25 X14	L1421713-7 Surface Water 11-FEB-14 16:20 R9	L1421713-8 Surface Water 11-FEB-14 14:25 X14-R	L1421713-9 Surface Water 11-FEB-14 16:35 R10	L1421713-10 Surface Water 11-FEB-14 15:05 X3A
WATER						
Physical Tests	Conductivity (uS/cm)	610	269	638	261	301
	Hardness (as CaCO3) (mg/L)	386	139	383	143	150
	pH (pH)	7.56	7.86	7.56	7.72	7.56
	Total Suspended Solids (mg/L)	2.0	<1.0	1.8	<1.0	1.6
	Total Dissolved Solids (mg/L)	475	154	475	155	176
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	171	127	169	125	130
	Ammonia, Total (as N) (mg/L)	0.0867	0.0053	0.0769	<0.0050	0.0187
	Chloride (Cl) (mg/L)	<0.50	<0.50	0.68	<0.50	<0.50
	Fluoride (F) (mg/L)	0.165	0.169	0.164	0.169	0.175
	Nitrate (as N) (mg/L)	0.224	0.284	0.224	0.272	0.255
	Nitrite (as N) (mg/L)	<0.0010	0.0011	<0.0010	0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0041	<0.0020	0.0047	0.0031
	Sulfate (SO4) (mg/L)	218	21.5	219	22.0	36.7
	Anion Sum (meq/L)	7.98	3.02	8.00	2.99	3.39
	Cation Sum (meq/L)	8.26	2.95	8.21	3.02	3.20
	Cation - Anion Balance (%)	1.7	-1.2	1.3	0.5	-2.9
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.35	1.28	1.28	1.16	1.45
	Total Organic Carbon (mg/L)	1.40	1.20	1.13	1.41	1.43
Total Metals	Aluminum (Al)-Total (mg/L)	0.0150	0.0132	0.0132	0.0100	0.0236
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00037	0.00058	0.00038	0.00054	0.00043
	Barium (Ba)-Total (mg/L)	0.0687	0.0710	0.0721	0.0700	0.0726
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.000261	<0.000010	0.000274	0.000016	0.000391
	Calcium (Ca)-Total (mg/L)	98.5	36.9	103	37.5	41.8
	Chromium (Cr)-Total (mg/L)	0.00011	0.00012	<0.00010	<0.00010	0.00013
	Cobalt (Co)-Total (mg/L)	0.00361	<0.00010	0.00357	<0.00010	0.00247
	Copper (Cu)-Total (mg/L)	0.00058	<0.00050	<0.00050	<0.00050	0.00074
	Iron (Fe)-Total (mg/L)	0.734	0.138	0.732	0.136	0.341
	Lead (Pb)-Total (mg/L)	0.000168	0.000429	0.000222	0.000057	0.000581
	Lithium (Li)-Total (mg/L)	0.00745	0.00601	0.00773	0.00626	0.00615
	Magnesium (Mg)-Total (mg/L)	23.7	8.67	23.8	8.57	10.8
	Manganese (Mn)-Total (mg/L)	4.00	0.0227	3.97	0.0248	0.207
	Molybdenum (Mo)-Total (mg/L)	0.000680	0.000821	0.000704	0.000801	0.000682

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1421713-1	L1421713-2	L1421713-3	L1421713-4	L1421713-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	12-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14
Sampled Time	13:00	15:25	14:50	19:20	15:50
Client ID	TRAVEL BLANK	X2	X10	FIELD BLANK	NF2
Grouping / **Analyte**					
WATER					
Total Metals Nickel (Ni)-Total (mg/L)	<0.00050	0.00603	0.00371	<0.00050	0.00664
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	<0.050	1.01	1.09	<0.050	1.00
Selenium (Se)-Total (mg/L)	<0.00010	0.00041	0.00039	<0.00010	0.00042
Silicon (Si)-Total (mg/L)	<0.050	5.61	5.48	<0.050	5.96
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	<0.050	3.05	2.94	<0.050	3.13
Strontium (Sr)-Total (mg/L)	<0.00020	0.176	0.207	<0.00020	0.192
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	<0.000010	0.00238	0.00267	<0.000010	0.00261
Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total (mg/L)	<0.0030	0.936	0.532	<0.0030	1.01
Zirconium (Zr)-Total (mg/L)	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Dissolved Metals Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)		0.0028	0.0015	<0.0010	0.0041
Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)		0.00020	0.00015	<0.00010	0.00028
Barium (Ba)-Dissolved (mg/L)		0.0755	0.0806	0.000174 RRV	0.0714
Beryllium (Be)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved (mg/L)		0.000603	0.000282	<0.000010	0.000634
Calcium (Ca)-Dissolved (mg/L)		39.4	43.7	<0.020	41.5
Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved (mg/L)		0.00410	0.00131	<0.00010	0.00426
Copper (Cu)-Dissolved (mg/L)		0.00029	0.00033	<0.00020	0.00028
Iron (Fe)-Dissolved (mg/L)		0.045	0.017	<0.010	0.097
Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	0.000056
Lithium (Li)-Dissolved (mg/L)		0.00714	0.00659	<0.00050	0.00750
Magnesium (Mg)-Dissolved (mg/L)		12.0	12.5	<0.0050	10.9
Manganese (Mn)-Dissolved (mg/L)		0.277	0.125	<0.000050	0.242
Molybdenum (Mo)-Dissolved (mg/L)		0.000716	0.000661	<0.000050	0.000783
Nickel (Ni)-Dissolved (mg/L)		0.00632	0.00426	<0.00050	0.00635
Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)		1.10	1.27	<0.050	1.01

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1421713-6 Surface Water 11-FEB-14 14:25 X14	L1421713-7 Surface Water 11-FEB-14 16:20 R9	L1421713-8 Surface Water 11-FEB-14 14:25 X14-R	L1421713-9 Surface Water 11-FEB-14 16:35 R10	L1421713-10 Surface Water 11-FEB-14 15:05 X3A
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00893	<0.00050	0.00856	<0.00050	0.00461
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	1.82	0.971	1.82	0.940	1.11
	Selenium (Se)-Total (mg/L)	0.00040	0.00044	0.00036	0.00041	0.00037
	Silicon (Si)-Total (mg/L)	5.98	5.92	6.05	5.69	5.74
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	6.57	3.12	6.52	2.78	3.03
	Strontium (Sr)-Total (mg/L)	0.325	0.159	0.328	0.164	0.184
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00301	0.00248	0.00328	0.00245	0.00252
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	0.428	<0.0030	0.429	0.0088	0.688
	Zirconium (Zr)-Total (mg/L)	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0014	<0.0010	0.0046	0.0020
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00021	0.00044	0.00022	0.00040	0.00017
	Barium (Ba)-Dissolved (mg/L)	0.0741	0.0773	0.0741	0.0796	0.0715
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000290	<0.000010	0.000283	0.000017	0.000365
	Calcium (Ca)-Dissolved (mg/L)	112	40.4	110	41.8	43.1
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00389	<0.00010	0.00390	<0.00010	0.00232
	Copper (Cu)-Dissolved (mg/L)	0.00033	0.00025	0.00033	0.00027	0.00029
	Iron (Fe)-Dissolved (mg/L)	0.382	0.026	0.385	0.029	0.061
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00865	0.00695	0.00823	0.00712	0.00634
	Magnesium (Mg)-Dissolved (mg/L)	25.7	9.32	26.3	9.30	10.4
	Manganese (Mn)-Dissolved (mg/L)	4.31	0.0215	4.47	0.0256	0.197
	Molybdenum (Mo)-Dissolved (mg/L)	0.000755	0.000836	0.000731	0.000843	0.000652
	Nickel (Ni)-Dissolved (mg/L)	0.00944	<0.00050	0.00954	<0.00050	0.00440
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	2.04	1.03	2.05	1.06	1.12

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1421713-1	L1421713-2	L1421713-3	L1421713-4	L1421713-5
Description	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Sampled Date	12-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14	11-FEB-14
Sampled Time	13:00	15:25	14:50	19:20	15:50
Client ID	TRAVEL BLANK	X2	X10	FIELD BLANK	NF2
Grouping / **Analyte**					
WATER					
Dissolved Metals Selenium (Se)-Dissolved (mg/L)		0.00032	0.00041	<0.00010	0.00045
Silicon (Si)-Dissolved (mg/L)		4.38	6.25	<0.050	6.02
Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)		3.30	3.40	<0.050	3.21
Strontium (Sr)-Dissolved (mg/L)		0.171	0.208	<0.00020	0.187
Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)		0.00234	0.00263	<0.000010	0.00252
Vanadium (V)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Dissolved (mg/L)		1.01	0.599	<0.0010	1.03
Zirconium (Zr)-Dissolved (mg/L)		<0.00080	<0.00080	<0.00080	<0.00080

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1421713-6 Surface Water 11-FEB-14 14:25 X14	L1421713-7 Surface Water 11-FEB-14 16:20 R9	L1421713-8 Surface Water 11-FEB-14 14:25 X14-R	L1421713-9 Surface Water 11-FEB-14 16:35 R10	L1421713-10 Surface Water 11-FEB-14 15:05 X3A
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00042	0.00048	0.00042	0.00048	0.00036
	Silicon (Si)-Dissolved (mg/L)	6.60	6.15	6.57	6.48	5.58
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	6.97	3.11	7.15	3.19	2.98
	Strontium (Sr)-Dissolved (mg/L)	0.373	0.172	0.359	0.181	0.194
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00355	0.00249	0.00355	0.00253	0.00273
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.462	0.0011	0.467	0.0104	0.671
	Zirconium (Zr)-Dissolved (mg/L)	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lithium (Li)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Phosphorus (P)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1421713-10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1421713-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1421713-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1421713-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

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

ANIONS-CL-IC-WR	Water	Chloride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-F-IC-WR	Water	Fluoride by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-NO2-IC-WR	Water	Nitrite Nitrogen by Ion Chromatography	EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

Reference Information

ANIONS-NO3-IC-WR Water Nitrate Nitrogen by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR Water Sulphate by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

EC-MAN-WR Water Conductivity by Meter APHA 2510 (B)

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using an electrode.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-MAN-WR Water pH by Meter APHA 4500-H (B)

"This analysis is carried out using procedures adapted from APHA Method 4500-H ""pH Value"". The pH is determined in the laboratory using a pH electrode."

TDS-CALC-VA Water TDS (Calculated) APHA 1030E (20TH EDITION)

This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".

TSS-LOW-WR Water Total Suspended Solids by Grav. (1 mg/L) APHA 2540 D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.

ZR-D-MS-VA Water Dissolved Zr in Water by ICPMS EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United

Reference Information

States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

ZR-T-MS-VA Water Total Zr in Water by ICPMS EPA SW-846 3005A/6020A

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

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

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

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1 2

GLOSSARY OF REPORT TERMS

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

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

ALS Environmental

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

L1421713-COFC

Page 1 of 1

Report To		Report Format / Distribution		Turnaround Time (TAT) (subject to availability)
Company:	EDI	☑ Standard ☐ Other		○ Regular (Standard Turnaround Times - Business Days)
Contact:	Meighan Kearns	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Avenue	Email 1:	mkearns@edynamics.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Whitehorse, YT Y1A 3T8	Email 2:	adrienne.turcotte@gov.yk.ca	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #:	13-Y-0452	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:		Quote #:	Q38556	
Phone:	Fax:	ALS Contact:	Sampler: L.GRIEVE	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-COL-VA,P-T-COL-VA	ANIONS-ALL-IC-WR	CARBONS-DOC-VA	CARBONS-TOC-VA,NH3-F-VA	EC-MAN-WR,PH-MAN-WR	MET-D-CCMS-VA,ZR-D-MS-VA	MET-T-CCMS-VA,ZR-T-MS-VA	IONBALANCE-VA	TDS-CALC-VA	TSS-LOW-WR	HARDNESS-CALC-VA		Number of Containers
#	TRAVEL BLANK	N/A	N/A	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
1	X2	11-FEB-14	1525	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
2	X10	11-FEB-14	1450	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
3	Field Blank	11-FEB-14	1920	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
4	NF2	11-FEB-14	1550	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
5	X14	11-FEB-14	1425	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
6	R9	11-FEB-14	1620	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
7	X14-R	11-FEB-14	14:25	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
8																	

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Use Faro Equis Format to report

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Laura Grieve				12-FEB-14	2:05	6.9 °C				

GENF 18.01 Front

ALS Environmental

Chain of Custody / Analytical Reque
Canada Toll Free: 1 800 668 98
www.alsglobal.com

L1421713-COFC

Report To		Report Format / Distribution		Analysis subject to availability)
Company:	EDI	☑ Standard ☐ Other		○ Regular (Standard Turnaround Times - Business Days)
Contact:	Meighan Kearns	☑ PDF ☑ Excel ☐ Digital ☐ Fax		◉ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	2195 - 2nd Avenue	Email 1: mkearns@edynamics.com		○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Whitehorse, YT Y1A 3T8	Email 2: adrienne.turcotte@gov.yk.ca		○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	867-393-4882 Fax:	Email 3:		
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information		Analysis Request
Hardcopy of Invoice with Report?	☐ Yes ☑ No	Job #: 13-Y-0452		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #: Q38556		
Lab Work Order # (lab use only)		ALS Contact:	Sampler: L. GRIEVE	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-COL-VA,P-T-COL-VA	ANIONS-ALL-IC-WR	CARBONS-DOC-VA	CARBONS-TOC-VA,NH3-F-V	EC-MAN-WR,PH-MAN-WR	MET-D-CCMS-VA,ZR-D-MS-	MET-T-CCMS-VA,ZR-T-MS-	IONBALANCE-VA	TDS-CALC-VA	TSS-LOW-WR	HARDNESS-CALC-VA		Number of Containers
1	R10	11-FEB-14	16:35	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
2	X3A	11-FEB-14	15:05	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Use Faro Equis Format to report

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

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Laura Grieve	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature: °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

ENVIRONMENTAL DYNAMICS INC.
ATTN: Meighan Kearns
2195 - 2nd Avenue
Whitehorse YT Y1A 3T8

Date Received: 13-FEB-14
Report Date: 18-FEB-14 17:24 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1422440

Project P.O. #: NOT SUBMITTED
Job Reference: 13-Y-0452
C of C Numbers: 1
Legal Site Desc:

Can Dang
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1422440-1	L1422440-2			
	Description	Surface Water	Surface Water			
	Sampled Date	13-FEB-14	13-FEB-14			
	Sampled Time	09:50	11:10			
	Client ID	R3	X14			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	562	662			
	Hardness (as CaCO3) (mg/L)	326	385			
	pH (pH)	7.59	7.48			
	Total Suspended Solids (mg/L)	<1.0	1.2			
	Total Dissolved Solids (mg/L)	403	502			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	172	188			
	Ammonia, Total (as N) (mg/L)	0.0500	0.0970			
	Chloride (Cl) (mg/L)	<0.50	0.51			
	Fluoride (F) (mg/L)	0.136	0.161			
	Nitrate (as N) (mg/L)	0.241	0.226			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020			
	Sulfate (SO4) (mg/L)	171	234			
	Anion Sum (meq/L)	7.01	8.67			
	Cation Sum (meq/L)	6.90	8.28			
	Cation - Anion Balance (%)	-0.8	-2.3			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.29	1.39			
	Total Organic Carbon (mg/L)	1.35	1.26			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0042	0.0137			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00020	0.00038			
	Barium (Ba)-Total (mg/L)	0.0721	0.0683			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (mg/L)	0.000145	0.000325			
	Calcium (Ca)-Total (mg/L)	92.8	110			
	Chromium (Cr)-Total (mg/L)	0.00010	<0.00010			
	Cobalt (Co)-Total (mg/L)	0.00189	0.00411			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.211	0.768			
	Lead (Pb)-Total (mg/L)	0.000137	0.000216			
	Lithium (Li)-Total (mg/L)	0.00591	0.00805			
	Magnesium (Mg)-Total (mg/L)	20.1	25.2			
	Manganese (Mn)-Total (mg/L)	2.04	4.36			
	Molybdenum (Mo)-Total (mg/L)	0.000523	0.000723			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1422440-1	L1422440-2			
	Description	Surface Water	Surface Water			
	Sampled Date	13-FEB-14	13-FEB-14			
	Sampled Time	09:50	11:10			
	Client ID	R3	X14			
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00525	0.00984			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	1.69	1.94			
	Selenium (Se)-Total (mg/L)	0.00039	0.00041			
	Silicon (Si)-Total (mg/L)	5.85	6.15			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	5.58	7.22			
	Strontium (Sr)-Total (mg/L)	0.300	0.366			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00281	0.00341			
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Total (mg/L)	0.258	0.526			
	Zirconium (Zr)-Total (mg/L)	<0.00080	<0.00080			
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0010	0.0016			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00013	0.00026			
	Barium (Ba)-Dissolved (mg/L)	0.0741	0.0692			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.000156	0.000317			
	Calcium (Ca)-Dissolved (mg/L)	95.2	112			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00191	0.00405			
	Copper (Cu)-Dissolved (mg/L)	0.00029	0.00030			
	Iron (Fe)-Dissolved (mg/L)	0.011	0.550			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.00608	0.00808			
	Magnesium (Mg)-Dissolved (mg/L)	21.5	26.0			
	Manganese (Mn)-Dissolved (mg/L)	2.12	4.42			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000525	0.000717			
	Nickel (Ni)-Dissolved (mg/L)	0.00543	0.00967			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	1.76	1.99			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1422440-1	L1422440-2			
	Description	Surface Water	Surface Water			
	Sampled Date	13-FEB-14	13-FEB-14			
	Sampled Time	09:50	11:10			
	Client ID	R3	X14			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00045	0.00045			
	Silicon (Si)-Dissolved (mg/L)	6.10	6.28			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	5.79	7.11			
	Strontium (Sr)-Dissolved (mg/L)	0.304	0.348			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00280	0.00338			
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010			
	Zinc (Zn)-Dissolved (mg/L)	0.268	0.528			
	Zirconium (Zr)-Dissolved (mg/L)	<0.00080	<0.00080			

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Sulfate (SO4)	MS-B	L1422440-1, -2
Matrix Spike	Sulfate (SO4)	MS-B	L1422440-1, -2
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1422440-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1422440-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1422440-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1422440-1, -2
Matrix Spike	Potassium (K)-Dissolved	MS-B	L1422440-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1422440-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2

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

ANIONS-CL-IC-WR Water Chloride by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-F-IC-WR Water Fluoride by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

ANIONS-NO2-IC-WR Water Nitrite Nitrogen by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-NO3-IC-WR Water Nitrate Nitrogen by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003. Nitrate is detected by UV absorbance.

ANIONS-SO4-IC-WR Water Sulphate by Ion Chromatography EPA 300.1

This analysis is carried out using procedures adapted from EPA Method 300.1, "Determination of Inorganic Anions by Ion Chromatography", Revision 1.0, April 1999 and from "Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column", Application Note 154 v.19, Dionex 2003.

CARBONS-DOC-VA Water Dissolved organic carbon by combustion APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

CARBONS-TOC-VA Water Total organic carbon by combustion APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

EC-MAN-WR Water Conductivity by Meter APHA 2510 (B)

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using an electrode.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

IONBALANCE-VA Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Reference Information

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

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

NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-MAN-WR	Water	pH by Meter	APHA 4500-H (B)

"This analysis is carried out using procedures adapted from APHA Method 4500-H ""pH Value"". The pH is determined in the laboratory using a pH electrode."

TDS-CALC-VA	Water	TDS (Calculated)	APHA 1030E (20TH EDITION)

This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".

TSS-LOW-WR	Water	Total Suspended Solids by Grav. (1 mg/L)	APHA 2540 D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.

ZR-D-MS-VA	Water	Dissolved Zr in Water by ICPMS	EPA SW-846 3005A/6020A

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

ZR-T-MS-VA	Water	Total Zr in Water by ICPMS	EPA SW-846 3005A/6020A

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

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

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

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

Reference Information

GLOSSARY OF REPORT TERMS

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

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

ALS Environmental

Chain of Custody / Analytical Requ[est]
Canada Toll Free: 1 800 668 9[...]
www.alsglobal.com

L1422440-COFC

#

Page 1 of 1

Report To	
Company:	EDI
Contact:	Meighan Kearns
Address:	2195 - 2nd Avenue Whitehorse, YT Y1A 3T8
Phone:	867-393-4882 Fax:
Invoice To	Same as Report ? ☑ Yes ☐ No
Hardcopy of Invoice with Report?	☐ Yes ☑ No
Company:	
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

Report Format / Distribution	
☑ Standard ☐ Other	
☑ PDF ☑ Excel ☐ Digital ☐ Fax	
Email 1:	mkearns@edynamics.com
Email 2:	adrienne.turcotte@gov.yk.ca
Email 3:	
Client / Project Information	
Job #:	13-Y-0452
PO / AFE:	
LSD:	
Quote #:	Q38556
ALS Contact:	M. Kearns
Sampler:	M. Kearns

[An]alysis subject to availability)

- ○ Regular (Standard Turnaround Times - Business Days)
- ● Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
- ○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
- ○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-COL-VA,P-T-COL-VA	ANIONS-ALL-IC-WR	CARBONS-DOC-VA	CARBONS-TOC-VA,NH3-F-V	EC-MAN-WR,PH-MAN-WR	MET-D-CCMS-VA,ZR-D-MS-	MET-T-CCMS-VA,ZR-T-MS-	IONBALANCE-VA	TDS-CALC-VA	TSS-LOW-WR	HARDNESS-CALC-VA		Number of Containers
1	R3	13-FEB-14	0950	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
2	X14	13-Feb-14	1110	Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5
				Surface Water	X	X	X	X	X	X	X	X	X	X	X		5

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Use Faro Equis Format to report

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: Laura Grieve	Date (dd-mmm-yy) 13-FEB-14	Time (hh-mm) 16:04	Received by: [signature]	Date: 13-Feb-14	Time: 4:15	Temperature: 1.0 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

GENF 18.01 Front