

May 24, 2014

EDI Job Number: 14-Y-0270

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

Attention: Adrienne Turcotte, Project Officer

Re: Rose Creek Monitoring Program – April 08, 2014 (Revised)

Assessment and Abandoned Mines (AAM) retained EDI Environmental Dynamics Inc. (EDI) to conduct water quality sampling at the Faro Mine Site. The Rose Creek Monitoring Program has been ongoing since November 2013 in response to changing water quality conditions. Table 1, attached, summarizes the field trips completed for the 2014 fiscal year. The intent of this memo is to summarize field data obtained during the April 08, 2014 field trip.

The objective of this field trip was to conduct surface water sampling at 10 monitoring sites, including QA/QC samples. Figure 1 provides the locations of all sampling sites. Table 2 summarizes field data collected at each sampling site.

Weather conditions on April 08, 2014 were mild, with temperatures near 0°C, overcast, moderate wind and some snow flurries and hail. All sites were sampled, except NF2-A, which was frozen to bottom. Similar to the previous trip, the following sample locations were modified:

- NF1 samples were collected closer to the rock drain; and,
- NF2-B samples were collected approximately 7 m from the original site, towards NF2-A.

Representative photos of each site are attached. ALS laboratory analytical reports for all water chemistry samples submitted during this field trip are 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 field trips conducted in the 2014 fiscal year, Rose Creek Monitoring Program.
- Table 2. Surface water sampling field data, Rose Creek Monitoring Program, April 08, 2014.
- Figure 1. Location of surface water sampling, Rose Creek Monitoring Program, April 08, 2014.
- Photos 1 – 10. Representative site photos.
- ALS Laboratory Analytical Reports



Table 1. Summary of field trips conducted in the 2014 fiscal year, Rose Creek Monitoring Program.

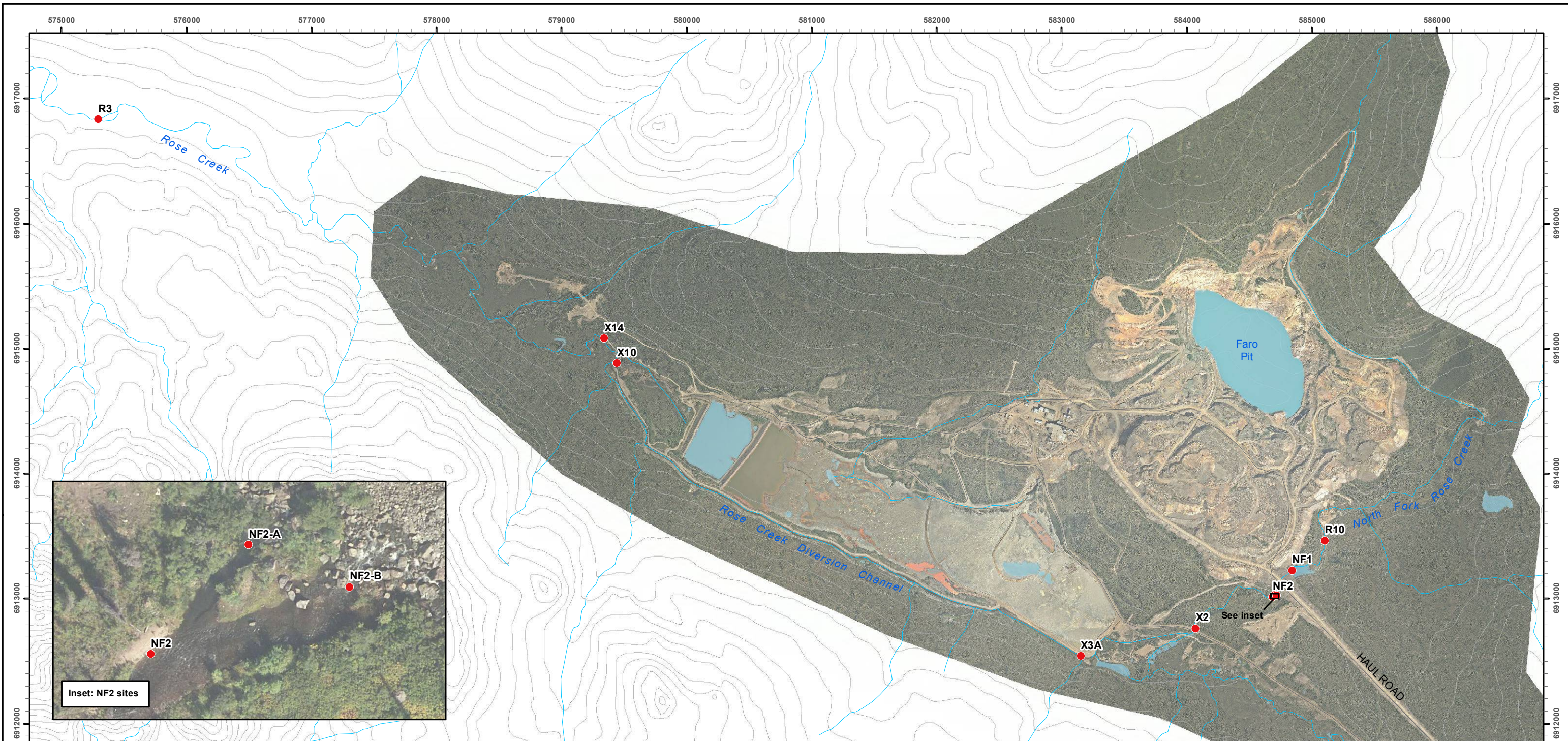
Field Date	General Tasks
Apr 01, 2014	• Surface water sampling
Apr 08, 2014	• Surface water sampling



Table 2. Surface water sampling field data, Rose Creek Monitoring Program, April 08, 2014.

Site Name	UTM Location		Sample		QA/ QC Rep. ID	In-situ Parameters			
	Easting	Northing	Date	Time		Temp (°C)	SPC (µS/cm)	pH	Turbidity (NTU)
R3	0575280	6916832	08-Apr-2014	9:00	R3-r	0.0	745.1	7.31	2.87
X14	0579350	6915085	08-Apr-2014	9:34	-	0.5	958.0	7.32	2.12
X10	0579460	6914879	08-Apr-2014	9:52	-	0.0	362.4	7.50	1.45
X3A	0583152	6912535	08-Apr-2014	10:20	-	0.0	359.2	7.40	2.34
X2	0584073	6912763	08-Apr-2014	10:35	-	0.0	358.3	7.22	1.84
NF2-A	0584710	6913033	08-Apr-2014	10:45	-	-	-	-	-
NF2-B	0584726	6913026	08-Apr-2014	10:50	-	0.0	317.9	7.23	1.19
NF2	0584688	6913006	08-Apr-2014	10:55	-	0.0	343.0	7.17	1.27
NF1	0584852	6913221	08-Apr-2014	12:15	-	0.0	314.6	7.38	1.45
R10	0585108	6913482	08-Apr-2014	12:30	-	0.0	308.6	7.49	1.58

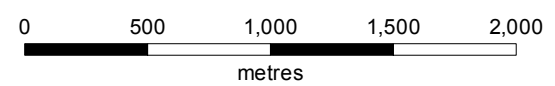
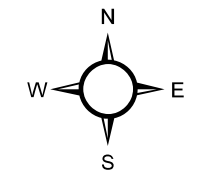
Where, UTM = Universal Transverse Mercator (NAD 83/ Zone 8);
 QA/QC Rep = Quality Assurance/ Quality Control Replicate;
 Temp = water temperature; and,
 SPC = specific conductance.



Location of surface water sampling, Rose Creek Monitoring Program, April 08, 2014

Legend

- Surface Water Sample Collected
- Road (Mine Access/Haul)
- Topographic Contour (30 m Interval)



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.

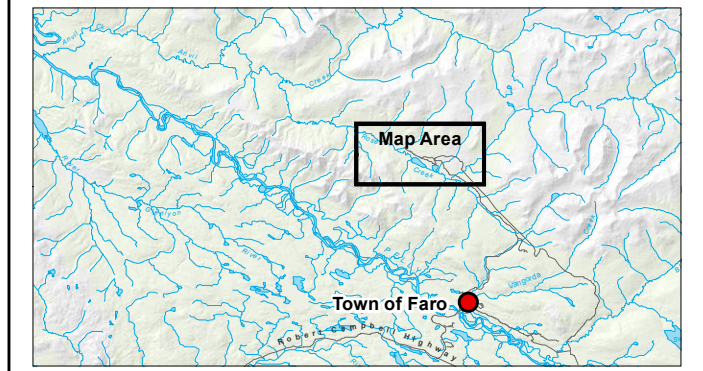
National Road Network courtesy of Her Majesty the Queen in Right of Canada, Department of Natural Resources. All Rights Reserved.

Detailed topographic 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: LG	Checked: MK	FIGURE 1	Date: 29/04/2014
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Map Prepared by
 EDI Environmental Dynamics Inc.



Site Photos



Photo 1. Upstream view at surface water sampling site R3, April 08, 2014.



Photo 2. Upstream view at surface water sampling site X14, April 08, 2014.



Photo 3. Upstream view at surface water sampling site X10, April 08, 2014.



Photo 4. Upstream view at surface water sampling site X3A, April 08, 2014.



Photo 5. Upstream view at surface water sampling site X2, April 08, 2014.



Photo 6. Overview at surface water sampling site NF2-A, April 08, 2014.



Photo 7. Upstream view from surface water sampling site NF2-B, April 08, 2014.



Photo 8. Upstream view at surface water sampling site NF2, April 08, 2014.



Photo 9. Downstream view from surface water sampling site NF1, April 08, 2014.



Photo 10. Upstream view from surface water sampling site R10, April 08, 2014.



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

Date Received: 09-APR-14
Report Date: 21-APR-14 10:20 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1441378
Project P.O. #: NOT SUBMITTED
Job Reference: 13-Y-0452
C of C Numbers: 1, 2
Legal Site Desc:

Can Dang
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-1 Water 08-APR-14 12:45 FIELD BLANK	L1441378-2 Water TRAVEL BLANK	L1441378-3 GRAB 08-APR-14 12:15 NF1	L1441378-4 GRAB 08-APR-14 12:30 R10	L1441378-5 GRAB 08-APR-14 09:10 R3-R
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	<2.0	297	298	677
	Hardness (as CaCO3) (mg/L)	<0.50	<0.50	150	147	363
	pH (pH)	5.93	5.88	7.42	7.58	7.58
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	1.0
	Total Dissolved Solids (mg/L)	<1.0	<1.0	167	167	460
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	<2.0	139	141	170
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0537
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	<0.020	<0.020	0.179	0.178	0.131
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.291	0.282	0.240
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	0.0044	0.0044	<0.0020
	Sulfate (SO4) (mg/L)	<0.50	<0.50	22.8	22.3	214
	Anion Sum (meq/L)	<0.10	<0.10	3.28	3.31	7.89
	Cation Sum (meq/L)	<0.10	<0.10	3.17	3.10	7.68
	Cation - Anion Balance (%)	0.0	0.0	-1.7	-3.2	-1.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50		1.31	1.24	1.33
	Total Organic Carbon (mg/L)	<0.50	<0.50	1.37	1.26	1.37
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0066	0.0085	0.0112
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00046	0.00050	0.00022
	Barium (Ba)-Total (mg/L)	<0.000050	<0.000050	0.0754	0.0767	0.0790
	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	<0.000010	0.000022	0.000015	0.000146
	Calcium (Ca)-Total (mg/L)	<0.020	<0.020	44.3	44.1	104
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	0.00013	0.00012	0.00017
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	0.00020	<0.00010	0.00194
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	0.103	0.102	0.206
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000194	0.000066	0.000138
	Lithium (Li)-Total (mg/L)	<0.00050	<0.00050	0.00874	0.00849	0.00641
	Magnesium (Mg)-Total (mg/L)	<0.0050	<0.0050	9.31	9.37	23.4
	Manganese (Mn)-Total (mg/L)	<0.000050	<0.000050	0.0331	0.0201	2.55
	Molybdenum (Mo)-Total (mg/L)	<0.000050	<0.000050	0.000939	0.000944	0.000552

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-6 GRAB 08-APR-14 09:34 X14	L1441378-7 GRAB 08-APR-14 09:52 X10	L1441378-8 GRAB 08-APR-14 09:00 R3	L1441378-9 GRAB 08-APR-14 10:35 X2	L1441378-10 GRAB 08-APR-14 10:20 X3A
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	858	354	653	342	340
	Hardness (as CaCO3) (mg/L)	496	175	388	170	171
	pH (pH)	7.45	7.58	7.60	7.38	7.46
	Total Suspended Solids (mg/L)	1.8	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	641	203	478	199	199
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	202	155	184	145	150
	Ammonia, Total (as N) (mg/L)	0.123	<0.0050	0.0545	0.0068	0.0070
	Chloride (Cl) (mg/L)	<2.5 ^{DLA}	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.22	0.179	0.130	0.198	0.190
	Nitrate (as N) (mg/L)	0.221	0.279	0.240	0.280	0.308
	Nitrite (as N) (mg/L)	<0.0050 ^{DLA}	<0.0010	0.0011	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	0.0032
	Sulfate (SO4) (mg/L)	321	40.6	214	43.8	40.2
	Anion Sum (meq/L)	10.7	3.97	8.15	3.84	3.87
	Cation Sum (meq/L)	10.6	3.70	8.21	3.63	3.62
	Cation - Anion Balance (%)	-0.5	-3.4	0.4	-2.8	-3.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.44	1.31	1.47	1.33	1.37
	Total Organic Carbon (mg/L)	1.38	1.35	1.29	1.25	1.42
Total Metals	Aluminum (Al)-Total (mg/L)	0.0082	0.0070	0.0115	0.0181	0.0197
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00013	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00037	0.00023	0.00025	0.00037	0.00032
	Barium (Ba)-Total (mg/L)	0.0739	0.0761	0.0820	0.0783	0.0785
	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)	0.000328	0.000318	0.000148	0.000778	0.000555
	Calcium (Ca)-Total (mg/L)	142	49.6	113	47.1	48.1
	Chromium (Cr)-Total (mg/L)	0.00011	0.00011	0.00020	0.00011	0.00026
	Cobalt (Co)-Total (mg/L)	0.00486	0.00101	0.00191	0.00492	0.00313
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00062
	Iron (Fe)-Total (mg/L)	0.778	0.081	0.206	0.256	0.157
	Lead (Pb)-Total (mg/L)	0.000131	0.000149	0.000123	0.000316	0.000345
	Lithium (Li)-Total (mg/L)	0.00992	0.00833	0.00744	0.00949	0.00791
	Magnesium (Mg)-Total (mg/L)	31.7	12.8	24.3	12.8	13.0
	Manganese (Mn)-Total (mg/L)	6.07	0.0971	2.61	0.332	0.234
	Molybdenum (Mo)-Total (mg/L)	0.000754	0.000724	0.000542	0.000844	0.000751

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-11 GRAB 08-APR-14 10:55 NF2	L1441378-12 GRAB 08-APR-14 10:50 NF2-B		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	328	303		
	Hardness (as CaCO3) (mg/L)	153	154		
	pH (pH)	7.39	7.52		
	Total Suspended Solids (mg/L)	<1.0	<1.0		
	Total Dissolved Solids (mg/L)	187	173		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	144	142		
	Ammonia, Total (as N) (mg/L)	0.0051	<0.0050		
	Chloride (Cl) (mg/L)	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.199	0.186		
	Nitrate (as N) (mg/L)	0.286	0.318		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010		
	Phosphorus (P)-Total (mg/L)	0.0027	0.0034		
	Sulfate (SO4) (mg/L)	37.5	25.4		
	Anion Sum (meq/L)	3.69	3.39		
	Cation Sum (meq/L)	3.29	3.26		
	Cation - Anion Balance (%)	-5.7	-2.0		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.22	1.27		
	Total Organic Carbon (mg/L)	1.18	1.22		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0163	0.0132		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	0.00036	0.00044		
	Barium (Ba)-Total (mg/L)	0.0645	0.0776		
	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)	0.000715	0.000145		
	Calcium (Ca)-Total (mg/L)	45.3	44.0		
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00011		
	Cobalt (Co)-Total (mg/L)	0.00451	0.00097		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.182	0.114		
	Lead (Pb)-Total (mg/L)	0.000312	0.000188		
	Lithium (Li)-Total (mg/L)	0.00897	0.00843		
	Magnesium (Mg)-Total (mg/L)	9.92	10.0		
	Manganese (Mn)-Total (mg/L)	0.248	0.0657		
	Molybdenum (Mo)-Total (mg/L)	0.000915	0.000916		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-1 Water 08-APR-14 12:45 FIELD BLANK	L1441378-2 Water TRAVEL BLANK	L1441378-3 GRAB 08-APR-14 12:15 NF1	L1441378-4 GRAB 08-APR-14 12:30 R10	L1441378-5 GRAB 08-APR-14 09:10 R3-R
Grouping	Analyte					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00582
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	<0.050	<0.050	1.05	1.07	1.73
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	0.00044	0.00042	0.00043
	Silicon (Si)-Total (mg/L)	<0.050	<0.050	5.92	5.90	5.70
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	<0.050	<0.050	3.27	3.32	6.13
	Strontium (Sr)-Total (mg/L)	<0.00020	<0.00020	0.197	0.200	0.340
	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	<0.000010	0.00289	0.00289	0.00302
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0149	0.0078	0.223
	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)	<0.0010		0.0021	0.0018	0.0012
	Antimony (Sb)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010		0.00034	0.00040	0.00015
	Barium (Ba)-Dissolved (mg/L)	<0.000050		0.0743	0.0744	0.0810
	Beryllium (Be)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050		0.00146	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010		0.000015	0.000014	0.000140
	Calcium (Ca)-Dissolved (mg/L)	<0.020		44.4	43.7	107
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00010		0.00020	<0.00010	0.00192
	Copper (Cu)-Dissolved (mg/L)	<0.00020		0.00027	0.00023	0.00049
	Iron (Fe)-Dissolved (mg/L)	<0.010		0.041	0.024	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.00050		0.00873	0.00842	0.00647
	Magnesium (Mg)-Dissolved (mg/L)	<0.0050		9.49	9.15	23.2
	Manganese (Mn)-Dissolved (mg/L)	<0.000050		0.0334	0.0183	2.57
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050		0.000910	0.000873	0.000496
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	0.00569
	Phosphorus (P)-Dissolved (mg/L)	<0.30		<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	<0.050		1.07	1.03	1.83

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1441378-6	L1441378-7	L1441378-8	L1441378-9	L1441378-10
		Description	GRAB	GRAB	GRAB	GRAB	GRAB
		Sampled Date	08-APR-14	08-APR-14	08-APR-14	08-APR-14	08-APR-14
		Sampled Time	09:34	09:52	09:00	10:35	10:20
		Client ID	X14	X10	R3	X2	X3A
Grouping	Analyte						
WATER							
Total Metals	Nickel (Ni)-Total (mg/L)		0.0122	0.00461	0.00591	0.00758	0.00585
	Phosphorus (P)-Total (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)		2.22	1.32	2.06	1.15	1.32
	Selenium (Se)-Total (mg/L)		0.00041	0.00046	0.00042	0.00041	0.00042
	Silicon (Si)-Total (mg/L)		6.40	5.48	5.91	5.99	5.75
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		8.52	3.27	6.51	3.57	3.46
	Strontium (Sr)-Total (mg/L)		0.416	0.217	0.342	0.213	0.220
	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)		0.00377	0.00278	0.00300	0.00301	0.00291
	Vanadium (V)-Total (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)		0.485	0.684	0.231	1.26	0.940
	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)		0.0021	0.0023	0.0012	0.0029	0.0026
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)		0.00029	0.00015	0.00016	0.00018	0.00014
	Barium (Ba)-Dissolved (mg/L)		0.0727	0.0781	0.0857	0.0764	0.0758
	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)		0.000324	0.000298	0.000147	0.000765	0.000545
	Calcium (Ca)-Dissolved (mg/L)		146	49.1	114	46.5	47.4
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00462	0.00096	0.00195	0.00483	0.00300
	Copper (Cu)-Dissolved (mg/L)		0.00033	0.00034	0.00032	0.00025	0.00029
	Iron (Fe)-Dissolved (mg/L)		0.604	<0.010	<0.010	0.074	0.019
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0102	0.00805	0.00737	0.00935	0.00785
	Magnesium (Mg)-Dissolved (mg/L)		31.8	12.8	24.9	12.9	12.7
	Manganese (Mn)-Dissolved (mg/L)		6.10	0.0946	2.63	0.331	0.226
	Molybdenum (Mo)-Dissolved (mg/L)		0.000771	0.000681	0.000494	0.000838	0.000713
	Nickel (Ni)-Dissolved (mg/L)		0.0119	0.00456	0.00586	0.00746	0.00557
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)		2.42	1.33	2.10	1.20	1.20

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-11 GRAB 08-APR-14 10:55 NF2	L1441378-12 GRAB 08-APR-14 10:50 NF2-B		
Grouping	Analyte				
WATER					
Total Metals	Nickel (Ni)-Total (mg/L)	0.00639	0.00166		
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30		
	Potassium (K)-Total (mg/L)	0.867	1.09		
	Selenium (Se)-Total (mg/L)	0.00045	0.00045		
	Silicon (Si)-Total (mg/L)	5.85	5.85		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	2.83	3.38		
	Strontium (Sr)-Total (mg/L)	0.211	0.208		
	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)	0.00293	0.00292		
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)	1.11	0.230		
	Zirconium (Zr)-Total (mg/L)	<0.00080	<0.00080		
Dissolved Metals	Dissolved Metals Filtration Location	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0034	0.0020		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00026	0.00030		
	Barium (Ba)-Dissolved (mg/L)	0.0810 ^{DTC}	0.0755		
	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)	0.000796	0.000146		
	Calcium (Ca)-Dissolved (mg/L)	42.1	44.8		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	0.00545	0.00096		
	Copper (Cu)-Dissolved (mg/L)	0.00020	0.00024		
	Iron (Fe)-Dissolved (mg/L)	0.108	0.033		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.00781	0.00865		
	Magnesium (Mg)-Dissolved (mg/L)	11.7	10.1		
	Manganese (Mn)-Dissolved (mg/L)	0.299	0.0657		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000767	0.000852		
	Nickel (Ni)-Dissolved (mg/L)	0.00775	0.00169		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	1.06 ^{DTC}	1.14		

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1441378-1 Water 08-APR-14 12:45 FIELD BLANK	L1441378-2 Water TRAVEL BLANK	L1441378-3 GRAB 08-APR-14 12:15 NF1	L1441378-4 GRAB 08-APR-14 12:30 R10	L1441378-5 GRAB 08-APR-14 09:10 R3-R
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00010		0.00044	0.00041	0.00042
	Silicon (Si)-Dissolved (mg/L)	<0.050		6.06	5.91	5.91
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	<0.050		3.28	3.20	6.27
	Strontium (Sr)-Dissolved (mg/L)	<0.00020		0.196	0.195	0.337
	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)	<0.000010		0.00289	0.00280	0.00297
	Vanadium (V)-Dissolved (mg/L)	<0.0010		<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		0.0145	0.0074	0.221
	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

	Sample ID	L1441378-6	L1441378-7	L1441378-8	L1441378-9	L1441378-10
Description	GRAB	GRAB	GRAB	GRAB	GRAB	GRAB
Sampled Date	08-APR-14	08-APR-14	08-APR-14	08-APR-14	08-APR-14	08-APR-14
Sampled Time	09:34	09:52	09:00	10:35	10:20	10:20
Client ID	X14	X10	R3	X2	X3A	X3A
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00041	0.00044	0.00041	0.00041	0.00040
	Silicon (Si)-Dissolved (mg/L)	6.33	5.66	5.95	6.05	5.63
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	8.93	3.26	6.63	3.59	3.30
	Strontium (Sr)-Dissolved (mg/L)	0.407	0.207	0.335	0.211	0.215
	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)	0.00366	0.00268	0.00303	0.00279	0.00287
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.487	0.686	0.228	1.28	0.923
	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.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1441378-11	L1441378-12		
	Description	GRAB	GRAB		
	Sampled Date	08-APR-14	08-APR-14		
	Sampled Time	10:55	10:50		
	Client ID	NF2	NF2-B		
Grouping	Analyte				
WATER					
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00049	0.00045		
	Silicon (Si)-Dissolved (mg/L)	5.89	6.03		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	3.57 ^{DTC}	3.41		
	Strontium (Sr)-Dissolved (mg/L)	0.187	0.203		
	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)	0.00255	0.00280		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	1.20	0.234		
	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)
Duplicate	Zirconium (Zr)-Dissolved	DLA	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1441378-5, -8
Matrix Spike	Dissolved Organic Carbon	MS-B	L1441378-5, -6, -7, -8
Matrix Spike	Total Organic Carbon	MS-B	L1441378-1, -2, -3, -4
Matrix Spike	Antimony (Sb)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1441378-1, -10, -11, -12, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1441378-10, -11, -12, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1441378-10, -11, -12, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
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)

Reference Information

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:

$$\text{Ion Balance (\%)} = \frac{[\text{Cation Sum} - \text{Anion Sum}]}{[\text{Cation Sum} + \text{Anion Sum}]}$$

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. Weston 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

Reference Information

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.

