



ENVIRONMENTAL DYNAMICS INC.

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Date Received: 19-FEB-14

Report Date: 25-FEB-14 17:30 (MT)

Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1423769

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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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		L1423769-1 Surface Water 18-FEB-14 10:55 X2	L1423769-2 Surface Water 18-FEB-14 10:35 X3A	L1423769-3 Surface Water 18-FEB-14 11:20 NF2	L1423769-4 Surface Water 18-FEB-14 10:15 X10	L1423769-5 Surface Water 18-FEB-14 11:10 NF2-B
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	319	325	312	327	281
	Hardness (as CaCO3) (mg/L)	153	160	148	166	141
	pH (pH)	7.39	7.46	7.45	7.65	7.60
	Total Suspended Solids (mg/L)	<1.0	1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	183	188	173	187	161
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	135	141	130	138	134
	Ammonia, Total (as N) (mg/L)	0.0084	0.0122	0.0064	0.0084	<0.0050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.188	0.187	0.191	0.175	0.170
	Nitrate (as N) (mg/L)	0.273	0.282	0.279	0.264	0.279
	Nitrite (as N) (mg/L)	0.0011	0.0011	0.0014	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0024	0.0035	0.0031	0.0025	0.0037
	Sulfate (SO4) (mg/L)	39.4	38.2	34.1	38.2	22.9
	Anion Sum (meq/L)	3.55	3.64	3.35	3.58	3.19
	Cation Sum (meq/L)	3.27	3.41	3.17	3.50	2.98
	Cation - Anion Balance (%)	-4.1	-3.3	-2.6	-1.2	-3.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.35	1.62	1.24	1.34	1.23
	Total Organic Carbon (mg/L)	1.32	1.50	1.44	1.40	1.37
Total Metals	Aluminum (Al)-Total (mg/L)	0.0161	0.0209	0.0180	0.0096	0.0106
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00015	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00043	0.00041	0.00052	0.00025	0.00047
	Barium (Ba)-Total (mg/L)	0.0737	0.0772	0.0748	0.0723	0.0743
	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)	0.000633	0.000468	0.000673	0.000309	0.000054
	Calcium (Ca)-Total (mg/L)	44.6	46.8	41.8	44.2	42.0
	Chromium (Cr)-Total (mg/L)	0.00011	0.00041	0.00010	0.00012	0.00012
	Cobalt (Co)-Total (mg/L)	0.00389	0.00272	0.00433	0.00133	0.00035
	Copper (Cu)-Total (mg/L)	<0.00050	0.00066	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.265	0.366	0.215	0.183	0.115
	Lead (Pb)-Total (mg/L)	0.000284	0.000330	0.000317	0.000145	0.000165
	Lithium (Li)-Total (mg/L)	0.00791	0.00690	0.00767	0.00623	0.00715
	Magnesium (Mg)-Total (mg/L)	12.1	11.8	11.3	12.3	9.67
	Manganese (Mn)-Total (mg/L)	0.264	0.229	0.238	0.121	0.0353
	Molybdenum (Mo)-Total (mg/L)	0.000805	0.000708	0.000826	0.000692	0.000844

* 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		L1423769-6 Surface Water 18-FEB-14 09:55 X14-R	L1423769-7 Surface Water 18-FEB-14 09:55 X14	L1423769-8 Surface Water 10-JAN-14 TRAVEL BLANK	L1423769-9 Surface Water 18-FEB-14 12:10 R10	L1423769-10 Surface Water 18-FEB-14 12:40 R8
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	685	699	<2.0	283	257
	Hardness (as CaCO3) (mg/L)	379	379	<0.50	140	126
	pH (pH)	7.54	7.49	5.75	7.75	7.67
	Total Suspended Solids (mg/L)	2.0	1.4	<1.0	<1.0	1.0
	Total Dissolved Solids (mg/L)	488	496	<1.0	158	139
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	187	177	<2.0	132	128
	Ammonia, Total (as N) (mg/L)	0.0846	0.0915	<0.0050	0.0072	0.0063
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.153	0.162	<0.020	0.170	0.168
	Nitrate (as N) (mg/L)	0.210	0.223	<0.0050	0.272	0.203
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	0.0040	0.0048
	Sulfate (SO4) (mg/L)	224	238	<0.50	21.8	9.90
	Anion Sum (meq/L)	8.41	8.51	<0.10	3.11	2.78
	Cation Sum (meq/L)	8.14	8.14	<0.10	2.95	2.67
	Cation - Anion Balance (%)	-1.7	-2.3	0.0	-2.6	-2.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.40	1.35		1.33	1.24
	Total Organic Carbon (mg/L)	1.59	1.49	<0.50	1.39	1.35
Total Metals	Aluminum (Al)-Total (mg/L)	0.0169	0.0171	<0.0030	0.0176	0.0103
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00039	0.00038	<0.00010	0.00058	0.00061
	Barium (Ba)-Total (mg/L)	0.0702	0.0706	<0.000050	0.0743	0.0739
	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)	0.000305	0.000317	<0.000010	0.000013	<0.000010
	Calcium (Ca)-Total (mg/L)	113	114	<0.020	43.0	38.2
	Chromium (Cr)-Total (mg/L)	0.00013	0.00014	<0.00010	0.00011	0.00016
	Cobalt (Co)-Total (mg/L)	0.00382	0.00387	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00052	0.00059	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.768	0.773	<0.010	0.149	0.149
	Lead (Pb)-Total (mg/L)	0.000184	0.000216	<0.000050	0.000073	<0.000050
	Lithium (Li)-Total (mg/L)	0.00822	0.00805	<0.00050	0.00682	0.00653
	Magnesium (Mg)-Total (mg/L)	25.9	26.6	<0.0050	9.08	7.86
	Manganese (Mn)-Total (mg/L)	4.52	4.37	<0.000050	0.0267	0.0219
	Molybdenum (Mo)-Total (mg/L)	0.000748	0.000734	<0.000050	0.000857	0.000859

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1423769-11 Surface Water 18-FEB-14 11:50 NF1	L1423769-12 Surface Water 18-FEB-14 09:26 FIELD BLANK	L1423769-13 Surface Water 18-FEB-14 12:20 R9		
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	289	<2.0	287		
	Hardness (as CaCO3) (mg/L)	144	<0.50	137		
	pH (pH)	7.63	6.34	7.76		
	Total Suspended Solids (mg/L)	<1.0	<1.0	1.0		
	Total Dissolved Solids (mg/L)	159	<1.0	155		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	130	<2.0	129		
	Ammonia, Total (as N) (mg/L)	0.0069	<0.0050	0.0051		
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.171	<0.020	0.171		
	Nitrate (as N) (mg/L)	0.291	<0.0050	0.279		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0010		
	Phosphorus (P)-Total (mg/L)	0.0042	<0.0020	0.0048		
	Sulfate (SO4) (mg/L)	22.3	<0.50	21.5		
	Anion Sum (meq/L)	3.08	<0.10	3.05		
	Cation Sum (meq/L)	3.04	<0.10	2.91		
	Cation - Anion Balance (%)	-0.7	0.0	-2.4		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.36	<0.50	1.25		
	Total Organic Carbon (mg/L)	1.39	<0.50	1.33		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0116	<0.0030	0.0142		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Total (mg/L)	0.00057	<0.00010	0.00062		
	Barium (Ba)-Total (mg/L)	0.0742	<0.000050	0.0744		
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Total (mg/L)	0.000019	<0.000010	<0.000010		
	Calcium (Ca)-Total (mg/L)	42.9	<0.020	42.7		
	Chromium (Cr)-Total (mg/L)	0.00013	<0.00010	0.00012		
	Cobalt (Co)-Total (mg/L)	0.00015	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.133	<0.010	0.142		
	Lead (Pb)-Total (mg/L)	0.000118	<0.000050	0.000072		
	Lithium (Li)-Total (mg/L)	0.00714	<0.00050	0.00701		
	Magnesium (Mg)-Total (mg/L)	9.26	<0.0050	9.23		
	Manganese (Mn)-Total (mg/L)	0.0341	<0.000050	0.0228		
	Molybdenum (Mo)-Total (mg/L)	0.000876	<0.000050	0.000897		

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1423769-1 Surface Water 18-FEB-14 10:55 X2	L1423769-2 Surface Water 18-FEB-14 10:35 X3A	L1423769-3 Surface Water 18-FEB-14 11:20 NF2	L1423769-4 Surface Water 18-FEB-14 10:15 X10	L1423769-5 Surface Water 18-FEB-14 11:10 NF2-B
Grouping	Analyte					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00620	0.00525	0.00642	0.00451	0.00088
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	1.09	1.19	1.03	1.14	1.01
	Selenium (Se)-Total (mg/L)	0.00045	0.00041	0.00046	0.00041	0.00043
	Silicon (Si)-Total (mg/L)	5.91	5.70	5.77	5.70	5.99
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	3.33	3.30	3.25	3.06	3.21
	Strontium (Sr)-Total (mg/L)	0.189	0.207	0.185	0.204	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)	0.00248	0.00266	0.00267	0.00267	0.00258
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	0.930	0.769	1.04	0.618	0.0712
	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)	0.0030	0.0027	0.0040	0.0017	0.0014
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00021	0.00020	0.00032	0.00013	0.00032
	Barium (Ba)-Dissolved (mg/L)	0.0744	0.0754	0.0735	0.0754	0.0759
	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)	0.000610	0.000441	0.000629	0.000305	0.000057
	Calcium (Ca)-Dissolved (mg/L)	42.2	44.9	41.1	46.5	41.3
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00382	0.00263	0.00418	0.00123	0.00034
	Copper (Cu)-Dissolved (mg/L)	0.00026	0.00031	0.00027	0.00027	0.00026
	Iron (Fe)-Dissolved (mg/L)	0.072	0.151	0.098	0.018	0.026
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00773	0.00659	0.00763	0.00682	0.00722
	Magnesium (Mg)-Dissolved (mg/L)	11.7	11.7	11.1	12.0	9.22
	Manganese (Mn)-Dissolved (mg/L)	0.258	0.221	0.231	0.119	0.0338
	Molybdenum (Mo)-Dissolved (mg/L)	0.000732	0.000675	0.000777	0.000683	0.000779
	Nickel (Ni)-Dissolved (mg/L)	0.00613	0.00502	0.00654	0.00429	0.00079
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.06	1.17	1.03	1.11	1.01

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1423769-6 Surface Water 18-FEB-14 09:55 X14-R	L1423769-7 Surface Water 18-FEB-14 09:55 X14	L1423769-8 Surface Water 10-JAN-14 TRAVEL BLANK	L1423769-9 Surface Water 18-FEB-14 12:10 R10	L1423769-10 Surface Water 18-FEB-14 12:40 R8
Grouping	Analyte					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00959	0.0100	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	1.88	1.89	<0.050	0.966	0.905
	Selenium (Se)-Total (mg/L)	0.00039	0.00040	<0.00010	0.00046	0.00044
	Silicon (Si)-Total (mg/L)	6.12	5.99	<0.050	5.98	5.99
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	7.26	7.29	<0.050	3.05	3.12
	Strontium (Sr)-Total (mg/L)	0.363	0.369	<0.00020	0.184	0.166
	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)	0.00334	0.00357	<0.000010	0.00266	0.00234
	Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)	0.480	0.482	<0.0030	0.0080	<0.0030
	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)	0.0016	0.0015		0.0019	0.0019
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010		<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00025	0.00025		0.00040	0.00042
	Barium (Ba)-Dissolved (mg/L)	0.0703	0.0696		0.0772	0.0718
	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)	0.000295	0.000298		0.000013	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	109	109		41.2	38.5
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010		<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00371	0.00371		<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00036	0.00034		0.00026	0.00020
	Iron (Fe)-Dissolved (mg/L)	0.540	0.550		0.029	0.035
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050		<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.00797	0.00788		0.00692	0.00677
	Magnesium (Mg)-Dissolved (mg/L)	26.1	25.7		8.94	7.25
	Manganese (Mn)-Dissolved (mg/L)	4.26	4.30		0.0230	0.0193
	Molybdenum (Mo)-Dissolved (mg/L)	0.000687	0.000689		0.000818	0.000832
	Nickel (Ni)-Dissolved (mg/L)	0.00938	0.00941		<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30		<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.90	1.88		0.982	0.890

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1423769-11	L1423769-12	L1423769-13		
		Description	Surface Water	Surface Water	Surface Water		
		Sampled Date	18-FEB-14	18-FEB-14	18-FEB-14		
		Sampled Time	11:50	09:26	12:20		
		Client ID	NF1	FIELD BLANK	R9		
Grouping	Analyte						
WATER							
Total Metals	Nickel (Ni)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Total (mg/L)		<0.30	<0.30	<0.30		
	Potassium (K)-Total (mg/L)		1.00	<0.050	1.01		
	Selenium (Se)-Total (mg/L)		0.00044	<0.00010	0.00046		
	Silicon (Si)-Total (mg/L)		6.11	<0.050	5.91		
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)		3.27	<0.050	3.10		
	Strontium (Sr)-Total (mg/L)		0.190	<0.00020	0.184		
	Thallium (Tl)-Total (mg/L)		<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)		<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)		0.00267	<0.000010	0.00264		
	Vanadium (V)-Total (mg/L)		<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Total (mg/L)		0.0125	<0.0030	<0.0030		
	Zirconium (Zr)-Total (mg/L)		<0.00080	<0.00080	<0.00080		
Dissolved Metals	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)		0.0025	<0.0010	0.0020		
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)		0.00036	<0.00010	0.00040		
	Barium (Ba)-Dissolved (mg/L)		0.0736	<0.000050	0.0738		
	Beryllium (Be)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010		
	Bismuth (Bi)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)		<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (mg/L)		0.000016	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)		42.3	<0.020	40.2		
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)		0.00015	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)		0.00029	<0.00020	0.00024		
	Iron (Fe)-Dissolved (mg/L)		0.036	<0.010	0.026		
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)		0.00738	<0.00050	0.00685		
	Magnesium (Mg)-Dissolved (mg/L)		9.32	<0.0050	8.97		
	Manganese (Mn)-Dissolved (mg/L)		0.0326	<0.000050	0.0195		
	Molybdenum (Mo)-Dissolved (mg/L)		0.000810	<0.000050	0.000818		
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050		
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)		0.985	<0.050	0.979		

* 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		L1423769-1 Surface Water 18-FEB-14 10:55 X2	L1423769-2 Surface Water 18-FEB-14 10:35 X3A	L1423769-3 Surface Water 18-FEB-14 11:20 NF2	L1423769-4 Surface Water 18-FEB-14 10:15 X10	L1423769-5 Surface Water 18-FEB-14 11:10 NF2-B
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00044	0.00040	0.00045	0.00041	0.00046
	Silicon (Si)-Dissolved (mg/L)	6.12	5.86	6.11	5.71	5.83
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	3.17	3.14	3.16	3.04	3.07
	Strontium (Sr)-Dissolved (mg/L)	0.190	0.197	0.181	0.204	0.180
	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)	0.00250	0.00264	0.00253	0.00262	0.00249
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.956	0.766	0.974	0.612	0.0720
	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 Description Sampled Date Sampled Time Client ID		L1423769-6 Surface Water 18-FEB-14 09:55 X14-R	L1423769-7 Surface Water 18-FEB-14 09:55 X14	L1423769-8 Surface Water 10-JAN-14 TRAVEL BLANK	L1423769-9 Surface Water 18-FEB-14 12:10 R10	L1423769-10 Surface Water 18-FEB-14 12:40 R8
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00040	0.00040		0.00048	0.00043
	Silicon (Si)-Dissolved (mg/L)	6.14	6.05		6.02	5.91
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010		<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	7.18	7.12		3.07	2.96
	Strontium (Sr)-Dissolved (mg/L)	0.353	0.356		0.181	0.163
	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)	0.00332	0.00338		0.00256	0.00234
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010		<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.475	0.471		0.0078	<0.0010
	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 Description Sampled Date Sampled Time Client ID		L1423769-11 Surface Water 18-FEB-14 11:50 NF1	L1423769-12 Surface Water 18-FEB-14 09:26 FIELD BLANK	L1423769-13 Surface Water 18-FEB-14 12:20 R9		
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00042	<0.00010	0.00044		
	Silicon (Si)-Dissolved (mg/L)	5.97	<0.050	5.94		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	3.11	<0.050	3.12		
	Strontium (Sr)-Dissolved (mg/L)	0.191	<0.00020	0.179		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00260	<0.000010	0.00265		
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010		
	Zinc (Zn)-Dissolved (mg/L)	0.0123	<0.0010	<0.0010		
	Zirconium (Zr)-Dissolved (mg/L)	<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	Cadmium (Cd)-Dissolved	DLM	L1423769-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1423769-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1423769-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1423769-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1423769-1, -10, -11, -12, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1423769-1, -10, -11, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L1423769-1, -10, -11, -13, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1423769-1, -10, -11, -13, -2, -3, -4, -5, -6, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
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 CaCO ₃ 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

Reference Information

included where data is present. Ion Balance is calculated as:

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

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. 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 2

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 ww - milligrams per kilogram based on wet weight of sample.

mg/kg lw - 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.



L1423769-COFC

GENF 18.01 Front



L1423769-COFC

GENF 18.01 Front