



ENVIRONMENTAL DYNAMICS INC.
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Date Received: 25-JUN-14
Report Date: 09-JUL-14 10:25 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1477148
Project P.O. #: NOT SUBMITTED
Job Reference: 14-Y-270
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	L1477148-1 Grab 23-JUN-14 15:54 NF2-A	L1477148-2 Grab 23-JUN-14 15:20 X3A	L1477148-3 Grab 23-JUN-14 15:00 X10	L1477148-4 Grab 23-JUN-14 16:15 NF2	L1477148-5 Grab 23-JUN-14 15:38 X2
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	107	116	129	121	119
	Hardness (as CaCO3) (mg/L)	59.3	61.4	68.5	62.5	61.4
	pH (pH)	7.62	7.78	7.79	7.62	7.67
	Total Suspended Solids (mg/L)	2.6	1.4	1.4	2.4	2.4
	Total Dissolved Solids (mg/L)	69.2	72.5	80.1	73.6	71.7
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	56.4	57.0	64.0	54.3	56.0
	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.073	0.075	0.078	0.078	0.075
	Nitrate (as N) (mg/L)	0.0218	0.0152	0.0107	0.0230	0.0176
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0060	0.0048	0.0043	0.0054	0.0111
	Sulfate (SO4) (mg/L)	8.24	10.6	11.7	12.6	10.2
	Anion Sum (meq/L)	1.30	1.37	1.53	1.35	1.34
	Cation Sum (meq/L)	1.26	1.31	1.46	1.35	1.31
	Cation - Anion Balance (%)	-1.6	-2.0	-2.3	-0.2	-1.1
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.72	3.40	3.30	3.66	3.73
	Total Organic Carbon (mg/L)	3.80	3.36	3.45	3.67	3.78
Total Metals	Aluminum (Al)-Total (mg/L)	0.0777	0.0584	0.0465	0.0941	0.0874
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00049	0.00066	0.00045	0.00055	0.00055
	Barium (Ba)-Total (mg/L)	0.0275	0.0330	0.0348	0.0355	0.0343
	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)	0.000025	0.000057	0.000044	0.000279	0.000089
	Calcium (Ca)-Total (mg/L)	17.8	17.5	21.7	17.6	17.4
	Chromium (Cr)-Total (mg/L)	0.00021	0.00023	0.00017	0.00029	0.00024
	Cobalt (Co)-Total (mg/L)	0.00014	0.00030	0.00025	0.00170	0.00052
	Copper (Cu)-Total (mg/L)	0.00084	0.00082	0.00086	0.00097	0.00093
	Iron (Fe)-Total (mg/L)	0.173	0.203	0.229	0.250	0.186
	Lead (Pb)-Total (mg/L)	0.000870	0.000584	0.000502	0.00116	0.000868
	Lithium (Li)-Total (mg/L)	0.00197	0.00151	0.00190	0.00215	0.00209
	Magnesium (Mg)-Total (mg/L)	3.57	3.98	4.80	4.77	4.30
	Manganese (Mn)-Total (mg/L)	0.0134	0.0295	0.0271	0.0912	0.0370
	Molybdenum (Mo)-Total (mg/L)	0.000367	0.000336	0.000387	0.000374	0.000358

* 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	L1477148-6 Grab 23-JUN-14 16:53 NF1	L1477148-7 Grab 23-JUN-14 17:09 R10	L1477148-8 Grab 23-JUN-14 18:51 FIELD BLANK	L1477148-9 Grab 23-JUN-14 16:03 NF2-B	L1477148-10 Grab TRAVEL BLANK
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	115	117	<2.0	111	<2.0
	Hardness (as CaCO3) (mg/L)	58.2	58.7	<0.50	58.0	<0.50
	pH (pH)	7.64	7.68	5.69	7.64	5.60
	Total Suspended Solids (mg/L)	1.0	2.2	<1.0	2.8	<1.0
	Total Dissolved Solids (mg/L)	67.8	69.5	<1.0	70.4	<1.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	53.1	57.9	<2.0	59.8	<2.0
	Ammonia, Total (as N) (mg/L)	0.0054	<0.0050	<0.0050	<0.0050	<0.0050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.072	0.074	<0.020	0.073	<0.020
	Nitrate (as N) (mg/L)	0.0396	0.0197	<0.0050	0.0216	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0056	0.0070	<0.0020	0.0065	<0.0020
	Sulfate (SO4) (mg/L)	8.72	7.95	<0.50	7.97	<0.50
	Anion Sum (meq/L)	1.25	1.33	<0.10	1.37	<0.10
	Cation Sum (meq/L)	1.24	1.25	<0.10	1.24	<0.10
	Cation - Anion Balance (%)	-0.3	-3.0	0.0	-5.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	3.95	3.54	<0.50	3.72	
	Total Organic Carbon (mg/L)	4.14	3.72	<0.50	3.67	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0622	0.0792	<0.0030	0.0999	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00055	0.00054	<0.00010	0.00057	<0.00010
	Barium (Ba)-Total (mg/L)	0.0347	0.0339	<0.000050	0.0350	<0.000050
	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)	0.000016	0.000015	<0.000010	0.000016	<0.000010
	Calcium (Ca)-Total (mg/L)	18.1	17.1	<0.020	17.2	<0.020
	Chromium (Cr)-Total (mg/L)	0.00018	0.00023	<0.00010	0.00026	<0.00010
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00094	0.00088	<0.00050	0.00094	<0.00050
	Iron (Fe)-Total (mg/L)	0.149	0.171	<0.010	0.208	<0.010
	Lead (Pb)-Total (mg/L)	0.000675	0.000529	<0.000050	0.00108	<0.000050
	Lithium (Li)-Total (mg/L)	0.00200	0.00198	<0.00050	0.00208	<0.00050
	Magnesium (Mg)-Total (mg/L)	3.83	3.85	<0.0050	3.97	<0.0050
	Manganese (Mn)-Total (mg/L)	0.0194	0.0150	<0.000050	0.0125	<0.000050
	Molybdenum (Mo)-Total (mg/L)	0.000506	0.000381	<0.000050	0.000356	<0.000050

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1477148-1	L1477148-2	L1477148-3	L1477148-4	L1477148-5
		Description	Grab	Grab	Grab	Grab	Grab
		Sampled Date	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14
		Sampled Time	15:54	15:20	15:00	16:15	15:38
		Client ID	NF2-A	X3A	X10	NF2	X2
Grouping	Analyte						
WATER							
Total Metals	Nickel (Ni)-Total (mg/L)		0.00060	0.00084	0.00085	0.00278	0.00116
	Phosphorus (P)-Total (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)		0.427	0.527	0.562	0.492	0.521
	Selenium (Se)-Total (mg/L)		0.00025	0.00017	0.00020	0.00021	0.00023
	Silicon (Si)-Total (mg/L)		4.04	3.75	3.55	4.34	4.04
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		1.26	1.48	1.50	1.46	1.47
	Strontium (Sr)-Total (mg/L)		0.0732	0.0805	0.101	0.0772	0.0739
	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)		0.000663	0.000753	0.000932	0.000695	0.000638
	Vanadium (V)-Total (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)		0.0258	0.0691	0.0635	0.393	0.110
	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)		0.0187	0.0162	0.0157	0.0218	0.0189
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)		0.00042	0.00036	0.00035	0.00044	0.00044
	Barium (Ba)-Dissolved (mg/L)		0.0329	0.0323	0.0338	0.0345	0.0335
	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)		0.000024	0.000046	0.000040	0.000277	0.000081
	Calcium (Ca)-Dissolved (mg/L)		17.4	17.9	19.3	17.1	17.7
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00010	0.00026	0.00021	0.00158	0.00044
	Copper (Cu)-Dissolved (mg/L)		0.00076	0.00067	0.00070	0.00082	0.00076
	Iron (Fe)-Dissolved (mg/L)		0.051	0.082	0.151	0.107	0.067
	Lead (Pb)-Dissolved (mg/L)		0.000247	0.000177	0.000199	0.000383	0.000279
	Lithium (Li)-Dissolved (mg/L)		0.00202	0.00170	0.00179	0.00214	0.00206
	Magnesium (Mg)-Dissolved (mg/L)		3.88	4.04	4.93	4.81	4.20
	Manganese (Mn)-Dissolved (mg/L)		0.00776	0.0247	0.0236	0.0841	0.0307
	Molybdenum (Mo)-Dissolved (mg/L)		0.000365	0.000285	0.000329	0.000348	0.000354
	Nickel (Ni)-Dissolved (mg/L)		<0.00050	0.00072	0.00074	0.00263	0.00102
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)		0.460	0.532	0.542	0.487	0.474

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1477148-6	L1477148-7	L1477148-8	L1477148-9	L1477148-10
		Description	Grab	Grab	Grab	Grab	Grab
		Sampled Date	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14	
		Sampled Time	16:53	17:09	18:51	16:03	
		Client ID	NF1	R10	FIELD BLANK	NF2-B	TRAVEL BLANK
Grouping	Analyte						
WATER							
Total Metals	Nickel (Ni)-Total (mg/L)		0.00053	<0.00050	<0.00050	0.00056	<0.00050
	Phosphorus (P)-Total (mg/L)		<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)		0.475	0.463	<0.050	0.488	<0.050
	Selenium (Se)-Total (mg/L)		0.00021	0.00023	<0.00010	0.00023	<0.00010
	Silicon (Si)-Total (mg/L)		4.24	4.03	<0.050	4.18	<0.050
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		1.37	1.40	<0.050	1.41	<0.050
	Strontium (Sr)-Total (mg/L)		0.0772	0.0729	<0.00020	0.0759	<0.00020
	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)		0.000679	0.000686	<0.000010	0.000667	<0.000010
	Vanadium (V)-Total (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Total (mg/L)		0.0071	0.0047	<0.0030	0.0058	<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)		0.0203	0.0207	<0.0010	0.0185	
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)		0.00044	0.00046	<0.00010	0.00043	
	Barium (Ba)-Dissolved (mg/L)		0.0348	0.0331	<0.000050	0.0327	
	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)		0.000015	<0.000010	<0.000010	<0.000010	
	Calcium (Ca)-Dissolved (mg/L)		17.2	17.1	<0.020	16.9	
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	
	Cobalt (Co)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Dissolved (mg/L)		0.00084	0.00076	<0.00020	0.00074	
	Iron (Fe)-Dissolved (mg/L)		0.058	0.063	<0.010	0.053	
	Lead (Pb)-Dissolved (mg/L)		0.000233	0.000232	<0.000050	0.000257	
	Lithium (Li)-Dissolved (mg/L)		0.00196	0.00199	<0.00050	0.00198	
	Magnesium (Mg)-Dissolved (mg/L)		3.74	3.86	<0.0050	3.81	
	Manganese (Mn)-Dissolved (mg/L)		0.0160	0.00905	<0.000050	0.00370	
	Molybdenum (Mo)-Dissolved (mg/L)		0.000349	0.000351	<0.000050	0.000332	
	Nickel (Ni)-Dissolved (mg/L)		0.00052	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Dissolved (mg/L)		<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)		0.475	0.453	<0.050	0.455	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1477148-1	L1477148-2	L1477148-3	L1477148-4	L1477148-5
		Description	Grab	Grab	Grab	Grab	Grab
		Sampled Date	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14
		Sampled Time	15:54	15:20	15:00	16:15	15:38
		Client ID	NF2-A	X3A	X10	NF2	X2
Grouping	Analyte						
WATER							
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)		0.00021	0.00018	0.00021	0.00021	0.00021
	Silicon (Si)-Dissolved (mg/L)		3.87	3.56	3.45	3.93	3.91
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		1.35	1.45	1.44	1.46	1.36
	Strontium (Sr)-Dissolved (mg/L)		0.0758	0.0827	0.0887	0.0740	0.0765
	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)		0.000667	0.000733	0.000805	0.000653	0.000639
	Vanadium (V)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)		0.0264	0.0653	0.0592	0.403	0.109
	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	L1477148-6	L1477148-7	L1477148-8	L1477148-9	L1477148-10
Description	Grab	Grab	Grab	Grab	Grab	Grab
Sampled Date	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14	23-JUN-14	
Sampled Time	16:53	17:09	18:51	16:03		
Client ID	NF1	R10	FIELD BLANK	NF2-B	TRAVEL BLANK	
Grouping	Analyte					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	0.00021	0.00024	<0.00010	0.00023	
	Silicon (Si)-Dissolved (mg/L)	4.08	4.04	<0.050	4.20	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	1.37	1.39	<0.050	1.38	
	Strontium (Sr)-Dissolved (mg/L)	0.0719	0.0718	<0.00020	0.0733	
	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)	0.000587	0.000668	<0.000010	0.000672	
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Zinc (Zn)-Dissolved (mg/L)	0.0062	0.0027	<0.0010	0.0038	
	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.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Beryllium (Be)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Phosphorus (P)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLA	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1477148-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Total	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1477148-1, -2, -3, -4, -5, -6, -7, -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.

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

Reference Information

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:

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

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-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

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

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

Reference Information

"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

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.

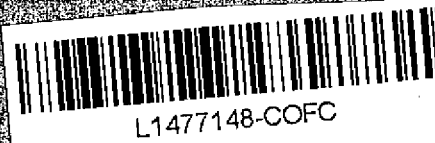
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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.



Report To		Report Format / Distri			select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)													
Company: EDI		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)													
Contact: Meighan Kearns		Quality Control (QC) Report with Report <input type="checkbox"/> Yes <input type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT													
Address: 2195 - 2nd Avenue Whitehorse, YT Y1A 3T8		<input type="checkbox"/> Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT													
Phone: 867-393-4882		Select Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge													
		Email 1 or Fax mkearns@edynamics.com			Specify Date Required for E2,E or P:													
		Email 2 adrienne.turcotte@gov.yk.ca			Analysis Request													
Invoice To		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
Same as Report To <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Select Invoice Distribution: <input type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																
Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax sjenner@edynamics.com																
Company: EDI		Email 2																
Contact: S Jenner																		
Project Information		Oil and Gas Required Fields (client use)																
ALS Quote #: Q38556		Approver ID:		Cost Center:														
Job #: 14-Y-270		GL Account:		Routing Code:														
PO / AFE:		Activity Code:																
LSD:		Location:																
ALS Lab Work Order # (lab use only)		ALS Contact:		Sampler: <i>BSM, DJ</i>														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ALK-COL-VA,P-T-COL-VA,IONBALANCE-V	ANIONS-ALL-IC-WR, TDS-CALC-VA	EC-MAN-WR,PH-MAN-WR	TSS-LOW-WR	CARBONS-TOC-VA,NHS-F-VA	CARBONS-DOC-VA	MET-T-CCMS-VA,ZR-T-MS-VA	MET-D-CCMS-VA,ZR-D-MS-VA	HARDNESS-CALC-VA	Number of Containers		
	NF2-A			23	15:54	GRAB	R	R	R	R	R	R	R	R	R	5		
	X3A			23	15:20	GRAB	R											
	X10			23	15:00	GRAB	R											
	NF2			23	16:15	GRAB	R											
	X2			23	15:38	GRAB	R											
	NF1			23	16:53	GRAB	R											
	R10			23	17:09	GRAB	R											
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)			SAMPLE CONDITION AS RECEIVED (lab use only):													
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input type="checkbox"/> No		Use CH2M_EQUIS for EDD.			Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>													
Are samples for human drinking water use? <input type="checkbox"/> Yes <input type="checkbox"/> No					Cup/leak Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>													
					Cooling initiated <input type="checkbox"/>													
					INITIAL COOLER TEMPERATURES °C: 11.35 15.50 3.8													
					FINAL COOLER TEMPERATURES °C:													
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)													
Released by: <i>B. SMITH</i>		Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

