

ECOLOGICAL LOGISTICS & RESEARCH LTD.

Date

ATTN: Chris Jastrebski 204 - 105 Titanium Way

Whitehorse YT Y1A 0E7

Date Received: 04-SEP-15

Report Date: 16-SEP-15 16:33 (MT)

Version: FINAL

Client Phone: 867-668-6386

Certificate of Analysis

Lab Work Order #: L1668448
Project P.O. #: NOT SUBMITTED

Job Reference: 15-210

C of C Numbers:

Legal Site Desc:

Jame Lo, B.Sc. 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



L1668448 CONTD....

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1668448-1 Water 31-AUG-15 10:37 HL	L1668448-2 Water 31-AUG-15 09:51 CC1	L1668448-3 Water 31-AUG-15 09:31 CC2	L1668448-4 Water 31-AUG-15 09:15 CC3	L1668448-5 Water 31-AUG-15 08:55 WC
Grouping	Analyte	-				
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	235	248	301	288	243
	pH (pH)	7.69	7.98	7.91	7.92	7.93
	Total Suspended Solids (mg/L)	<3.0	3.3	<3.0	3.3	16.0
Total Metals	Aluminum (Al)-Total (mg/L)	0.186	0.184	0.167	0.194	0.563
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	0.00101	0.00102	0.00120	0.00117	0.00130
	Barium (Ba)-Total (mg/L)	0.059	0.063	0.059	0.059	0.066
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	0.0000523	0.0000490	0.0000529	0.0000480	0.0000389
	Calcium (Ca)-Total (mg/L)	53.1	55.9	64.0	60.2	45.4
	Chromium (Cr)-Total (mg/L)	0.0011	0.0012	0.0012	0.0013	0.0024
	Cobalt (Co)-Total (mg/L)	0.00048	0.00048	0.00056	0.00054	0.00062
	Copper (Cu)-Total (mg/L)	0.0034	0.0034	0.0031	0.0033	0.0037
	Iron (Fe)-Total (mg/L)	0.514	0.538	0.528	0.585	1.08
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00050
	Lithium (Li)-Total (mg/L)	0.0029	0.0028	0.0045	0.0043	0.0029
	Magnesium (Mg)-Total (mg/L)	24.9	26.4	34.2	33.5	31.5
	Manganese (Mn)-Total (mg/L)	0.134	0.126	0.122	0.115	0.0915
	Mercury (Hg)-Total (mg/L)	0.0000089	0.0000079	0.0000078	0.0000074	0.0000110
	Molybdenum (Mo)-Total (mg/L)	0.0012	0.0012	0.0014	0.0013	0.0011
	Nickel (Ni)-Total (mg/L)	0.0047	0.0053	0.0088	0.0085	0.0078
	Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Selenium (Se)-Total (mg/L)	0.00118	0.00123	0.00163	0.00151	0.000974
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	0.000023
	Sodium (Na)-Total (mg/L)	2.4	2.5	2.8	2.9	3.3
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.016
	Uranium (U)-Total (mg/L)	0.00163	0.00167	0.00179	0.00180	0.00187
	Vanadium (V)-Total (mg/L)	0.00106	0.00112	0.00106	0.00115	0.00234
	Zinc (Zn)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

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

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Reference Information 16-SEP-15 16:33 (MT) Version: FINAL

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)	
Duplicate	Beryllium (Be)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Cadmium (Cd)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Chromium (Cr)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Cobalt (Co)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Copper (Cu)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Lead (Pb)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Selenium (Se)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Silver (Ag)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Thallium (TI)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Tin (Sn)-Total	DLA	L1668448-1, -2, -3, -4, -5	
Duplicate	Vanadium (V)-Total	DLA	L1668448-1, -2, -3, -4, -5	

Qualifier Description

DLA Detection Limit adjusted for required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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.

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

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 (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

PH-MAN-WR Water pH by Meter APHA 4500-H+

pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 - 5^{\circ}$ C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.

TSS-MAN-WR Water Total Suspended Solids by Gravimetric 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.

** 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

Chain of Custody Numbers:

Reference Information

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

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

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1668448-COFC

COC Number: 14 -

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Report To					Report Format / L				/ (Rush Tumaround Time (TAT) is not available for all tests)												
Company:	Ecological Logistics & Research Ltd.				Select Report Format: PDF DEXCEL DEDD (DIGITAL)				R Regular (Standard TAT if received by 3 pm - business days)												
Contact:	Chris Jastrebski				(QC) Report with R	eport 🗜 Yes	s I No	P Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT													
Address: 204-105 Titanium Way				Criteria on Repo	rt - provide details belov	v if box checked		E Emergency (1-2 bus, days If received by 3pm) 100% surcharge - contact ALS to confirm TAT													
	Whitehorse, YT Y1A 0E7			Select Distribut		IL MAIL	[]FAX	E2	2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge												
Phone:	867.668.6386			Email 1 or Fax	chris@elr.ca			Specify Date Required for E2,E or P:													
				Email 2	kmartens@minnov	v.ca			Analysis Request												
Invoice To	Same as Report To	▽ Yes	□ No		Invoice Di	stribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below													
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Company:	Ecological Logistics & Rese	earch Ltd.		Email 1 or Fax	chris@elr.ca																
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Drinking Water (DW) Samples¹ (client use) Special In			al Instructions / Spec	ify Criteria to add o	n report (client Us	se)	SAMPLE CONDITION AS RECEIVED (lab use only)								110						
Are samples taken from a Regulated DW System?		'-					Frozen				_ = = =										
Γ Yes Γ No							Ice packs Yes Cooling Initiated				No Custody seal intact					res	ш	No			
Are samples for human drinking water use?								INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES					<u></u>			
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