



ECOLOGICAL LOGISTICS & RESEARCH LTD.
ATTN: Chris Jastrebski
204 - 105 Titanium Way
Whitehorse YT Y1A 0E7

Date Received: 24-AUG-15
Report Date: 01-SEP-15 15:34 (MT)
Version: FINAL

Client Phone: 867-668-6386

Certificate of Analysis

Lab Work Order #: L1662011
Project P.O. #: NOT SUBMITTED
Job Reference: 15-210
C of C Numbers: 1
Legal Site Desc:



Jamie Lo, B.Sc.
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	L1662011-1	L1662011-2	L1662011-3	L1662011-4	L1662011-5
		Water	Water	Water	Water	Water
		16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15	16-AUG-15
		09:30	09:10	08:50	08:15	08:30
		HL	CC1	CC2	CC3	WC
Client ID						
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	287	274	360	351	309
	pH (pH)	7.92	8.11	7.89	7.91	7.93
	Total Suspended Solids (mg/L)	3.3	4.0	4.0	5.3	14.0
Total Metals	Aluminum (Al)-Total (mg/L)	0.0575	0.0392	0.0320	0.109	0.403
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00055
	Arsenic (As)-Total (mg/L)	0.00086	0.00085	0.00106	0.00112	0.00116
	Barium (Ba)-Total (mg/L)	0.060	0.054	0.054	0.057	0.064
	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)	0.0000295	0.0000322	0.0000405	0.0000437	0.0000317
	Calcium (Ca)-Total (mg/L)	62.2	59.8	71.0	67.9	56.4
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0021
	Cobalt (Co)-Total (mg/L)	0.00038	<0.00030	0.00051	0.00049	0.00047
	Copper (Cu)-Total (mg/L)	0.0029	0.0027	0.0027	0.0027	0.0031
	Iron (Fe)-Total (mg/L)	0.283	0.193	0.266	0.412	0.880
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Lithium (Li)-Total (mg/L)	0.0030	0.0028	0.0060	0.0050	0.0031
	Magnesium (Mg)-Total (mg/L)	32.0	30.3	44.3	44.0	40.8
	Manganese (Mn)-Total (mg/L)	0.124	0.0844	0.0945	0.0933	0.0879
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	0.0000057	0.0000106
	Molybdenum (Mo)-Total (mg/L)	0.0015	0.0014	0.0016	0.0016	0.0012
	Nickel (Ni)-Total (mg/L)	0.0050	0.0049	0.0113	0.0107	0.0082
	Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Selenium (Se)-Total (mg/L)	0.00121	0.00123	0.00126	0.00118	0.000871
	Silver (Ag)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Sodium (Na)-Total (mg/L)	3.0	2.7	3.5	3.6	3.7
	Thallium (Tl)-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	0.015
	Uranium (U)-Total (mg/L)	0.00208	0.00199	0.00207	0.00221	0.00275
	Vanadium (V)-Total (mg/L)	0.00052	<0.00050	<0.00050	0.00069	0.00170
	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.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Lead (Pb)-Total	MS-B	L1662011-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L1662011-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

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

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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 (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."			
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:

1

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.



L1662011-COFC

Report To			Report Format / Distribution				Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)																																																																																																																																																																																																																											
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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 checked="" type="checkbox"/> No							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 checked="" type="checkbox"/> No							Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>																																																																																																																																																																																																																											
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Released by: Luca Poloni		Date: Aug 21	Time:	Received by: J. Lyons		Date: 1045	Time: 24 Aug 15	Received by: Shafee			Date: Aug 25	Time: 1430																																																																																																																																																																																																																						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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NAL-02264 v03 Rev04 January 2014

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Michelle McKay Aug 24/15 10:05