



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

Date Received: 18-SEP-15
Report Date: 30-SEP-15 16:38 (MT)
Version: FINAL

Client Phone: 867-668-6386

Certificate of Analysis

Lab Work Order #: L1675053
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	Sampled Date	Sampled Time	Client ID	L1675053-1	L1675053-2	L1675053-3	L1675053-4	L1675053-5
					Water	Water	Water	Water	Water
		15-SEP-15	15-SEP-15		15-SEP-15	15-SEP-15	15-SEP-15	15-SEP-15	15-SEP-15
			15:58		14:56	14:30	13:54	14:17	
			HLB		CC1	CC2	CC3	WC	
Grouping	Analyte								
WATER									
Physical Tests	Hardness (as CaCO3) (mg/L)	276	289	396	381	353			
	pH (pH)	8.06	8.22	8.23	8.28	8.16			
	Total Suspended Solids (mg/L)	6.0	3.3	4.0	8.0	15.3			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0583	0.0607	0.0407	0.134	0.347			
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
	Arsenic (As)-Total (mg/L)	0.00079	0.00078	0.00106	0.00108	0.00105			
	Barium (Ba)-Total (mg/L)	0.059	0.061	0.054	0.058	0.067			
	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)	0.0000395	0.0000470	0.0000493	0.0000460	0.0000337			
	Calcium (Ca)-Total (mg/L)	62.5	65.1	78.1	73.8	68.0			
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0015			
	Cobalt (Co)-Total (mg/L)	0.00041	0.00037	0.00065	0.00058	0.00051			
	Copper (Cu)-Total (mg/L)	0.0030	0.0031	0.0024	0.0024	0.0027			
	Iron (Fe)-Total (mg/L)	0.265	0.259	0.312	0.488	0.802			
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
	Lithium (Li)-Total (mg/L)	0.0030	0.0030	0.0075	0.0062	0.0035			
	Magnesium (Mg)-Total (mg/L)	29.2	30.7	48.8	47.7	44.6			
	Manganese (Mn)-Total (mg/L)	0.203	0.167	0.153	0.138	0.117			
	Mercury (Hg)-Total (mg/L)	0.0000079	0.0000085	0.0000082	0.0000081	0.0000093			
	Molybdenum (Mo)-Total (mg/L)	0.0012	0.0014	0.0016	0.0014	0.0012			
	Nickel (Ni)-Total (mg/L)	0.0044	0.0050	0.0129	0.0111	0.0068			
	Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0			
	Selenium (Se)-Total (mg/L)	0.00134	0.00154	0.00144	0.00125	0.00100			
	Silver (Ag)-Total (mg/L)	<0.000020	0.000052	<0.000020	<0.000020	<0.000020			
	Sodium (Na)-Total (mg/L)	2.9	3.0	4.0	4.2	4.6			
	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)	0.00189	0.00211	0.00208	0.00242	0.00308				
Vanadium (V)-Total (mg/L)	0.00061	0.00057	<0.00050	0.00084	0.00162				
Zinc (Zn)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050				

Reference Information

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 CaCO ₃ 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-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
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			
It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
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			
It is recommended that this analysis be conducted in the field.			
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
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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.



Report To		Report Format / Distribution			Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)																							
Company: Ecological Logistics & Research Ltd.		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)																							
Contact: Chris Jastrebski		Quality Control (QC) Report with Report <input checked="" 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: 204-105 Titanium Way Whitehorse, YT Y1A 0E7		<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: 867.668.6386		Select Distribution: <input checked="" 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																							
Invoice To Same as Report To <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Email 1 or Fax chris@elr.ca			Specify Date Required for E2, E or P:																							
Copy of Invoice with Report <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Email 2 kmartens@minnow.ca			Analysis Request																							
Company: Ecological Logistics & Research Ltd.		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																							
Contact: Chris Jastrebski		Email 1 or Fax chris@elr.ca			P																							
Project Information		Oil and Gas Required Fields (client use)			Total Metals and Mercury																							
ALS Quote #: Q52337		Approver ID:			ASBESTOS																							
Job #: 15-210		GL Account:			pH																							
PO / AFE:		Routing Code:																										
LSD:		Activity Code:																										
		Location:																										
ALS Lab Work Order # (lab use only)		ALS Contact:			Number of Containers																							
Sampler:																												
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	TSS	Total Metals and Mercury		ASBESTOS	pH																		
	<input checked="" type="checkbox"/> HLB		15 Sep 15	15:58	Water	R	R		R																			
	CC1			14:56	Water	R	R		R																			
	CC2			14:30	Water	R	R		R																			
	CC3			13:54	Water	R	R		R																			
	WC			14:17	Water	R	R		R																			
Short Holding Time ● Rush Processing																												
Drinking Water (DW) Samples ¹ (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					Do Not use Sept 14 samples										Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input type="checkbox"/>													
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No															INITIAL COOLER TEMPERATURES °C 3.8 FINAL COOLER TEMPERATURES °C 8/4/6/8 °C													
SHIPMENT RELEASE (client use)								INITIAL SHIPMENT RECEPTION (lab use only)								FINAL SHIPMENT RECEPTION (lab use only)												
Released by: Wayne Emery		Date: Sept 15		Time: 18:30		Received by: [Signature]		Date: 15 Sept 15		Time: 9:15		Received by: [Signature]				Date: Sept 21				Time: 1130								

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY FAILURE TO COMPLETE ALL PORTIONS OF THIS FORM MAY DELAY ANALYSIS. PLEASE FILL IN THIS FORM LEGIBLY. BY THE USE OF THIS FORM THE USER ACKNOWLEDGES AND AGREES WITH THE TERMS AND CONDITIONS AS SPECIFIED ON THE BACK PAGE OF THE WHITE - REPORT COPY.

Chris Jastrebski Sept 18/15 To Stephen Clark of Woorlup Parsons for air mail.