

ENVIRONMENTAL DYNAMICS INC.

ATTN: Meghan Marjanovic

2195 - 2nd Ave

Whitehorse YT Y1A 3A2

Date Received: 19-NOV-15

Report Date: 01-DEC-15 12:22 (MT)

Version: FINAL

Client Phone: 867-393-4882

# Certificate of Analysis

Lab Work Order #: L1704431

Project P.O. #: NOT SUBMITTED

Job Reference: MOUNT NANSEN 15-Y-0146

C of C Numbers:

Legal Site Desc:

Can Dang Senior 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



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## ALS ENVIRONMENTAL ANALYTICAL REPORT

01-DEC-15 12:22 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1704431-1 Water 18-NOV-15 15:20 WQ-PW		
Grouping	Analyte			
WATER				
Physical Tests	Colour, True (CU)	<5.0		
	Conductivity (uS/cm)	354		
	Hardness (as CaCO3) (mg/L)	184		
	рН (рН)	8.16		
	Total Dissolved Solids (mg/L)	197		
	Turbidity (NTU)	<0.10		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	167		
	Chloride (CI) (mg/L)	<0.50		
	Fluoride (F) (mg/L)	0.090		
	Nitrate (as N) (mg/L)	0.134		
	Nitrite (as N) (mg/L)	<0.0010		
	Sulfate (SO4) (mg/L)	28.3		
	Anion Sum (meq/L)	3.95		
	Cation Sum (meq/L)	3.93		
	Cation - Anion Balance (%)	-0.2		
Total Metals	Aluminum (Al)-Total (mg/L)	<0.010		
	Antimony (Sb)-Total (mg/L)	<0.00050		
	Arsenic (As)-Total (mg/L)	0.00042		
	Barium (Ba)-Total (mg/L)	0.082		
	Boron (B)-Total (mg/L)	<0.10		
	Cadmium (Cd)-Total (mg/L)	<0.00020		
	Calcium (Ca)-Total (mg/L)	42.7		
	Chromium (Cr)-Total (mg/L)	<0.0020		
	Copper (Cu)-Total (mg/L)	<0.0010		
	Iron (Fe)-Total (mg/L)	<0.030		
	Lead (Pb)-Total (mg/L)	0.00063		
	Magnesium (Mg)-Total (mg/L)	18.8		
	Manganese (Mn)-Total (mg/L)	<0.0020		
	Mercury (Hg)-Total (mg/L)	<0.00020		
	Potassium (K)-Total (mg/L)	0.90		
	Selenium (Se)-Total (mg/L)	<0.0010		
	Sodium (Na)-Total (mg/L)	5.3		
	Uranium (U)-Total (mg/L)	0.00163		
	Zinc (Zn)-Total (mg/L)	<0.050		

## Reference Information

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**Test Method References:** 

ALS Test Code Matrix Test Description Method Reference\*\*

ALK-COL-VA Water Alkalinity by Colourimetric (Automated) EPA 310.2

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This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange

colourimetric method.

CL-IC-N-WR Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COLOUR-TRUE-VA Water Colour (True) by Spectrometer BCMOE Colour Single Wavelength

This analysis is carried out using procedures adapted from British Columbia Environmental Manual "Colour- Single Wavelength." Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method.

Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.

Concurrent measurement of sample pH is recommended.

EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-IC-N-WR Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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-TOT-CVAFS-VA** Water Total Hg in Water by CVAFS LOR=50ppt EPA 1631E (mod)

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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

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:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

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).

NO2-L-IC-N-WR Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-WR Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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

### **Reference Information**

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It is recommended that this analysis be conducted in the field.

SO4-IC-N-WR Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

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".

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

\*\* 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

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

#### **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.

# ALS Environmental

# Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878



	COC Number: 14 -		
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Contact:	Meghan Marjanovic	Quality Control	Quality Control (QC) Report with Report				P Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT										
Address:	2195 - 2nd Avenue	Criteria on Reg	Criteria on Report - provide details below if box checked			E     Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT											
	Whitehorse, YT Y1A 3T8	Select Distribut	Select Distribution:				E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge										
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Are samples for human drinking water use? □ No						MINITIAL COOLER TEMPERATURES C. S. FINAL COOLER TEMPERATURES C.											
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