

Whitehorse YT Y1A 0E7

ECOLOGICAL LOGISTICS & RESEARCH LTD.

Date Received: 28-AUG-15

ATTN: Chris Jastrebski Report Date: 09-SEP-15 11:31 (MT)

204 - 105 Titanium Way

Version: FINAL

Client Phone: 867-668-6386

# Certificate of Analysis

Lab Work Order #: L1665125
Project P.O. #: NOT SUBMITTED

Job Reference: 15-210

C of C Numbers: 1

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



L1665125 CONTD....

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Version: FINAL

## ALS ENVIRONMENTAL ANALYTICAL REPORT

|                | Sample ID<br>Description<br>Sampled Date<br>Sampled Time<br>Client ID | Water 26-AUG-15 09:51 | L1665125-2<br>Water<br>26-AUG-15<br>09:19<br>CC1 | L1665125-3<br>Water<br>26-AUG-15<br>08:56<br>CC2 | L1665125-4<br>Water<br>26-AUG-15<br>08:28<br>CC3 | L1665125-5<br>Water<br>26-AUG-15<br>08:37<br>WC |  |
|----------------|---|-----------------------|--|--|--|---|--|
| Grouping       | Analyte   |                       |  |  |  |   |  |
| WATER          |   |                       |  |  |  |   |  |
| Physical Tests | Hardness (as CaCO3) (mg/L)  | 261                   | 261  | 308  | 288  | 262   |  |
|                | рН (рН)   | 7.81                  | 8.09   | 8.05   | 8.06   | 7.98  |  |
|                | Total Suspended Solids (mg/L)   | <3.0                  | 4.0  | <3.0   | 31.3   | 69.3  |  |
| Total Metals   | Aluminum (Al)-Total (mg/L)  | 0.129                 | 0.123  | 0.133  | 0.628  | 1.81  |  |
|                | Antimony (Sb)-Total (mg/L)  | <0.00050              | <0.00050   | <0.00050   | <0.00050   | 0.00052   |  |
|                | Arsenic (As)-Total (mg/L)   | 0.00085               | 0.00083  | 0.00109  | 0.00133  | 0.00224   |  |
|                | Barium (Ba)-Total (mg/L)  | 0.059                 | 0.059  | 0.056  | 0.072  | 0.119   |  |
|                | 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)   | 0.0000424             | 0.0000381  | 0.0000467  | 0.0000892  | 0.000209  |  |
|                | Calcium (Ca)-Total (mg/L)   | 57.9                  | 58.0   | 64.6   | 57.7   | 48.6  |  |
|                | Chromium (Cr)-Total (mg/L)  | <0.0010               | 0.0010   | 0.0014   | 0.0024   | 0.0065  |  |
|                | Cobalt (Co)-Total (mg/L)  | 0.00041               | 0.00037  | 0.00055  | 0.00081  | 0.00170   |  |
|                | Copper (Cu)-Total (mg/L)  | <0.0035               | <0.0035  | <0.0035  | <0.0045  | 0.0082  |  |
|                | Iron (Fe)-Total (mg/L)  | 0.409                 | 0.439  | 0.452  | 1.22   | 3.47  |  |
|                | Lead (Pb)-Total (mg/L)  | <0.00050              | <0.00050   | <0.00050   | 0.00074  | 0.00225   |  |
|                | Lithium (Li)-Total (mg/L)   | 0.0032                | 0.0032   | 0.0045   | 0.0041   | 0.0040  |  |
|                | Magnesium (Mg)-Total (mg/L)   | 28.2                  | 28.1   | 35.7   | 35.0   | 34.2  |  |
|                | Manganese (Mn)-Total (mg/L)   | 0.126                 | 0.0994   | 0.121  | 0.121  | 0.143   |  |
|                | Mercury (Hg)-Total (mg/L)   | 0.0000062             | 0.0000069  | <0.0000050                                       | 0.0000152  | 0.0000150                                       |  |
|                | Molybdenum (Mo)-Total (mg/L)  | 0.0012                | 0.0013   | 0.0014   | 0.0014   | 0.0014  |  |
|                | Nickel (Ni)-Total (mg/L)  | 0.0044                | 0.0044   | 0.0096   | 0.0099   | 0.0127  |  |
|                | Potassium (K)-Total (mg/L)  | <2.0                  | <2.0   | <2.0   | <2.0   | <2.0  |  |
|                | Selenium (Se)-Total (mg/L)  | 0.00118               | 0.00123  | 0.00133  | 0.00131  | 0.00105   |  |
|                | Silver (Ag)-Total (mg/L)  | <0.000020             | <0.000020  | <0.000020  | 0.000028   | 0.000076  |  |
|                | Sodium (Na)-Total (mg/L)  | 2.5                   | 2.4  | 2.8  | 3.0  | 3.4   |  |
|                | 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   | 0.020  | 0.039   |  |
|                | Uranium (U)-Total (mg/L)  | 0.00164               | 0.00167  | 0.00180  | 0.00190  | 0.00208   |  |
|                | Vanadium (V)-Total (mg/L)   | 0.00079               | 0.00067  | 0.00081  | 0.00207  | 0.00559   |  |
|                | Zinc (Zn)-Total (mg/L)  | <0.0050               | <0.0050  | <0.0050  | 0.0057   | 0.0163  |  |
|                |   |                       |  |  |  |   |  |

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

## L1665125 CONTD....

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### Reference Information

Version: FINΔI

#### QC Samples with Qualifiers & Comments:

| QC Type Description | Parameter            | Qualifier | Applies to Sample Number(s) |
|---------------------|----------------------|-----------|-----------------------------|
| Duplicate           | Copper (Cu)-Total    | DLB       | L1665125-1, -2, -3, -4, -5  |
| Method Blank        | Copper (Cu)-Total    | MB-LOR    | L1665125-1, -2, -3, -4, -5  |
| Matrix Spike        | Manganese (Mn)-Total | MS-B      | L1665125-1, -2, -3, -4, -5  |

#### **Qualifiers for Individual Parameters Listed:**

| Qualifier | Description   |
|-----------|---|
| DLB       | Detection Limit was raised due to detection of analyte at comparable level in Method Blank.                               |
| MB-LOR    | Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level. |
| 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.

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

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** Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) Water

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 Total Metals in Water by ICPOES EPA SW-846 3005A/6010B Water

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°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.

TSS-MAN-WR 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:

#### **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.

ma/ka 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

L1665125-COFC

COC Number: 14 -

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|   | www.alsglobal.com   |   |  |                  | L.1000120-   | ا ان  |  |             |   |               |            |  |             |  |               |               |          |                      |
|---|---|---|--|------------------|--|---|--|-------------|---|---------------|------------|--|-------------|--|---------------|---------------|----------|----------------------|
| Report To   |   | 1   | Report Format  | <del>i</del> /   |  |   |  | or San      | ura taŭ                                       | al Balo       | ur (Bush   | F  | and Time    | (TAT):   |               |               |          |                      |
| Company:  | Ecological Logistics & Research Ltd.  | Select Report Format: PDF PEXCEL PEOD (DIGITAL) |  |                  |  | R   |  |             |   |               |            |  |             |  |               |               |          |                      |
| Contact:  | Chris Jastrebski  | _   | Quality Control (QC) Report with Report Ves No             |                  |  |   | P Priority (2-4 bus, days if received by 3pm) 50% surcharge - contact ALS to confirm TAT |             |   |               |            |  |             |  |               |               |          |                      |
| Address:  | 204-105 Titanium Way  | <b></b> f                                       | port - provide details belo                                |                  | 7 110  | E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT                        |  |             |   |               |            |  |             |  |               |               |          |                      |
|   | Whitehorse, YT Y1A 0E7  | Select Distribu                                 |  |                  | □FAX   |   |  |             |   |               |            |  |             |  |               |               |          |                      |
| Phone: 867.668.6386                                     |   |   | chris@elr.ca   |                  |  | E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge  Specify Date Required for E2,E or P: |  |             |   |               |            |  |             |  |               |               |          |                      |
| L   |   | Email 2 kmartens@minnow.ca patricia. randell@   |  |                  |  |   |  |             |   |               |            |  |             |  |               |               |          |                      |
| Invoice To  | Same as Report To Ves No  | Invoice Distribution                            |  |                  |  | Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below  |  |             |   |               |            |  |             |  |               |               |          |                      |
|   | Copy of Invoice with Report ☐ Yes ☑ No  | Select Invoice                                  | Distribution: 🗷 🗷  | MAIL MAIL        | FAX  | ļ.  | PΠ   |             |   | -             |            | $\neg$                                       |             | T  |               | $\neg$        | $\neg$   |                      |
| Company:  | Ecological Logistics & Research Ltd.  | Email 1 or Fax                                  | chris@elr.ca   |                  |  |   |  |             |   |               |            | +  | _           | +  | $\rightarrow$ | <del> -</del> | $\dashv$ |                      |
| Contact:  | Chris Jastrebski  | Email 2   |  |                  |  | 1   | ŀ  | ļ           | Į   |               |            |  |             | 1 1  | . [           | ĺ             | - 1      |                      |
| <del></del>   | Project Information   | C   | II and Gas Require   | d Fields (client | use)   | 1   | 1  |             |   |               | -          | İ  |             |  |               |               | - 1      | ers                  |
| ALS Quote #:  | Q52337  | Approver ID:                                    |  | Cost Center:     |  | 1   |  |             |   | ı             |            | ŀ  |             |  |               | - [           |          | ita<br>Ta            |
| Job #:  | 15-210  | GL Account:                                     |  | Routing Code:    |  | i   |  | j           |   |               |            | ı  |             |  | i             |               |          | Ŝ                    |
| PO / AFE:   |   | Activity Code:                                  |  |                  |  |   | ģ  | - 1         | i   |               |            |  |             |  |               |               | - 1      | Number of Containers |
| LSD:  |   | Location:                                       |  |                  | Transfer to a succession of the contract of th |   | ĕ  |             |   |               |            |  | 1           |  |               |               |          |                      |
| ALS Lab Work Order# (lab use only)                      |   | ALS Contact:                                    | •  | Sampler:         |  |   | als and Mercury  |             |   |               |            |  |             |  |               |               |          | ž                    |
| ALS Sample #<br>(lab use only)                          | Sample Identification and/or Coordinates (This description will appear on the report) |   | Date<br>(dd-mmm-yy)  | Time<br>(hh:mm)  | Sample Type  | 7.55  | Total Metals   |             | # d   |               |            |  |             |  | İ             |               |          |                      |
|   | HL  |   | 26/02/15   | 09:51            | Water  | -   | 2  | ۷           | 7   |               | $-\!\!\!+$ | -  | <del></del> | ┿  | <del>-</del>  | <b>-</b>      | $\dashv$ |                      |
|   | CC1   |   | 26/03/15   |                  | Water  | 5   | 5  | $\dashv$    | <u>                                      </u> |               |            | +  |             | ┿  |               | $\perp$       | _        | 3                    |
|   | GC2   |   | 26/02/15   | 08:56            | Water  | 7   | 0  |             | R   |               |            | -  | —           | <del>                                     </del> |               | _             |          | _3_                  |
|   | CC3   |   |  |                  | Water  | P   | K O  | -           | R   |               |            | +  | +           | <del>                                     </del> | -             | _             | _ـــ     | 3                    |
|   | wc  |   | 06/08/15   | 08:37            | Water  |   | 2  |             | K.  | $\dashv$      | _          | <del> -</del>                                | -           | ╆  |               | $\dashv$      | _        | 3                    |
|   |   | <del>-</del>                                    | 26/08/15   | 00.37            | vvater   | <u> </u>  | <u>C  </u>   | -           | R   | $\dashv$      |            | +  |             |  | $\dashv$      | $\dashv$      | $\dashv$ | 3                    |
|   |   |   |  |                  |  |   | $\dashv$   | -           |   | -             | -          | 71 1.4                                       |             | $\vdash$   | -             | +             | +        |                      |
|   |   |   |  |                  |  |   | $\dashv$   | -           |   | $\dashv$      |            | <del>-   -</del>                             | +           | ╂╼┷┼   | $\dashv$      | +             |          |                      |
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|   |   |   |  |                  |  | ļ   | _  | -           | +   |               |            | +  |             | $\vdash$   | +             | +             | +-       |                      |
|   |   |   |  |                  |  |   |  | $\dashv$    | +   |               |            | -  | +-          | -  | +             | -             | -        |                      |
|   |   |   |  |                  |  | -   |  | $\dashv$    |   |               |            | +-   |             | ┝┼   |               | +             | -        |                      |
| Drinking Water (DW) Samples¹ (client use) Special Instr |   |   | tructions / Specify Criteria to add on report (client Use) |                  |  |   | SAMPLE CONDITION AS RECEIVED (lab use only).  Frozen SiF Observations Yes No             |             |   |               |            |  |             |  |               |               |          |                      |
| Are samples taken from a Regulated DW System?           |   |   |  |                  |  |   | ke \   | <b>/</b> 00 | ¦/  | /             |            |  |             |  |               |               | No       | 빌                    |
| ∏. Yes 📈 No   |   |   |  |                  |  | Ice packs Yes ☑ Mo ☐ Custody seal intact Yes ☐ No Cooling Initiated 17  |  |             |   |               |            | 10   |             |  |               |               |          |                      |
| Are samples for human drinking water use?               |   |   |  |                  | ŀ  | INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C   |  |             |   |               |            |  |             |  |               |               |          |                      |
| l Yes l No  |   |   |  |                  | <u> </u>   | 3,  |  | 4           | T   |               |            |  | A DIAL C    | WLER   | 1 CMP         | -7010         | τ⊑ο °C   |                      |
|   | SHIPMENT RELEASE (client use)   | INITIAL S                                       | HIPMENT RECEPT   | ION (lab use onl | v)   |   |  |             | FINA  | SHIT          | ARENT      | DECT   | EPTION      | /lat-  | ·:-           |               | -        |                      |
| Released by:  | Jastrichsti Pate: 23th Time: 07:00 Receive  |   |  | Date:            | **   | Receive   | ed by:   |             | 4 11474                                       | <u>. 3011</u> | INICIAI    |  | ate:        |  | i <b>m</b> e: |               |          |                      |
| REFER TO BACK   | PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION                                       |   | WHIT   | E - LABORATOR    | V CODY VELL  | OW C  | IC NIT   | 0001        |   |               |            | <u> 1                                   </u> | 1, 38, 110  |  |               | <u> </u>      |          |                      |