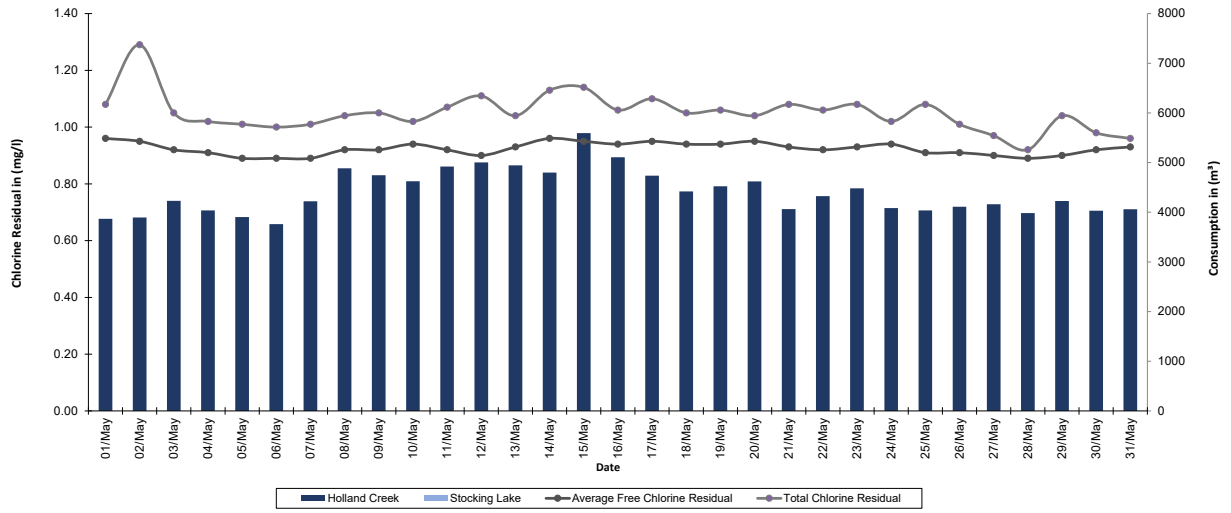
# Town of Ladysmith - Arbutus Water treatment Plant

## May 2024 - Monthly Report

| Date | Daily Flow | | | Chlorine Residual | | | | CT* | External Lab Testing | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Stocking Lake | Holland Creek | Combined Flow | Free Min | Free Max | Free Avg | Total | | HPC | E.coli | Total Coliforms | Aluminum | THM | HAA |
| | m³ | m³ | m³ | mg/l | mg/l | mg/l | mg/l | Minutes·mg/l | CFU | MPN | MPN | mg/l | mg/l | mg/l |
| 01-May | 0 | 3869 | 3869 | 0.96 | 0.97 | 0.96 | 1.08 | 128 | | | | | | |
| 02-May | 0 | 3894 | 3894 | 0.95 | 0.98 | 0.95 | 1.29 | 222 | 1 | < 1 | < 1 | | | |
| 03-May | 0 | 4231 | 4231 | 0.92 | 0.95 | 0.92 | 1.05 | 166 | | | | | | |
| 04-May | 0 | 4037 | 4037 | 0.89 | 0.92 | 0.91 | 1.02 | 149 | | | | | | |
| 05-May | 0 | 3904 | 3904 | 0.89 | 0.91 | 0.89 | 1.01 | 158 | | | | | | |
| 06-May | 0 | 3761 | 3761 | 0.88 | 0.90 | 0.89 | 1.00 | 180 | | | | | | |
| 07-May | 0 | 4221 | 4221 | 0.87 | 0.90 | 0.89 | 1.01 | 177 | < 1 | < 1 | < 1 | | | |
| 08-May | 0 | 4885 | 4885 | 0.88 | 0.92 | 0.92 | 1.04 | 156 | | | | | | |
| 09-May | 0 | 4744 | 4744 | 0.91 | 0.93 | 0.92 | 1.05 | 222 | | | | | | |
| 10-May | 0 | 4624 | 4624 | 0.91 | 0.94 | 0.94 | 1.02 | 212 | | | | | | |
| 11-May | 0 | 4920 | 4920 | 0.92 | 0.94 | 0.92 | 1.07 | 160 | | | | | | |
| 12-May | 0 | 5002 | 5002 | 0.89 | 1.11 | 0.90 | 1.11 | 184 | | | | | | |
| 13-May | 0 | 4945 | 4945 | 0.87 | 0.95 | 0.93 | 1.04 | 270 | | | | | | |
| 14-May | 0 | 4799 | 4799 | 0.92 | 0.96 | 0.96 | 1.13 | 213 | | | | | | |
| 15-May | 0 | 5594 | 5594 | 0.94 | 0.97 | 0.95 | 1.14 | 192 | < 1 | < 1 | < 1 | 0.0124 | 0.0129 | 0.0083 |
| 16-May | 0 | 5108 | 5108 | 0.92 | 0.95 | 0.94 | 1.06 | 264 | | | | | | |
| 17-May | 0 | 4736 | 4736 | 0.93 | 0.95 | 0.95 | 1.10 | 228 | | | | | | |
| 18-May | 0 | 4419 | 4419 | 0.94 | 0.95 | 0.94 | 1.05 | 155 | | | | | | |
| 19-May | 0 | 4523 | 4523 | 0.93 | 0.95 | 0.94 | 1.06 | 149 | | | | | | |
| 20-May | 0 | 4620 | 4620 | 0.93 | 0.95 | 0.95 | 1.04 | 89 | | | | | | |
| 21-May | 0 | 4064 | 4064 | 0.93 | 0.95 | 0.93 | 1.08 | 146 | | | | | | |
| 22-May | 0 | 4323 | 4323 | 0.91 | 0.93 | 0.92 | 1.06 | 157 | < 1 | < 1 | < 1 | | | |
| 23-May | 0 | 4482 | 4482 | 0.90 | 0.93 | 0.93 | 1.08 | 139 | | | | | | |
| 24-May | 0 | 4083 | 4083 | 0.95 | 0.92 | 0.94 | 1.02 | 121 | | | | | | |
| 25-May | 0 | 4036 | 4036 | 0.90 | 0.94 | 0.91 | 1.08 | 158 | | | | | | |
| 26-May | 0 | 4110 | 4110 | 0.89 | 0.91 | 0.91 | 1.01 | 154 | | | | | | |
| 27-May | 0 | 4160 | 4160 | 0.89 | 0.91 | 0.90 | 0.97 | 117 | | | | | | |
| 28-May | 0 | 3983 | 3983 | 0.89 | 0.90 | 0.89 | 0.92 | 160 | | | | | | |
| 29-May | 0 | 4226 | 4226 | 0.88 | 0.90 | 0.90 | 1.04 | 164 | | | | | | |
| 30-May | 0 | 4032 | 4032 | 0.89 | 0.92 | 0.92 | 0.98 | 160 | < 1 | < 1 | < 1 | | | |
| 31-May | 0 | 4060 | 4060 | 0.91 | 0.94 | 0.93 | 0.96 | 127 | | | | | | |
| **Total** | 0 | 136395 | 136395 | | | | | | | | | | | |
| **Average** | 0 | 4400 | 4400 | 0.91 | 0.94 | 0.92 | 1.05 | 170 | < 1 | < 1 | < 1 | 0.0124 | 0.0129 | 0.00825 |

*CT - Recorded as the minimum value at the highest daily flow ** Manual Residual were not taken

### Arbutus WTP Consumption and Chlorine Residual



VEOLIA

InSight

# Town of Ladysmith Arbutus DWTP

## Monthly LRV and Turbidity Report

# 05/01/2024 - 06/01/2024

## LRV Monthly Average

| Asset | Parameter | Health | Avg | Std. Dev | Points | LL | LCL | %In | % between L and LL | % below LL | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | LRV | | 5.0 | 0.0 | 32 | 4.25 | 4.5 | 100 % | 0 % | 0 % | # |
| UF 2 | LRV | | 5.0 | 0.0 | 32 | 4.25 | 4.5 | 100 % | 0 % | 0 % | # |
| UF 3 | LRV | | 5.0 | 0.0 | 32 | 4.25 | 4.5 | 100 % | 0 % | 0 % | # |

## LRV Daily Values

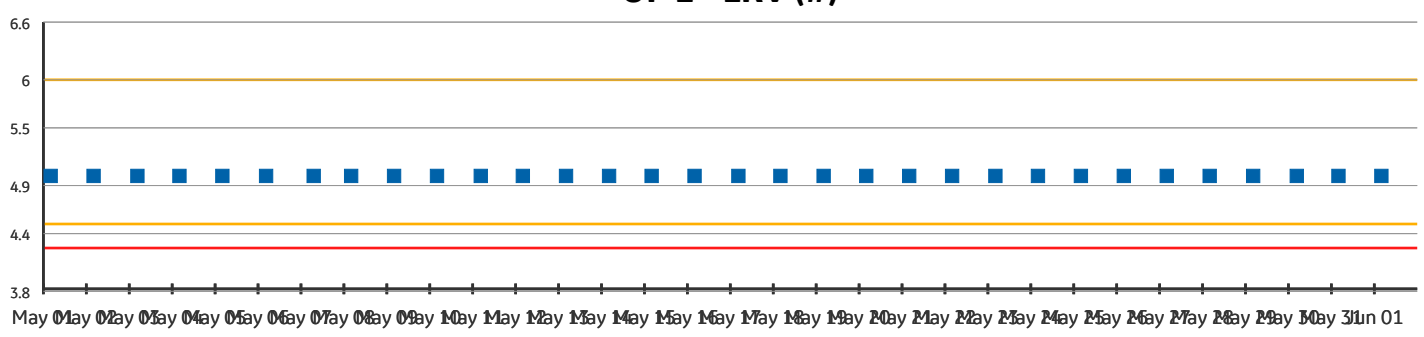
| Asset | Parameter | May 01 | May 02 | May 03 | May 04 | May 05 | May 06 | May 07 | May 08 | May 09 | May 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | LRV | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 2 | LRV | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 3 | LRV | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

| Asset | May 11 | May 12 | May 13 | May 14 | May 15 | May 16 | May 17 | May 18 | May 19 | May 20 | May 21 | May 22 | May 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 2 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 3 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

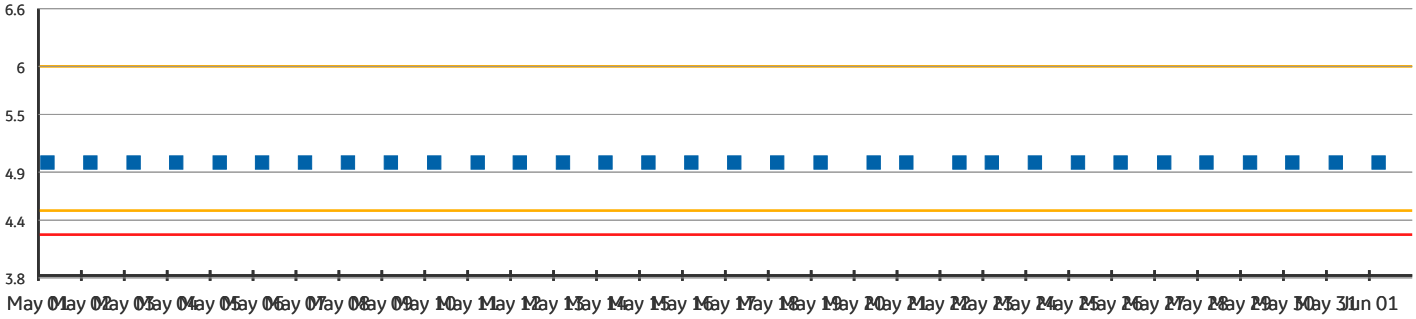
| Asset | May 24 | May 25 | May 26 | May 27 | May 28 | May 29 | May 30 | May 31 | Jun 01 |
|---|---|---|---|---|---|---|---|---|---|
| UF 1 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 2 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 3 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |

## LRV Raw Data

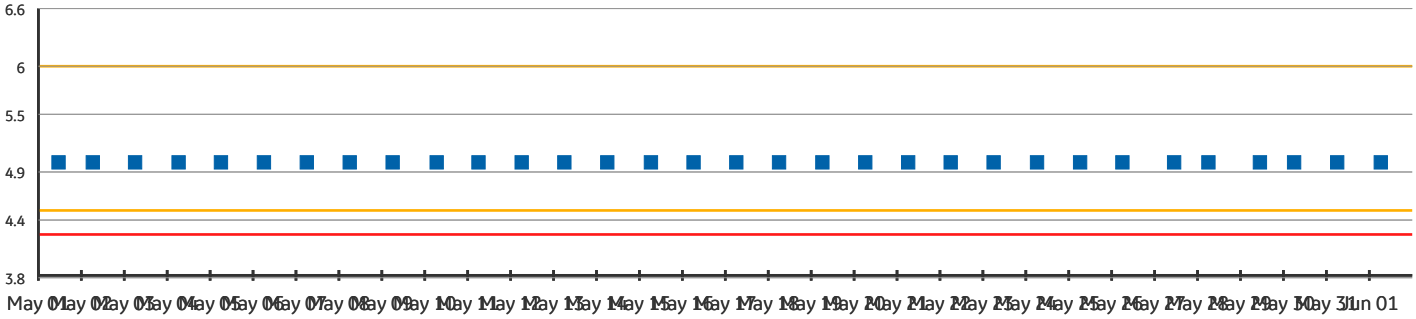
### UF 1 - LRV (#)



## UF 2 - LRV (#)




## UF 3 - LRV (#)




## Turbidity Monthly Average

| Asset | Parameter | Health | Avg | Std. Dev | Points | UCL | HH | %In | % between H and HH | % above HH | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | PermeateTurbidity | | 0.014 | 0.0 | 45208 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 2 | PermeateTurbidity | | 0.012 | 0.0 | 45208 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 3 | PermeateTurbidity | | 0.014 | 0.0 | 45208 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 1 | PermeateTurbidityAfterBP | | 0.014 | 0.0 | 485 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |
| UF 2 | PermeateTurbidityAfterBP | | 0.012 | 0.0 | 515 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |
| UF 3 | PermeateTurbidityAfterBP | | 0.014 | 0.0 | 526 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |

## Turbidity Daily Averages

| Asset | Parameter | May 01 | May 02 | May 03 | May 04 | May 05 | May 06 | May 07 | May 08 | May 09 | May 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | PermeateTurbidity | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.014 | 0.014 |
| UF 2 | PermeateTurbidity | 0.011 | 0.012 | 0.012 | 0.011 | 0.011 | 0.011 | 0.012 | 0.012 | 0.011 | 0.012 |
| UF 3 | PermeateTurbidity | 0.012 | 0.011 | 0.012 | 0.012 | 0.012 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |
| UF 1 | PermeateTurbidityAfterBP | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.014 | 0.014 |
| UF 2 | PermeateTurbidityAfterBP | 0.011 | 0.012 | 0.012 | 0.011 | 0.011 | 0.011 | 0.012 | 0.011 | 0.011 | 0.012 |
| UF 3 | PermeateTurbidityAfterBP | 0.012 | 0.012 | 0.013 | 0.012 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |

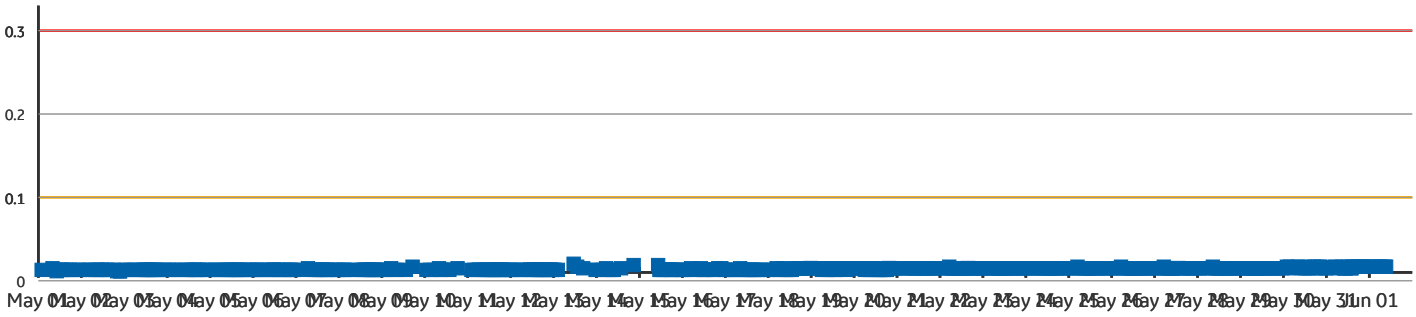
| Asset | May 11 | May 12 | May 13 | May 14 | May 15 | May 16 | May 17 | May 18 | May 19 | May 20 | May 21 | May 22 | May 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | 0.013 | 0.013 | 0.015 | 0.014 | 0.015 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.015 | 0.015 | 0.015 |
| UF 2 | 0.013 | 0.011 | 0.011 | 0.012 | 0.012 | 0.012 | 0.012 | 0.013 | 0.013 | 0.014 | 0.013 | 0.014 | 0.013 |
| UF 3 | 0.013 | 0.016 | 0.014 | 0.013 | 0.014 | 0.013 | 0.014 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 |
| UF 1 | 0.013 | 0.013 | 0.015 | 0.014 | 0.014 | 0.014 | 0.013 | 0.014 | 0.014 | 0.014 | 0.015 | 0.015 | 0.015 |
| UF 2 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.013 | 0.013 | 0.013 | 0.014 | 0.013 | 0.014 | 0.013 |

| Asset | May 11 | May 12 | May 13 | May 14 | May 15 | May 16 | May 17 | May 18 | May 19 | May 20 | May 21 | May 22 | May 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 3 | 0.014 | 0.015 | 0.013 | 0.014 | 0.014 | 0.014 | 0.014 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 |

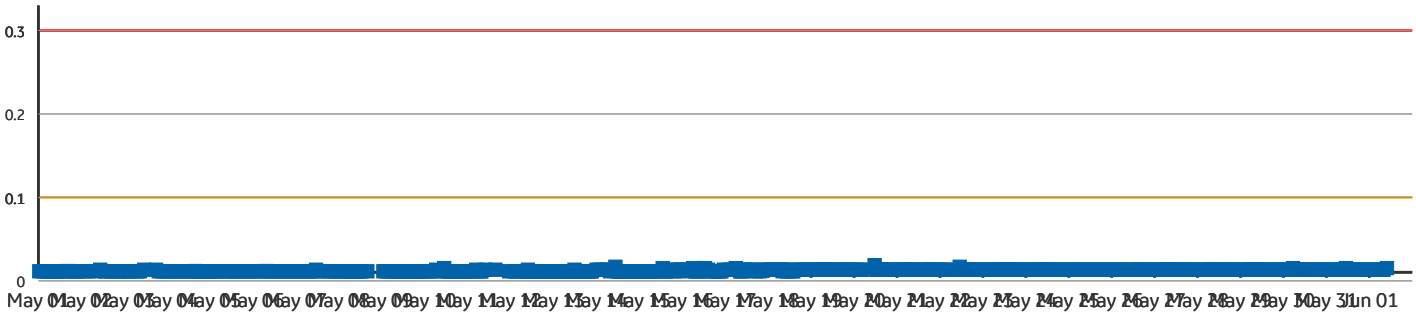
| Asset | May 24 | May 25 | May 26 | May 27 | May 28 | May 29 | May 30 | May 31 | Jun 01 |
|---|---|---|---|---|---|---|---|---|---|
| UF 1 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.016 | 0.017 |
| UF 2 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |
| UF 3 | 0.015 | 0.015 | 0.015 | 0.016 | 0.015 | 0.015 | 0.015 | 0.015 | 0.014 |
| UF 1 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.016 | 0.016 | 0.017 |
| UF 2 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.014 | 0.014 |
| UF 3 | 0.015 | 0.015 | 0.015 | 0.016 | 0.015 | 0.016 | 0.015 | 0.014 | 0.015 |

## Turbidity Raw Data

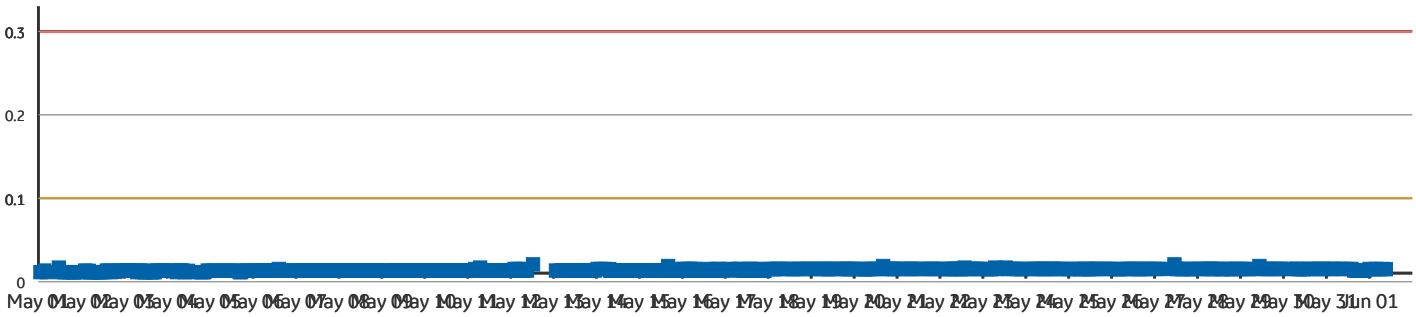
### UF 1 - PermeateTurbidityAfterBP (NTU)




### UF 2 - PermeateTurbidityAfterBP (NTU)




### UF 3 - PermeateTurbidityAfterBP (NTU)



# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24A9697** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Weekly Sampling | Date Samples Received | : 03-May-2024 12:33 |
| PO | : PO #10916 | Date Analysis Commenced | : 03-May-2024 |
| C-O-C number | : ---- | Issue Date | : 08-May-2024 13:28 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Microbiology, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Inorganics, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Microbiology, Burnaby, British Columbia |

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µS/cm | microsiemens per centimetre |
| CFU/mL | colony forming units per millilitre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | Client sample ID | Raw Water | DAF Effluent | UF Effluent | Treated Water (post reservoir) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 02-May-2024 10:30 | 02-May-2024 10:30 | 02-May-2024 10:30 | 02-May-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | VA24A9697-001 | VA24A9697-002 | VA24A9697-003 | VA24A9697-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| Alkalinity, total (as CaCO3) | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 11.0 | ---- |
| Colour, true | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| Conductivity | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 54.8 | ---- |
| pH | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.30 | ---- |
| Turbidity | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| Carbon, dissolved organic [DOC] | ---- | E358-L/VA | 0.50 | mg/L | 3.03 | 1.06 | 1.01 | ---- | ---- |
| Carbon, total organic [TOC] | ---- | E355-L/VA | 0.50 | mg/L | 3.17 | 1.40 | 1.04 | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| Heterotrophic plate count [HPC] | ---- | E020/VA | 1 | CFU/mL | ---- | ---- | ---- | 1 | ---- |
| Coliforms, Escherichia coli [E. coli] | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |
| Coliforms, total | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24A9697** | Page | : 1 of 7 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Weekly Sampling | Date Samples Received | : 03-May-2024 12:33 |
| PO | : PO #10916 | Issue Date | : 08-May-2024 13:28 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

**This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.**

**Key**

**Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.**
**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
**DQO: Data Quality Objective.**
**LOR: Limit of Reporting (detection limit).**
**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0047** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 08-May-2024 10:20 |
| PO | : 10880 | Date Analysis Commenced | : 08-May-2024 |
| C-O-C number | : ---- | Issue Date | : 14-May-2024 14:09 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Courtney Cox | Analyst- General | Inorganics, Burnaby, British Columbia |
| Kim Jensen | Department Manager - Metals | Inorganics, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Microbiology, Burnaby, British Columbia |

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

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LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µS/cm | microsiemens per centimetre |
| CFU/mL | colony forming units per millilitre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Qualifiers

| *Qualifier* | *Description* |
|---|---|
| *HTP* | *Sample preparation or preservation hold time was exceeded.* |
| *SFP* | *Sample was filtered and preserved at the laboratory.* |

## Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID: Raw Water | DAF Effluent | UF Effluent | Treated Water (post reservoir) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time: 07-May-2024 10:00 | 07-May-2024 10:00 | 07-May-2024 10:00 | 07-May-2024 10:00 | ---- |
| | | | | | VA24B0047-001 | VA24B0047-002 | VA24B0047-003 | VA24B0047-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 12.2 | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 55.5 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.35 | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 3.12 SFP | 1.19 SFP | 1.30 HTP, SFP | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.93 | 1.44 | 1.12 | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| **Heterotrophic plate count [HPC]** | ---- | E020/VA | 1 | CFU/mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, Escherichia coli [E. coli]** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, total** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0047** | Page | : 1 of 7 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 08-May-2024 10:20 |
| PO | : 10880 | Issue Date | : 14-May-2024 14:13 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

**This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.**

**Key**

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**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
**DQO: Data Quality Objective.**
**LOR: Limit of Reporting (detection limit).**
**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0935** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Monthly Sampling | Date Samples Received | : 16-May-2024 12:35 |
| PO | : 10880 | Date Analysis Commenced | : 17-May-2024 |
| C-O-C number | : ---- | Issue Date | : 24-May-2024 15:49 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Janice Leung | Supervisor - Organics Instrumentation | Organics, Burnaby, British Columbia |
| Kevin Duarte | Supervisor - Metals ICP Instrumentation | Metals, Burnaby, British Columbia |
| Sanja Risticevic | Department Manager - LCMS | LCMS, Waterloo, Ontario |

## General Comments

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Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µg/L | micrograms per litre |
| mg/L | milligrams per litre |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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## Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID | Treated Water (post reservoir) | ---- | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 15-May-2024 10:30 | ---- | ---- | ---- | ---- |
| | | | | | VA24B0935-001 | -------- | -------- | -------- | -------- | -------- |
| | | | | | Result | ---- | ---- | ---- | ---- | ---- |
| **Total Metals** | | | | | | | | | | |
| **Aluminum, total** | 7429-90-5 | E420/VA | 0.0030 | mg/L | | 0.0124 | ---- | ---- | ---- | ---- |
| **Volatile Organic Compounds [THMs]** | | | | | | | | | | |
| **Bromodichloromethane** | 75-27-4 | E611B/VA | 1.0 | µg/L | | 1.1 | ---- | ---- | ---- | ---- |
| **Bromoform** | 75-25-2 | E611B/VA | 1.0 | µg/L | | <1.0 | ---- | ---- | ---- | ---- |
| **Chloroform** | 67-66-3 | E611B/VA | 1.0 | µg/L | | 11.8 | ---- | ---- | ---- | ---- |
| **Dibromochloromethane** | 124-48-1 | E611B/VA | 1.0 | µg/L | | <1.0 | ---- | ---- | ---- | ---- |
| **Trihalomethanes [THMs], total** | ---- | E611B/VA | 2.0 | µg/L | | 12.9 | ---- | ---- | ---- | ---- |
| **Volatile Organic Compounds [THMs] Surrogates** | | | | | | | | | | |
| **Bromofluorobenzene, 4-** | 460-00-4 | E611B/VA | 1.0 | % | | 85.8 | ---- | ---- | ---- | ---- |
| **Difluorobenzene, 1,4-** | 540-36-3 | E611B/VA | 1.0 | % | | 103 | ---- | ---- | ---- | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Bromochloroacetic acid** | 5589-96-8 | E750/WT | 1.00 | µg/L | | <1.00 | ---- | ---- | ---- | ---- |
| **Dibromoacetic acid** | 631-64-1 | E750/WT | 1.00 | µg/L | | <1.00 | ---- | ---- | ---- | ---- |
| **Dichloroacetic acid** | 79-43-6 | E750/WT | 1.00 | µg/L | | 4.64 | ---- | ---- | ---- | ---- |
| **Monobromoacetic acid** | 79-08-3 | E750/WT | 1.00 | µg/L | | <1.00 | ---- | ---- | ---- | ---- |
| **Monochloroacetic acid** | 79-11-8 | E750/WT | 1.00 | µg/L | | <1.00 | ---- | ---- | ---- | ---- |
| **Trichloroacetic acid** | 76-03-9 | E750/WT | 1.00 | µg/L | | 3.61 | ---- | ---- | ---- | ---- |
| **Haloacetic acids, total [HAA5]** | n/a | E750/WT | 5.00 | µg/L | | 8.25 | ---- | ---- | ---- | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0935** | Page | : 1 of 5 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Monthly Sampling | Date Samples Received | : 16-May-2024 12:35 |
| PO | : 10880 | Issue Date | : 24-May-2024 15:49 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 1 | | |
| No. of samples analysed | : 1 | | |

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**Key**

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**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
**DQO: Data Quality Objective.**
**LOR: Limit of Reporting (detection limit).**
**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Matrix Spike Duplicate (MSD) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0931** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 16-May-2024 12:35 |
| PO | : 10880 | Date Analysis Commenced | : 16-May-2024 |
| C-O-C number | : ---- | Issue Date | : 23-May-2024 10:10 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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- Analytical Results

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| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Microbiology, Burnaby, British Columbia |

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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µS/cm | microsiemens per centimetre |
| CFU/mL | colony forming units per millilitre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

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## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | Client sample ID | Raw Water | DAF Effluent | UF Effluent | Treated Water (post reservoir) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 15-May-2024 10:30 | 15-May-2024 10:30 | 15-May-2024 10:30 | 15-May-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | VA24B0931-001 | VA24B0931-002 | VA24B0931-003 | VA24B0931-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 11.6 | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 55.5 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.29 | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 2.65 | 0.71 | 0.98 | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.63 | 1.10 | 0.99 | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| **Heterotrophic plate count [HPC]** | ---- | E020/VA | 1 | CFU/mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, Escherichia coli [E. coli]** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, total** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B0931** | Page | : 1 of 7 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 16-May-2024 12:35 |
| PO | : 10880 | Issue Date | : 23-May-2024 10:10 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B1521** | Page | : 1 of 6 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Weekly Sampling | Date Samples Received | : 23-May-2024 11:10 |
| PO | : 10880 | Date Analysis Commenced | : 23-May-2024 |
| C-O-C number | : ---- | Issue Date | : 30-May-2024 16:05 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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- Analytical Results
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| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Brieanna Allen | Production/Validation Manager | Microbiology, Burnaby, British Columbia |
| Ghazaleh Khanmirzaei | Analyst | Metals, Burnaby, British Columbia |
| Harpreet Chawla | Team Leader - Inorganics | Inorganics, Calgary, Alberta |
| Janice Leung | Supervisor - Organics Instrumentation | Organics, Burnaby, British Columbia |
| Kim Jensen | Department Manager - Metals | Metals, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| % T/cm | % transmittance per centimetre |
| µg/L | micrograms per litre |
| AU/cm | absorbance units per centimetre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID: Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time: 22-May-2024 08:07 | 22-May-2024 10:15 | ---- | ---- | ---- |
| | | | | | VA24B1521-001 | VA24B1521-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **Physical Tests** | | | | | | | | | |
| **Absorbance, UV (@ 254nm)** | ---- | E404/VA | 0.0050 | AU/cm | 0.0690 | 0.114 | ---- | ---- | ---- |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | 9.5 | 3.6 | ---- | ---- | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | 8.0 | 20.8 | ---- | ---- | ---- |
| **Hardness (as CaCO3), from total Ca/Mg** | ---- | EC100A/VA | 0.60 | mg/L | 10.3 | 4.75 | ---- | ---- | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | 7.27 | 6.77 | ---- | ---- | ---- |
| **Solids, total dissolved [TDS]** | ---- | E162/VA | 10 | mg/L | 28 | 21 | ---- | ---- | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | 0.57 | 0.50 | ---- | ---- | ---- |
| **Transmittance, UV (@ 254nm)** | ---- | E404/VA | 1.0 | % T/cm | 85.3 | 76.9 | ---- | ---- | ---- |
| **Anions and Nutrients** | | | | | | | | | |
| **Bromide** | 24959-67-9 | E235.Br-L/VA | 0.050 | mg/L | <0.050 | <0.050 | ---- | ---- | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 2.62 | 3.47 | ---- | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/CG | 0.50 | mg/L | 3.60 | 3.36 | ---- | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| **Coliforms, Escherichia coli [E. coli]** | ---- | E010/VA | 1 | MPN/100mL | 2 | <1 | ---- | ---- | ---- |
| **Coliforms, total** | ---- | E010/VA | 1 | MPN/100mL | 23 | 248 | ---- | ---- | ---- |
| **Total Metals** | | | | | | | | | |
| **Aluminum, total** | 7429-90-5 | E420/VA | 0.0030 | mg/L | 0.0392 | 0.0877 | ---- | ---- | ---- |
| **Antimony, total** | 7440-36-0 | E420/VA | 0.00010 | mg/L | <0.00010 | <0.00010 | ---- | ---- | ---- |
| **Arsenic, total** | 7440-38-2 | E420/VA | 0.00010 | mg/L | 0.00010 | <0.00010 | ---- | ---- | ---- |
| **Barium, total** | 7440-39-3 | E420/VA | 0.00010 | mg/L | 0.00311 | 0.00359 | ---- | ---- | ---- |
| **Beryllium, total** | 7440-41-7 | E420/VA | 0.000100 | mg/L | <0.000100 | <0.000100 | ---- | ---- | ---- |
| **Bismuth, total** | 7440-69-9 | E420/VA | 0.000050 | mg/L | <0.000050 | <0.000050 | ---- | ---- | ---- |
| **Boron, total** | 7440-42-8 | E420/VA | 0.010 | mg/L | 0.019 | <0.010 | ---- | ---- | ---- |
| **Cadmium, total** | 7440-43-9 | E420/VA | 0.0000050 | mg/L | 0.000325 | <0.0000050 | ---- | ---- | ---- |
| **Calcium, total** | 7440-70-2 | E420/VA | 0.050 | mg/L | 3.34 | 1.51 | ---- | ---- | ---- |
| **Cesium, total** | 7440-46-2 | E420/VA | 0.000010 | mg/L | <0.000010 | <0.000010 | ---- | ---- | ---- |
| **Chromium, total** | 7440-47-3 | E420/VA | 0.00050 | mg/L | <0.00050 | <0.00050 | ---- | ---- | ---- |
| **Cobalt, total** | 7440-48-4 | E420/VA | 0.00010 | mg/L | <0.00010 | <0.00010 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 22-May-2024 08:07 | 22-May-2024 10:15 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24B1521-001 | VA24B1521-002 | -------- | -------- | -------- |
| | | | | | | Result | Result | ---- | ---- | ---- |
| **Total Metals** | | | | | | | | | | |
| Copper, total | 7440-50-8 | E420/VA | 0.00050 | mg/L | | 0.00087 | 0.00074 | ---- | ---- | ---- |
| Iron, total | 7439-89-6 | E420/VA | 0.010 | mg/L | | 0.035 | 0.107 | ---- | ---- | ---- |
| Lead, total | 7439-92-1 | E420/VA | 0.000050 | mg/L | | <0.000050 | <0.000050 | ---- | ---- | ---- |
| Lithium, total | 7439-93-2 | E420/VA | 0.0010 | mg/L | | <0.0010 | <0.0010 | ---- | ---- | ---- |
| Magnesium, total | 7439-95-4 | E420/VA | 0.0050 | mg/L | | 0.474 | 0.238 | ---- | ---- | ---- |
| Manganese, total | 7439-96-5 | E420/VA | 0.00010 | mg/L | | 0.00367 | 0.0185 | ---- | ---- | ---- |
| Mercury, total | 7439-97-6 | E508/VA | 0.0000050 | mg/L | | <0.0000050 | <0.0000050 | ---- | ---- | ---- |
| Molybdenum, total | 7439-98-7 | E420/VA | 0.000050 | mg/L | | 0.000190 | <0.000050 | ---- | ---- | ---- |
| Nickel, total | 7440-02-0 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | ---- | ---- | ---- |
| Phosphorus, total | 7723-14-0 | E420/VA | 0.050 | mg/L | | <0.050 | <0.050 | ---- | ---- | ---- |
| Potassium, total | 7440-09-7 | E420/VA | 0.050 | mg/L | | 0.257 | 0.116 | ---- | ---- | ---- |
| Rubidium, total | 7440-17-7 | E420/VA | 0.00020 | mg/L | | 0.00062 | 0.00035 | ---- | ---- | ---- |
| Selenium, total | 7782-49-2 | E420/VA | 0.000050 | mg/L | | <0.000050 | <0.000050 | ---- | ---- | ---- |
| Silicon, total | 7440-21-3 | E420/VA | 0.10 | mg/L | | 1.74 | 1.18 | ---- | ---- | ---- |
| Silver, total | 7440-22-4 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | ---- | ---- | ---- |
| Sodium, total | 7440-23-5 | E420/VA | 0.050 | mg/L | | 1.12 | 0.684 | ---- | ---- | ---- |
| Strontium, total | 7440-24-6 | E420/VA | 0.00020 | mg/L | | 0.00982 | 0.00612 | ---- | ---- | ---- |
| Sulfur, total | 7704-34-9 | E420/VA | 0.50 | mg/L | | <0.50 | <0.50 | ---- | ---- | ---- |
| Tellurium, total | 13494-80-9 | E420/VA | 0.00020 | mg/L | | <0.00020 | <0.00020 | ---- | ---- | ---- |
| Thallium, total | 7440-28-0 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | ---- | ---- | ---- |
| Thorium, total | 7440-29-1 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | ---- | ---- | ---- |
| Tin, total | 7440-31-5 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | ---- | ---- | ---- |
| Titanium, total | 7440-32-6 | E420/VA | 0.00030 | mg/L | | 0.00040 | 0.00064 | ---- | ---- | ---- |
| Tungsten, total | 7440-33-7 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | ---- | ---- | ---- |
| Uranium, total | 7440-61-1 | E420/VA | 0.000010 | mg/L | | 0.000021 | <0.000010 | ---- | ---- | ---- |
| Vanadium, total | 7440-62-2 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | ---- | ---- | ---- |
| Zinc, total | 7440-66-6 | E420/VA | 0.0030 | mg/L | | <0.0030 | <0.0030 | ---- | ---- | ---- |
| Zirconium, total | 7440-67-7 | E420/VA | 0.00020 | mg/L | | <0.00020 | <0.00020 | ---- | ---- | ---- |
| **Hydrocarbons** | | | | | | | | | | |
| EPH (C10-C19) | ---- | E601A/VA | 250 | µg/L | | <250 | <250 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 22-May-2024 08:07 | 22-May-2024 10:15 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24B1521-001 | VA24B1521-002 | -------- | -------- | -------- |
| | | | | | | Result | Result | ---- | ---- | ---- |
| **Hydrocarbons** | | | | | | | | | | |
| EPH (C10-C32) | ---- | E601A/VA | 400 | µg/L | | <400 | <400 | ---- | ---- | ---- |
| EPH (C19-C32) | ---- | E601A/VA | 250 | µg/L | | <250 | <250 | ---- | ---- | ---- |
| TEH (C10-C30), BC | ---- | E601A/VA | 250 | µg/L | | <250 | <250 | ---- | ---- | ---- |
| **Hydrocarbons Surrogates** | | | | | | | | | | |
| Bromobenzotrifluoride, 2- (EPH surrogate) | 392-83-6 | E601A/VA | 1.0 | % | | 77.3 | 74.9 | ---- | ---- | ---- |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | | | | | |
| Acenaphthene | 83-32-9 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Acenaphthylene | 208-96-8 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Acridine | 260-94-6 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Anthracene | 120-12-7 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Benz(a)anthracene | 56-55-3 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Benzo(a)pyrene | 50-32-8 | E641A/VA | 0.0050 | µg/L | | <0.0050 | <0.0050 | ---- | ---- | ---- |
| Benzo(b+j)fluoranthene | n/a | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Benzo(b+j+k)fluoranthene | n/a | E641A/VA | 0.015 | µg/L | | <0.015 | <0.015 | ---- | ---- | ---- |
| Benzo(g,h,i)perylene | 191-24-2 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Benzo(k)fluoranthene | 207-08-9 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Chrysene | 218-01-9 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Dibenz(a,h)anthracene | 53-70-3 | E641A/VA | 0.0050 | µg/L | | <0.0050 | <0.0050 | ---- | ---- | ---- |
| Fluoranthene | 206-44-0 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Fluorene | 86-73-7 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Indeno(1,2,3-c,d)pyrene | 193-39-5 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Methylnaphthalene, 1- | 90-12-0 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Methylnaphthalene, 2- | 91-57-6 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Naphthalene | 91-20-3 | E641A/VA | 0.050 | µg/L | | <0.050 | <0.050 | ---- | ---- | ---- |
| Phenanthrene | 85-01-8 | E641A/VA | 0.020 | µg/L | | <0.020 | <0.020 | ---- | ---- | ---- |
| Pyrene | 129-00-0 | E641A/VA | 0.010 | µg/L | | <0.010 | <0.010 | ---- | ---- | ---- |
| Quinoline | 91-22-5 | E641A/VA | 0.050 | µg/L | | <0.050 | <0.050 | ---- | ---- | ---- |
| **Polycyclic Aromatic Hydrocarbons Surrogates** | | | | | | | | | | |
| Chrysene-d12 | 1719-03-5 | E641A/VA | 0.1 | % | | 97.6 | 109 | ---- | ---- | ---- |
| Naphthalene-d8 | 1146-65-2 | E641A/VA | 0.1 | % | | 94.0 | 98.2 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 22-May-2024 08:07 | 22-May-2024 10:15 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24B1521-001 | VA24B1521-002 | -------- | -------- | -------- |
| | | | | | | Result | Result | ---- | ---- | ---- |
| **Polycyclic Aromatic Hydrocarbons Surrogates** | | | | | | | | | | |
| **Phenanthrene-d10** | 1517-22-2 | E641A/VA | 0.1 | % | | 104 | 113 | ---- | ---- | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B1521** | Page | : 1 of 11 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Weekly Sampling | Date Samples Received | : 23-May-2024 11:10 |
| PO | : 10880 | Issue Date | : 30-May-2024 16:05 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

**This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.**

**Key**

**Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.**
**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
**DQO: Data Quality Objective.**
**LOR: Limit of Reporting (detection limit).**
**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B1513** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 23-May-2024 11:10 |
| PO | : PO #10916 | Date Analysis Commenced | : 23-May-2024 |
| C-O-C number | : ---- | Issue Date | : 29-May-2024 12:51 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Microbiology, Burnaby, British Columbia |

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µS/cm | microsiemens per centimetre |
| CFU/mL | colony forming units per millilitre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Workorder Comments

**Sample Treated Water (post reservoir): HPC Exceeded Recommended Holding Time prior to receipt at the lab for Microbiology analysis. Testing will proceed. No BC/Yukon Drinking Water Declaration form was received.**

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | Client sample ID | Raw Water | DAF Effluent | UF Effluent | Treated Water (post reservoir) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 22-May-2024 10:30 | 22-May-2024 10:30 | 22-May-2024 10:30 | 22-May-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | VA24B1513-001 | VA24B1513-002 | VA24B1513-003 | VA24B1513-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 11.8 | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 57.9 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.38 | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 2.85 | 0.91 | 0.91 | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.54 | 1.26 | 0.92 | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| **Heterotrophic plate count [HPC]** | ---- | E020/VA | 1 | CFU/mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, Escherichia coli [E. coli]** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, total** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B1513** | Page | : 1 of 7 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 23-May-2024 11:10 |
| PO | : PO #10916 | Issue Date | : 29-May-2024 12:50 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

**This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.**

**Key**

**Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.**
**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
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**RPD: Relative Percent Difference.**

## *Workorder Comments*

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## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B2518** | Page | : 1 of 4 |
| **Amendment** | : **1** | | |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Quarterly DT Sampling | Date Samples Received | : 31-May-2024 12:00 |
| PO | : 10880 | Date Analysis Commenced | : 04-Jun-2024 |
| C-O-C number | : ---- | Issue Date | : 11-Jun-2024 10:44 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Angela Ren | Team Leader - Metals | Metals, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
| Tracy Harley | Supervisor - Water Quality Instrumentation | Inorganics, Burnaby, British Columbia |

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

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Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| mg/L | milligrams per litre |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Workorder Comments

Amendment (11/06/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

MB hit for Alkalinity but all the samples were re-analysed

## Analytical Results

Sub-Matrix: Water
(Matrix: Water)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID | FJCC | Town Hall | Fire Department | RCMP | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 30-May-2024 10:30 | 30-May-2024 10:30 | 30-May-2024 10:30 | 30-May-2024 10:30 | ---- |
| | | | | | | VA24B2518-001 | VA24B2518-002 | VA24B2518-003 | VA24B2518-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | | 13.0 | 13.7 | 12.6 | 13.7 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | | 7.35 | 7.36 | 7.37 | 7.43 | ---- |
| **Solids, total dissolved [TDS]** | ---- | E162/VA | 10 | mg/L | | 46 | 39 | 40 | 44 | ---- |
| **Total Metals** | | | | | | | | | | |
| **Aluminum, total** | 7429-90-5 | E420/VA | 0.0030 | mg/L | | 0.0102 | 0.0101 | 0.0093 | 0.0460 | ---- |
| **Antimony, total** | 7440-36-0 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Arsenic, total** | 7440-38-2 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Barium, total** | 7440-39-3 | E420/VA | 0.00010 | mg/L | | 0.00330 | 0.00346 | 0.00349 | 0.00310 | ---- |
| **Beryllium, total** | 7440-41-7 | E420/VA | 0.000020 | mg/L | | <0.000020 | <0.000020 | <0.000020 | <0.000020 | ---- |
| **Bismuth, total** | 7440-69-9 | E420/VA | 0.000050 | mg/L | | <0.000050 | <0.000050 | <0.000050 | <0.000050 | ---- |
| **Boron, total** | 7440-42-8 | E420/VA | 0.010 | mg/L | | 0.020 | 0.021 | 0.021 | 0.023 | ---- |
| **Cadmium, total** | 7440-43-9 | E420/VA | 0.0000050 | mg/L | | <0.0000050 | <0.0000050 | <0.0000050 | <0.0000050 | ---- |
| **Calcium, total** | 7440-70-2 | E420/VA | 0.050 | mg/L | | 2.31 | 2.24 | 2.29 | 2.30 | ---- |
| **Cesium, total** | 7440-46-2 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | <0.000010 | <0.000010 | ---- |
| **Chromium, total** | 7440-47-3 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | <0.00050 | <0.00050 | ---- |
| **Cobalt, total** | 7440-48-4 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Copper, total** | 7440-50-8 | E420/VA | 0.00050 | mg/L | | 0.0392 | 0.0787 | 0.343 | 0.241 | ---- |
| **Iron, total** | 7439-89-6 | E420/VA | 0.010 | mg/L | | 0.013 | <0.010 | <0.010 | 0.284 | ---- |
| **Lead, total** | 7439-92-1 | E420/VA | 0.000050 | mg/L | | 0.000614 | 0.000302 | 0.00203 | 0.00103 | ---- |
| **Lithium, total** | 7439-93-2 | E420/VA | 0.0010 | mg/L | | <0.0010 | <0.0010 | <0.0010 | <0.0010 | ---- |
| **Magnesium, total** | 7439-95-4 | E420/VA | 0.0050 | mg/L | | 0.352 | 0.390 | 0.372 | 0.564 | ---- |
| **Manganese, total** | 7439-96-5 | E420/VA | 0.00010 | mg/L | | 0.00016 | <0.00010 | 0.00017 | 0.00215 | ---- |
| **Molybdenum, total** | 7439-98-7 | E420/VA | 0.000050 | mg/L | | 0.000062 | 0.000068 | 0.000087 | 0.000075 | ---- |
| **Nickel, total** | 7440-02-0 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | 0.00053 | <0.00050 | ---- |
| **Phosphorus, total** | 7723-14-0 | E420/VA | 0.050 | mg/L | | <0.050 | <0.050 | <0.050 | <0.050 | ---- |
| **Potassium, total** | 7440-09-7 | E420/VA | 0.050 | mg/L | | 0.138 | 0.137 | 0.135 | 0.142 | ---- |
| **Rubidium, total** | 7440-17-7 | E420/VA | 0.00020 | mg/L | | 0.00035 | 0.00035 | 0.00036 | 0.00033 | ---- |
| **Selenium, total** | 7782-49-2 | E420/VA | 0.000050 | mg/L | | <0.000050 | <0.000050 | <0.000050 | <0.000050 | ---- |
| **Silicon, total** | 7440-21-3 | E420/VA | 0.10 | mg/L | | 2.15 | 2.23 | 2.09 | 2.13 | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | FJCC | Town Hall | Fire Department | RCMP | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 30-May-2024 10:30 | 30-May-2024 10:30 | 30-May-2024 10:30 | 30-May-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24B2518-001 | VA24B2518-002 | VA24B2518-003 | VA24B2518-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Total Metals** | | | | | | | | | | |
| **Silver, total** | 7440-22-4 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | 0.000025 | <0.000010 | ---- |
| **Sodium, total** | 7440-23-5 | E420/VA | 0.050 | mg/L | | 8.23 | 8.62 | 8.43 | 8.51 | ---- |
| **Strontium, total** | 7440-24-6 | E420/VA | 0.00020 | mg/L | | 0.0109 | 0.0116 | 0.0114 | 0.0112 | ---- |
| **Sulfur, total** | 7704-34-9 | E420/VA | 0.50 | mg/L | | 0.63 | 0.68 | 0.65 | 0.68 | ---- |
| **Tellurium, total** | 13494-80-9 | E420/VA | 0.00020 | mg/L | | <0.00020 | <0.00020 | <0.00020 | <0.00020 | ---- |
| **Thallium, total** | 7440-28-0 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | <0.000010 | <0.000010 | ---- |
| **Thorium, total** | 7440-29-1 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Tin, total** | 7440-31-5 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Titanium, total** | 7440-32-6 | E420/VA | 0.00030 | mg/L | | <0.00030 | <0.00030 | <0.00030 | <0.00030 | ---- |
| **Tungsten, total** | 7440-33-7 | E420/VA | 0.00010 | mg/L | | <0.00010 | <0.00010 | <0.00010 | <0.00010 | ---- |
| **Uranium, total** | 7440-61-1 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | <0.000010 | <0.000010 | ---- |
| **Vanadium, total** | 7440-62-2 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | <0.00050 | <0.00050 | ---- |
| **Zinc, total** | 7440-66-6 | E420/VA | 0.0030 | mg/L | | 0.0042 | 0.0044 | 0.0085 | 0.0134 | ---- |
| **Zirconium, total** | 7440-67-7 | E420/VA | 0.00020 | mg/L | | <0.00020 | <0.00020 | <0.00020 | <0.00020 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B2518** | Page | : 1 of 8 |
| **Amendment** | : 1 | | |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment - Quarterly DT Sampling | Date Samples Received | : 31-May-2024 12:00 |
| PO | : 10880 | Issue Date | : 11-Jun-2024 10:46 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

**This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.**

**Key**

**Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.**
**CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.**
**DQO: Data Quality Objective.**
**LOR: Limit of Reporting (detection limit).**
**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B2424** | Page | : 1 of 3 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby BC Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 31-May-2024 12:00 |
| PO | : PO #10916 | Date Analysis Commenced | : 31-May-2024 |
| C-O-C number | : ---- | Issue Date | : 06-Jun-2024 10:56 |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

| *Signatories* | *Position* | *Laboratory Department* |
|---|---|---|
| Kate Dimitrova | Supervisor - Inorganic | Inorganics, Burnaby, British Columbia |
| Kevin Duarte | Supervisor - Metals ICP Instrumentation | Microbiology, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Microbiology, Burnaby, British Columbia |

## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

| *Unit* | *Description* |
|---|---|
| µS/cm | microsiemens per centimetre |
| CFU/mL | colony forming units per millilitre |
| CU | colour units (1 cu = 1 mg/l pt) |
| mg/L | milligrams per litre |
| MPN/100mL | most probable number per hundred millilitres |
| NTU | nephelometric turbidity units |
| pH units | pH units |

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

## Workorder Comments

**Sample Treated Water (post reservoir): HPC Exceeded Recommended Holding Time prior to receipt at the lab for Microbiology analysis. Testing will proceed.**

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | Client sample ID | Raw Water | DAF Effluent | UF Effluent | Treated Water (post reservoir) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Client sampling date / time | 30-May-2024 09:00 | 30-May-2024 09:00 | 30-May-2024 09:00 | 30-May-2024 09:00 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | VA24B2424-001 | VA24B2424-002 | VA24B2424-003 | VA24B2424-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 12.3 | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 56.5 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.28 | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 2.35 | 0.72 | 0.82 | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.76 | 1.83 | 0.96 | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| **Heterotrophic plate count [HPC]** | ---- | E020/VA | 1 | CFU/mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, Escherichia coli [E. coli]** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |
| **Coliforms, total** | ---- | E010/VA | 1 | MPN/100mL | ---- | ---- | ---- | <1 | ---- |

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B2424** | Page | : 1 of 7 |
| Client | : **Town of Ladysmith** | Laboratory | : ALS Environmental - Vancouver |
| Contact | : Shawn Baker | Account Manager | : Thomas Chang |
| Address | : 410 Esplanade PO Box 220<br>Ladysmith BC Canada V9G 1A2 | Address | : 8081 Lougheed Highway<br>Burnaby, British Columbia Canada V5A 1W9 |
| Telephone | : ---- | Telephone | : +1 604 253 4188 |
| Project | : Arbutus Water Treatment Plant - Weekly Sampling | Date Samples Received | : 31-May-2024 12:00 |
| PO | : PO #10916 | Issue Date | : 06-Jun-2024 10:57 |
| C-O-C number | : ---- | | |
| Sampler | : ---- | | |
| Site | : Town of Ladysmith | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

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**RPD: Relative Percent Difference.**

## *Workorder Comments*

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### *Outliers: Reference Material (RM) Samples*

- No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

## Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.