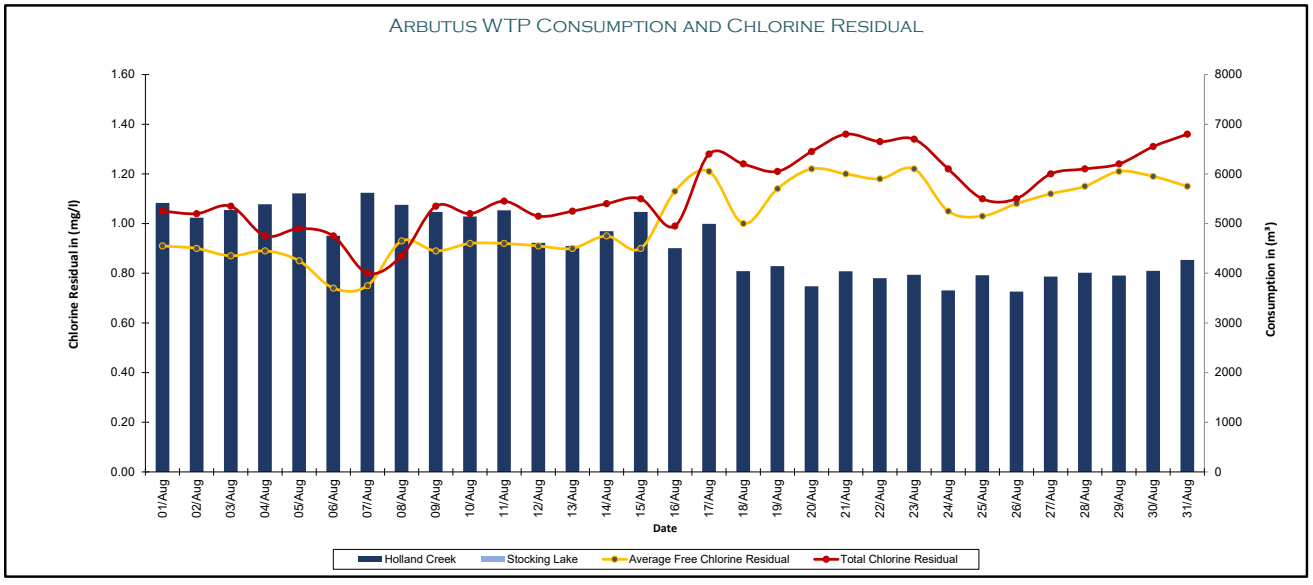
# Town of Ladysmith - Arbutus Water treatment Plant

## August 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-Aug | 0 | 5417 | 5417 | 0.88 | 0.92 | 0.91 | 1.05 | 107 | | | | | | |
| 02-Aug | 0 | 5120 | 5120 | 0.88 | 0.92 | 0.90 | 1.04 | 141 | | | | | | |
| 03-Aug | 0 | 5273 | 5273 | 0.85 | 0.91 | 0.87 | 1.07 | 158 | | | | | | |
| 04-Aug | 0 | 5389 | 5389 | 0.79 | 0.90 | 0.89 | 0.95 | 203 | | | | | | |
| 05-Aug | 0 | 5607 | 5607 | 0.83 | 0.90 | 0.85 | 0.98 | 143 | < 1 | < 1 | < 1 | | | |
| 06-Aug | 0 | 4754 | 4754 | 0.71 | 0.87 | 0.74 | 0.95 | 152 | | | | | | |
| 07-Aug | 0 | 5619 | 5619 | 0.70 | 0.76 | 0.75 | 0.80 | 166 | | | | | | |
| 08-Aug | 0 | 5376 | 5376 | 0.72 | 0.93 | 0.93 | 0.87 | 326 | | | | | | |
| 09-Aug | 0 | 5234 | 5234 | 0.86 | 1.00 | 0.89 | 1.07 | 182 | | | | | | |
| 10-Aug | 0 | 5143 | 5143 | 0.87 | 0.93 | 0.92 | 1.04 | 204 | | | | | | |
| 11-Aug | 0 | 5266 | 5266 | 0.90 | 0.95 | 0.92 | 1.09 | 217 | | | | | | |
| 12-Aug | 0 | 4613 | 4613 | 0.87 | 0.93 | 0.91 | 1.03 | 215 | | | | | | |
| 13-Aug | 0 | 4550 | 4550 | 0.86 | 0.92 | 0.90 | 1.05 | 202 | < 1 | < 1 | < 1 | | 0.0733 | 0.0665 |
| 14-Aug | 0 | 4847 | 4847 | 0.88 | 0.96 | 0.95 | 1.08 | 189 | | | | | | |
| 15-Aug | 0 | 5235 | 5235 | 0.88 | 0.98 | 0.90 | 1.10 | 161 | | | | | | |
| 16-Aug | 0 | 4504 | 4504 | 0.85 | 1.13 | 1.13 | 0.99 | 220 | | | | | | |
| 17-Aug | 0 | 4994 | 4994 | 1.12 | 1.24 | 1.21 | 1.28 | 192 | | | | | | |
| 18-Aug | 0 | 4042 | 4042 | 1.00 | 1.23 | 1.00 | 1.24 | 255 | | | | | | |
| 19-Aug | 0 | 4144 | 4144 | 0.96 | 1.15 | 1.14 | 1.21 | 288 | | | | | | |
| 20-Aug | 0 | 3738 | 3738 | 1.11 | 1.26 | 1.22 | 1.29 | 290 | < 1 | < 1 | < 1 | | 0.0876 | 0.0724 |
| 21-Aug | 0 | 4040 | 4040 | 1.12 | 1.22 | 1.20 | 1.36 | 303 | | | | | | |
| 22-Aug | 0 | 3900 | 3900 | 1.15 | 1.20 | 1.18 | 1.33 | 255 | | | | | | |
| 23-Aug | 0 | 3969 | 3969 | 1.16 | 1.23 | 1.22 | 1.34 | 258 | | | | | | |
| 24-Aug | 0 | 3654 | 3654 | 1.05 | 1.22 | 1.05 | 1.22 | 238 | | | | | | |
| 25-Aug | 0 | 3961 | 3961 | 0.98 | 1.04 | 1.03 | 1.10 | 257 | | | | | | |
| 26-Aug | 0 | 3632 | 3632 | 1.00 | 1.09 | 1.08 | 1.10 | 257 | | | | | | |
| 27-Aug | 0 | 3933 | 3933 | 1.06 | 1.13 | 1.12 | 1.20 | 250 | < 1 | < 1 | < 1 | | 0.0819 | 0.0585 |
| 28-Aug | 0 | 4011 | 4011 | 1.07 | 1.15 | 1.15 | 1.22 | 263 | | | | | | |
| 29-Aug | 0 | 3955 | 3955 | 1.14 | 1.22 | 1.21 | 1.24 | 253 | | | | | | |
| 30-Aug | 0 | 4049 | 4049 | 1.18 | 1.23 | 1.19 | 1.31 | 254 | | | | | | |
| 31-Aug | 0 | 4269 | 4269 | 1.15 | 1.20 | 1.15 | 1.36 | 241 | | | | | | |
| Total | 0 | 142238 | 142238 | | | | | | | | | | | |
| Average | 0 | 4588 | 4588 | 0.95 | 1.06 | 1.02 | 1.13 | 221 | < 1 | < 1 | < 1 | #DIV/0! | 0.0809 | 0.06580 |

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



VEOLIA

InSight

# Town of Ladysmith Arbutus DWTP

## Monthly LRV and Turbidity Report

# 08/01/2024 - 09/01/2024

## 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

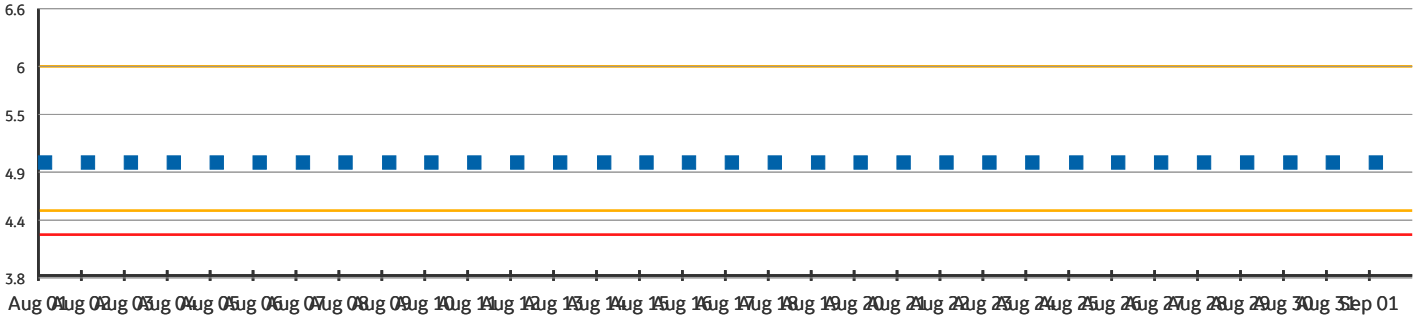
| Asset | Parameter | Aug 01 | Aug 02 | Aug 03 | Aug 04 | Aug 05 | Aug 06 | Aug 07 | Aug 08 | Aug 09 | Aug 10 | Aug 11 | Aug 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | LRV | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 2 | LRV | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 3 | LRV | 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 | Aug 13 | Aug 14 | Aug 15 | Aug 16 | Aug 17 | Aug 18 | Aug 19 | Aug 20 | Aug 21 | Aug 22 | Aug 23 | Aug 24 | Aug 25 | Aug 26 | Aug 27 | Aug 28 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 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 | 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 | 5.0 | 5.0 | 5.0 |

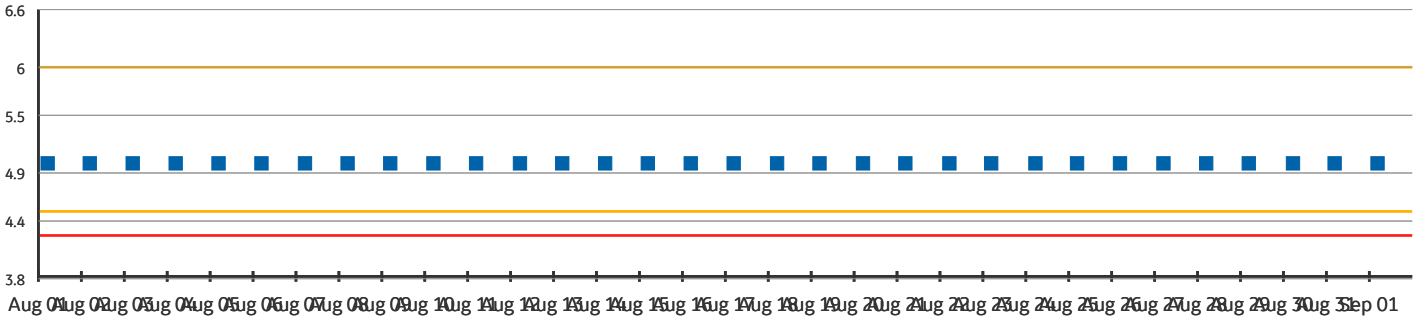
| Asset | Aug 29 | Aug 30 | Aug 31 | Sep 01 |
|---|---|---|---|---|
| UF 1 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 2 | 5.0 | 5.0 | 5.0 | 5.0 |
| UF 3 | 5.0 | 5.0 | 5.0 | 5.0 |

## LRV Raw Data

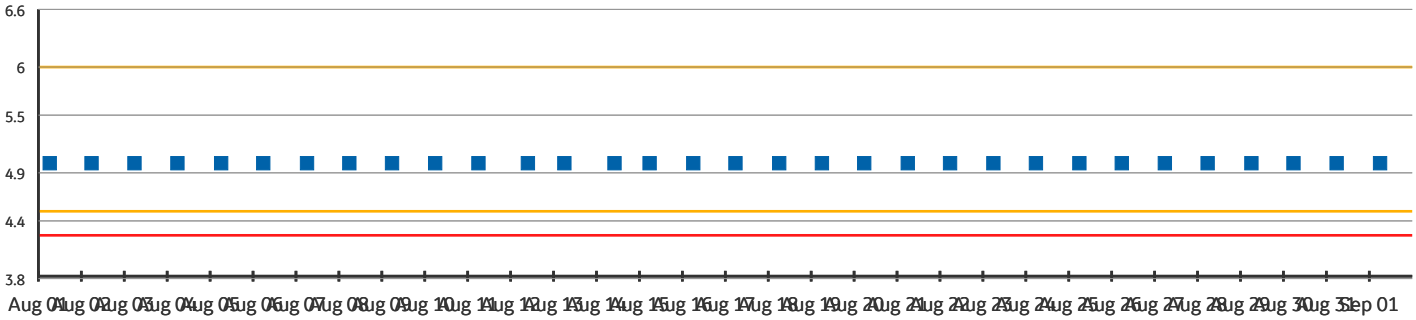
## UF 1 - LRV (#)




## 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 | | 0.017 | 0.0 | 45205 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 2 | PermeateTurbidity | | 0.016 | 0.0 | 45205 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 3 | PermeateTurbidity | | 0.018 | 0.0 | 45205 | -- | -- | 100 % | 0 % | 0 % | NTU |
| UF 1 | PermeateTurbidityAfterBP | ● | 0.017 | 0.0 | 530 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |
| UF 2 | PermeateTurbidityAfterBP | ● | 0.016 | 0.0 | 529 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |
| UF 3 | PermeateTurbidityAfterBP | ● | 0.018 | 0.0 | 533 | 0.1 | 0.3 | 100 % | 0 % | 0 % | NTU |

## Turbidity Daily Averages

| Asset | Parameter | Aug 01 | Aug 02 | Aug 03 | Aug 04 | Aug 05 | Aug 06 | Aug 07 | Aug 08 | Aug 09 | Aug 10 | Aug 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | PermeateTurbidity | 0.029 | 0.024 | 0.017 | 0.016 | 0.015 | 0.016 | 0.017 | 0.017 | 0.017 | 0.017 | 0.017 |
| UF 2 | PermeateTurbidity | 0.015 | 0.016 | 0.015 | 0.015 | 0.016 | 0.016 | 0.018 | 0.018 | 0.018 | 0.017 | 0.016 |
| UF 3 | PermeateTurbidity | 0.019 | 0.019 | 0.019 | 0.019 | 0.019 | 0.02 | 0.021 | 0.021 | 0.021 | 0.02 | 0.02 |

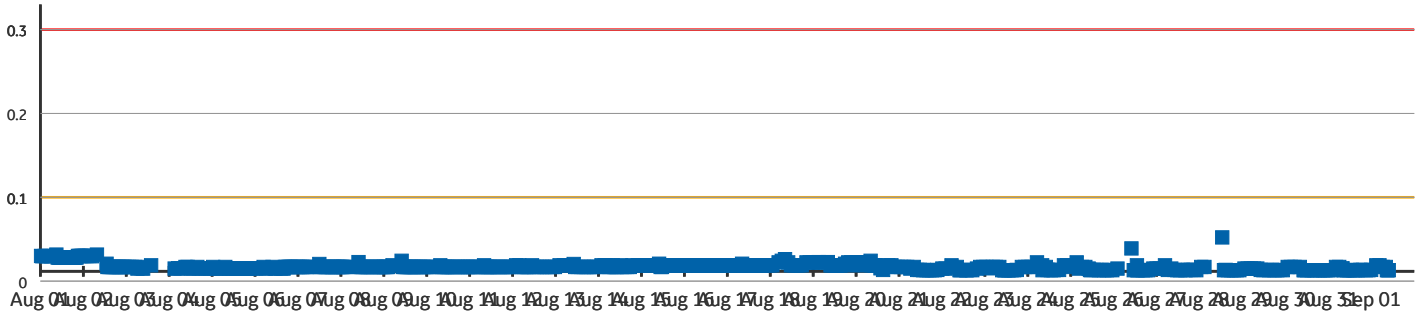
| Asset | Parameter | Aug 01 | Aug 02 | Aug 03 | Aug 04 | Aug 05 | Aug 06 | Aug 07 | Aug 08 | Aug 09 | Aug 10 | Aug 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | PermeateTurbidityAfterBP | 0.029 | 0.021 | 0.017 | 0.016 | 0.015 | 0.016 | 0.017 | 0.017 | 0.017 | 0.017 | 0.017 |
| UF 2 | PermeateTurbidityAfterBP | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.017 | 0.017 | 0.017 | 0.017 | 0.017 |
| UF 3 | PermeateTurbidityAfterBP | 0.019 | 0.019 | 0.019 | 0.019 | 0.019 | 0.02 | 0.021 | 0.02 | 0.02 | 0.02 | 0.019 |

| Asset | Aug 12 | Aug 13 | Aug 14 | Aug 15 | Aug 16 | Aug 17 | Aug 18 | Aug 19 | Aug 20 | Aug 21 | Aug 22 | Aug 23 | Aug 24 | Aug 25 | Aug 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UF 1 | 0.017 | 0.017 | 0.018 | 0.018 | 0.019 | 0.019 | 0.019 | 0.019 | 0.017 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 | 0.017 |
| UF 2 | 0.015 | 0.015 | 0.015 | 0.016 | 0.016 | 0.016 | 0.017 | 0.017 | 0.016 | 0.015 | 0.014 | 0.014 | 0.015 | 0.014 | 0.014 |
| UF 3 | 0.021 | 0.02 | 0.021 | 0.02 | 0.021 | 0.021 | 0.022 | 0.021 | 0.018 | 0.015 | 0.015 | 0.016 | 0.016 | 0.015 | 0.015 |
| UF 1 | 0.017 | 0.018 | 0.018 | 0.019 | 0.019 | 0.019 | 0.021 | 0.021 | 0.019 | 0.014 | 0.015 | 0.015 | 0.016 | 0.015 | 0.016 |
| UF 2 | 0.016 | 0.015 | 0.016 | 0.016 | 0.016 | 0.016 | 0.017 | 0.017 | 0.016 | 0.015 | 0.015 | 0.015 | 0.015 | 0.014 | 0.015 |
| UF 3 | 0.02 | 0.019 | 0.02 | 0.02 | 0.02 | 0.019 | 0.023 | 0.02 | 0.018 | 0.015 | 0.015 | 0.016 | 0.016 | 0.015 | 0.015 |

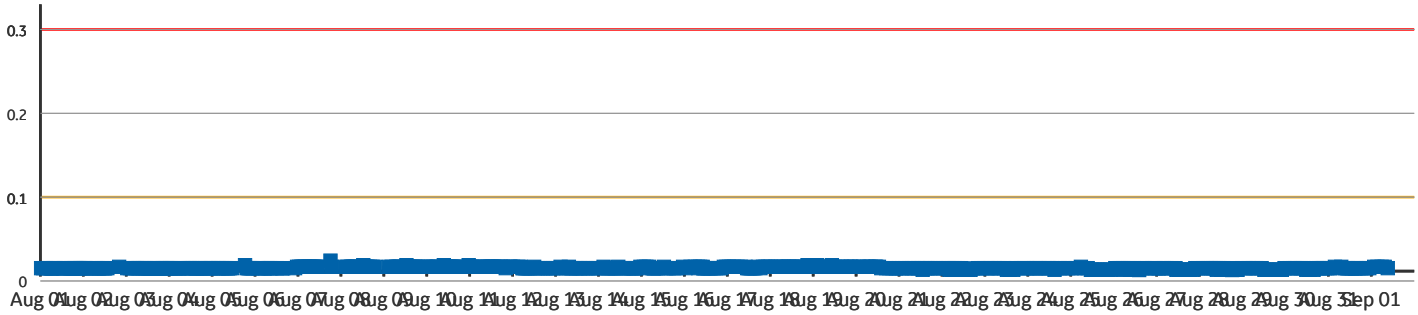
| Asset | Aug 27 | Aug 28 | Aug 29 | Aug 30 | Aug 31 | Sep 01 |
|---|---|---|---|---|---|---|
| UF 1 | 0.013 | 0.019 | 0.013 | 0.014 | 0.014 | 0.014 |
| UF 2 | 0.014 | 0.014 | 0.014 | 0.014 | 0.015 | 0.015 |
| UF 3 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 |
| UF 1 | 0.014 | 0.018 | 0.014 | 0.014 | 0.014 | 0.016 |
| UF 2 | 0.014 | 0.015 | 0.014 | 0.015 | 0.015 | 0.017 |
| UF 3 | 0.016 | 0.015 | 0.015 | 0.015 | 0.015 | 0.015 |

## Turbidity Raw Data

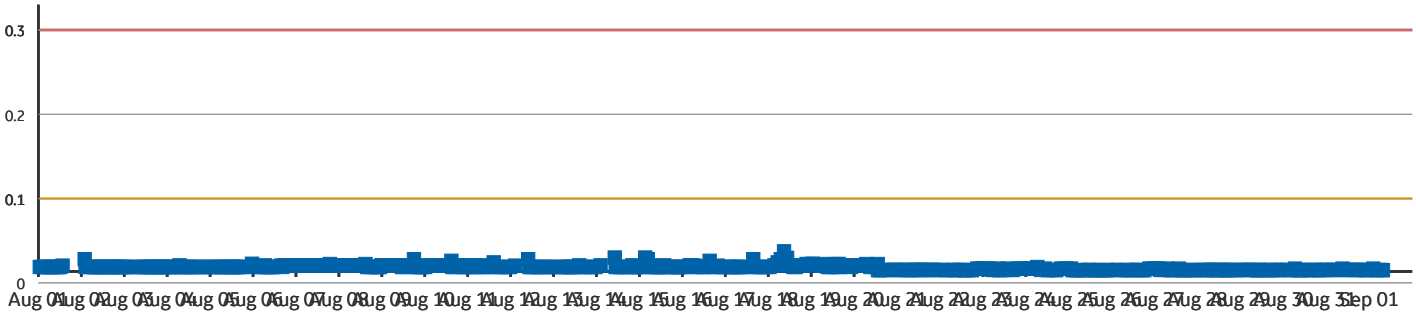
### UF 1 - PermeateTurbidityAfterBP (NTU)




### UF 2 - PermeateTurbidityAfterBP (NTU)



# UF 3 - PermeateTurbidityAfterBP (NTU)



# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24B9499** | 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 | : 07-Aug-2024 09:45 |
| PO | : 10880 | Date Analysis Commenced | : 07-Aug-2024 |
| C-O-C number | : ---- | Issue Date | : 12-Aug-2024 10:40 |
| 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* |
|---|---|---|
| Marianne Jensen | Analyst- General | Inorganics, 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: **Drinking 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 | | | | | 06-Aug-2024 12:10 | 06-Aug-2024 12:20 | 06-Aug-2024 12:15 | 06-Aug-2024 12:00 | ---- |
| | | | | | VA24B9499-001 | VA24B9499-002 | VA24B9499-003 | VA24B9499-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | ---- | 12.1 | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | ---- | <5.0 | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | ---- | 59.2 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | ---- | 7.40 | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | ---- | <0.10 | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 1.86 | 0.82 | 0.98 | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.01 | 1.00 | 0.76 | ---- | ---- |
| **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** | : **VA24B9499** | 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 | : 07-Aug-2024 09:45 |
| PO | : 10880 | Issue Date | : 12-Aug-2024 10:40 |
| 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** | : **VA24C0379** | Page | : 1 of 4 |
| 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 | : 14-Aug-2024 12:30 |
| PO | : 10880 | Date Analysis Commenced | : 14-Aug-2024 |
| C-O-C number | : ---- | Issue Date | : 20-Aug-2024 13:37 |
| 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
- 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 |
| Monica Ko | Lab Assistant | Inorganics, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Microbiology, Burnaby, British Columbia |
| Stephanie Pinheiro | Team Leader - LCMS | LCMS, Waterloo, Ontario |

## 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* |
|---|---|
| µg/L | micrograms per litre |
| 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**)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution system (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | ---- |
| | | | | | | VA24C0379-001 | VA24C0379-002 | VA24C0379-003 | VA24C0379-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | | ---- | ---- | 8.3 | ---- | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | | ---- | ---- | <5.0 | ---- | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | | ---- | ---- | 33.2 | ---- | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | | ---- | ---- | 7.25 | ---- | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | | ---- | ---- | <0.10 | ---- | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | | |
| **Carbon, dissolved inorganic [DIC]** | ---- | E353-L/VA | 0.50 | mg/L | | ---- | 1.96 | ---- | ---- | ---- |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | | 2.14 | 2.04 | ---- | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | | 2.41 | 2.16 | ---- | ---- | ---- |
| **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 | ---- | ---- |
| **Volatile Organic Compounds [THMs]** | | | | | | | | | | |
| **Bromodichloromethane** | 75-27-4 | E611B/VA | 1.0 | µg/L | | ---- | ---- | 2.7 | 3.2 | ---- |
| **Bromoform** | 75-25-2 | E611B/VA | 1.0 | µg/L | | ---- | ---- | <1.0 | <1.0 | ---- |
| **Chloroform** | 67-66-3 | E611B/VA | 1.0 | µg/L | | ---- | ---- | 70.6 | 83.9 | ---- |
| **Dibromochloromethane** | 124-48-1 | E611B/VA | 1.0 | µg/L | | ---- | ---- | <1.0 | <1.0 | ---- |
| **Trihalomethanes [THMs], total** | ---- | E611B/VA | 2.0 | µg/L | | ---- | ---- | 73.3 | 87.1 | ---- |
| **Volatile Organic Compounds [THMs] Surrogates** | | | | | | | | | | |
| **Bromofluorobenzene, 4-** | 460-00-4 | E611B/VA | 1.0 | % | | ---- | ---- | 94.2 | 98.4 | ---- |
| **Difluorobenzene, 1,4-** | 540-36-3 | E611B/VA | 1.0 | % | | ---- | ---- | 101 | 100.0 | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Bromochloroacetic acid** | 5589-96-8 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | <1.00 | ---- |
| **Dibromoacetic acid** | 631-64-1 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | <1.00 | ---- |
| **Dichloroacetic acid** | 79-43-6 | E750/WT | 1.00 | µg/L | | ---- | ---- | 26.3 | 30.3 | ---- |
| **Monobromoacetic acid** | 79-08-3 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | <1.00 | ---- |
| **Monochloroacetic acid** | 79-11-8 | E750/WT | 1.00 | µg/L | | ---- | ---- | 1.41 | 1.67 | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution system (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | 13-Aug-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24C0379-001 | VA24C0379-002 | VA24C0379-003 | VA24C0379-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Trichloroacetic acid** | 76-03-9 | E750/WT | 1.00 | µg/L | | ---- | ---- | 38.8 | 45.9 | ---- |
| **Haloacetic acids, total [HAA5]** | n/a | E750/WT | 5.00 | µg/L | | ---- | ---- | 66.5 | 77.9 | ---- |

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** | : **VA24C0379** | Page | : 1 of 9 |
| 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 | : 14-Aug-2024 12:30 |
| PO | : 10880 | Issue Date | : 20-Aug-2024 13:36 |
| 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 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)

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

## Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24C1216** | Page | : 1 of 4 |
| 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 | : 21-Aug-2024 12:05 |
| PO | : PO #10916 | Date Analysis Commenced | : 21-Aug-2024 |
| C-O-C number | : 17-Week 2 | Issue Date | : 03-Sep-2024 09:38 |
| 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
- 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 |
| Monica Ko | Lab Assistant | Inorganics, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Microbiology, Burnaby, British Columbia |
| Stephanie Pinheiro | Team Leader - LCMS | LCMS, Waterloo, Ontario |
| 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.

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* |
|---|---|
| µg/L | micrograms per litre |
| 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

**Treated water sample :Exceeded Recommended Holding Time prior to receipt at the lab for HPC analysis.Requested HPC analysis will be carried out from the expired sample.**

## Analytical Results

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

| Analyte | CAS Number | Method/Lab | LOR | Unit | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution System (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|
| *Client sample ID* | | | | | VA24C1216-001 | VA24C1216-002 | VA24C1216-003 | VA24C1216-004 | -------- |
| *Client sampling date / time* | | | | | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | ---- |
| | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | ---- | ---- | 10.2 | ---- | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | ---- | ---- | <5.0 | ---- | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | ---- | ---- | 38.6 | ---- | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | ---- | ---- | 7.32 | ---- | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | ---- | ---- | <0.10 | ---- | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | |
| **Carbon, dissolved inorganic [DIC]** | ---- | E353-L/VA | 0.50 | mg/L | ---- | 2.25 | ---- | ---- | ---- |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | 2.05 | 2.11 | ---- | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | 2.20 | 2.26 | ---- | ---- | ---- |
| **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 | ---- | ---- |
| **Volatile Organic Compounds [THMs]** | | | | | | | | | |
| **Bromodichloromethane** | 75-27-4 | E611B/VA | 1.0 | µg/L | ---- | ---- | 2.9 | 3.4 | ---- |
| **Bromoform** | 75-25-2 | E611B/VA | 1.0 | µg/L | ---- | ---- | <1.0 | <1.0 | ---- |
| **Chloroform** | 67-66-3 | E611B/VA | 1.0 | µg/L | ---- | ---- | 84.7 | 107 | ---- |
| **Dibromochloromethane** | 124-48-1 | E611B/VA | 1.0 | µg/L | ---- | ---- | <1.0 | <1.0 | ---- |
| **Trihalomethanes [THMs], total** | ---- | E611B/VA | 2.0 | µg/L | ---- | ---- | 87.6 | 110 | ---- |
| **Volatile Organic Compounds [THMs] Surrogates** | | | | | | | | | |
| **Bromofluorobenzene, 4-** | 460-00-4 | E611B/VA | 1.0 | % | ---- | ---- | 94.5 | 91.6 | ---- |
| **Difluorobenzene, 1,4-** | 540-36-3 | E611B/VA | 1.0 | % | ---- | ---- | 101 | 99.3 | ---- |
| **Haloacetic Acids** | | | | | | | | | |
| **Bromochloroacetic acid** | 5589-96-8 | E750/WT | 1.00 | µg/L | ---- | ---- | <1.00 | 1.04 | ---- |
| **Dibromoacetic acid** | 631-64-1 | E750/WT | 1.00 | µg/L | ---- | ---- | <1.00 | <1.00 | ---- |
| **Dichloroacetic acid** | 79-43-6 | E750/WT | 1.00 | µg/L | ---- | ---- | 34.1 | 37.6 | ---- |
| **Monobromoacetic acid** | 79-08-3 | E750/WT | 1.00 | µg/L | ---- | ---- | <1.00 | <1.00 | ---- |
| **Monochloroacetic acid** | 79-11-8 | E750/WT | 1.00 | µg/L | ---- | ---- | 1.55 | 2.07 | ---- |

## Analytical Results

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

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution System (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | 20-Aug-2024 10:30 | ---- |
| | | | | | | VA24C1216-001 | VA24C1216-002 | VA24C1216-003 | VA24C1216-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Trichloroacetic acid** | 76-03-9 | E750/WT | 1.00 | µg/L | | ---- | ---- | 36.7 | 43.1 | ---- |
| **Haloacetic acids, total [HAA5]** | n/a | E750/WT | 5.00 | µg/L | | ---- | ---- | 72.4 | 82.8 | ---- |

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** | : **VA24C1216** | Page | : 1 of 9 |
| 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 | : 21-Aug-2024 12:05 |
| PO | : PO #10916 | Issue Date | : 03-Sep-2024 09:34 |
| C-O-C number | : 17-Week 2 | | |
| 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 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)

- 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** | : **VA24C1486** | 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 - Quarterly Lake Sampling | Date Samples Received | : 22-Aug-2024 12:20 |
| PO | : 10880 | Date Analysis Commenced | : 23-Aug-2024 |
| C-O-C number | : ---- | Issue Date | : 03-Sep-2024 16:00 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : VA22-GMSM100-001 Tender# 2022-IS-20 | | |
| No. of samples received | : 2 | | |
| No. of samples analysed | : 2 | | |

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 |
| Lindsay Gung | Supervisor - Water Chemistry | Inorganics, Burnaby, British Columbia |
| Maya Urquhart | Lab Analyst | Metals, 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* |
|---|---|
| % 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.

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)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID: Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| Client sampling date / time | | | | | 21-Aug-2024 11:00 | 21-Aug-2024 09:30 | ---- | ---- | ---- |
| | | | | | VA24C1486-001 | VA24C1486-002 | -------- | -------- | -------- |
| | | | | | Result | Result | ---- | ---- | ---- |
| **Physical Tests** | | | | | | | | | |
| Absorbance, UV (@ 254nm) | ---- | E404/VA | 0.0050 | AU/cm | 0.0580 | 0.0740 | ---- | ---- | ---- |
| Alkalinity, total (as CaCO3) | ---- | E290/VA | 1.0 | mg/L | 9.8 | 4.3 | ---- | ---- | ---- |
| Colour, true | ---- | E329/VA | 5.0 | CU | <5.0 | <5.0 | ---- | ---- | ---- |
| Hardness (as CaCO3), from total Ca/Mg | ---- | EC100A/VA | 0.60 | mg/L | 10.6 | 4.75 | ---- | ---- | ---- |
| pH | ---- | E108/VA | 0.10 | pH units | 7.13 | 6.73 | ---- | ---- | ---- |
| Solids, total dissolved [TDS] | ---- | E162/VA | 10 | mg/L | 28 | 23 | ---- | ---- | ---- |
| Turbidity | ---- | E121/VA | 0.10 | NTU | 0.47 | 0.38 | ---- | ---- | ---- |
| Transmittance, UV (@ 254nm) | ---- | E404/VA | 1.0 | % T/cm | 87.5 | 84.3 | ---- | ---- | ---- |
| **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 | 2.43 | 3.18 | ---- | ---- | ---- |
| Carbon, total organic [TOC] | ---- | E355-L/VA | 0.50 | mg/L | 2.78 | 3.37 | ---- | ---- | ---- |
| **Microbiological Tests** | | | | | | | | | |
| Coliforms, Escherichia coli [E. coli] | ---- | E010/VA | 1 | MPN/100mL | <1 | <1 | ---- | ---- | ---- |
| Coliforms, total | ---- | E010/VA | 1 | MPN/100mL | 1200 | 1410 | ---- | ---- | ---- |
| **Total Metals** | | | | | | | | | |
| Aluminum, total | 7429-90-5 | E420/VA | 0.0030 | mg/L | 0.0300 | 0.0320 | ---- | ---- | ---- |
| 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 | 0.00013 | <0.00010 | ---- | ---- | ---- |
| Barium, total | 7440-39-3 | E420/VA | 0.00010 | mg/L | 0.00307 | 0.00299 | ---- | ---- | ---- |
| 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 | 0.022 | <0.010 | ---- | ---- | ---- |
| Cadmium, total | 7440-43-9 | E420/VA | 0.0000050 | mg/L | <0.0000050 | <0.0000050 | ---- | ---- | ---- |
| Calcium, total | 7440-70-2 | E420/VA | 0.050 | mg/L | 3.34 | 1.46 | ---- | ---- | ---- |
| Cesium, total | 7440-46-2 | E420/VA | 0.000010 | mg/L | 0.000011 | <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 | 21-Aug-2024 11:00 | 21-Aug-2024 09:30 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24C1486-001 | VA24C1486-002 | -------- | -------- | -------- |
| | | | | | | Result | Result | ---- | ---- | ---- |
| **Total Metals** | | | | | | | | | | |
| Copper, total | 7440-50-8 | E420/VA | 0.00050 | mg/L | | 0.00054 | 0.00085 | ---- | ---- | ---- |
| Iron, total | 7439-89-6 | E420/VA | 0.010 | mg/L | | 0.050 | 0.115 | ---- | ---- | ---- |
| 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 | | 0.559 | 0.269 | ---- | ---- | ---- |
| Manganese, total | 7439-96-5 | E420/VA | 0.00010 | mg/L | | 0.00426 | 0.0131 | ---- | ---- | ---- |
| 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 | | 0.000236 | <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 | | 0.279 | 0.169 | ---- | ---- | ---- |
| Rubidium, total | 7440-17-7 | E420/VA | 0.00020 | mg/L | | 0.00067 | 0.00053 | ---- | ---- | ---- |
| Selenium, total | 7782-49-2 | E420/VA | 0.000050 | mg/L | | <0.000050 | 0.000054 | ---- | ---- | ---- |
| Silicon, total | 7440-21-3 | E420/VA | 0.10 | mg/L | | 1.83 | 1.00 | ---- | ---- | ---- |
| 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 | | 1.20 | 0.761 | ---- | ---- | ---- |
| Strontium, total | 7440-24-6 | E420/VA | 0.00020 | mg/L | | 0.0113 | 0.00710 | ---- | ---- | ---- |
| Sulfur, total | 7704-34-9 | E420/VA | 0.50 | mg/L | | 0.54 | <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 | | <0.00030 | <0.00030 | ---- | ---- | ---- |
| 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 | | 0.000019 | <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 | 21-Aug-2024 11:00 | 21-Aug-2024 09:30 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24C1486-001 | VA24C1486-002 | -------- | -------- | -------- |
| | | | | | | 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 | % | | 91.4 | 91.9 | ---- | ---- | ---- |
| **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 | % | | 102 | 100 | ---- | ---- | ---- |
| Naphthalene-d8 | 1146-65-2 | E641A/VA | 0.1 | % | | 95.4 | 96.3 | ---- | ---- | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Stocking Lake | Holland Lake | ---- | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 21-Aug-2024 11:00 | 21-Aug-2024 09:30 | ---- | ---- | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24C1486-001 | VA24C1486-002 | -------- | -------- | -------- |
| | | | | | | Result | Result | ---- | ---- | ---- |
| **Polycyclic Aromatic Hydrocarbons Surrogates** | | | | | | | | | | |
| **Phenanthrene-d10** | 1517-22-2 | E641A/VA | 0.1 | % | | 106 | 107 | ---- | ---- | ---- |

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** | : **VA24C1486** | 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 - Quarterly Lake Sampling | Date Samples Received | : 22-Aug-2024 12:20 |
| PO | : 10880 | Issue Date | : 03-Sep-2024 16:27 |
| 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** | : **VA24C2138** | Page | : 1 of 4 |
| 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 | : 28-Aug-2024 11:00 |
| PO | : 10880 | Date Analysis Commenced | : 28-Aug-2024 |
| C-O-C number | : 17-Week 3 | Issue Date | : 09-Sep-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
- 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* |
|---|---|---|
| Lindsay Gung | Supervisor - Water Chemistry | Microbiology, Burnaby, British Columbia |
| Lindsay Gung | Supervisor - Water Chemistry | Organics, Burnaby, British Columbia |
| Miles Gropen | Department Manager - Inorganics | Inorganics, Burnaby, British Columbia |
| Monica Ko | Lab Assistant | Inorganics, Burnaby, British Columbia |
| Stephanie Pinheiro | Team Leader - LCMS | LCMS, Waterloo, Ontario |

## 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* |
|---|---|
| µg/L | micrograms per litre |
| 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**)

| Analyte | CAS Number | Method/Lab | LOR | Unit | Client sample ID | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution System (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | ---- |
| | | | | | | VA24C2138-001 | VA24C2138-002 | VA24C2138-003 | VA24C2138-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | | ---- | ---- | 10.0 | ---- | ---- |
| **Colour, true** | ---- | E329/VA | 5.0 | CU | | ---- | ---- | <5.0 | ---- | ---- |
| **Conductivity** | ---- | E100/VA | 2.0 | µS/cm | | ---- | ---- | 36.0 | ---- | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | | ---- | ---- | 7.28 | ---- | ---- |
| **Turbidity** | ---- | E121/VA | 0.10 | NTU | | ---- | ---- | <0.10 | ---- | ---- |
| **Organic / Inorganic Carbon** | | | | | | | | | | |
| **Carbon, dissolved inorganic [DIC]** | ---- | E353-L/VA | 0.50 | mg/L | | ---- | 2.20 | ---- | ---- | ---- |
| **Carbon, dissolved organic [DOC]** | ---- | E358-L/VA | 0.50 | mg/L | | 1.71 | 1.79 | ---- | ---- | ---- |
| **Carbon, total organic [TOC]** | ---- | E355-L/VA | 0.50 | mg/L | | 2.79 | 2.11 | ---- | ---- | ---- |
| **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 | ---- | ---- |
| **Volatile Organic Compounds [THMs]** | | | | | | | | | | |
| **Bromodichloromethane** | 75-27-4 | E611B/VA | 1.0 | µg/L | | ---- | ---- | 3.2 | 4.3 | ---- |
| **Bromoform** | 75-25-2 | E611B/VA | 1.0 | µg/L | | ---- | ---- | <1.0 | <1.0 | ---- |
| **Chloroform** | 67-66-3 | E611B/VA | 1.0 | µg/L | | ---- | ---- | 78.7 | 120 | ---- |
| **Dibromochloromethane** | 124-48-1 | E611B/VA | 1.0 | µg/L | | ---- | ---- | <1.0 | <1.0 | ---- |
| **Trihalomethanes [THMs], total** | ---- | E611B/VA | 2.0 | µg/L | | ---- | ---- | 81.9 | 124 | ---- |
| **Volatile Organic Compounds [THMs] Surrogates** | | | | | | | | | | |
| **Bromofluorobenzene, 4-** | 460-00-4 | E611B/VA | 1.0 | % | | ---- | ---- | 93.8 | 94.7 | ---- |
| **Difluorobenzene, 1,4-** | 540-36-3 | E611B/VA | 1.0 | % | | ---- | ---- | 98.7 | 98.3 | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Bromochloroacetic acid** | 5589-96-8 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | 1.01 | ---- |
| **Dibromoacetic acid** | 631-64-1 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | <1.00 | ---- |
| **Dichloroacetic acid** | 79-43-6 | E750/WT | 1.00 | µg/L | | ---- | ---- | 26.5 | 36.3 | ---- |
| **Monobromoacetic acid** | 79-08-3 | E750/WT | 1.00 | µg/L | | ---- | ---- | <1.00 | <1.00 | ---- |
| **Monochloroacetic acid** | 79-11-8 | E750/WT | 1.00 | µg/L | | ---- | ---- | 1.46 | 2.27 | ---- |

## Analytical Results

| Sub-Matrix: Water (Matrix: Water) | | | | | Client sample ID | Raw Water | UF Effluent | Treated Water (post reservoir) | Distribution System (WWTP) | ---- |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Client sampling date / time | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | 27-Aug-2024 10:30 | ---- |
| Analyte | CAS Number | Method/Lab | LOR | Unit | | VA24C2138-001 | VA24C2138-002 | VA24C2138-003 | VA24C2138-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Haloacetic Acids** | | | | | | | | | | |
| **Trichloroacetic acid** | 76-03-9 | E750/WT | 1.00 | µg/L | | ---- | ---- | 30.5 | 37.2 | ---- |
| **Haloacetic acids, total [HAA5]** | n/a | E750/WT | 5.00 | µg/L | | ---- | ---- | 58.5 | 75.8 | ---- |

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** | : **VA24C2138** | Page | : 1 of 9 |
| 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 | : 28-Aug-2024 11:00 |
| PO | : 10880 | Issue Date | : 09-Sep-2024 10:56 |
| C-O-C number | : 17-Week 3 | | |
| 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 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)

- 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** | : **VA24C2590** | Page | : 1 of 4 |
| 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 - Quarterly DT Sampling | Date Samples Received | : 30-Aug-2024 10:50 |
| PO | : 10880 | Date Analysis Commenced | : 31-Aug-2024 |
| C-O-C number | : ---- | Issue Date | : 11-Sep-2024 16:39 |
| 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* |
|---|---|---|
| Ghazaleh Khanmirzaei | Analyst | Metals, Burnaby, British Columbia |
| Kate Dimitrova | Supervisor - Inorganic | Inorganics, Burnaby, British Columbia |
| Kim Jensen | Department Manager - Metals | Metals, 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* |
|---|---|
| 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.

## 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 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | ---- |
| | | | | | | VA24C2590-001 | VA24C2590-002 | VA24C2590-003 | VA24C2590-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Physical Tests** | | | | | | | | | | |
| **Alkalinity, total (as CaCO3)** | ---- | E290/VA | 1.0 | mg/L | | 10.0 | 10.1 | 10.2 | 11.5 | ---- |
| **Hardness (as CaCO3), from total Ca/Mg** | ---- | EC100A/VA | 0.60 | mg/L | | 6.86 | 7.26 | 6.92 | 7.69 | ---- |
| **pH** | ---- | E108/VA | 0.10 | pH units | | 7.33 | 7.35 | 7.36 | 7.44 | ---- |
| **Solids, total dissolved [TDS]** | ---- | E162/VA | 10 | mg/L | | 33 | 31 | 29 | 28 | ---- |
| **Total Metals** | | | | | | | | | | |
| **Aluminum, total** | 7429-90-5 | E420/VA | 0.0030 | mg/L | | 0.0293 | 0.0231 | 0.0162 | 0.0438 | ---- |
| **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 | | 0.00014 | 0.00010 | <0.00010 | <0.00010 | ---- |
| **Barium, total** | 7440-39-3 | E420/VA | 0.00010 | mg/L | | 0.00330 | 0.00323 | 0.00308 | 0.00265 | ---- |
| **Beryllium, total** | 7440-41-7 | E420/VA | 0.000100 | mg/L | | <0.000100 | <0.000100 | <0.000100 | <0.000100 | ---- |
| **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 | | 0.022 | 0.022 | 0.022 | 0.024 | ---- |
| **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 | | 2.18 | 2.26 | 2.18 | 2.24 | ---- |
| **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 | | 0.0192 | 0.0404 | 0.229 | 0.241 | ---- |
| **Iron, total** | 7439-89-6 | E420/VA | 0.010 | mg/L | | 0.021 | <0.010 | <0.010 | 0.083 | ---- |
| **Lead, total** | 7439-92-1 | E420/VA | 0.000050 | mg/L | | 0.000736 | 0.000186 | 0.00182 | 0.00105 | ---- |
| **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 | | 0.344 | 0.392 | 0.359 | 0.510 | ---- |
| **Manganese, total** | 7439-96-5 | E420/VA | 0.00010 | mg/L | | 0.00037 | 0.00016 | 0.00038 | 0.00125 | ---- |
| **Mercury, total** | 7439-97-6 | E508/VA | 0.0000050 | mg/L | | <0.0000050 | <0.0000050 | <0.0000050 | <0.0000050 | ---- |
| **Molybdenum, total** | 7439-98-7 | E420/VA | 0.000050 | mg/L | | 0.000102 | 0.000117 | 0.000084 | 0.000118 | ---- |
| **Nickel, total** | 7440-02-0 | E420/VA | 0.00050 | mg/L | | <0.00050 | <0.00050 | <0.00050 | <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 | | 0.161 | 0.159 | 0.164 | 0.168 | ---- |
| **Rubidium, total** | 7440-17-7 | E420/VA | 0.00020 | mg/L | | 0.00047 | 0.00046 | 0.00049 | 0.00054 | ---- |

## 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 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | 29-Aug-2024 10:30 | ---- |
| | | | | | | VA24C2590-001 | VA24C2590-002 | VA24C2590-003 | VA24C2590-004 | -------- |
| | | | | | | Result | Result | Result | Result | ---- |
| **Total Metals** | | | | | | | | | | |
| **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 | | 1.83 | 1.84 | 1.68 | 1.76 | ---- |
| **Silver, total** | 7440-22-4 | E420/VA | 0.000010 | mg/L | | <0.000010 | <0.000010 | 0.000016 | <0.000010 | ---- |
| **Sodium, total** | 7440-23-5 | E420/VA | 0.050 | mg/L | | 4.37 | 4.49 | 4.32 | 4.56 | ---- |
| **Strontium, total** | 7440-24-6 | E420/VA | 0.00020 | mg/L | | 0.0102 | 0.0106 | 0.00996 | 0.0102 | ---- |
| **Sulfur, total** | 7704-34-9 | E420/VA | 0.50 | mg/L | | <0.50 | <0.50 | <0.50 | <0.50 | ---- |
| **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 | | 0.000011 | 0.000011 | <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 | | <0.0030 | <0.0030 | 0.0057 | 0.0074 | ---- |
| **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.

ALS Canada Ltd.

right solutions.
right partner.

# QUALITY CONTROL INTERPRETIVE REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **VA24C2590** | Page | : 1 of 8 |
| 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 - Quarterly DT Sampling | Date Samples Received | : 30-Aug-2024 10:50 |
| PO | : 10880 | Issue Date | : 11-Sep-2024 16:38 |
| 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 Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike 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.