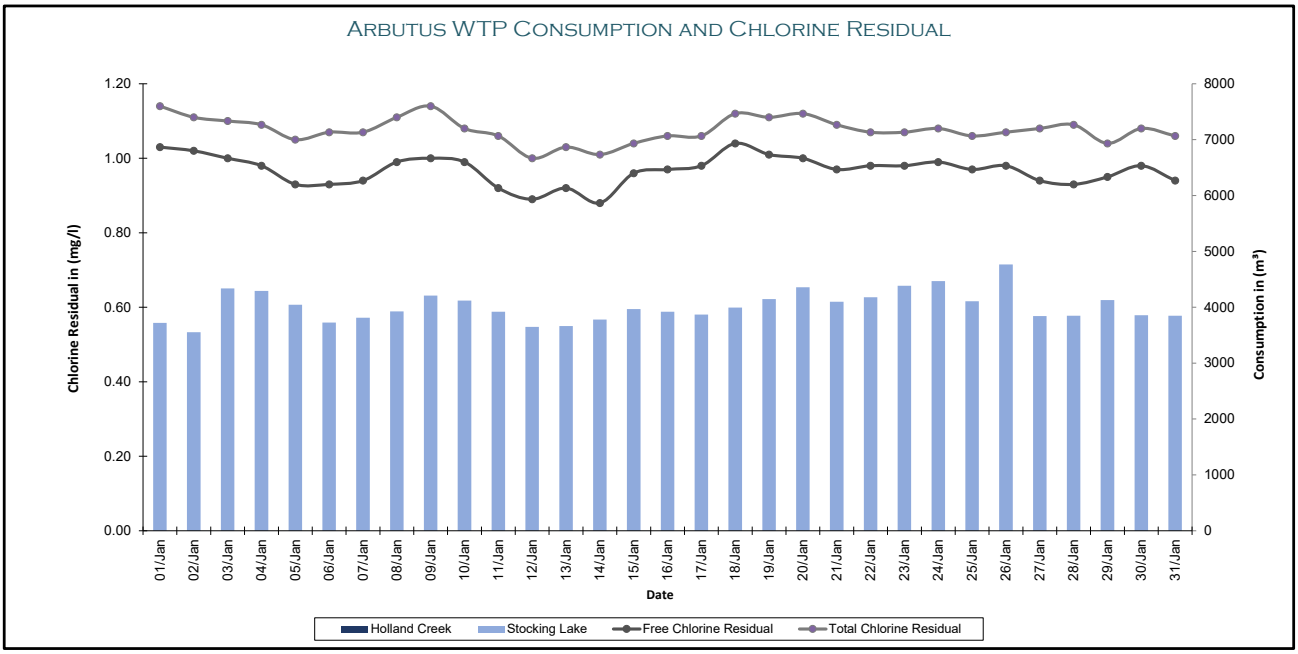
Town of Ladysmith - Arbutus Water treatment Plant

January 2024 - Monthly Report

Date	Daily Flow			Chlorine Residual		CT*	External Lab Testing					
	Stocking Lake	Holland Creek	Combined Flow	Free	Total		E.coli	Total Coliforms	HPC	Aluminum	THM	HAA
	m³	m³	m³	mg/l	mg/l	Minutes·mg/l	CFU	CFU	CFU	mg/l	mg/l	mg/l
01-Jan	3720	0	3720	1.03	1.14	147						
02-Jan	3553	0	3553	1.02	1.11	133						
03-Jan	4336	0	4336	1.00	1.10	100						
04-Jan	4294	0	4294	0.98	1.09	125						
05-Jan	4046	0	4046	0.93	1.05	127	< 1	< 1	< 1			
06-Jan	3725	0	3725	0.93	1.07	101						
07-Jan	3813	0	3813	0.94	1.07	102						
08-Jan	3926	0	3926	0.99	1.11	86						
09-Jan	4209	0	4209	1.00	1.14	126	< 1	< 1	< 1			
10-Jan	4119	0	4119	0.99	1.08	176						
11-Jan	3921	0	3921	0.92	1.06	143						
12-Jan	3650	0	3650	0.89	1.00	116						
13-Jan	3664	0	3664	0.92	1.03	100						
14-Jan	3780	0	3780	0.88	1.01	111						
15-Jan	3969	0	3969	0.96	1.04	183						
16-Jan	3920	0	3920	0.97	1.06	118						
17-Jan	3870	0	3870	0.98	1.06	132						
18-Jan	3995	0	3995	1.04	1.12	196	< 1	< 1	< 1			
19-Jan	4146	0	4146	1.01	1.11	197						
20-Jan	4357	0	4357	1.00	1.12	216						
21-Jan	4098	0	4098	0.97	1.09	173						
22-Jan	4179	0	4179	0.98	1.07	173						
23-Jan	4384	0	4384	0.98	1.07	183						
24-Jan	4468	0	4468	0.99	1.08	105	< 1	< 1	< 1			
25-Jan	4109	0	4109	0.97	1.06	125						
26-Jan	4767	0	4767	0.98	1.07	162						
27-Jan	3843	0	3843	0.94	1.08	150						
28-Jan	3850	0	3850	0.93	1.09	153						
29-Jan	4128	0	4128	0.95	1.04	173						
30-Jan	3857	0	3857	0.98	1.08	130	< 1	< 1	< 1	0.0112	0.0172	0.0095
31-Jan	3848	0	3848	0.94	1.06	137						
Total	124544	0	124544									
Average	4018	0	4018	0.97	1.08	142	< 1	< 1	< 1	0.0112	0.0172	0.00951

*CT - Recorded as the minimum value at the highest daily flow

Arbutus WTP Consumption and Chlorine Residual



VEOLIA

InSight

Town of Ladysmith Arbutus DWTP

Monthly LRV and Turbidity Report

01/01/2024 - 02/01/2024

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

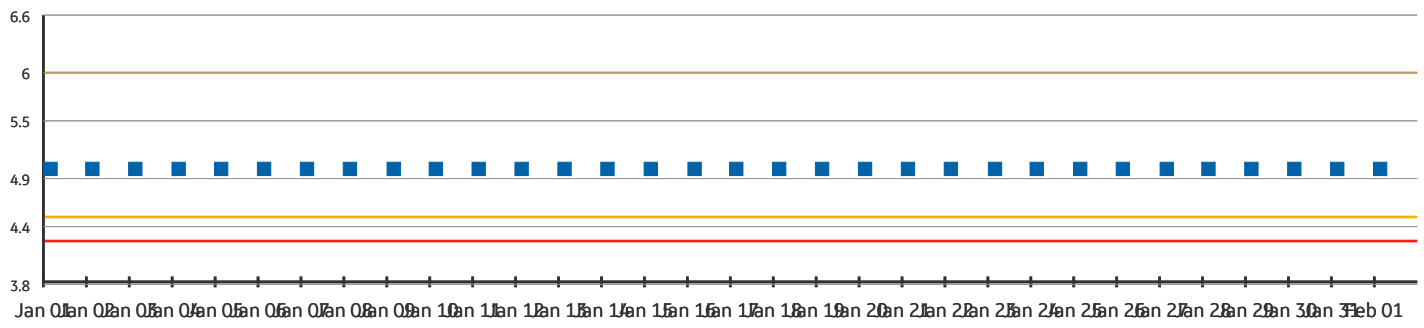
Asset	Parameter	Jan 01	Jan 02	Jan 03	Jan 04	Jan 05	Jan 06	Jan 07	Jan 08	Jan 09	Jan 10
UF 1	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Asset	Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 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

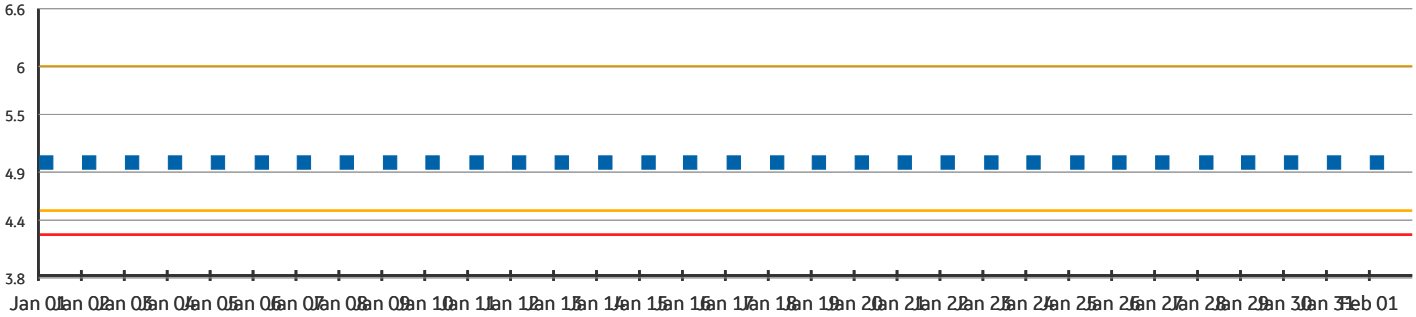
Asset	Jan 24	Jan 25	Jan 26	Jan 27	Jan 28	Jan 29	Jan 30	Jan 31	Feb 01
UF 1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

LRV Raw Data

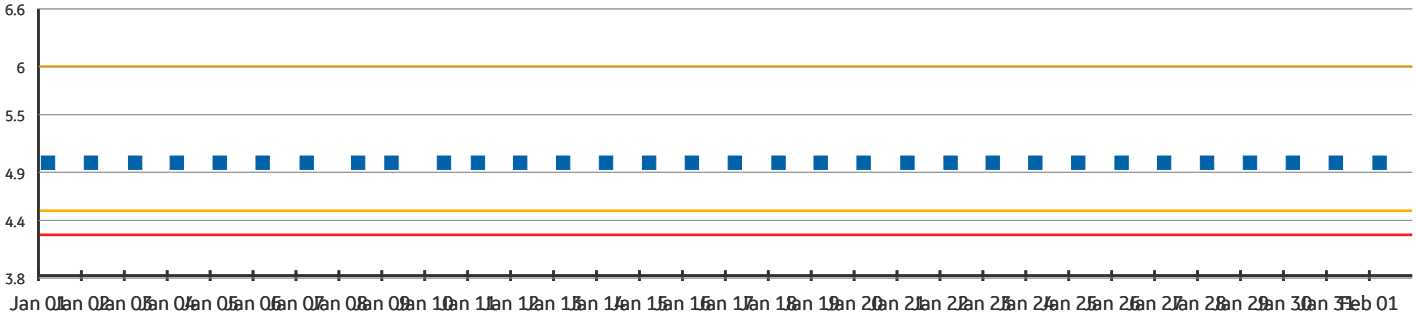
UF 1 - LRV (#)



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		0.017	0.01	45146	--	--	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidity		0.015	0.0	45146	--	--	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidity		0.016	0.0	45146	--	--	100 %	0 %	0 %	NTU
UF 1	PermeateTurbidityAfterBP		0.016	0.01	437	0.1	0.3	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidityAfterBP		0.015	0.0	464	0.1	0.3	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidityAfterBP		0.016	0.0	463	0.1	0.3	100 %	0 %	0 %	NTU

Turbidity Daily Averages

Asset	Parameter	Jan 01	Jan 02	Jan 03	Jan 04	Jan 05	Jan 06	Jan 07	Jan 08	Jan 09	Jan 10
UF 1	PermeateTurbidity	0.02	0.02	0.021	0.021	0.021	0.021	0.022	0.022	0.022	0.022
UF 2	PermeateTurbidity	0.018	0.018	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019
UF 3	PermeateTurbidity	0.019	0.019	0.019	0.02	0.021	0.021	0.021	0.021	0.021	0.021
UF 1	PermeateTurbidityAfterBP	0.02	0.02	0.02	0.021	0.021	0.021	0.022	0.022	0.022	0.022
UF 2	PermeateTurbidityAfterBP	0.018	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019
UF 3	PermeateTurbidityAfterBP	0.019	0.019	0.019	0.02	0.021	0.021	0.021	0.021	0.021	0.021

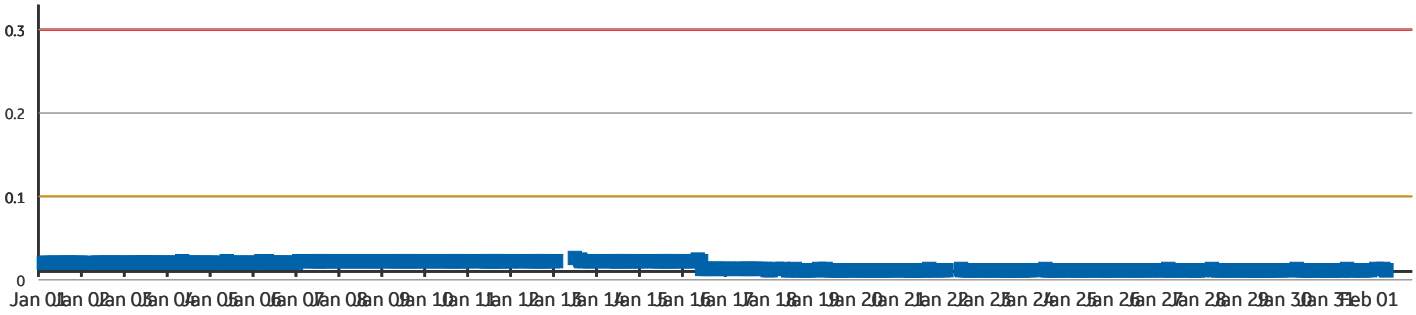
Asset	Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 23
UF 1	0.022	0.022	0.023	0.022	0.023	0.017	0.013	0.012	0.012	0.012	0.011	0.012	0.011
UF 2	0.02	0.02	0.021	0.021	0.017	0.011	0.011	0.011	0.011	0.012	0.011	0.011	0.011
UF 3	0.021	0.021	0.022	0.022	0.022	0.022	0.016	0.011	0.011	0.011	0.011	0.011	0.011
UF 1	0.022	0.022	0.023	0.022	0.022	0.017	0.013	0.012	0.012	0.011	0.012	0.012	0.011

Asset	Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16	Jan 17	Jan 18	Jan 19	Jan 20	Jan 21	Jan 22	Jan 23
UF 2	0.019	0.02	0.021	0.021	0.016	0.012	0.011	0.011	0.012	0.011	0.011	0.011	0.011
UF 3	0.021	0.021	0.022	0.023	0.023	0.022	0.015	0.011	0.011	0.011	0.011	0.011	0.011

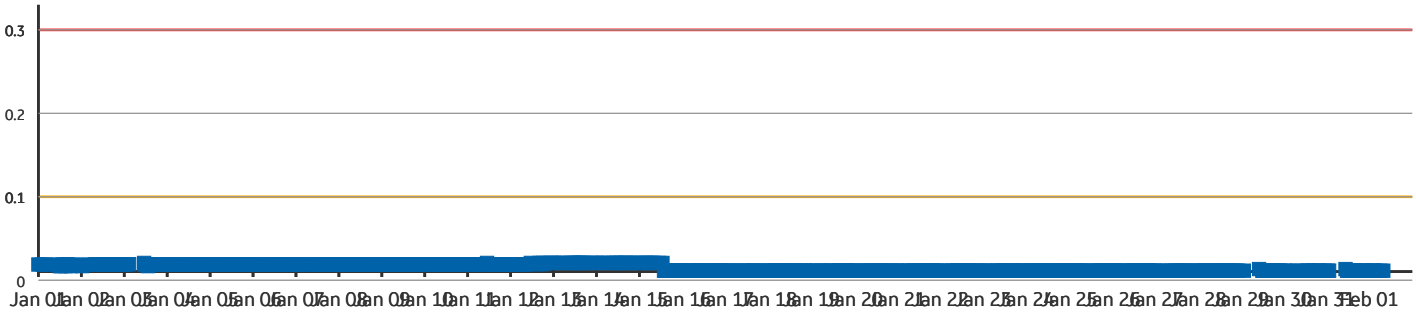
Asset	Jan 24	Jan 25	Jan 26	Jan 27	Jan 28	Jan 29	Jan 30	Jan 31	Feb 01
UF 1	0.012	0.011	0.011	0.011	0.011	0.011	0.012	0.012	0.012
UF 2	0.011	0.011	0.011	0.011	0.011	0.012	0.011	0.012	0.011
UF 3	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
UF 1	0.012	0.011	0.011	0.012	0.012	0.011	0.012	0.012	0.012
UF 2	0.011	0.011	0.011	0.011	0.011	0.012	0.011	0.012	0.011
UF 3	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011

Turbidity Raw Data

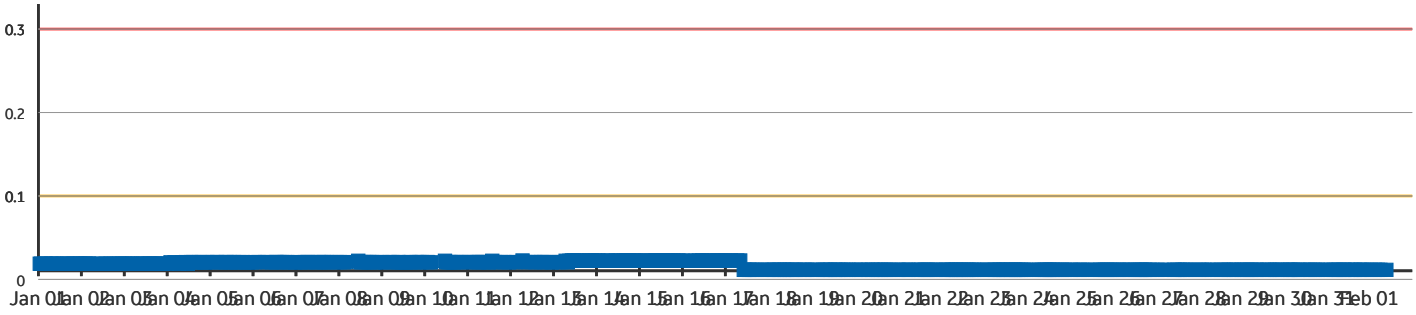
UF 1 - PermeateTurbidityAfterBP (NTU)



UF 2 - PermeateTurbidityAfterBP (NTU)



UF 3 - PermeateTurbidityAfterBP (NTU)



CERTIFICATE OF ANALYSIS

Work Order	: **VA24A0252**	Page	: 1 of 3
Amendment	: **1**		
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment - Weekly Sampling	Date Samples Received	: 05-Jan-2024 11:15
PO	: 10880	Date Analysis Commenced	: 05-Jan-2024
C-O-C number	: ----	Issue Date	: 11-Jan-2024 11:43
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*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	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.

Workorder Comments

Sample(s) Treated Water: Exceeded Recommended Holding Time prior to receipt at the lab for HPC analysis.

Amendment (11/01/2024): This report has been amended and re-released to allow the reporting of additional analytical data.

Qualifiers

Qualifier	*Description*
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					05-Jan-2024 09:50	05-Jan-2024 09:50	05-Jan-2024 09:50	05-Jan-2024 09:50	----
					VA24A0252-001	VA24A0252-002	VA24A0252-003	VA24A0252-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	14.2	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	62.6	----
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	3.45	1.21 SFP	1.49 SFP	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.66	1.47	1.19	----	----
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	: **VA24A0252**	Page	: 1 of 7
Amendment	: **1**		
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment - Weekly Sampling	Date Samples Received	: 05-Jan-2024 11:15
PO	: 10880	Issue Date	: 11-Jan-2024 11:43
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	: **VA24A0500**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 10-Jan-2024 12:00
PO	: 10880	Date Analysis Commenced	: 10-Jan-2024
C-O-C number	: ----	Issue Date	: 16-Jan-2024 12:26
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	Microbiology, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, 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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MPN/100mL	most probable number per hundred millilitres
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pH units	pH units

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>: greater than.

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

Workorder Comments

Sample(s) 004: Exceeded Recommended Holding Time prior to receipt at the lab for HPC analysis.

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
				Client sampling date / time	09-Jan-2024 10:30	09-Jan-2024 10:30	09-Jan-2024 10:30	09-Jan-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A0500-001	VA24A0500-002	VA24A0500-003	VA24A0500-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	15.6	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	66.9	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.33	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.47	1.20	1.19	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.52	1.46	0.98	----	----
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	: **VA24A0500**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 10-Jan-2024 12:00
PO	: 10880	Issue Date	: 16-Jan-2024 12:26
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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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

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

CERTIFICATE OF ANALYSIS

Work Order	: **VA24A1006**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 19-Jan-2024 11:30
PO	: 10880	Date Analysis Commenced	: 19-Jan-2024
C-O-C number	: ----	Issue Date	: 24-Jan-2024 16:08
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
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): Exceeded Recommended Holding Time prior to receipt at the lab for HPC analysis. HPC testing will proceed unless notified otherwise.

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					18-Jan-2024 10:30	18-Jan-2024 10:30	18-Jan-2024 10:30	18-Jan-2024 10:30	----
					VA24A1006-001	VA24A1006-002	VA24A1006-003	VA24A1006-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	16.0	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	66.2	----
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	2.86	1.35	1.13	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.61	2.15	1.85	----	----
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	: **VA24A1006**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 19-Jan-2024 11:30
PO	: 10880	Issue Date	: 24-Jan-2024 16:08
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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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	: **VA24A1436**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Monthly Sampling	Date Samples Received	: 25-Jan-2024 11:55
PO	: 10880	Date Analysis Commenced	: 26-Jan-2024
C-O-C number	: ----	Issue Date	: 30-Jan-2024 15:21
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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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*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Stephanie Pinheiro	Analyst	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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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: 24-Jan-2024 10:30	----	----	----	----
					VA24A1436-001	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0112	----	----	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	1.3	----	----	----	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	15.9	----	----	----	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	17.2	----	----	----	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	84.2	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	98.0	----	----	----	----
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	4.61	----	----	----	----
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	4.90	----	----	----	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L	9.51	----	----	----	----

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	: **VA24A1436**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Monthly Sampling	Date Samples Received	: 25-Jan-2024 11:55
PO	: 10880	Issue Date	: 30-Jan-2024 15:21
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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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 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	: **VA24A1434**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 25-Jan-2024 11:55
PO	: 10880	Date Analysis Commenced	: 25-Jan-2024
C-O-C number	: ----	Issue Date	: 29-Jan-2024 18:06
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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Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Microbiology, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia

General Comments

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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).

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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.

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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					24-Jan-2024 10:30	24-Jan-2024 10:30	24-Jan-2024 10:30	24-Jan-2024 10:30	----
					VA24A1434-001	VA24A1434-002	VA24A1434-003	VA24A1434-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	17.1	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	67.3	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.37	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.48	1.10	1.07	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.71	1.22	1.06	----	----
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	: **VA24A1434**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 25-Jan-2024 11:55
PO	: 10880	Issue Date	: 29-Jan-2024 18:07
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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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	: **VA24A1837**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 31-Jan-2024 12:09
PO	: 10880	Date Analysis Commenced	: 31-Jan-2024
C-O-C number	: ----	Issue Date	: 06-Feb-2024 16:13
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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- General Comments
- Analytical Results

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Signatories

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Signatories	*Position*	*Laboratory Department*
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia

General Comments

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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*
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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(s) Treated Water: Exceeded Recommended Holding Time prior to receipt at the lab for HPC 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-Jan-2024 10:30	30-Jan-2024 10:30	30-Jan-2024 10:30	30-Jan-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A1837-001	VA24A1837-002	VA24A1837-003	VA24A1837-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	17.6	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	71.0	----
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	2.59	1.16	1.17	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.66	1.38	1.55	----	----
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	: **VA24A1837**	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 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 31-Jan-2024 12:09
PO	: 10880	Issue Date	: 06-Feb-2024 16:13
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

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.