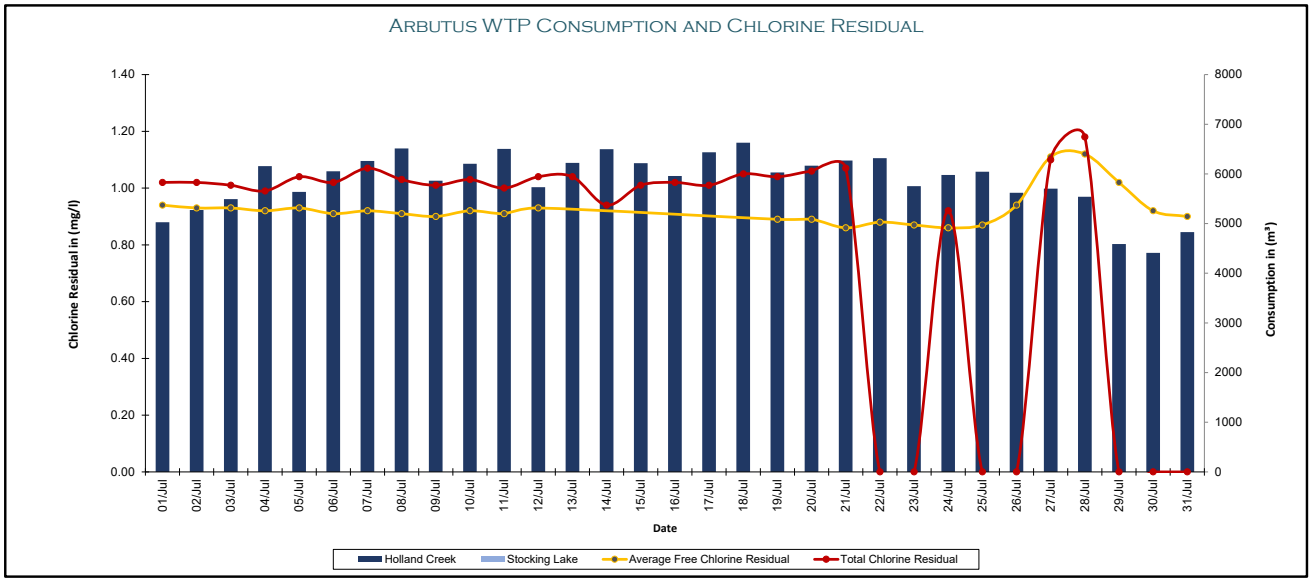
Town of Ladysmith - Arbutus Water treatment Plant

July 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-Jul	0	5028	5028	0.94	0.95	0.94	1.02	81						
02-Jul	0	5272	5272	0.92	0.95	0.93	1.02	109						
03-Jul	0	5492	5492	0.92	0.94	0.93	1.01	92	< 1	< 1	< 1	0.0106	0.0097	0.0071
04-Jul	0	6158	6158	0.92	0.93	0.92	0.99	101						
05-Jul	0	5637	5637	0.90	0.93	0.93	1.04	80						
06-Jul	0	6054	6054	0.90	0.93	0.91	1.02	85						
07-Jul	0	6261	6261	0.91	0.92	0.92	1.07	102						
08-Jul	0	6513	6513	0.90	0.92	0.91	1.03	74						
09-Jul	0	5862	5862	0.88	0.91	0.90	1.01	147						
10-Jul	0	6203	6203	0.91	1.12	0.92	1.03	128	< 1	< 1	< 1			
11-Jul	0	6504	6504	0.90	0.92	0.91	1.00	155						
12-Jul	0	5734	5734	0.90	0.94	0.93	1.04	125						
13-Jul	0	6222	6222				1.04	112						
14-Jul	0	6497	6497				0.94	97						
15-Jul	0	6215	6215				1.01	163						
16-Jul	0	5959	5959				1.02	117	< 1	< 1	< 1			
17-Jul	0	6435	6435				1.01	105						
18-Jul	0	6629	6629				1.05	103						
19-Jul	0	6028	6028	0.86	0.93	0.89	1.04	135						
20-Jul	0	6167	6167	0.86	0.90	0.89	1.06	103						
21-Jul	0	6270	6270	0.84	0.89	0.86	1.07	217						
22-Jul	0	6316	6316	0.84	0.88	0.88	**	100						
23-Jul	0	5754	5754	0.84	0.89	0.87	**	152						
24-Jul	0	5980	5980	0.84	0.88	0.86	0.92	167	< 1	< 1	< 1			
25-Jul	0	6045	6045	0.84	0.88	0.87	**	184						
26-Jul	0	5620	5620	0.82	0.95	0.94	**	144						
27-Jul	0	5702	5702	0.92	1.11	1.11	1.10	107						
28-Jul	0	5539	5539	1.08	1.14	1.12	1.18	68						
29-Jul	0	4589	4589	0.98	1.20	1.02	**	196						
30-Jul	0	4411	4411	0.91	1.01	0.92	**	121						
31-Jul	0	4828	4828	0.88	0.94	0.90	**	167	< 1	< 1	< 1			
Total	0	181924	181924											
Average	0	5869	5869	0.90	0.96	0.93	1.03	124	< 1	< 1	< 1	0.0106	0.0097	0.00705

*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

07/01/2024 - 08/01/2024

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

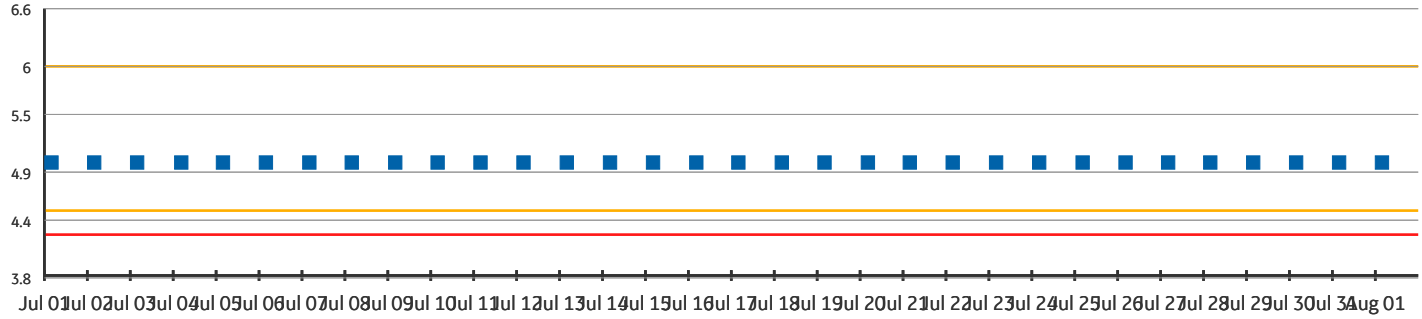
Asset	Parameter	Jul 01	Jul 02	Jul 03	Jul 04	Jul 05	Jul 06	Jul 07	Jul 08	Jul 09	Jul 10	Jul 11	Jul 12
UF 1	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Asset	Jul 13	Jul 14	Jul 15	Jul 16	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26	Jul 27	Jul 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

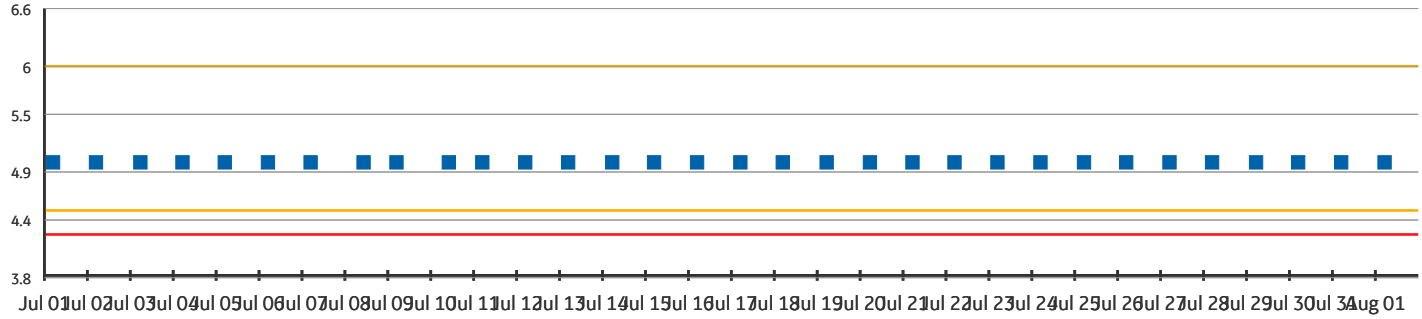
Asset	Jul 29	Jul 30	Jul 31	Aug 01
UF 1	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0

LRV Raw Data

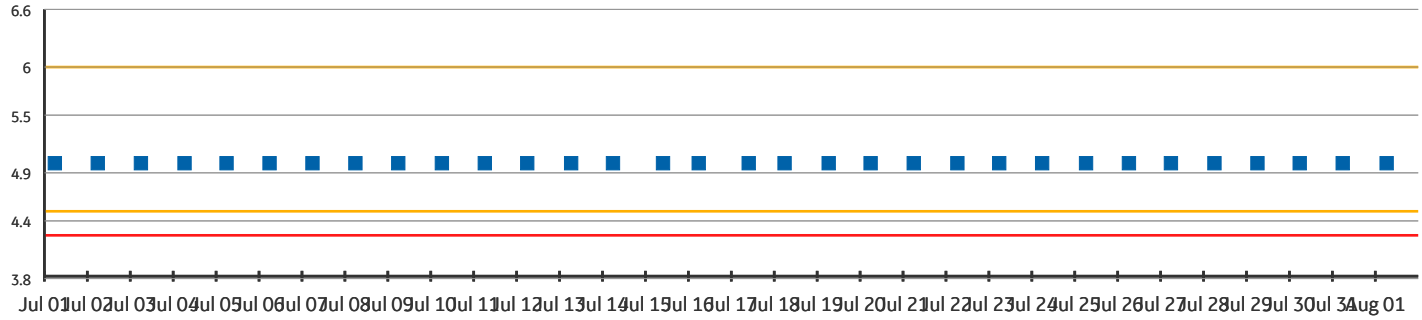
UF 1 - LRV (#)



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		0.019	0.0	45222	--	--	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidity		0.02	0.01	45222	--	--	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidity		0.022	0.0	45222	--	--	100 %	0 %	0 %	NTU
UF 1	PermeateTurbidityAfterBP		0.019	0.0	669	0.1	0.3	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidityAfterBP		0.019	0.01	658	0.1	0.3	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidityAfterBP		0.021	0.0	671	0.1	0.3	100 %	0 %	0 %	NTU

Turbidity Daily Averages

Asset	Parameter	Jul 01	Jul 02	Jul 03	Jul 04	Jul 05	Jul 06	Jul 07	Jul 08	Jul 09	Jul 10	Jul 11
UF 1	PermeateTurbidity	0.014	0.014	0.014	0.014	0.013	0.013	0.014	0.015	0.015	0.015	0.015
UF 2	PermeateTurbidity	0.03	0.03	0.032	0.034	0.034	0.035	0.036	0.038	0.038	0.025	0.013
UF 3	PermeateTurbidity	0.015	0.015	0.017	0.017	0.017	0.017	0.017	0.017	0.018	0.023	0.026

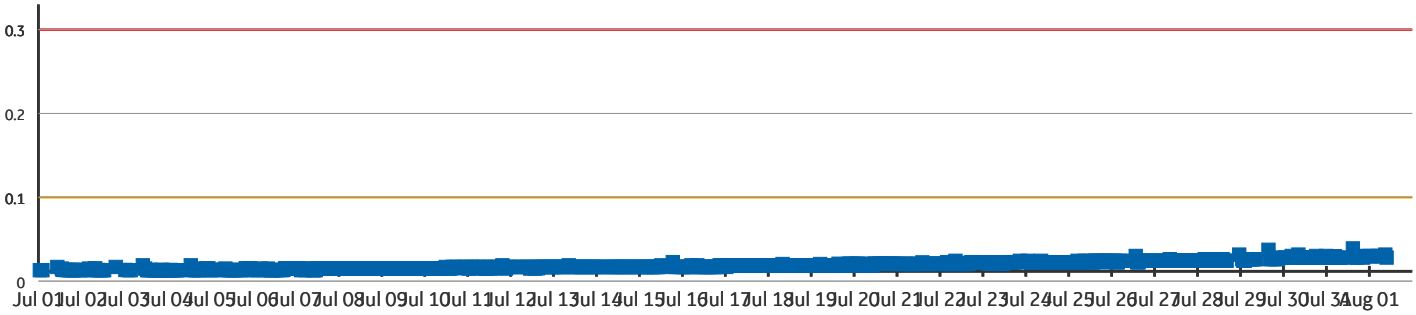
Asset	Parameter	Jul 01	Jul 02	Jul 03	Jul 04	Jul 05	Jul 06	Jul 07	Jul 08	Jul 09	Jul 10	Jul 11
UF 1	PermeateTurbidityAfterBP	0.014	0.014	0.014	0.014	0.014	0.014	0.015	0.015	0.015	0.016	0.016
UF 2	PermeateTurbidityAfterBP	0.03	0.03	0.032	0.033	0.034	0.035	0.036	0.038	0.038	0.02	0.013
UF 3	PermeateTurbidityAfterBP	0.015	0.015	0.016	0.017	0.017	0.017	0.017	0.017	0.018	0.023	0.026

Asset	Jul 12	Jul 13	Jul 14	Jul 15	Jul 16	Jul 17	Jul 18	Jul 19	Jul 20	Jul 21	Jul 22	Jul 23	Jul 24	Jul 25	Jul 26
UF 1	0.016	0.017	0.017	0.017	0.017	0.019	0.019	0.019	0.02	0.021	0.021	0.022	0.023	0.023	0.025
UF 2	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.027	0.026	0.027	0.028	0.028	0.028	0.028	0.029	0.03	0.026	0.02	0.021	0.02	0.019	0.019
UF 1	0.017	0.017	0.017	0.017	0.017	0.019	0.019	0.019	0.02	0.021	0.021	0.022	0.023	0.023	0.024
UF 2	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.027	0.026	0.027	0.027	0.027	0.027	0.028	0.029	0.03	0.027	0.021	0.021	0.02	0.019	0.019

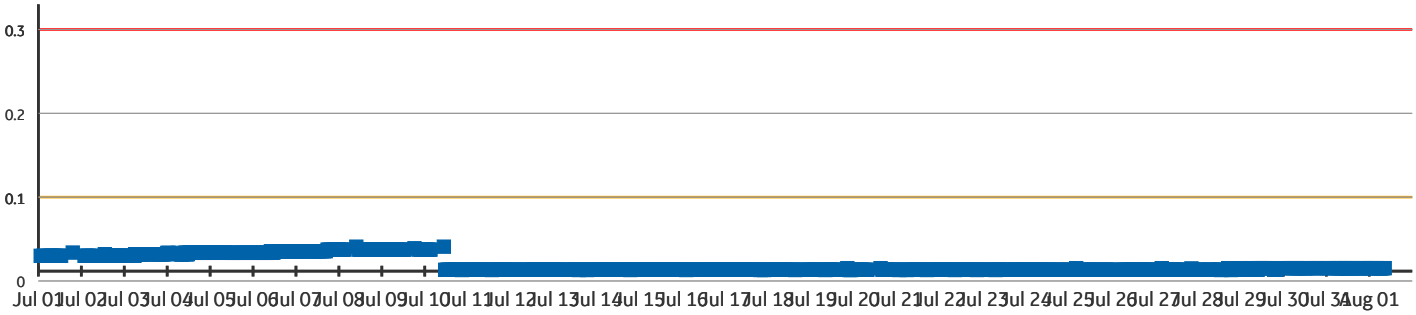
Asset	Jul 27	Jul 28	Jul 29	Jul 30	Jul 31	Aug 01
UF 1	0.024	0.025	0.028	0.028	0.029	0.028
UF 2	0.013	0.014	0.015	0.015	0.015	0.015
UF 3	0.019	0.019	0.019	0.019	0.019	0.019
UF 1	0.024	0.025	0.027	0.029	0.029	0.03
UF 2	0.014	0.013	0.014	0.015	0.015	0.015
UF 3	0.019	0.019	0.019	0.019	0.019	0.019

Turbidity Raw Data

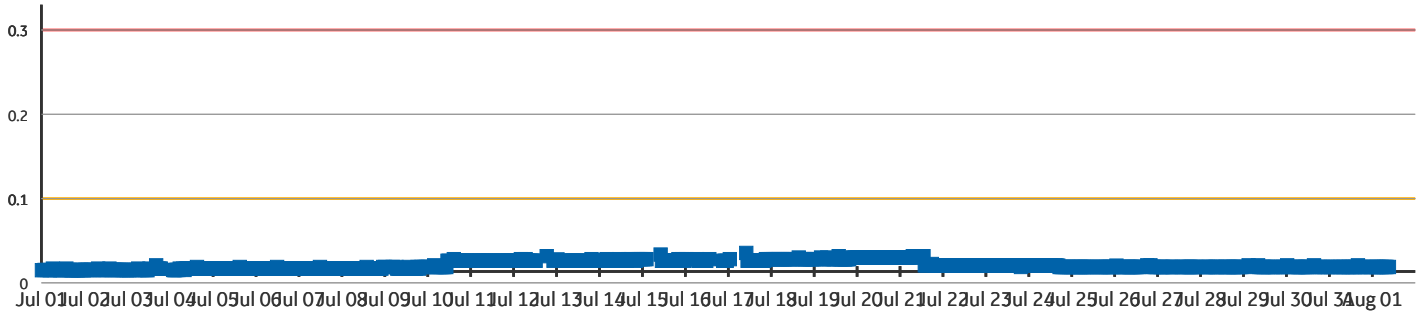
UF 1 - PermeateTurbidityAfterBP (NTU)



UF 2 - PermeateTurbidityAfterBP (NTU)



UF 3 - PermeateTurbidityAfterBP (NTU)



CERTIFICATE OF ANALYSIS

Work Order	: **VA24B5913**	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 - Weekly Sampling	Date Samples Received	: 04-Jul-2024 11:00
PO	: 10880	Date Analysis Commenced	: 04-Jul-2024
C-O-C number	: ----	Issue Date	: 15-Jul-2024 12:03
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*
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.

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

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	03-Jul-2024 11:00	03-Jul-2024 10:55	03-Jul-2024 10:50	03-Jul-2024 10:45	----
						VA24B5913-001	VA24B5913-002	VA24B5913-003	VA24B5913-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		----	----	----	12.9	----
Colour, true	----	E329/VA	5.0	CU		----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm		----	----	----	55.2	----
pH	----	E108/VA	0.10	pH units		----	----	----	7.38	----
Turbidity	----	E121/VA	0.10	NTU		----	----	----	<0.10	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		2.31	0.86	2.47 RRV	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		2.38	1.29	3.46 RRV	----	----
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	: **VA24B5913**	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 - Weekly Sampling	Date Samples Received	: 04-Jul-2024 11:00
PO	: 10880	Issue Date	: 15-Jul-2024 11:58
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 Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate 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	: **VA24B5914**	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 - Monthly Sampling	Date Samples Received	: 04-Jul-2024 11:00
PO	: 10880	Date Analysis Commenced	: 05-Jul-2024
C-O-C number	: ----	Issue Date	: 10-Jul-2024 15:44
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

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

General Comments

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.

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Unit	*Description*
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>: 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	Treated Water (post reservoir)	----	----	----	----
					Client sampling date / time	03-Jul-2024 10:30	----	----	----	----
					VA24B5914-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Total Metals										
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L		0.0106	----	----	----	----
Volatile Organic Compounds [THMs]										
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L		<1.0	----	----	----	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L		<1.0	----	----	----	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L		9.7	----	----	----	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L		<1.0	----	----	----	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L		9.7	----	----	----	----
Volatile Organic Compounds [THMs] Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%		83.8	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%		103	----	----	----	----
Haloacetic Acids										
Bromochloroacetic acid	5589-96-8	E750/WT	1.00	µg/L		<1.00	----	----	----	----
Dibromoacetic acid	631-64-1	E750/WT	1.00	µg/L		<1.00	----	----	----	----
Dichloroacetic acid	79-43-6	E750/WT	1.00	µg/L		3.31	----	----	----	----
Monobromoacetic acid	79-08-3	E750/WT	1.00	µg/L		<1.00	----	----	----	----
Monochloroacetic acid	79-11-8	E750/WT	1.00	µg/L		<1.00	----	----	----	----
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L		3.74	----	----	----	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L		7.05	----	----	----	----

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	: **VA24B5914**	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 - Monthly Sampling	Date Samples Received	: 04-Jul-2024 11:00
PO	: 10880	Issue Date	: 10-Jul-2024 15:44
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24B6693**	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 - Weekly Sampling	Date Samples Received	: 11-Jul-2024 12:50
PO	: PO #10916	Date Analysis Commenced	: 11-Jul-2024
C-O-C number	: ----	Issue Date	: 17-Jul-2024 10:01
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*
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia

General Comments

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

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

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

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

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

LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

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

Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
					Client sampling date / time	10-Jul-2024 10:30	10-Jul-2024 10:30	10-Jul-2024 10:30	10-Jul-2024 10:30	----
						VA24B6693-001	VA24B6693-002	VA24B6693-003	VA24B6693-004	--------
						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		----	----	----	57.0	----
pH	----	E108/VA	0.10	pH units		----	----	----	7.45	----
Turbidity	----	E121/VA	0.10	NTU		----	----	----	<0.10	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		1.95	0.76	0.74	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		2.03	1.50	1.02	----	----
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	: **VA24B6693**	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 - Weekly Sampling	Date Samples Received	: 11-Jul-2024 12:50
PO	: PO #10916	Issue Date	: 17-Jul-2024 09:36
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		

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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	: **VA24B7266**	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 - Weekly Sampling	Date Samples Received	: 17-Jul-2024 12:00
PO	: 10880	Date Analysis Commenced	: 17-Jul-2024
C-O-C number	: ----	Issue Date	: 23-Jul-2024 14:39
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.

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- Analytical Results

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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
Leon Yang	Analyst	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.

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LOR: Limit of Reporting (detection limit).

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

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

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

Workorder Comments

Sample(s): Samples Received with temperature >10 °C

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	16-Jul-2024 10:30	16-Jul-2024 10:30	16-Jul-2024 10:30	16-Jul-2024 10:30	----
						VA24B7266-001	VA24B7266-002	VA24B7266-003	VA24B7266-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		----	----	----	11.7	----
Colour, true	----	E329/VA	5.0	CU		----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm		----	----	----	55.2	----
pH	----	E108/VA	0.10	pH units		----	----	----	7.30	----
Turbidity	----	E121/VA	0.10	NTU		----	----	----	<0.10	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		2.16	0.64	0.71	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		2.40	1.30	0.70	----	----
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	: **VA24B7266**	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 - Weekly Sampling	Date Samples Received	: 17-Jul-2024 12:00
PO	: 10880	Issue Date	: 23-Jul-2024 14:22
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		

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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	: **VA24B8198**	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-Jul-2024 11:00
PO	: 10880	Date Analysis Commenced	: 25-Jul-2024
C-O-C number	: ----	Issue Date	: 29-Jul-2024 14:05
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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This Certificate of Analysis contains the following information:

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- Analytical Results

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Signatories

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Signatories	*Position*	*Laboratory Department*
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.

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

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

LOR: Limit of Reporting (detection limit).

Unit	*Description*
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) 004: Exceeded Recommended Holding Time prior to receipt at the lab for HPC analysis.

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-Jul-2024 11:00	24-Jul-2024 11:00	24-Jul-2024 11:00	24-Jul-2024 11:00	----
						VA24B8198-001	VA24B8198-002	VA24B8198-003	VA24B8198-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		----	----	----	13.0	----
Colour, true	----	E329/VA	5.0	CU		----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm		----	----	----	58.4	----
pH	----	E108/VA	0.10	pH units		----	----	----	7.45	----
Turbidity	----	E121/VA	0.10	NTU		----	----	----	<0.10	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		2.19	0.99	0.82	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L		2.14	1.01	1.23	----	----
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	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24B8198**	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-Jul-2024 11:00
PO	: 10880	Issue Date	: 29-Jul-2024 13:56
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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Key

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RPD: Relative Percent Difference.

Workorder Comments

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Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

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

CERTIFICATE OF ANALYSIS

Work Order	: **VA24B8830**	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-Jul-2024 10:20
PO	: 10880	Date Analysis Commenced	: 31-Jul-2024
C-O-C number	: ----	Issue Date	: 07-Aug-2024 09:35
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

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

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

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Unit	*Description*
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mg/L	milligrams per litre
MPN/100mL	most probable number per hundred millilitres
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

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Analytical Results

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

Analyte	CAS Number	Method/Lab	LOR	Unit	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
Client sample ID									
Client sampling date / time					30-Jul-2024 12:00	30-Jul-2024 12:00	30-Jul-2024 12:00	30-Jul-2024 12:00	----
					VA24B8830-001	VA24B8830-002	VA24B8830-003	VA24B8830-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	12.2	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	60.9	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.31	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.19	1.28	1.24	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.69	1.28	1.12	----	----
Microbiological Tests									
Heterotrophic plate count [HPC]	----	E020/VA	1	CFU/mL	----	----	----	<1	----
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100mL	----	----	----	<1	----
Coliforms, total	----	E010/VA	1	MPN/100mL	----	----	----	<1	----

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

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24B8830**	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-Jul-2024 10:20
PO	: 10880	Issue Date	: 07-Aug-2024 09:37
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.