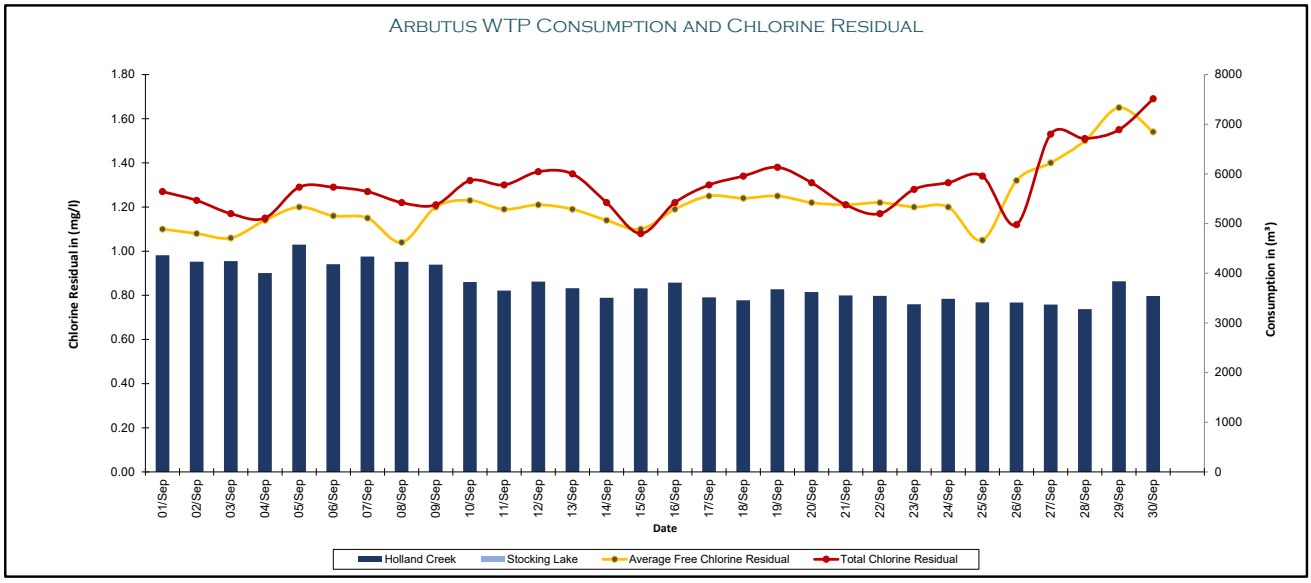
Town of Ladysmith - Arbutus Water treatment Plant

September 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-Sep	0	4362	4362	1.09	1.16	1.10	1.27	238						
02-Sep	0	4233	4233	1.05	1.11	1.08	1.23	278						
03-Sep	0	4244	4244	1.04	1.09	1.06	1.17	240						
04-Sep	0	4004	4004	1.04	1.14	1.14	1.15	247	< 1	< 1	< 1		0.0608	0.0545
05-Sep	0	4577	4577	1.12	1.22	1.20	1.29	259						
06-Sep	0	4181	4181	1.15	1.22	1.16	1.29	258						
07-Sep	0	4336	4336	1.14	1.19	1.15	1.27	250						
08-Sep	0	4231	4231	1.04	1.17	1.04	1.22	266						
09-Sep	0	4172	4172	1.03	1.20	1.20	1.21	266						
10-Sep	0	3823	3823	1.19	1.24	1.23	1.32	237						
11-Sep	0	3651	3651	1.17	1.25	1.19	1.30	226	< 1	< 1	< 1		0.0639	0.0573
12-Sep	0	3832	3832	1.16	1.24	1.21	1.36	253						
13-Sep	0	3700	3700	1.18	1.24	1.19	1.35	219						
14-Sep	0	3505	3505	1.13	1.19	1.14	1.22	207						
15-Sep	0	3695	3695	0.97	1.10	1.10	1.08	132						
16-Sep	0	3812	3812	1.10	1.21	1.19	1.22	203						
17-Sep	0	3515	3515	1.15	1.25	1.25	1.30	220	< 1	< 1	< 1	0.0134	0.0606	0.0536
18-Sep	0	3455	3455	1.21	1.27	1.24	1.34	282						
19-Sep	0	3678	3678	1.24	1.24	1.25	1.38	214						
20-Sep	0	3622	3622	1.19	1.25	1.22	1.31	231						
21-Sep	0	3552	3552	1.18	1.23	1.21	1.21	224						
22-Sep	0	3546	3546	1.19	1.23	1.22	1.17	225						
23-Sep	0	3376	3376	1.17	12.22	1.20	1.28	276						
24-Sep	0	3485	3485	1.11	1.20	1.20	1.31	198	< 1	< 1	< 1	0.0298	0.0514	0.0394
25-Sep	0	3415	3415	1.05	1.22	1.05	1.34	159						
26-Sep	0	3410	3410	0.94	1.33	1.32	1.12	278						
27-Sep	0	3370	3370	1.32	1.40	1.40	1.53	223						
28-Sep	0	3278	3278	1.39	1.50	1.50	1.51	209						
29-Sep	0	3838	3838	1.44	1.66	1.65	1.55	159						
30-Sep	0	3542	3542	1.53	1.66	1.54	1.69	207						
Total	0	113440	113440											
Average	0	3781	3781	1.16	1.62	1.22	1.30	229	< 1	< 1	< 1	0.0216	0.0592	0.05120

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

Arbutus WTP Consumption and Chlorine Residual



VEOLIA

InSight

Town of Ladysmith Arbutus DWTP

Monthly LRV and Turbidity Report

08/31/2024 - 10/01/2024

LRV Monthly Average

Asset	Parameter	Health	Avg	Std. Dev	Points	LL	L	%In	% between L and LL	% < 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

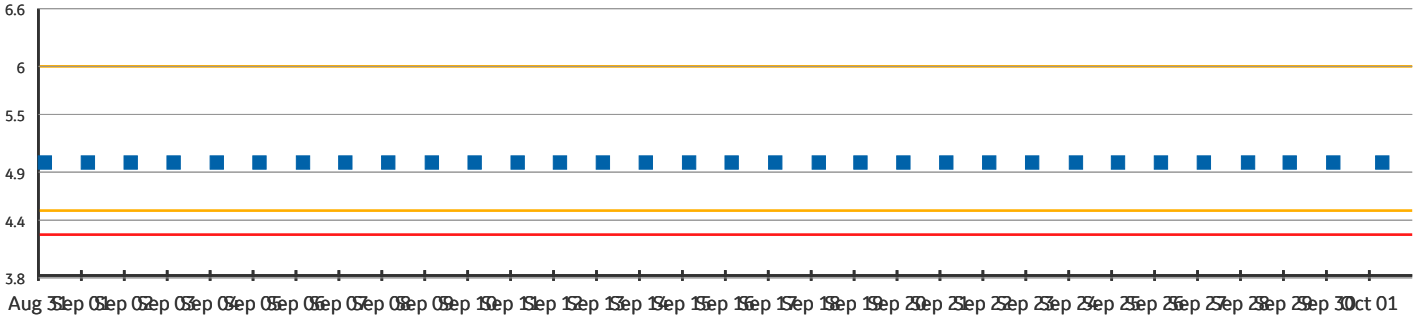
Asset	Parameter	Aug 31	Sep 01	Sep 02	Sep 03	Sep 04	Sep 05	Sep 06	Sep 07	Sep 08	Sep 09	Sep 10	Sep 11
UF 1	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Asset	Sep 12	Sep 13	Sep 14	Sep 15	Sep 16	Sep 17	Sep 18	Sep 19	Sep 20	Sep 21	Sep 22	Sep 23	Sep 24	Sep 25	Sep 26	Sep 27
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

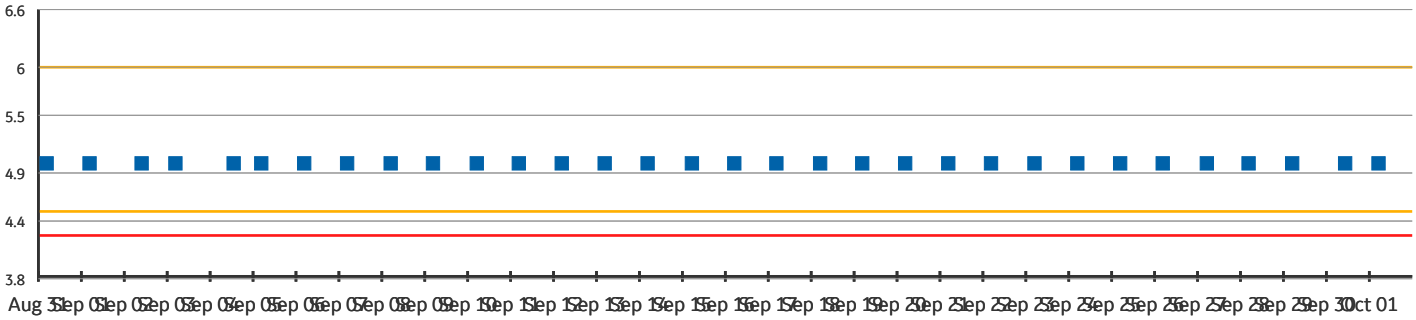
Asset	Sep 28	Sep 29	Sep 30	Oct 01
UF 1	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0

LRV Raw Data

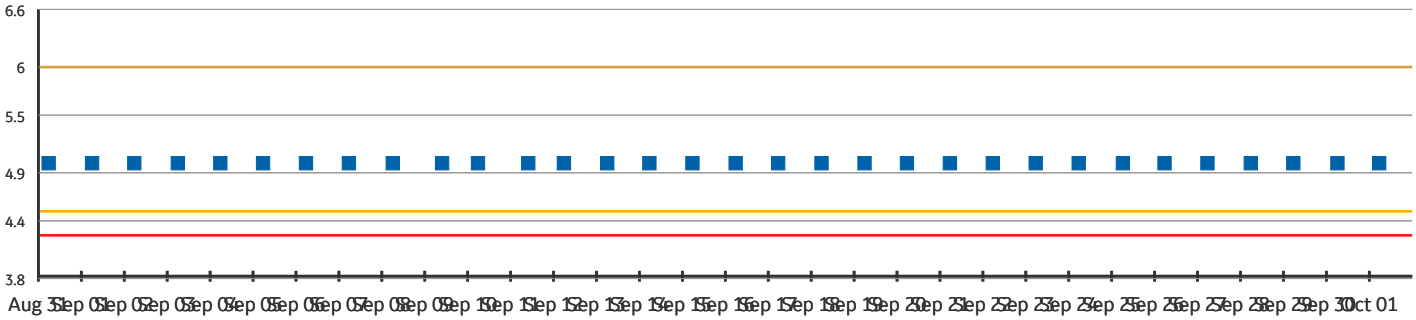
UF 1 - LRV (#)



UF 2 - LRV (#)



UF 3 - LRV (#)



Turbidity Monthly Average

Asset	Parameter	Health	Avg	Std. Dev	Points	H	HH	%In	% between H and HH	% > HH	Unit
UF 1	PermeateTurbidity		0.017	0.03	45185	--	--	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidity		0.016	0.0	45185	--	--	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidity		0.015	0.0	45185	--	--	100 %	0 %	0 %	NTU
UF 1	PermeateTurbidityAfterBP	●	0.016	0.01	444	0.1	0.3	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidityAfterBP	●	0.016	0.0	448	0.1	0.3	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidityAfterBP	●	0.016	0.0	441	0.1	0.3	100 %	0 %	0 %	NTU

Turbidity Daily Averages

Asset	Parameter	Aug 31	Sep 01	Sep 02	Sep 03	Sep 04	Sep 05	Sep 06	Sep 07	Sep 08	Sep 09	Sep 10
UF 1	PermeateTurbidity	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.015	0.016	0.016	0.015
UF 2	PermeateTurbidity	0.015	0.015	0.02	0.015	0.024	0.015	0.016	0.016	0.015	0.015	0.015
UF 3	PermeateTurbidity	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.017	0.015

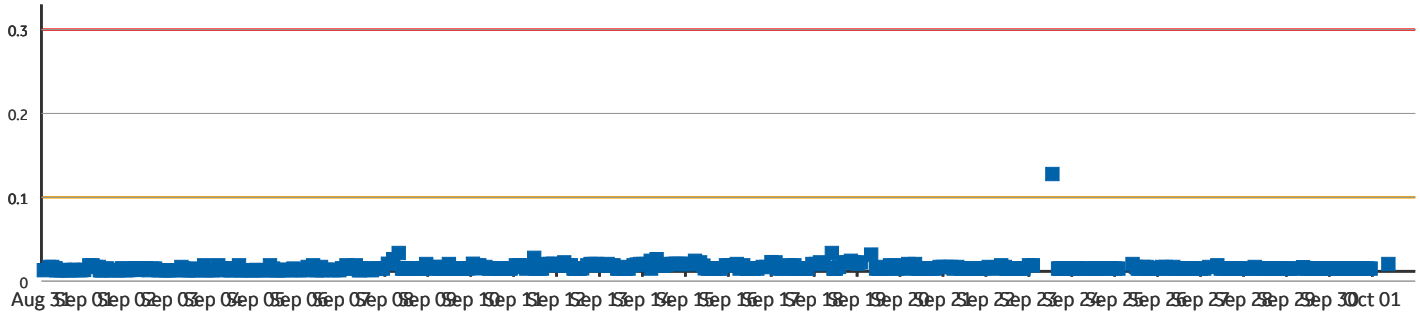
Asset	Parameter	Aug 31	Sep 01	Sep 02	Sep 03	Sep 04	Sep 05	Sep 06	Sep 07	Sep 08	Sep 09	Sep 10
UF 1	PermeateTurbidityAfterBP	0.014	0.015	0.014	0.014	0.014	0.014	0.014	0.015	0.018	0.016	0.016
UF 2	PermeateTurbidityAfterBP	0.015	0.016	0.018	0.016	0.021	0.016	0.016	0.016	0.017	0.015	0.015
UF 3	PermeateTurbidityAfterBP	0.015	0.015	0.015	0.016	0.015	0.015	0.015	0.015	0.016	0.016	0.015

Asset	Sep 11	Sep 12	Sep 13	Sep 14	Sep 15	Sep 16	Sep 17	Sep 18	Sep 19	Sep 20	Sep 21	Sep 22	Sep 23	Sep 24	Sep 25
UF 1	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.017	0.018	0.016	0.015	0.016	0.059	0.015	0.016
UF 2	0.015	0.015	0.015	0.015	0.014	0.014	0.016	0.015	0.015	0.014	0.014	0.015	0.015	0.015	0.016
UF 3	0.019	0.015	0.015	0.016	0.015	0.015	0.015	0.015	0.014	0.014	0.014	0.014	0.015	0.015	0.016
UF 1	0.018	0.018	0.018	0.02	0.018	0.017	0.017	0.021	0.018	0.016	0.015	0.016	0.028	0.015	0.016
UF 2	0.017	0.016	0.016	0.017	0.015	0.015	0.016	0.017	0.015	0.014	0.015	0.015	0.015	0.015	0.016
UF 3	0.018	0.015	0.017	0.017	0.015	0.015	0.015	0.016	0.015	0.015	0.014	0.015	0.015	0.015	0.016

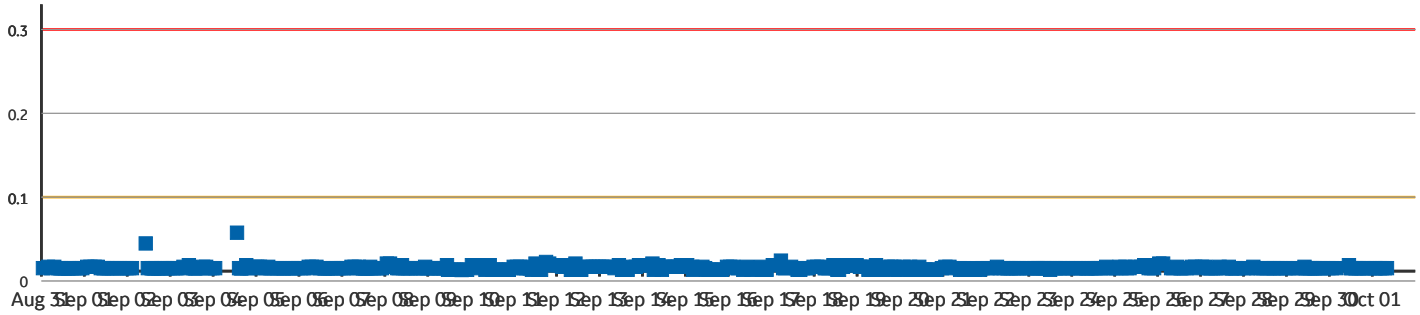
Asset	Sep 26	Sep 27	Sep 28	Sep 29	Sep 30	Oct 01
UF 1	0.015	0.015	0.015	0.016	0.015	0.016
UF 2	0.016	0.015	0.015	0.015	0.016	0.015
UF 3	0.016	0.016	0.015	0.015	0.015	0.015
UF 1	0.015	0.015	0.015	0.015	0.015	0.02
UF 2	0.017	0.016	0.015	0.015	0.016	0.015
UF 3	0.016	0.016	0.015	0.015	0.015	0.015

Turbidity Raw Data

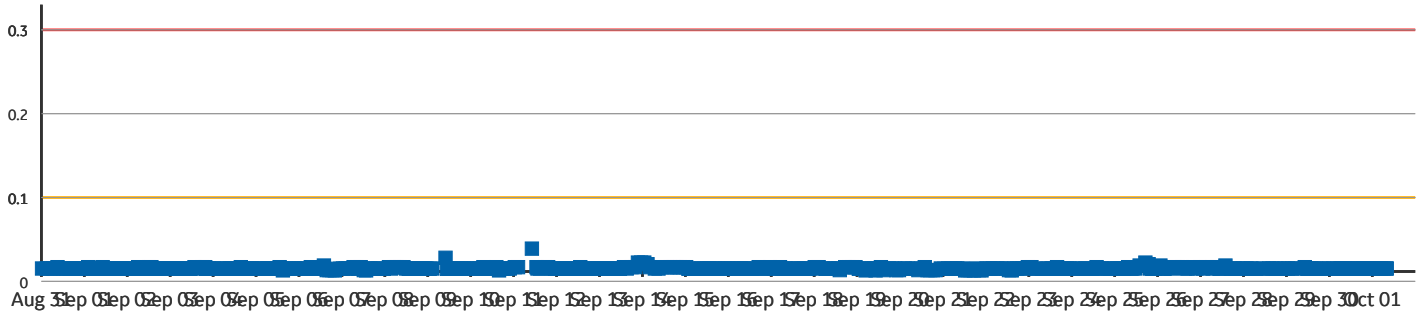
UF 1 - PermeateTurbidityAfterBP (NTU)



UF 2 - PermeateTurbidityAfterBP (NTU)



UF 3 - PermeateTurbidityAfterBP (NTU)



CERTIFICATE OF ANALYSIS

Work Order	: **VA24C3029**	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 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	: 05-Sep-2024 12:10
PO	: PO #10916	Date Analysis Commenced	: 05-Sep-2024
C-O-C number	: 17 - Week 4	Issue Date	: 12-Sep-2024 13:10
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Harpreet Chawla	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Lindsay Gung	Supervisor - Water Chemistry	Microbiology, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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.

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

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

All 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	UF Effluent	Treated Water (post reservoir)	Distribution system (WWTP)	----
					Client sampling date / time	04-Sep-2024 10:30	04-Sep-2024 10:30	04-Sep-2024 10:30	04-Sep-2024 10:30	----
						VA24C3029-001	VA24C3029-002	VA24C3029-003	VA24C3029-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L		----	----	9.9	----	----
Colour, true	----	E329/VA	5.0	CU		----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm		----	----	38.4	----	----
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		----	2.20	----	----	----
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L		1.77	1.88	----	----	----
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L		1.83	1.96	----	----	----
Microbiological Tests										
Heterotrophic plate count [HPC]	----	E020/VA	1	CFU/mL		----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100mL		----	----	<1	----	----
Coliforms, total	----	E010/VA	1	MPN/100mL		----	----	<1	----	----
Volatile Organic Compounds [THMs]										
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L		----	----	2.5	2.7	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L		----	----	<1.0	<1.0	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L		----	----	58.3	60.4	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L		----	----	<1.0	<1.0	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L		----	----	60.8	63.1	----
Volatile Organic Compounds [THMs] Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%		----	----	94.3	96.6	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%		----	----	100	99.6	----
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		----	----	22.9	24.5	----
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		----	----	1.20	1.43	----

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	04-Sep-2024 10:30	04-Sep-2024 10:30	04-Sep-2024 10:30	04-Sep-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA24C3029-001	VA24C3029-002	VA24C3029-003	VA24C3029-004	--------
						Result	Result	Result	Result	----
Haloacetic Acids										
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L		----	----	30.4	34.4	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L		----	----	54.5	60.3	----

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	: **VA24C3029**	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 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	: 05-Sep-2024 12:10
PO	: PO #10916	Issue Date	: 12-Sep-2024 13:13
C-O-C number	: 17 - Week 4		
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	:	**VA24C3845**		
Client	:	**Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	:	Shawn Baker	Account Manager	: Thomas Chang
Address	:	410 Esplanade PO Box 220 Ladysmith British Columbia 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	: 12-Sep-2024 12:00
PO	:	PO #10916	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	:	17-Week 5-Turned Saturator on For 1 day.	Issue Date	: 20-Sep-2024 02:22
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*
Elke Tabora	Lab Analyst	Inorganics, Calgary, Alberta
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jon Fisher	Production Manager, Environmental	LCMS, Waterloo, Ontario
Kate Dimitrova	Supervisor - Inorganic	Inorganics, 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.

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

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Raw Water	UF Effluent	Treated Water (post reservoir)	Distribution system (WWTP)	----
Client sample ID									
Client sampling date / time					11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	----
					VA24C3845-001	VA24C3845-002	VA24C3845-003	VA24C3845-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	9.9	----	----
Colour, true	----	E329/VA	5.0	CU	----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	34.1	----	----
pH	----	E108/VA	0.10	pH units	----	----	7.26	----	----
Turbidity	----	E121/VA	0.10	NTU	----	----	<0.10	----	----
Organic / Inorganic Carbon									
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L	----	1.15	----	----	----
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.04	2.88	----	----	----
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L	1.51	1.93	----	----	----
Microbiological Tests									
Heterotrophic plate count [HPC]	----	E020/VA	1	CFU/mL	----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Coliforms, total	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	----	----	2.8	3.7	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	----	----	61.1	87.5	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	----	----	63.9	91.2	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	----	----	89.7	89.0	----

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	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit		VA24C3845-001	VA24C3845-002	VA24C3845-003	VA24C3845-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds [THMs] Surrogates										
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%		----	----	97.4	97.5	----
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		----	----	25.6	29.4	----
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		----	----	1.59	1.69	----
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L		----	----	30.1	35.4	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L		----	----	57.3	66.5	----

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	: **VA24C3845**	Page	: 1 of 10
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	: 12-Sep-2024 12:00
PO	: PO #10916	Issue Date	: 19-Sep-2024 13:16
C-O-C number	: 17-Week 5-Turned Saturator on For 1 day.		
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.
- No Matrix Spike Duplicate (MSD) outliers occur - please see following pages for full details.
- 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

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

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24C3845**		
Client	:	**Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	:	Shawn Baker	Account Manager	: Thomas Chang
Address	:	410 Esplanade PO Box 220 Ladysmith British Columbia 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	: 12-Sep-2024 12:00
PO	:	PO #10916	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	:	17-Week 5-Turned Saturator on For 1 day.	Issue Date	: 20-Sep-2024 02:22
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*
Elke Tabora	Lab Analyst	Inorganics, Calgary, Alberta
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jon Fisher	Production Manager, Environmental	LCMS, Waterloo, Ontario
Kate Dimitrova	Supervisor - Inorganic	Inorganics, 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.

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

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Raw Water	UF Effluent	Treated Water (post reservoir)	Distribution system (WWTP)	----
Client sample ID									
Client sampling date / time					11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	----
					VA24C3845-001	VA24C3845-002	VA24C3845-003	VA24C3845-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	9.9	----	----
Colour, true	----	E329/VA	5.0	CU	----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	34.1	----	----
pH	----	E108/VA	0.10	pH units	----	----	7.26	----	----
Turbidity	----	E121/VA	0.10	NTU	----	----	<0.10	----	----
Organic / Inorganic Carbon									
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L	----	1.15	----	----	----
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.04	2.88	----	----	----
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L	1.51	1.93	----	----	----
Microbiological Tests									
Heterotrophic plate count [HPC]	----	E020/VA	1	CFU/mL	----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Coliforms, total	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	----	----	2.8	3.7	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	----	----	61.1	87.5	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	----	----	63.9	91.2	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	----	----	89.7	89.0	----

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	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	11-Sep-2024 10:30	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit		VA24C3845-001	VA24C3845-002	VA24C3845-003	VA24C3845-004	----
						Result	Result	Result	Result	----
Volatile Organic Compounds [THMs] Surrogates										
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%		----	----	97.4	97.5	----
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		----	----	25.6	29.4	----
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		----	----	1.59	1.69	----
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L		----	----	30.1	35.4	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L		----	----	57.3	66.5	----

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	: **VA24C3845**	Page	: 1 of 10
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	: 12-Sep-2024 12:00
PO	: PO #10916	Issue Date	: 19-Sep-2024 13:16
C-O-C number	: 17-Week 5-Turned Saturator on For 1 day.		
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.
- No Matrix Spike Duplicate (MSD) outliers occur - please see following pages for full details.
- 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

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

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Microbiological Tests	Anonymous	Anonymous	Heterotrophic plate count [HPC]	----	E020	66.7 % DUP-H	65%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Haloacetic Acids : Haloacetic Acids in Water by LC-MS/MS										
Glass vial (ammonium chloride) Distribution system (WWTP)	E750	11-Sep-2024	17-Sep-2024	14 days	6 days	✓	17-Sep-2024	14 days	0 days	✓
Haloacetic Acids : Haloacetic Acids in Water by LC-MS/MS										
Glass vial (ammonium chloride) Treated Water (post reservoir)	E750	11-Sep-2024	17-Sep-2024	14 days	6 days	✓	17-Sep-2024	14 days	0 days	✓
Microbiological Tests : Heterotrophic Plate Count (Pour Plate)										
Sterile HDPE (Sodium thiosulphate) Treated Water (post reservoir)	E020	11-Sep-2024	----	----	----		12-Sep-2024	24 hrs	29 hrs	× EHTR
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) Treated Water (post reservoir)	E010	11-Sep-2024	----	----	----		12-Sep-2024	30 hrs	29 hrs	✓
Organic / Inorganic Carbon : Dissolved Inorganic Carbon by Combustion										
HDPE UF Effluent	E353-L	11-Sep-2024	----	----	----		15-Sep-2024	14 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) Raw Water	E358-L	11-Sep-2024	13-Sep-2024	3 days	2 days	✓	13-Sep-2024	28 days	0 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (lab preserved) UF Effluent	E358-L	11-Sep-2024	13-Sep-2024	3 days	2 days	✓	13-Sep-2024	28 days	0 days	✓

Matrix: **Water**

Evaluation: ✗ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
Raw Water	E355-L	11-Sep-2024	18-Sep-2024	28 days	7 days	✓	19-Sep-2024	28 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
UF Effluent	E355-L	11-Sep-2024	18-Sep-2024	28 days	7 days	✓	19-Sep-2024	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
Treated Water (post reservoir)	E290	11-Sep-2024	13-Sep-2024	14 days	2 days	✓	16-Sep-2024	14 days	5 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE										
Treated Water (post reservoir)	E329	11-Sep-2024	13-Sep-2024	3 days	2 days	✓	13-Sep-2024	3 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
Treated Water (post reservoir)	E100	11-Sep-2024	13-Sep-2024	28 days	2 days	✓	16-Sep-2024	28 days	5 days	✓
Physical Tests : pH by Meter										
HDPE										
Treated Water (post reservoir)	E108	11-Sep-2024	13-Sep-2024	0.25 hrs	48 hrs	✗ EHTR-FM	16-Sep-2024	0.25 hrs	128 hrs	✗ EHTR-FM
Physical Tests : Turbidity by Nephelometry										
HDPE										
Treated Water (post reservoir)	E121	11-Sep-2024	----	----	----		13-Sep-2024	3 days	2 days	✓
Volatile Organic Compounds [THMs] : THMs by Headspace GC-MS										
Glass vial (sodium thiosulfate)										
Distribution system (WWTP)	E611B	11-Sep-2024	13-Sep-2024	14 days	2 days	✓	13-Sep-2024	14 days	2 days	✓
Volatile Organic Compounds [THMs] : THMs by Headspace GC-MS										
Glass vial (sodium thiosulfate)										
Treated Water (post reservoir)	E611B	11-Sep-2024	13-Sep-2024	14 days	2 days	✓	13-Sep-2024	14 days	2 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1649598	1	10	10.0	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1649608	1	3	33.3	5.0	✓
Conductivity in Water	E100	1649599	1	9	11.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1652720	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1648873	1	15	6.6	5.0	✓
Heterotrophic Plate Count (Pour Plate)	E020	1647548	1	7	14.2	5.0	✓
pH by Meter	E108	1649597	1	18	5.5	5.0	✓
THMs by Headspace GC-MS	E611B	1648983	1	20	5.0	5.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1648016	1	12	8.3	10.0	×
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1659408	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	1650533	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1649598	1	10	10.0	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1649608	1	3	33.3	5.0	✓
Conductivity in Water	E100	1649599	1	9	11.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1652720	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1648873	1	15	6.6	5.0	✓
Haloacetic Acids in Water by LC-MS/MS	E750	1655403	1	20	5.0	4.7	✓
pH by Meter	E108	1649597	1	18	5.5	5.0	✓
THMs by Headspace GC-MS	E611B	1648983	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1659408	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	1650533	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1649598	1	10	10.0	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1649608	1	3	33.3	5.0	✓
Conductivity in Water	E100	1649599	1	9	11.1	5.0	✓
Dissolved Inorganic Carbon by Combustion	E353-L	1652720	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1648873	1	15	6.6	5.0	✓
Haloacetic Acids in Water by LC-MS/MS	E750	1655403	1	20	5.0	4.7	✓
Heterotrophic Plate Count (Pour Plate)	E020	1647548	1	7	14.2	5.0	✓
THMs by Headspace GC-MS	E611B	1648983	1	20	5.0	5.0	✓
Total Coliforms and E. coli (Enzyme Substrate)	E010	1648016	1	12	8.3	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1659408	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	1650533	1	20	5.0	5.0	✓
Matrix Spikes (MS)							

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Dissolved Inorganic Carbon by Combustion	E353-L	1652720	1	12	8.3	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1648873	1	15	6.6	5.0	✓
Haloacetic Acids in Water by LC-MS/MS	E750	1655403	1	20	5.0	4.7	✓
THMs by Headspace GC-MS	E611B	1648983	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1659408	1	9	11.1	5.0	✓
Matrix Spike Duplicates (MSD)							
Haloacetic Acids in Water by LC-MS/MS	E750	1655403	1	20	5.0	4.7	✓

Methodology References and Summaries

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. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms and E. coli (Enzyme Substrate)	E010 ALS Environmental - Vancouver	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Heterotrophic Plate Count (Pour Plate)	E020 ALS Environmental - Vancouver	Water	APHA 9215B (mod)	Culture medium is poured into plates containing test portions, incubated at 35±0.5°C for 48 hours, after which the observed colonies are enumerated.
Conductivity in Water	E100 ALS Environmental - Vancouver	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Vancouver	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
Alkalinity Species by Titration	E290 ALS Environmental - Vancouver	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Colour (True) by Spectrometer (5 CU)	E329 ALS Environmental - Vancouver	Water	APHA 2120 C (mod)	Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Dissolved Inorganic Carbon by Combustion	E353-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Inorganic Carbon is determined on a sample which is filtered through a 0.45 micron filter prior to analysis by the high temperature combustion method with measurement by an infrared detector, where the sample is acidified in a reaction chamber to convert all inorganic carbons (carbonates) to carbon dioxide for analysis.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Calgary	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
THMs by Headspace GC-MS	E611B ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
Haloacetic Acids in Water by LC-MS/MS	E750 ALS Environmental - Waterloo	Water	MOE E3478	An aliquot of sample is fortified with formic acid and internal standards and analyzed via direct injection by LCMSMS

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Calgary	Water		Preparation for Total Organic Carbon by Combustion
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Vancouver	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
Preparation of Haloacetic acid in Water for LCMSMS	EP750 ALS Environmental - Waterloo	Water	E3478	An aliquot of samples is fortified with formic acid and internal standard to be analyzed by direct injection LCMSMS

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL REPORT

Work Order	: **VA24C3845**	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	: 12-Sep-2024 12:00
PO	: PO #10916	Date Analysis Commenced	: 12-Sep-2024
C-O-C number	: 17-Week 5-Turned Saturator on For 1 day.	Issue Date	: 19-Sep-2024 13:15
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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Matrix Spike Duplicate (MSD) Report; Relative Percent Difference (RPD)
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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*
Elke Tabora	Lab Analyst	Calgary Inorganics, Calgary, Alberta
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Jon Fisher	Production Manager, Environmental	Waterloo LCMS, Waterloo, Ontario
Kate Dimitrova	Supervisor - Inorganic	Vancouver Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Vancouver Microbiology, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology 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
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1649597)											
VA24C3781-001	Anonymous	pH	----	E108	0.10	pH units	5.47	5.42	0.918%	4%	----
Physical Tests (QC Lot: 1649598)											
VA24C3781-001	Anonymous	Alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1649599)											
VA24C3781-001	Anonymous	Conductivity	----	E100	2.0	µS/cm	<2.0	<2.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1649608)											
VA24C3781-001	Anonymous	Colour, true	----	E329	5.0	CU	<5.0	<5.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1650533)											
KS2403726-001	Anonymous	Turbidity	----	E121	0.10	NTU	3.69	4.16	12.0%	15%	----
Organic / Inorganic Carbon (QC Lot: 1648873)											
VA24C3845-001	Raw Water	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.04	2.04	0.007	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1652720)											
VA24C3594-001	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1659408)											
CG2413119-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 1647548)											
VA24C3768-001	Anonymous	Heterotrophic plate count [HPC]	----	E020	1	CFU/mL	6	3	66.7%	65%	DUP-H
Microbiological Tests (QC Lot: 1648016)											
VA24C3849-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010	10000	MPN/100mL	12000000	8660000	32.6%	65%	----
		Coliforms, total	----	E010	10000	MPN/100mL	>24200000	>24200000	0.00%	65%	----
Volatile Organic Compounds [THMs] (QC Lot: 1648983)											
VA24C3523-001	Anonymous	Bromodichloromethane	75-27-4	E611B	1.0	µg/L	<1.0	<1.0	0.0%	30%	----
		Bromoform	75-25-2	E611B	1.0	µg/L	1.0	1.1	9.7%	30%	----
		Chloroform	67-66-3	E611B	1.0	µg/L	<1.0	<1.0	0.0%	30%	----
		Dibromochloromethane	124-48-1	E611B	1.0	µg/L	<1.0	<1.0	0.0%	30%	----

Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1649598)						
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 1649599)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 1649608)						
Colour, true	----	E329	5	CU	<5.0	----
Physical Tests (QCLot: 1650533)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Organic / Inorganic Carbon (QCLot: 1648873)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1652720)						
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 1659408)						
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Microbiological Tests (QCLot: 1647548)						
Heterotrophic plate count [HPC]	----	E020	1	CFU/mL	<1	----
Microbiological Tests (QCLot: 1648016)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Coliforms, total	----	E010	1	MPN/100mL	<1	----
Volatile Organic Compounds [THMs] (QCLot: 1648983)						
Bromodichloromethane	75-27-4	E611B	1	µg/L	<1.0	----
Bromoform	75-25-2	E611B	1	µg/L	<1.0	----
Chloroform	67-66-3	E611B	1	µg/L	<1.0	----
Dibromochloromethane	124-48-1	E611B	1	µg/L	<1.0	----
Haloacetic Acids (QCLot: 1655403)						
Bromochloroacetic acid	5589-96-8	E750	0.5	µg/L	<0.50	----
Dibromoacetic acid	631-64-1	E750	1	µg/L	<1.00	----
Dichloroacetic acid	79-43-6	E750	1	µg/L	<1.00	----
Monobromoacetic acid	79-08-3	E750	0.2	µg/L	<0.20	----
Monochloroacetic acid	79-11-8	E750	0.5	µg/L	<0.50	----
Trichloroacetic acid	76-03-9	E750	1	µg/L	<1.00	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1649597)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1649598)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	104	85.0	115	----
Physical Tests (QCLot: 1649599)									
Conductivity	----	E100	1	µS/cm	147 µS/cm	96.0	90.0	110	----
Physical Tests (QCLot: 1649608)									
Colour, true	----	E329	5	CU	100 CU	104	85.0	115	----
Physical Tests (QCLot: 1650533)									
Turbidity	----	E121	0.1	NTU	200 NTU	97.0	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1648873)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1652720)									
Carbon, dissolved inorganic [DIC]	----	E353-L	0.5	mg/L	8 mg/L	98.5	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1659408)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	93.3	80.0	120	----
Volatile Organic Compounds [THMs] (QCLot: 1648983)									
Bromodichloromethane	75-27-4	E611B	1	µg/L	100 µg/L	93.2	70.0	130	----
Bromoform	75-25-2	E611B	1	µg/L	100 µg/L	111	70.0	130	----
Chloroform	67-66-3	E611B	1	µg/L	100 µg/L	98.5	70.0	130	----
Dibromochloromethane	124-48-1	E611B	1	µg/L	100 µg/L	98.9	70.0	130	----
Haloacetic Acids (QCLot: 1655403)									
Bromochloroacetic acid	5589-96-8	E750	0.5	µg/L	2.5 µg/L	75.1	70.0	130	----
Dibromoacetic acid	631-64-1	E750	1	µg/L	5 µg/L	116	70.0	130	----
Dichloroacetic acid	79-43-6	E750	1	µg/L	5 µg/L	109	70.0	130	----
Monobromoacetic acid	79-08-3	E750	0.2	µg/L	1 µg/L	118	70.0	130	----
Monochloroacetic acid	79-11-8	E750	0.5	µg/L	2.5 µg/L	111	70.0	130	----
Trichloroacetic acid	76-03-9	E750	1	µg/L	5 µg/L	105	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 1648873)										
VA24C3845-002	UF Effluent	Carbon, dissolved organic [DOC]	----	E358-L	4.94 mg/L	5 mg/L	98.9	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1652720)										
VA24C3594-002	Anonymous	Carbon, dissolved inorganic [DIC]	----	E353-L	ND mg/L	----	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1659408)										
CG2413119-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	4.09 mg/L	5 mg/L	81.8	70.0	130	----
Volatile Organic Compounds [THMs] (QCLot: 1648983)										
VA24C3528-004	Anonymous	Bromodichloromethane	75-27-4	E611B	92.2 µg/L	100 µg/L	92.2	60.0	140	----
		Bromoform	75-25-2	E611B	104 µg/L	100 µg/L	104	60.0	140	----
		Chloroform	67-66-3	E611B	95.0 µg/L	100 µg/L	95.0	60.0	140	----
		Dibromochloromethane	124-48-1	E611B	96.8 µg/L	100 µg/L	96.8	60.0	140	----
Haloacetic Acids (QCLot: 1655403)										
CG2413109-001	Anonymous	Bromochloroacetic acid	5589-96-8	E750	2.26 µg/L	2.5 µg/L	90.3	70.0	130	----
		Dibromoacetic acid	631-64-1	E750	5.34 µg/L	5 µg/L	107	70.0	130	----
		Dichloroacetic acid	79-43-6	E750	ND µg/L	----	ND	70.0	130	----
		Monobromoacetic acid	79-08-3	E750	1.00 µg/L	1 µg/L	100	70.0	130	----
		Monochloroacetic acid	79-11-8	E750	2.56 µg/L	2.5 µg/L	102	70.0	130	----
		Trichloroacetic acid	76-03-9	E750	ND µg/L	----	ND	70.0	130	----

Matrix Spike Duplicate (MSD) Report

A Matrix Spike Duplicate (MSD) is a duplicate of a Matrix Spike (MS), which has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spike Duplicates provide information regarding method precision. ALS DQOs for Matrix Spike Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD).

Sub-Matrix: **Water**

					Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	MSD Result	RPD(%) or Difference	MSD Limits	Qualifier
Haloacetic Acids (QC Lot: 1655403)											
QC-165540-004	Anonymous	Bromochloroacetic acid	5589-96-8	E750	1.00	µg/L	2.83	2.49	16.4%	200%	----
		Dibromoacetic acid	631-64-1	E750	1.00	µg/L	5.34	5.30	0.939%	200%	----
		Dichloroacetic acid	79-43-6	E750	1.00	µg/L	19.9	20.4	----%	Diff <2x LOR	----
		Monobromoacetic acid	79-08-3	E750	1.00	µg/L	1.19	1.12	7.15%	200%	----
		Monochloroacetic acid	79-11-8	E750	1.00	µg/L	4.49	4.57	3.85%	200%	----
		Trichloroacetic acid	76-03-9	E750	1.00	µg/L	24.1	24.0	----%	Diff <2x LOR	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - Week 5 - Turned Saturator on For 1 Day.

Page of

Report To	Contact and company name below will appear on the final report
Company:	Town of Ladysmith
Contact:	Shawn Baker
Phone:	778-674-3015
	Company address below will appear on the final report
Street:	410 Esplanade PO Box 220
City/Province:	Ladysmith, BC
Postal Code:	V9G 1A2
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Town of Ladysmith
Contact:	Kristine Hawkins

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☐ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: sbaker@ladysmith.ca

Email 2: vcai@ladysmith.ca

Email 3:

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: ap@ladysmith.ca

Email 2:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ ; 3 day [P3-25%] ☐ ; 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E1 - 100%] ☐ ; Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	Arbutus Water Treatment Plant - Weekly Sampling	Major/Minor Code:	Routing Code:
PO / AFE:	10880	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): 3845

ALS Contact: Thomas Chang Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TOC	DOC	E.coli	Total Coliforms	HPC	Alk	PH	Colour	Turbidity	Conductivity	THM	HAA	Dissolved Inorganic Carbon	SAMPLES ON HOLD	Sample is hazardous (please provide further detail)	NUMBER OF CONTAINERS
	Raw Water	11-09-24	10:30	Grab	x	x														
	UF Effluent	↓	↓	↓	x	x											x			
	Treated Water (post reservoir)						x	x	x	x	x	x	x	x	x	x				
	Distribution system (WWTP)						↓	↓	↓	↓	↓	↓	↓	↓	x	x				

Environmental Division Vancouver

Work Order Reference VA24C3845

Thomas

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client

Are samples taken from a Regulated DW System? ☑ YES ☐ NO

Are samples for human consumption/ use? ☑ YES ☐ NO

add on report by clicking on the drop-down list below

ctronic COC only)

CDWG Comparison all Doc samples had no preserved, not filtered.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					6.6		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Victor Cai	Date: 11-09-24	Time: 1130	Received by:	Date:	Time:	Received by: SS	Date: 12/09/24	Time: 1200

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

SEPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24C4502**	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 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	: 18-Sep-2024 11:35
PO	: PO #10880	Date Analysis Commenced	: 18-Sep-2024
C-O-C number	: Week 6	Issue Date	: 26-Sep-2024 12:22
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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
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.

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

Sample(s)UF Effluent:general container not received at laboratory, but analysis requested on Chain of Custody / analytical request form; subsample cannot be obtained from other containers to meet request. The requested DIC analysis cannot be performed.

Qualifiers

Qualifier	*Description*
SFP	*Sample was filtered and preserved at the laboratory.*
SP	*Sample was preserved at the laboratory.*

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									
Client sampling date / time					17-Sep-2024 12:50	17-Sep-2024 13:00	17-Sep-2024 13:05	17-Sep-2024 13:30	----
					VA24C4502-001	VA24C4502-002	VA24C4502-003	VA24C4502-004	--------
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	10.1	----	----
Colour, true	----	E329/VA	5.0	CU	----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	34.4	----	----
pH	----	E108/VA	0.10	pH units	----	----	7.21	----	----
Turbidity	----	E121/VA	0.10	NTU	----	----	<0.10	----	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	1.88	1.93 SFP	----	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.09	1.85 SP	----	----	----
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	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	----	----	0.0134	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	----	----	2.7	3.1	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	----	----	57.9	73.5	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	----	----	60.6	76.6	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	----	----	99.9	102	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	----	----	102	101	----
Haloacetic Acids									
Bromochloroacetic acid	5589-96-8	E750/WT	1.00	µg/L	----	----	1.05	1.24	----
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	----	----	23.9	27.9	----
Monobromoacetic acid	79-08-3	E750/WT	1.00	µg/L	----	----	<1.00	<1.00	----

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	17-Sep-2024 12:50	17-Sep-2024 13:00	17-Sep-2024 13:05	17-Sep-2024 13:30	----
						VA24C4502-001	VA24C4502-002	VA24C4502-003	VA24C4502-004	--------
						Result	Result	Result	Result	----
Haloacetic Acids										
Monochloroacetic acid	79-11-8	E750/WT	1.00	µg/L		----	----	1.06	1.58	----
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L		----	----	28.6	33.3	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L		----	----	53.6	62.8	----

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.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24C4502**	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 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	: 18-Sep-2024 11:35
PO	: PO #10880	Issue Date	: 26-Sep-2024 12:28
C-O-C number	: Week 6		
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	: **VA24C5351**		
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith British Columbia 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-Sep-2024 10:15
PO	: 10880	Date Analysis Commenced	: 25-Sep-2024
C-O-C number	: ----	Issue Date	: 08-Oct-2024 18:49
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*
Elke Tabora	Lab Analyst	Inorganics, Calgary, Alberta
Kate Dimitrova	Supervisor - Inorganic	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Rebecca Sit	Supervisor - Organics Extractions	Organics, 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.

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

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) 003: 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/Accreditation	LOR	Unit	Raw Water	UF Effluent	Treated Water (post reservoir)	Distribution system (WWTP)	----
Client sample ID									
Client sampling date / time					24-Sep-2024 10:30	24-Sep-2024 10:30	24-Sep-2024 10:30	24-Sep-2024 10:30	----
					VA24C5351-001	VA24C5351-002	VA24C5351-003	VA24C5351-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	10.1	----	----
Colour, true	----	E329/VA	5.0	CU	----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	35.3	----	----
pH	----	E108/VA	0.10	pH units	----	----	7.39	----	----
Turbidity	----	E121/VA	0.10	NTU	----	----	<0.10	----	----
Organic / Inorganic Carbon									
Carbon, dissolved inorganic [DIC]	----	E353-L/VA	0.50	mg/L	----	2.50	----	----	----
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.15	2.05	----	----	----
Carbon, total organic [TOC]	----	E355-L/CG	0.50	mg/L	1.71	1.47	----	----	----
Microbiological Tests									
Heterotrophic plate count [HPC]	----	E020/VA	1	CFU/mL	----	----	<1	----	----
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Coliforms, total	----	E010/VA	1	MPN/100 mL	----	----	<1	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	----	0.0222	0.0298	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	----	----	2.7	3.3	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	----	----	48.7	63.9	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	----	----	<1.0	<1.0	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	----	----	51.4	67.2	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	Raw Water	UF Effluent	Treated Water (post reservoir)	Distribution system (WWTP)	----
Client sample ID									
Client sampling date / time					24-Sep-2024 10:30	24-Sep-2024 10:30	24-Sep-2024 10:30	24-Sep-2024 10:30	----
					VA24C5351-001	VA24C5351-002	VA24C5351-003	VA24C5351-004	----
					Result	Result	Result	Result	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	----	----	94.1	95.4	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	----	----	102	103	----
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	----	----	17.2	20.2	----
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	----	----	<1.00	1.30	----
Trichloroacetic acid	76-03-9	E750/WT	1.00	µg/L	----	----	22.2	24.2	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L	----	----	39.4	45.7	----

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	: **VA24C5351**	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 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-Sep-2024 10:15
PO	: 10880	Issue Date	: 08-Oct-2024 18:49
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

- No Quality Control Sample Frequency Outliers occur.