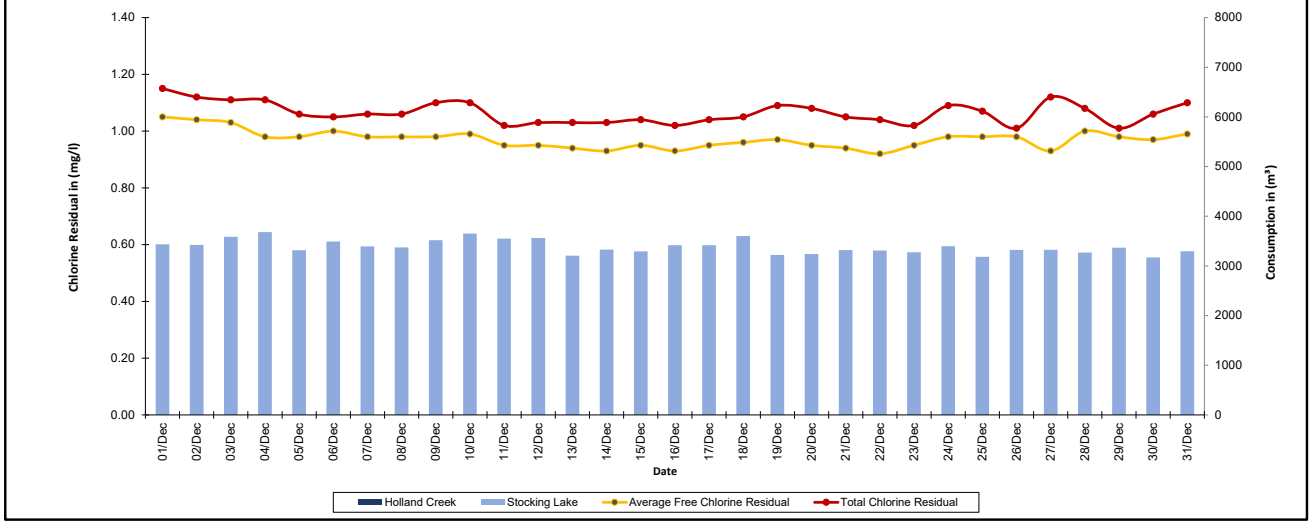
Town of Ladysmith - Arbutus Water treatment Plant

December 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-Dec	3435	0	3435	1.03	1.06	1.05	1.15	147						
02-Dec	3423	0	3423	1.02	1.05	1.04	1.12	153						
03-Dec	3587	0	3587	1.01	1.04	1.03	1.11	138	< 1	< 1	< 1	0.0077	0.0183	0.0117
04-Dec	3680	0	3680	0.98	1.03	0.98	1.11	147						
05-Dec	3317	0	3317	0.96	0.99	0.98	1.06	96						
06-Dec	3490	0	3490	0.97	1.00	1.00	1.05	144						
07-Dec	3393	0	3393	0.98	1.00	0.98	1.06	130						
08-Dec	3372	0	3372	0.97	0.99	0.98	1.06	138						
09-Dec	3518	0	3518	0.96	0.99	0.98	1.10	144						
10-Dec	3650	0	3650	0.97	0.99	0.99	1.10	139	< 1	< 1	< 1			
11-Dec	3551	0	3551	0.95	0.98	0.95	1.02	133						
12-Dec	3561	0	3561	0.92	0.96	0.95	1.03	164						
13-Dec	3207	0	3207	0.93	0.95	0.94	1.03	162						
14-Dec	3329	0	3329	0.91	0.95	0.93	1.03	202						
15-Dec	3293	0	3293	0.92	0.96	0.95	1.04	271						
16-Dec	3417	0	3417	0.91	0.95	0.93	1.02	264						
17-Dec	3416	0	3416	0.92	0.95	0.95	1.04	284	1	< 1	< 1			
18-Dec	3602	0	3602	0.94	0.97	0.96	1.05	175						
19-Dec	3220	0	3220	0.95	0.97	0.97	1.09	178						
20-Dec	3240	0	3240	0.93	0.98	0.95	1.08	142						
21-Dec	3318	0	3318	0.93	0.96	0.94	1.05	136						
22-Dec	3309	0	3309	0.91	0.95	0.92	1.04	172						
23-Dec	3275	0	3275	0.89	0.96	0.95	1.02	142	< 1	< 1	< 1			
24-Dec	3395	0	3395	0.95	0.99	0.98	1.09	130						
25-Dec	3182	0	3182	0.96	1.00	0.98	1.07	181						
26-Dec	3321	0	3321	0.97	1.00	0.98	1.01	146						
27-Dec	3325	0	3325	0.97	1.00	0.93	1.12	150						
28-Dec	3270	0	3270	0.97	1.00	1.00	1.08	137						
29-Dec	3367	0	3367	0.98	1.00	0.98	1.01	126						
30-Dec	3170	0	3170	0.95	0.98	0.97	1.06	126	< 1	< 1	< 1			
31-Dec	3296	0	3296	0.96	1.00	0.99	1.10	122						
Total	104929	0	104929											
Average	3385	0	3385	0.95	0.99	0.97	1.06	159	< 1	< 1	< 1	0.0077	0.0183	0.01170

*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

12/01/2024 - 01/01/2025

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

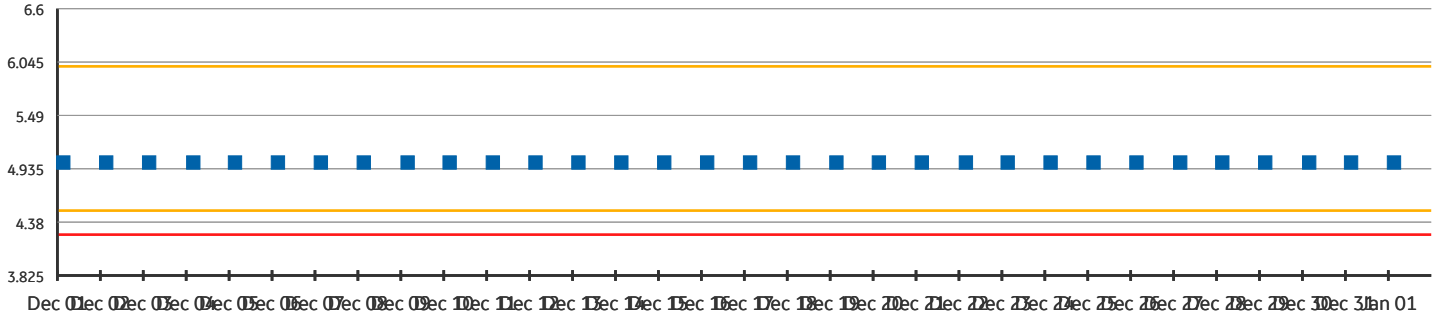
Asset	Parameter	Dec 01	Dec 02	Dec 03	Dec 04	Dec 05	Dec 06	Dec 07	Dec 08	Dec 09	Dec 10	Dec 11	Dec 12
UF 1	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

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

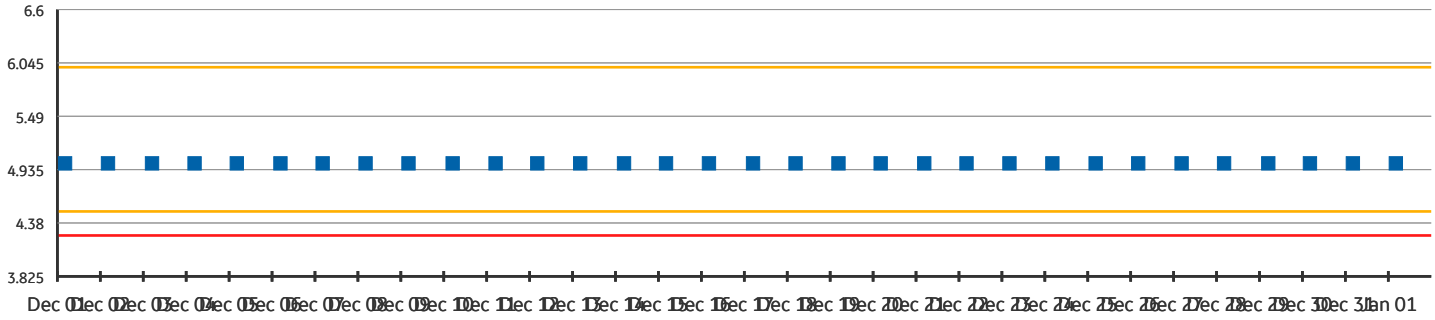
Asset	Dec 29	Dec 30	Dec 31	Jan 01
UF 1	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	--

LRV Raw Data

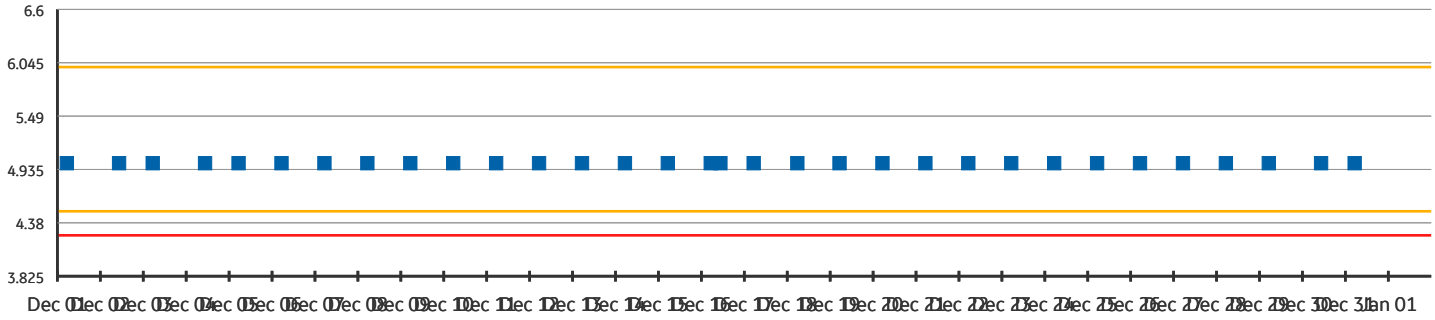
UF 1 - LRV (#)



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		0.013	0.0	45211	--	--	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidity		0.014	0.0	45211	--	--	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidity		0.012	0.0	45211	--	--	100 %	0 %	0 %	NTU
UF 1	PermeateTurbidityAfterBP	●	0.013	0.0	398	0.1	0.3	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidityAfterBP	●	0.014	0.0	393	0.1	0.3	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidityAfterBP	●	0.012	0.0	363	0.1	0.3	100 %	0 %	0 %	NTU

Turbidity Daily Averages

Asset	Parameter	Dec 01	Dec 02	Dec 03	Dec 04	Dec 05	Dec 06	Dec 07	Dec 08	Dec 09	Dec 10	Dec 11
UF 1	PermeateTurbidity	0.011	0.011	0.012	0.011	0.012	0.012	0.012	0.013	0.013	0.013	0.013
UF 2	PermeateTurbidity	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	PermeateTurbidity	0.011	0.012	0.011	0.012	0.011	0.011	0.012	0.011	0.012	0.012	0.011

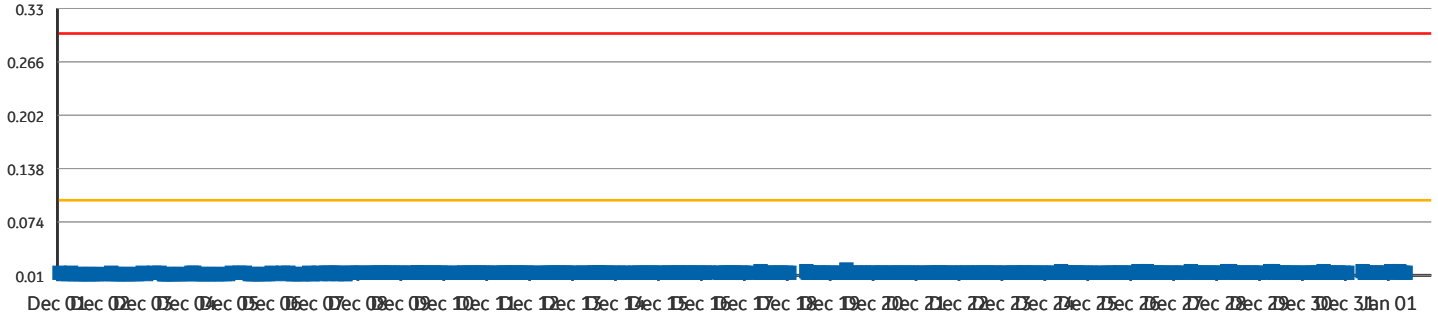
Asset	Parameter	Dec 01	Dec 02	Dec 03	Dec 04	Dec 05	Dec 06	Dec 07	Dec 08	Dec 09	Dec 10	Dec 11
UF 1	PermeateTurbidityAfterBP	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.013	0.013	0.013	0.013
UF 2	PermeateTurbidityAfterBP	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	PermeateTurbidityAfterBP	0.011	0.012	0.011	0.012	0.011	0.011	0.011	0.011	0.012	0.012	0.012

Asset	Dec 12	Dec 13	Dec 14	Dec 15	Dec 16	Dec 17	Dec 18	Dec 19	Dec 20	Dec 21	Dec 22	Dec 23	Dec 24	Dec 25	Dec 26
UF 1	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 2	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.014	0.013	0.014	0.014
UF 3	0.011	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.013	0.013	0.013
UF 1	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 2	0.013	0.013	0.013	0.013	0.013	0.013	0.014	0.013	0.013	0.013	0.014	0.014	0.013	0.014	0.014
UF 3	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.013	0.013	0.013	0.013	0.013	0.013

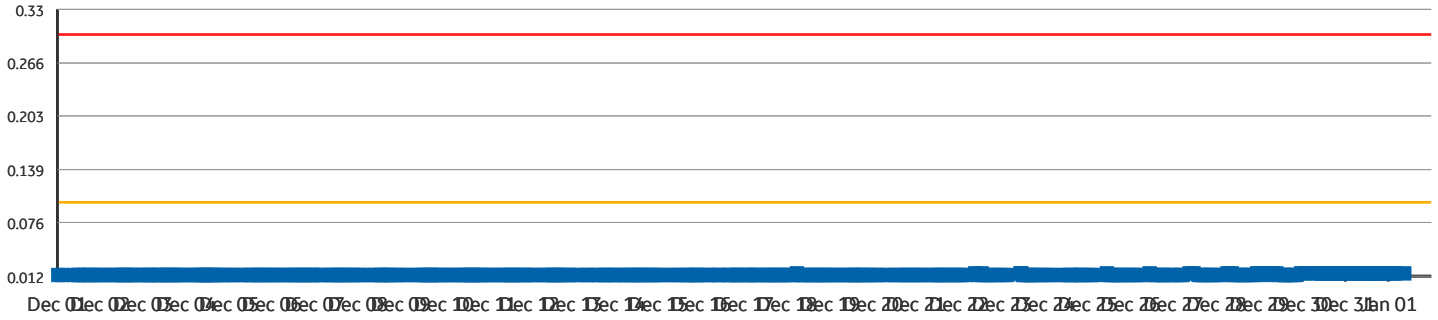
Asset	Dec 27	Dec 28	Dec 29	Dec 30	Dec 31	Jan 01
UF 1	0.013	0.013	0.013	0.013	0.014	0.014
UF 2	0.013	0.014	0.014	0.015	0.015	0.015
UF 3	0.013	0.013	0.013	0.013	0.013	0.013
UF 1	0.013	0.013	0.013	0.013	0.013	0.014
UF 2	0.014	0.014	0.014	0.015	0.015	0.015
UF 3	0.013	0.013	0.013	0.014	0.013	0.013

Turbidity Raw Data

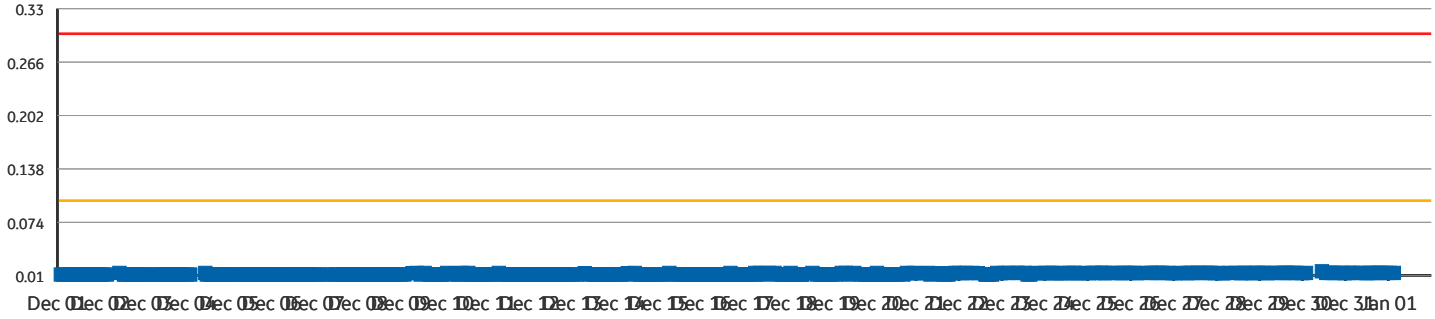
UF 1 - PermeateTurbidityAfterBP (NTU)



UF 2 - PermeateTurbidityAfterBP (NTU)



UF 3 - PermeateTurbidityAfterBP (NTU)



CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D2688**			
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 - Monthly Sampling	Date Samples Received	:	04-Dec-2024 12:35
PO	:	PO #10916	Date Analysis Commenced	:	05-Dec-2024
C-O-C number	:	----	Issue Date	:	11-Dec-2024 12:52
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
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*
mg/L	milligrams per litre
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.

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	----	----	----	----
					Client sampling date / time	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2688-001	----	----	----	----
					Result	----	----	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0077	----	----	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	1.4	----	----	----	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	16.9	----	----	----	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	18.3	----	----	----	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	89.8	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	102	----	----	----	----
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	5.24	----	----	----	----
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	6.50	----	----	----	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L	11.7	----	----	----	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D2688**	Page	: 1 of 5
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Monthly Sampling	Date Samples Received	: 04-Dec-2024 12:35
PO	: PO #10916	Issue Date	: 11-Dec-2024 12:51
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		

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)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D2684**			
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	:	04-Dec-2024 12:35
PO	:	PO #10916	Date Analysis Commenced	:	04-Dec-2024
C-O-C number	:	----	Issue Date	:	09-Dec-2024 09:11
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	Microbiology, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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

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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

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

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
				Client sampling date / time	03-Dec-2024 10:30	03-Dec-2024 10:30	03-Dec-2024 10:30	03-Dec-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2684-001	VA24D2684-002	VA24D2684-003	VA24D2684-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	15.4	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	63.2	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.40	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.58	1.29	1.19	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.59	1.03	0.92	----	----
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	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D2684**	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	: 04-Dec-2024 12:35
PO	: PO #10916	Issue Date	: 09-Dec-2024 09:10
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D3252**		
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	: 11-Dec-2024 11:15
PO	:	PO #10916	Date Analysis Commenced	: 11-Dec-2024
C-O-C number	:	----	Issue Date	: 17-Dec-2024 15:37
Sampler	:	----		
Site	:	Town of Ladysmith		
Quote number	:	VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	:	4		
No. of samples analysed	:	4		

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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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*
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
µS/cm	microsiemens per centimetre

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

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
				Client sampling date / time	10-Dec-2024 10:30	10-Dec-2024 10:30	10-Dec-2024 10:30	10-Dec-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D3252-001	VA24D3252-002	VA24D3252-003	VA24D3252-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	17.5	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	67.6	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.44	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.64	1.36	1.42	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.70	1.27	1.08	----	----
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	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D3252**	Page	: 1 of 8
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant- Weekly Sampling	Date Samples Received	: 11-Dec-2024 11:15
PO	: PO #10916	Issue Date	: 17-Dec-2024 15:37
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		

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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 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	:	**VA24D3796**		
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	: 18-Dec-2024 12:00
PO	:	PO #10880	Date Analysis Commenced	: 18-Dec-2024
C-O-C number	:	----	Issue Date	: 23-Dec-2024 09:45
Sampler	:	----		
Site	:	Town of Ladysmith		
Quote number	:	VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	:	4		
No. of samples analysed	:	4		

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- General Comments
- Analytical Results

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Signatories

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

Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	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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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*
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
µS/cm	microsiemens per centimetre

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

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

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
				Client sampling date / time	17-Dec-2024 10:30	17-Dec-2024 10:30	17-Dec-2024 10:30	17-Dec-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D3796-001	VA24D3796-002	VA24D3796-003	VA24D3796-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	12.4	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	56.5	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.12	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	3.05	1.25	1.30	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.72	1.31	1.16	----	----
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	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D3796**	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	: 18-Dec-2024 12:00
PO	: PO #10880	Issue Date	: 23-Dec-2024 09:44
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

CERTIFICATE OF ANALYSIS

Work Order	:	**VA24D4296**		
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	: 24-Dec-2024 09:40
PO	:	10880	Date Analysis Commenced	: 24-Dec-2024
C-O-C number	:	----	Issue Date	: 31-Dec-2024 13:46
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*
Kim Jensen	Department Manager - Metals	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

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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
µS/cm	microsiemens per centimetre

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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					23-Dec-2024 10:30	23-Dec-2024 10:30	23-Dec-2024 10:30	23-Dec-2024 10:30	----
					VA24D4296-001	VA24D4296-002	VA24D4296-003	VA24D4296-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	16.9	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	67.4	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.37	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	3.19	1.42	1.46	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.62	1.24	1.12	----	----
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	----

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D4296**	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	: 24-Dec-2024 09:40
PO	: 10880	Issue Date	: 31-Dec-2024 13:45
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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- 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	:	**VA24D4554**		
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	: 31-Dec-2024 10:30
PO	:	PO #10880	Date Analysis Commenced	: 31-Dec-2024
C-O-C number	:	----	Issue Date	: 06-Jan-2025 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		

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Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Microbiology, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia

General Comments

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Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
				Client sampling date / time	30-Dec-2024 10:30	30-Dec-2024 10:30	30-Dec-2024 10:30	30-Dec-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D4554-001	VA24D4554-002	VA24D4554-003	VA24D4554-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	----	----	----	17.9	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	74.5	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.42	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.78	1.58	1.50	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.21	1.03	1.10	----	----
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	----

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

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right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24D4554**	Page	: 1 of 8
Client	: **Town of Ladysmith**	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 31-Dec-2024 10:30
PO	: PO #10880	Issue Date	: 06-Jan-2025 10:01
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.