

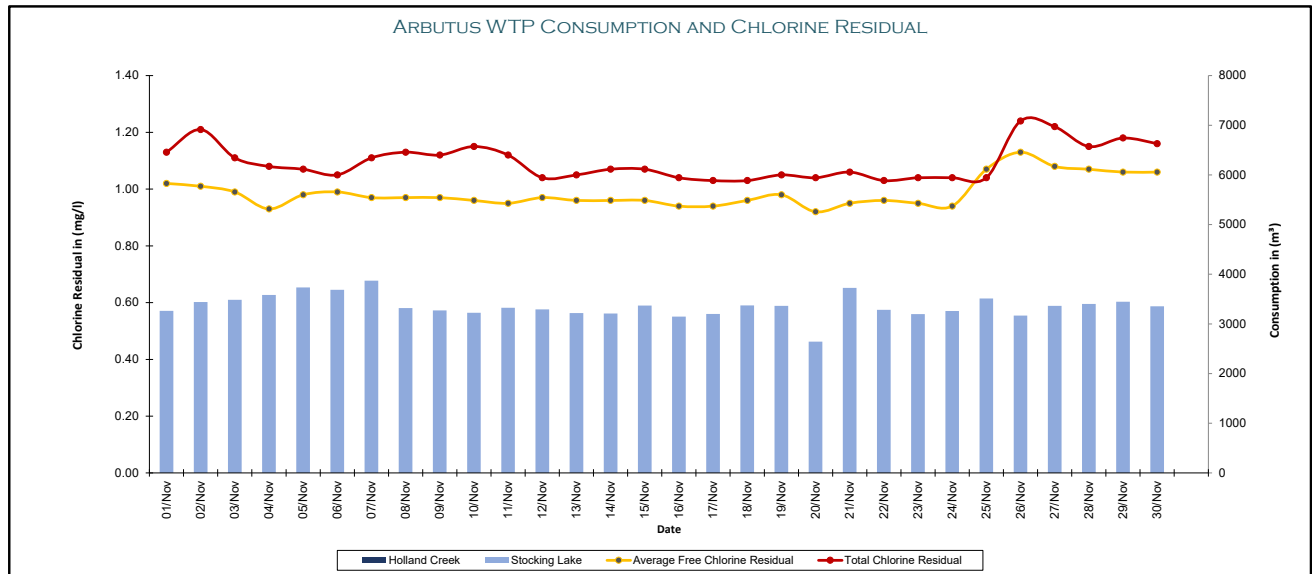
TOWN OF LADYSMITH - ARBUTUS WATER TREATMENT PLANT

NOVEMBER 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		CFU	MPN	MPN	mg/l	mg/l	mg/l
01-Nov	3262	0	3262	0.94	1.02	1.02	1.13	237						
02-Nov	3440	0	3440	1.00	1.06	1.01	1.21	298						
03-Nov	3485	0	3485	0.97	1.01	0.99	1.11	275						
04-Nov	3582	0	3582	0.89	1.01	0.93	1.08	265						
05-Nov	3734	0	3734	0.98	0.99	0.98	1.07	241						
06-Nov	3688	0	3688	0.95	0.99	0.99	1.05	202	< 1	< 1	< 1	0.0094	0.0198	0.0123
07-Nov	3872	0	3872	0.95	0.99	0.97	1.11	179						
08-Nov	3318	0	3318	0.95	0.98	0.97	1.13	194						
09-Nov	3272	0	3272	0.96	0.99	0.97	1.12	119						
10-Nov	3223	0	3223	0.95	0.98	0.96	1.15	148						
11-Nov	3326	0	3326	0.93	0.96	0.95	1.12	129						
12-Nov	3292	0	3292	0.92	0.98	0.97	1.04	181	< 1	< 1	< 1			
13-Nov	3217	0	3217	0.95	0.98	0.96	1.05	200						
14-Nov	3209	0	3209	0.93	0.97	0.96	1.07	207						
15-Nov	3369	0	3369	0.95	0.98	0.96	1.07	233						
16-Nov	3146	0	3146	0.94	0.97	0.94	1.04	143						
17-Nov	3202	0	3202	0.93	0.96	0.94	1.03	186						
18-Nov	3373	0	3373	0.94	0.97	0.96	1.03	167						
19-Nov	3364	0	3364	0.94	0.98	0.98	1.05	186	< 1	< 1	< 1			
20-Nov	2644	0	2644	0.92	0.98	0.92	1.04	92						
21-Nov	3725	0	3725	0.94	0.96	0.95	1.06	102						
22-Nov	3284	0	3284	0.94	0.96	0.96	1.03	131						
23-Nov	3197	0	3197	0.94	0.96	0.95	1.04	131						
24-Nov	3260	0	3260	0.92	0.95	0.94	1.04	121						
25-Nov	3511	0	3511	0.91	1.07	1.07	1.04	162						
26-Nov	3169	0	3169	1.07	1.15	1.13	1.24	148	< 1	< 1	< 1			
27-Nov	3364	0	3364	1.08	1.14	1.08	1.22	148						
28-Nov	3402	0	3402	1.06	1.09	1.07	1.15	149						
29-Nov	3446	0	3446	1.05	1.07	1.06	1.18	148						
30-Nov	3354	0	3354	1.03	1.06	1.06	1.16	157						

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

Total	100730	0	100730											
Average	3358	0	3358	0.96	1.01	0.99	1.10	176	< 1	< 1	< 1	0.0094	0.0198	0.01230



Town of Ladysmith Arbutus DWTP

Monthly LRV and Turbidity Report

10/31/2024 - 12/01/2024

LRV Monthly Average

Asset	Parameter	Health	Avg	Std. Dev	Points	LL	L	%In	% between L and LL	% < LL	Unit
UF 1	LRV	<div></div>	5.0	0.0	32	4.25	4.5	100 %	0 %	0 %	#
UF 2	LRV	<div></div>	5.0	0.0	33	4.25	4.5	100 %	0 %	0 %	#
UF 3	LRV	<div></div>	5.0	0.0	33	4.25	4.5	100 %	0 %	0 %	#

LRV Daily Values

Asset	Parameter	Oct 31	Nov 01	Nov 02	Nov 03	Nov 04	Nov 05	Nov 06	Nov 07	Nov 08	Nov 09	Nov 10	Nov 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	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23	Nov 24	Nov 25	Nov 26	Nov 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

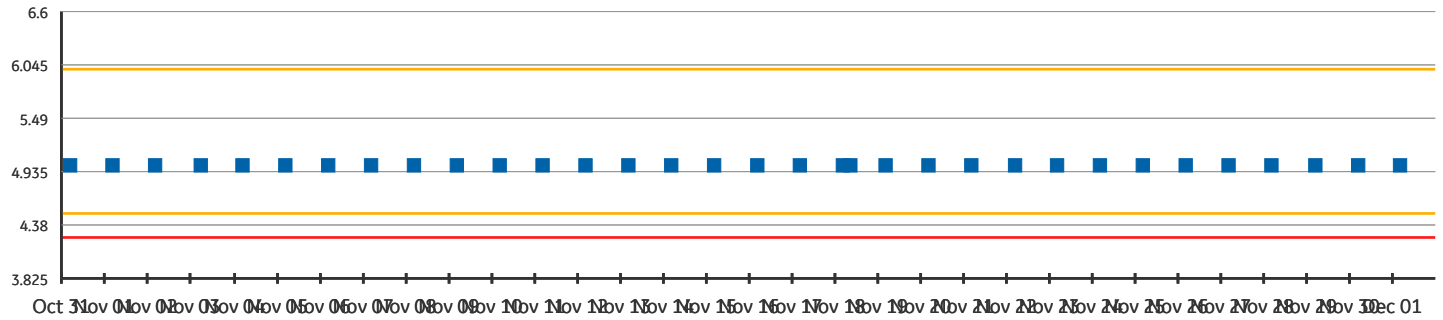
Asset	Nov 28	Nov 29	Nov 30	Dec 01
UF 1	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0

LRV Raw Data

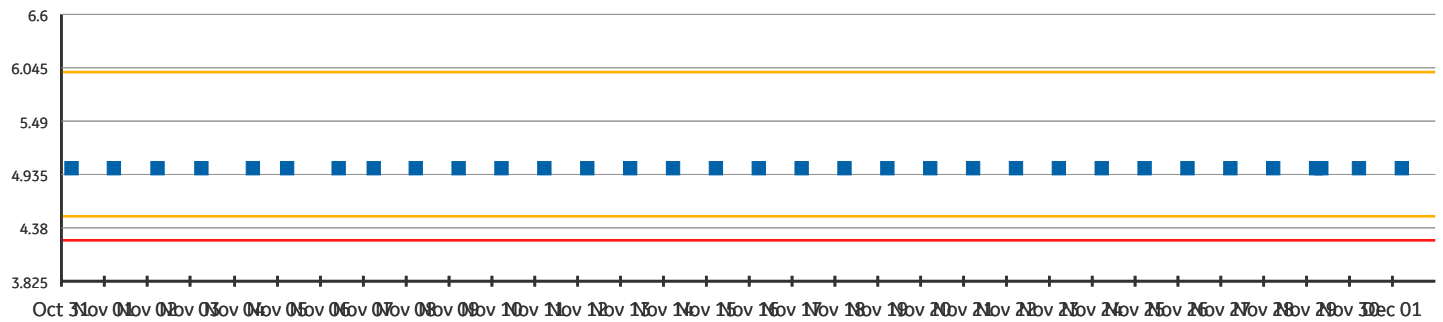
UF 1 - LRV (#)



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		0.015	0.0	45206	--	--	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidity		0.017	0.0	45206	--	--	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidity		0.016	0.01	45206	--	--	100 %	0 %	0 %	NTU
UF 1	PermeateTurbidityAfterBP	●	0.015	0.0	394	0.1	0.3	100 %	0 %	0 %	NTU
UF 2	PermeateTurbidityAfterBP	●	0.017	0.0	385	0.1	0.3	100 %	0 %	0 %	NTU
UF 3	PermeateTurbidityAfterBP	●	0.016	0.0	364	0.1	0.3	100 %	0 %	0 %	NTU

Turbidity Daily Averages

[illegible]

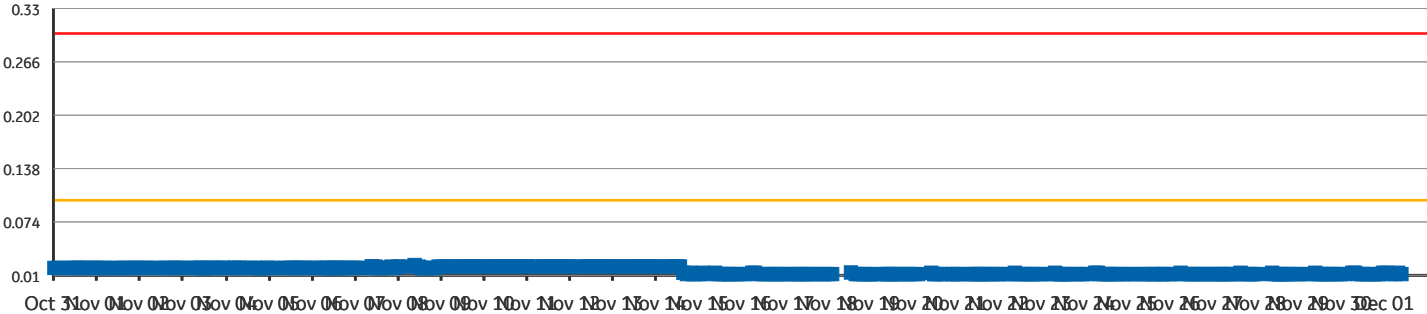
Asset	Parameter	Oct 31	Nov 01	Nov 02	Nov 03	Nov 04	Nov 05	Nov 06	Nov 07	Nov 08	Nov 09	Nov 10
UF 1	PermeateTurbidityAfterBP	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.02	0.02	0.02
UF 2	PermeateTurbidityAfterBP	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.022	0.023	0.023
UF 3	PermeateTurbidityAfterBP	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.022

Asset	Nov 11	Nov 12	Nov 13	Nov 14	Nov 15	Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22	Nov 23	Nov 24	Nov 25
UF 1	0.02	0.02	0.02	0.017	0.011	0.011	0.011	0.012	0.011	0.012	0.011	0.012	0.011	0.011	0.011
UF 2	0.023	0.023	0.023	0.018	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.022	0.022	0.022	0.017	0.011	0.011	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
UF 1	0.02	0.02	0.02	0.017	0.012	0.012	0.011	0.012	0.011	0.012	0.011	0.012	0.012	0.012	0.011
UF 2	0.023	0.023	0.023	0.017	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.023	0.023	0.023	0.017	0.011	0.011	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.011

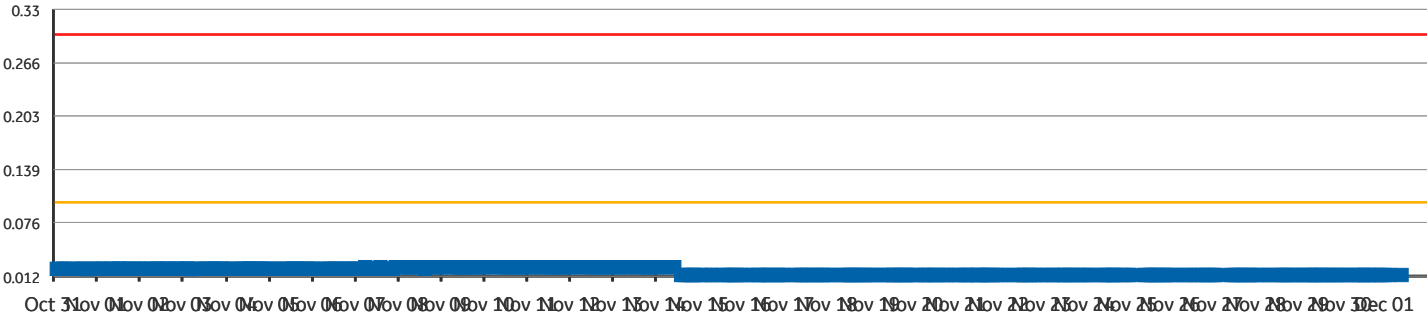
Asset	Nov 26	Nov 27	Nov 28	Nov 29	Nov 30	Dec 01
UF 1	0.011	0.012	0.012	0.012	0.012	0.011
UF 2	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.011	0.012	0.011	0.011	0.011	0.011
UF 1	0.012	0.012	0.012	0.012	0.012	0.012
UF 2	0.013	0.013	0.013	0.013	0.013	0.013
UF 3	0.011	0.011	0.011	0.011	0.011	0.011

Turbidity Raw Data

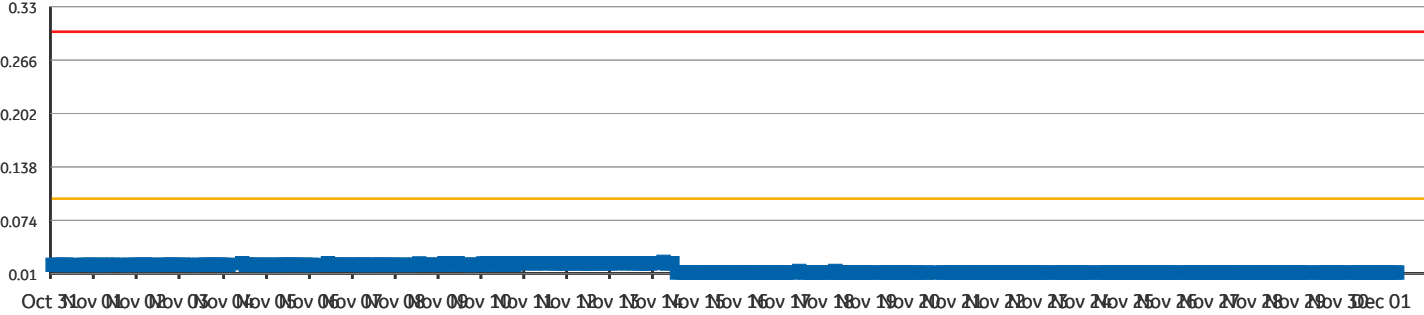
UF 1 - PermeateTurbidityAfterBP (NTU)



UF 2 - PermeateTurbidityAfterBP (NTU)



UF 3 - PermeateTurbidityAfterBP (NTU)



CERTIFICATE OF ANALYSIS

Work Order	: VA24D0216		
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	: 07-Nov-2024 12:00
PO	: PO #10916	Date Analysis Commenced	: 09-Nov-2024
C-O-C number	: ----	Issue Date	: 18-Nov-2024 09:44
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Organics, Burnaby, British Columbia
Sanja Risticvic	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
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					Treated Water (post reservoir)	----	----	----	----
Client sampling date / time					06-Nov-2024 10:30	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D0216-001	----	----	----	----
					Result	----	----	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0094	----	----	----	----
Volatile Organic Compounds [THMs]									
Bromodichloromethane	75-27-4	E611B/VA	1.0	µg/L	1.7	----	----	----	----
Bromoform	75-25-2	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Chloroform	67-66-3	E611B/VA	1.0	µg/L	18.1	----	----	----	----
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	<1.0	----	----	----	----
Trihalomethanes [THMs], total	----	E611B/VA	2.0	µg/L	19.8	----	----	----	----
Volatile Organic Compounds [THMs] Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	96.2	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	101	----	----	----	----
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	5.71	----	----	----	----
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	6.60	----	----	----	----
Haloacetic acids, total [HAA5]	n/a	E750/WT	5.00	µg/L	12.3	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D0216	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	: 07-Nov-2024 12:00
PO	: PO #10916	Issue Date	: 18-Nov-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	: 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	: VA24D0208		
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	: 07-Nov-2024 12:00
PO	: PO #10916	Date Analysis Commenced	: 07-Nov-2024
C-O-C number	: ----	Issue Date	: 12-Nov-2024 10:56
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

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- Analytical Results

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Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia



General Comments

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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.

Workorder Comments

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



Qualifiers

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



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

Client sample ID					Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
Client sampling date / time					06-Nov-2024 10:30	06-Nov-2024 10:30	06-Nov-2024 10:30	06-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab/Accreditation	LOR	Unit	VA24D0208-001	VA24D0208-002	VA24D0208-003	VA24D0208-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	E290/VA	1.0	mg/L	----	----	----	16.9	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	68.8	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.41	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.55 ^{SFP}	1.34 ^{SFP}	1.29 ^{SFP}	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.69	1.34	1.41	----	----
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.

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D0208	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	: 07-Nov-2024 12:00
PO	: PO #10916	Issue Date	: 12-Nov-2024 10:57
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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Outliers: Reference Material (RM) Samples

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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	: VA24D0645		
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	: 13-Nov-2024 10:10
PO	: 10880	Date Analysis Commenced	: 13-Nov-2024
C-O-C number	: ----	Issue Date	: 22-Nov-2024 15:27
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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia



General Comments

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
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.

Work Order : VA24D0645
Client : Town of Ladysmith
Project : Arbutus Water Treatment Plant - Weekly Sampling





Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

Client sample ID					Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
Client sampling date / time					12-Nov-2024 10:30	12-Nov-2024 10:30	12-Nov-2024 10:30	12-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D0645-001	VA24D0645-002	VA24D0645-003	VA24D0645-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	E290/VA	1.0	mg/L	----	----	----	17.1	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	69.5	----
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	2.50	1.32	1.38	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.65	1.42	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.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D0645	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	: 13-Nov-2024 10:10
PO	: 10880	Issue Date	: 22-Nov-2024 15:26
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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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

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

CERTIFICATE OF ANALYSIS

Work Order	: VA24D1415		
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 - Weekly Sampling	Date Samples Received	: 20-Nov-2024 10:00
PO	: PO #10916	Date Analysis Commenced	: 20-Nov-2024
C-O-C number	: ----	Issue Date	: 26-Nov-2024 10:46
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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:

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- Analytical Results

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Signatories

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<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia



General Comments

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
NTU	nephelometric turbidity units
CU	colour units (1 cu = 1 mg/l pt)
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre
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.

Work Order : VA24D1415
Client : Town of Ladysmith
Project : Arbutus Water Treatment - Weekly Sampling





Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
Client sampling date / time						19-Nov-2024 10:30	19-Nov-2024 10:30	19-Nov-2024 10:30	19-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D1415-001	VA24D1415-002	VA24D1415-003	VA24D1415-004	VA24D1415-004	----
					Result	Result	Result	Result	Result	----
Physical Tests										
Alkalinity, total (as CaCO ₃)	----	E290/VA	1.0	mg/L	----	----	----	16.6	----	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	65.2	----	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.36	----	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----	----
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	3.16	1.43	1.27	----	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.96	1.38	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	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D1415	Page	: 1 of 7
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver
Contact	: Shawn Baker	Account Manager	: Thomas Chang
Address	: 410 Esplanade PO Box 220 Ladysmith BC Canada V9G 1A2	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment - Weekly Sampling	Date Samples Received	: 20-Nov-2024 10:00
PO	: PO #10916	Issue Date	: 26-Nov-2024 10:47
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Key

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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	: VA24D2067		
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	: 27-Nov-2024 11:45
PO	: 10880	Date Analysis Commenced	: 27-Nov-2024
C-O-C number	: ----	Issue Date	: 02-Dec-2024 12:47
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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<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia



General Comments

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Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
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Unit	Description
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CU	colour units (1 cu = 1 mg/l pt)
mg/L	milligrams per litre
pH units	pH units
µS/cm	microsiemens per centimetre
CFU/mL	colony forming units per millilitre
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Work Order : VA24D2067
Client : Town of Ladysmith
Project : Arbutus Water Treatment Plant- Weekly Sampling





Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

Client sample ID					Raw Water	DAF Effluent	UF Effluent	Treated Water (post reservoir)	----
Client sampling date / time					26-Nov-2024 10:30	26-Nov-2024 10:30	26-Nov-2024 10:30	26-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2067-001	VA24D2067-002	VA24D2067-003	VA24D2067-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	E290/VA	1.0	mg/L	----	----	----	16.7	----
Colour, true	----	E329/VA	5.0	CU	----	----	----	<5.0	----
Conductivity	----	E100/VA	2.0	µS/cm	----	----	----	66.8	----
pH	----	E108/VA	0.10	pH units	----	----	----	7.36	----
Turbidity	----	E121/VA	0.10	NTU	----	----	----	<0.10	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	3.02	1.31	1.30	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	2.76	1.33	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	----

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D2067	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	: 27-Nov-2024 11:45
PO	: 10880	Issue Date	: 02-Dec-2024 12:47
C-O-C number	: ----		
Sampler	: ----		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Workorder Comments

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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	: VA24D2207		
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 - Quarterly DT Sampling	Date Samples Received	: 28-Nov-2024 10:30
PO	: 10880	Date Analysis Commenced	: 29-Nov-2024
C-O-C number	: ----	Issue Date	: 05-Dec-2024 10:06
Sampler	: ----		
Site	: ----		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia



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Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Client sample ID					FJCC	Town Hall	Fire Department	RCMP	----
Client sampling date / time					27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2207-001	VA24D2207-002	VA24D2207-003	VA24D2207-004	----
					Result	Result	Result	Result	----
Physical Tests									
Alkalinity, total (as CaCO ₃)	----	E290/VA	1.0	mg/L	17.5	16.6	17.0	19.1	----
pH	----	E108/VA	0.10	pH units	7.34	7.33	7.38	7.50	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	41	46	46	52	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0062	0.0065	0.0096	0.0234	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.00318	0.00315	0.00383	0.00398	----
Beryllium, total	7440-41-7	E420/VA	0.000020	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.023	0.023	0.022	0.030	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	3.80	3.65	3.68	3.77	----
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	0.00013	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	0.0365	0.0713	0.347	0.400	----
Iron, total	7439-89-6	E420/VA	0.010	mg/L	0.015	<0.010	<0.010	0.236	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	0.000612	0.000232	0.00228	0.00196	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	0.0020	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	0.454	0.472	0.473	0.882	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

Sub-Matrix: Water (Matrix: Water)					Client sample ID	FJCC	Town Hall	Fire Department	RCMP	----
Client sampling date / time					27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2207-001	VA24D2207-002	VA24D2207-003	VA24D2207-004	----	
					Result	Result	Result	Result	----	
Total Metals										
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.00046	0.00032	0.00076	0.00219	----	
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.000148	0.000142	0.000115	0.000146	----	
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	<0.00050	<0.00050	<0.00050	0.00096	----	
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	----	
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	0.246	0.244	0.242	0.244	----	
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.00057	0.00058	0.00060	0.00055	----	
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	----	
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	1.69	1.64	1.76	1.65	----	
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	<0.000010	<0.000010	0.000022	0.000011	----	
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	8.93	9.25	8.89	9.22	----	
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.0122	0.0113	0.0122	0.0123	----	
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	0.52	0.55	<0.50	<0.50	----	
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	----	
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----	
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	----	
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	----	
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	----	
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	----	
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	0.0040	<0.0030	0.0076	0.0158	----	



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	FJCC	Town Hall	Fire Department	RCMP	----
					Client sampling date / time	27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	27-Nov-2024 10:30	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2207-001	VA24D2207-002	VA24D2207-003	VA24D2207-004		----
					Result	Result	Result	Result		----
Total Metals										
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020		----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D2207	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 - Quarterly DT Sampling	Date Samples Received	: 28-Nov-2024 10:30
PO	: 10880	Issue Date	: 05-Dec-2024 10:06
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 4		
No. of samples analysed	: 4		

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

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- 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	: VA24D2347		
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 - Quarterly Lake Sampling	Date Samples Received	: 29-Nov-2024 11:50
PO	: 10880	Date Analysis Commenced	: 29-Nov-2024
C-O-C number	: ----	Issue Date	: 06-Dec-2024 11:42
Sampler	: ----		
Site	: ----		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 2		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia



General Comments

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
LOR: Limit of Reporting (detection limit).

Unit	Description
mg/L	milligrams per litre
µg/L	micrograms per litre
pH units	pH units
NTU	nephelometric turbidity units
% T/cm	% transmittance per centimetre
AU/cm	absorbance units per centimetre
CU	colour units (1 cu = 1 mg/l pt)
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.

Work Order : VA24D2347
Client : Town of Ladysmith
Project : Arbutus Water Treatment Plant - Quarterly Lake Sampling





Analytical Results

Sub-Matrix: Water

(Matrix: Water)

Client sample ID					Stocking Lake	Holland Lake	----	----	----
Client sampling date / time					28-Nov-2024 11:00	28-Nov-2024 10:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2347-001	VA24D2347-002	----	----	----
					Result	Result	----	----	----
Physical Tests									
Absorbance, UV (@ 254nm)	----	E404/VA	0.0050	AU/cm	0.0800	0.117	----	----	----
Alkalinity, total (as CaCO3)	----	E290/VA	1.0	mg/L	9.1	3.9	----	----	----
Colour, true	----	E329/VA	5.0	CU	8.8	15.4	----	----	----
Hardness (as CaCO3), from total Ca/Mg	----	EC100A/VA	0.60	mg/L	10.0	4.51	----	----	----
pH	----	E108/VA	0.10	pH units	7.07	6.69	----	----	----
Solids, total dissolved [TDS]	----	E162/VA	10	mg/L	26	17	----	----	----
Turbidity	----	E121/VA	0.10	NTU	0.66	0.34	----	----	----
Transmittance, UV (@ 254nm)	----	E404/VA	1.0	% T/cm	83.2	76.4	----	----	----
Anions and Nutrients									
Bromide	24959-67-9	E235.Br-L/VA	0.050	mg/L	<0.050	<0.050	----	----	----
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	E358-L/VA	0.50	mg/L	2.90	3.88	----	----	----
Carbon, total organic [TOC]	----	E355-L/VA	0.50	mg/L	3.48	3.77	----	----	----
Microbiological Tests									
Coliforms, Escherichia coli [E. coli]	----	E010/VA	1	MPN/100 mL	<1	1	----	----	----
Coliforms, total	----	E010/VA	1	MPN/100 mL	75	112	----	----	----
Total Metals									
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0408	0.0787	----	----	----
Antimony, total	7440-36-0	E420/VA	0.00010	mg/L	<0.00010	<0.00010	----	----	----
Arsenic, total	7440-38-2	E420/VA	0.00010	mg/L	0.00014	<0.00010	----	----	----
Barium, total	7440-39-3	E420/VA	0.00010	mg/L	0.00306	0.00370	----	----	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	Stocking Lake	Holland Lake	----	----	----
					Client sampling date / time	28-Nov-2024 11:00	28-Nov-2024 10:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2347-001	VA24D2347-002	----	----	----	----
					Result	Result	----	----	----	----
Total Metals										
Beryllium, total	7440-41-7	E420/VA	0.000100	mg/L	<0.000100	<0.000100	----	----	----	----
Bismuth, total	7440-69-9	E420/VA	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
Boron, total	7440-42-8	E420/VA	0.010	mg/L	0.022	<0.010	----	----	----	----
Cadmium, total	7440-43-9	E420/VA	0.0000050	mg/L	0.0000054	<0.0000050	----	----	----	----
Calcium, total	7440-70-2	E420/VA	0.050	mg/L	3.19	1.38	----	----	----	----
Cesium, total	7440-46-2	E420/VA	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
Chromium, total	7440-47-3	E420/VA	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Cobalt, total	7440-48-4	E420/VA	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Copper, total	7440-50-8	E420/VA	0.00050	mg/L	<0.00050	0.00072	----	----	----	----
Iron, total	7439-89-6	E420/VA	0.010	mg/L	0.048	0.094	----	----	----	----
Lead, total	7439-92-1	E420/VA	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----
Lithium, total	7439-93-2	E420/VA	0.0010	mg/L	<0.0010	<0.0010	----	----	----	----
Magnesium, total	7439-95-4	E420/VA	0.0050	mg/L	0.508	0.259	----	----	----	----
Manganese, total	7439-96-5	E420/VA	0.00010	mg/L	0.00761	0.00808	----	----	----	----
Mercury, total	7439-97-6	E508/VA	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----	----
Molybdenum, total	7439-98-7	E420/VA	0.000050	mg/L	0.000202	<0.000050	----	----	----	----
Nickel, total	7440-02-0	E420/VA	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Phosphorus, total	7723-14-0	E420/VA	0.050	mg/L	<0.050	<0.050	----	----	----	----
Potassium, total	7440-09-7	E420/VA	0.050	mg/L	0.245	0.123	----	----	----	----
Rubidium, total	7440-17-7	E420/VA	0.00020	mg/L	0.00066	0.00035	----	----	----	----
Selenium, total	7782-49-2	E420/VA	0.000050	mg/L	<0.000050	<0.000050	----	----	----	----



Analytical Results

Sub-Matrix: Water
 (Matrix: Water)

					Client sample ID	Stocking Lake	Holland Lake	----	----	----
					Client sampling date / time	28-Nov-2024 11:00	28-Nov-2024 10:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2347-001	VA24D2347-002	----	----	----	----
					Result	Result	----	----	----	----
Total Metals										
Silicon, total	7440-21-3	E420/VA	0.10	mg/L	1.91	1.20	----	----	----	----
Silver, total	7440-22-4	E420/VA	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
Sodium, total	7440-23-5	E420/VA	0.050	mg/L	1.08	0.755	----	----	----	----
Strontium, total	7440-24-6	E420/VA	0.00020	mg/L	0.00997	0.00662	----	----	----	----
Sulfur, total	7704-34-9	E420/VA	0.50	mg/L	<0.50	<0.50	----	----	----	----
Tellurium, total	13494-80-9	E420/VA	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
Thallium, total	7440-28-0	E420/VA	0.000010	mg/L	<0.000010	<0.000010	----	----	----	----
Thorium, total	7440-29-1	E420/VA	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Tin, total	7440-31-5	E420/VA	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Titanium, total	7440-32-6	E420/VA	0.00030	mg/L	0.00040	0.00075	----	----	----	----
Tungsten, total	7440-33-7	E420/VA	0.00010	mg/L	<0.00010	<0.00010	----	----	----	----
Uranium, total	7440-61-1	E420/VA	0.000010	mg/L	0.000024	<0.000010	----	----	----	----
Vanadium, total	7440-62-2	E420/VA	0.00050	mg/L	<0.00050	<0.00050	----	----	----	----
Zinc, total	7440-66-6	E420/VA	0.0030	mg/L	<0.0030	<0.0030	----	----	----	----
Zirconium, total	7440-67-7	E420/VA	0.00020	mg/L	<0.00020	<0.00020	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L	<250	<250	----	----	----	----
EPH (C10-C32)	----	E601A/VA	400	µg/L	<400	<400	----	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L	<250	<250	----	----	----	----
TEH (C10-C30), BC	----	E601A/VA	250	µg/L	<250	<250	----	----	----	----



Analytical Results

Sub-Matrix: Water

(Matrix: Water)

					Client sample ID	Stocking Lake	Holland Lake	----	----	----
					Client sampling date / time	28-Nov-2024 11:00	28-Nov-2024 10:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2347-001	VA24D2347-002	----	----	----	----
					Result	Result	----	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%	80.8	88.6	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L	<0.0050	<0.0050	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L	<0.015	<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L	<0.0050	<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L	<0.050	<0.050	----	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L	<0.020	<0.020	----	----	----	----



Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	Stocking Lake	Holland Lake	----	----	----
Client sampling date / time					28-Nov-2024 11:00	28-Nov-2024 10:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24D2347-001	VA24D2347-002	----	----	----	----
					Result	Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Pyrene	129-00-0	E641A/VA	0.010	µg/L	<0.010	<0.010	----	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L	<0.050	<0.050	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%	95.9	98.4	----	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%	96.4	97.5	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%	94.1	95.8	----	----	----	----

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24D2347	Page	: 1 of 12
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 - Quarterly Lake Sampling	Date Samples Received	: 29-Nov-2024 11:50
PO	: 10880	Issue Date	: 06-Dec-2024 11:41
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	: 2		
No. of samples analysed	: 2		

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Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

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

Outliers : Frequency of Quality Control Samples

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