TOWN OF LADYSMITH - ARBUTUS WATER TREATMENT PLANT

April 2024 - Monthly Report

		Daily Flow			Chlorine	Residual			External Lab Testing						
Date	Stocking Lake	Holland Creek	Combined Flow	Free Min	Free Max	Free Avg	Total	CT*	HPC	E.coli	Total	Aluminum	тнм	HAA	
	m³	m³	m³	mg/l	mg/l	mg/l	mg/l	Minutes-mg/I	CFU	MPN	MPN	mg/l	mg/l	mg/l	
01-Apr	3748	0	3748	0.92	0.96	0.95	1.02	199							
02-Apr	3683	0	3683	0.89	0.96	0.93	1.01	227							
03-Apr	4401	0	4401	0.88	1.00	1.00	0.99	311	< 1	< 1	< 1				
04-Apr	3794	0	3794	0.94	1.10	0.99	1.02	282							
05-Apr	4007	0	4007	0.91	0.99	0.98	1.03	296							
06-Apr	3490	0	3490	0.91	0.98	0.92	1.03	184							
07-Apr	4021	0	4021	0.87	0.99	0.99	0.98	159							
08-Apr	4074	0	7074	0.95	1.01	1.01	1.05	158							
09-Apr	3974	0	3974	0.93	1.01	0.98	1.03	164	< 1	< 1	< 1	0.0091	0.0174	0.0123	
10-Apr	3800	0	3800	0.89	0.98	0.91	1.00	199							
11-Apr	3791	0	3791	0.84	0.91	0.91	0.94	186							
12-Apr	3738	0	3738	0.86	1.03	1.03	0.97	141							
13-Apr	3891	0	3891	1.03	1.13	1.12	1.20	253							
14-Apr	3900	0	3900	1.06	1.12	1.10	1.19	184							
15-Apr	3922	0	3922	1.06	1.11	1.06	1.31	119							
16-Apr	3928	0	3928	1.01	1.06	1.02	1.20	176	< 1	< 1	< 1				
17-Apr	4294	0	4294	0.99	1.02	1.01	1.04	157							
18-Apr	4305	0	4305	0.97	1.01	1.00	1.00	152							
19-Apr	4398	0	4398	0.97	1.00	0.99	1.11	124							
20-Apr	4128	0	4128	0.96	0.99	0.97	1.09	192							
21-Apr	3834	0	3834	0.95	1.09	0.97	1.08	180							
22-Apr	4141	0	4141	0.94	0.99	0.98	1.09	193							
23-Apr	4368	0	4368	0.96	1.01	1.01	1.12	184	< 1	< 1	< 1				
24-Apr	2049	1911	3960	0.98	1.01	1.00	1.09	191							
25-Apr	0	4368	4368	0.99	1.02	1.01	1.13	187							
26-Apr	0	3634	3634	0.95	1.01	0.99	1.04	113							
27-Apr	0	3608	3608	0.92	0.96	0.93	1.02	227							
28-Apr	0	3737	3737	0.91	0.93	0.93	1.09	223							
29-Apr	0	3816	3816	0.91	0.96	0.96	1.03	161							
30-Apr	0	4076	4076	0.95	0.97	0.97	1.07	189							
*CT - Record	ded as the minimum va	lue at the highest daily	flow ** Manual Resid	ual were not tak	en										
Total	93679	25150	121829												
Average	3123	838	4061	0.94	1.01	0.99	1.07	190	< 1	< 1	< 1	0.0091	0.0174	0.01230	





Town of Ladysmith Arbutus DWTP

Monthly LRV and Turbidity Report

03/31/2024 - 05/01/2024

LRV Monthly Average

Asset	Parameter	Health	Avg	Std. De v	Points	LL	LCL	%In	% betw een L and LL	% belo w LL	Unit
UF 1	LRV		5.0	0.0	33	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	31	4.25	4.5	100 %	0%	0 %	#

LRV Daily Values

Asset	Parameter	Mar 31	Apr 01	Apr 02	Apr 03	Apr 04	Apr 05	Apr 06	Apr 07	Apr 08	Apr 09
UF 1	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	LRV	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Asset	Apr 10	Apr 11	Apr 12	Apr 13	Apr 14	Apr 15	Apr 16	Apr 17	Apr 18	Apr 19	Apr 20	Apr 21	Apr 22
UF 1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Asset	Apr 23	Apr 24	Apr 25	Apr 26	Apr 27	Apr 28	Apr 29	Apr 30	May 01
UF 1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
UF 3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	

LRV Raw Data







Asset	Parameter	Health	Avg	Std. De v	Points	UCL	нн	%In	% betw een H and HH	% abov e HH	Unit
UF 1	PermeateTurbidity		0.019	0.0	45250			100 %	0%	0 %	NTU
UF 2	PermeateTurbidity		0.016	0.01	45250			100 %	0%	0 %	NTU
UF 3	PermeateTurbidity		0.014	0.0	45250			100 %	0%	0 %	NTU
UF 1	PermeateTurbidityAfterBP		0.019	0.0	448	0.1	0.3	100 %	0%	0 %	NTU
UF 2	PermeateTurbidityAfterBP		0.016	0.0	467	0.1	0.3	100 %	0%	0 %	NTU
UF 3	PermeateTurbidityAfterBP		0.014	0.0	440	0.1	0.3	100 %	0%	0 %	NTU

Turbidity Daily Averages

Asset		Parame	eter	1	Mar 31	Apr	01	Apr 02	Apr 0	3 Apr	04	Apr 0	5 Ap	or 06	Apr 0	7 A	pr 08	Apr 0	9
UF 1	Pe	rmeateT	urbidity		0.019	0.0	19	0.019	0.019	0.0	19	0.019	0.	.019	0.02	(0.021	0.02	
UF 2	Pe	rmeateT	urbidity		0.015	0.0	15	0.015	0.015	0.0	16	0.016	0.	016	0.017	7 (0.017	0.017	,
UF 3	Pe	rmeateT	urbidity		0.017	0.0	17	0.017	0.017	0.0	17	0.017	0.	.017	0.017	7 (0.017	0.017	,
UF 1	Perme	ateTurbi	dityAfter	·ВР	0.019	0.0	19	0.019	0.019	0.0	19	0.02	C	0.02	0.02	(0.021	0.021	_
UF 2	Perme	ateTurbi	dityAfter	·ВР	0.015	0.0	15	0.015	0.015	0.0	16	0.016	i 0.	.016	0.017	7 (0.017	0.017	,
UF 3	Perme	ateTurbi	dityAfter	·ВР	0.017	0.0	17	0.017	0.017	0.0	17	0.017	0.	.018	0.018	3 (0.017	0.017	ł
Asset	Apr 10	Apr 11	Apr 12	Apr	13 Apı	r 14	Apr	15 Apı	16 A	or 17	Apr	18 Aj	or 19) Apr	20 A	pr 2	1 Apr	22	
UF 1	0.021	0.02	0.02	0.02	22 0.0)22	0.02	23 0.0	022 0	024	0.0	24 0	.025	0.0	26 C).026	5 0.0	18	
UF 2	0.017	0.017	0.017	0.01	17 0.0)17	0.01	L8 0.C	019 0	019	0.0	19 0	.019	0.0	19	0.02	0.0)2	
UF 3	0.017	0.018	0.015	0.01	11 0.0)11	0.01	L1 0.0	011 0	011	0.0	11 0	.011	0.0	12 0	0.012	2 0.0	11	
UF 1	0.021	0.021	0.021	0.02	22 0.0	23	0.02	23 0.0	023 0	024	0.0	24 0	.026	0.0	25 C	0.026	5 0.0	18	
LIF 2	0.017	0.017	0.017	0.01	17 0.0	18	0.01		019 0	019	0.0	19 0	019	0.0	19 0	010	3 00)2	

Asset	Apr 10	Apr 11	Apr 12	Apr 13	Apr 14	Apr 15	Apr 16	Apr 17	Apr 18	Apr 19	Apr 20	Apr 21	Apr 22
UF 3	0.018	0.018	0.015	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
Asset	Apr 23	Apr 24	Apr 25	Apr 26	Apr 27	Apr 28	Apr 29	Apr 30	May 01				
UF 1	0.013	0.013	0.013	0.013	0.013	0.012	0.013	0.012	0.013				
UF 2	0.021	0.021	0.017	0.012	0.011	0.011	0.011	0.011	0.011				
UF 3	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012				
UF 1	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013				
UF 2	0.021	0.021	0.016	0.012	0.011	0.011	0.011	0.011	0.011				
UF 3	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012				

Turbidity Raw Data

UF 1 - PermeateTurbidityAfterBP (NTU)







Mar 34 pr 04 pr 02 pr 05 pr 04 pr 05 pr 05



CERTIFICATE OF ANALYSIS								
Work Order	: VA24A7044	Page	: 1 of 3					
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver					
Contact	: Shawn Baker	Account Manager	: Thomas Chang					
Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway					
	Ladysmith BC Canada V9G 1A2		Burnaby BC Canada V5A 1W9					
Telephone	:	Telephone	: +1 604 253 4188					
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 04-Apr-2024 10:45					
PO	: PO #10880	Date Analysis Commenced	: 04-Apr-2024					
C-O-C number	:	Issue Date	: 09-Apr-2024 13:54					
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
Caitlin Macey	Team Leader - Inorganics	Microbiology, Burnaby, British Columbia
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia



General Comments

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

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

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference. Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

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

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

<: less than.

>: greater than.

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

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

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

Workorder Comments

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



Analytical Results

ub-Matrix: Water Client sample ID		Raw Water	DAF Effluent	UF Effluent	Treated Water				
(Matrix: Water)								(post reservoir)	
			Client samp	oling date / time	03-Apr-2024 10:30	03-Apr-2024 10:30	03-Apr-2024 10:30	03-Apr-2024 10:30	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A7044-001	VA24A7044-002	VA24A7044-003	VA24A7044-004	
					Result	Result	Result	Result	
Physical Tests									
Alkalinity, total (as CaCO3)		E290/VA	1.0	mg/L				16.2	
Colour, true		E329/VA	5.0	CU				<5.0	
Conductivity		E100/VA	2.0	µS/cm				63.7	
рН		E108/VA	0.10	pH units				7.54	
Turbidity		E121/VA	0.10	NTU				<0.10	
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]		E358-L/VA	0.50	mg/L	2.76	1.30	1.18		
Carbon, total organic [TOC]		E355-L/VA	0.50	mg/L	2.62	1.32	1.10		
Microbiological Tests									
Heterotrophic plate count [HPC]		E020/VA	1	CFU/mL				<1	
Coliforms, Escherichia coli [E. coli]		E010/VA	1	MPN/100mL				<1	
Coliforms, total		E010/VA	1	MPN/100mL				<1	

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

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



QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA24A7044	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	Address	: 8081 Lougheed Highway
	Ladysmith BC Canada V9G 1A2		Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 04-Apr-2024 10:45
PO	: PO #10880	Issue Date	: 09-Apr-2024 13:55
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

- <u>No</u> 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

• <u>No</u> Quality Control Sample Frequency Outliers occur.



CERTIFICATE OF ANALYSIS							
Work Order	: VA24A7541	Page	: 1 of 3				
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver				
Contact	: Shawn Baker	Account Manager	: Thomas Chang				
Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway				
	Ladysmith BC Canada V9G 1A2		Burnaby BC Canada V5A 1W9				
Telephone		Telephone	: +1 604 253 4188				
Project	: Arbutus Water Treatment - Monthly Sampling	Date Samples Received	: 10-Apr-2024 12:35				
PO	: 10880	Date Analysis Commenced	: 11-Apr-2024				
C-O-C number	:	Issue Date	: 16-Apr-2024 10:58				
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.

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- 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
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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.

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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
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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Analytical Results

Sub-Matrix: Water Client sample IE			ient sample ID	Treated Water	 	 	
(Matrix: Water)					(post reservoir)		
Client sampling date / time					09-Apr-2024 10:30	 	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A7541-001	 	
					Result	 	
Total Metals							
Aluminum, total	7429-90-5	E420/VA	0.0030	mg/L	0.0091	 	
Volatile Organic Compounds [THMs]							
Bromodichloromethane	75-27-4	E611B/VA	1.0	μg/L	1.3	 	
Bromoform	75-25-2	E611B/VA	1.0	µg/L	<1.0	 	
Chloroform	67-66-3	E611B/VA	1.0	µg/L	16.1	 	
Dibromochloromethane	124-48-1	E611B/VA	1.0	µg/L	<1.0	 	
Trihalomethanes [THMs], total		E611B/VA	2.0	μg/L	17.4	 	
Volatile Organic Compounds [THMs] Surrogates							
Bromofluorobenzene, 4-	460-00-4	E611B/VA	1.0	%	83.8	 	
Difluorobenzene, 1,4-	540-36-3	E611B/VA	1.0	%	98.0	 	
Haloacetic Acids							
Bromochloroacetic acid	5589-96-8	E750/WT	1.00	µg/L	<1.00	 	
Dibromoacetic acid	631-64-1	E750/WT	1.00	µg/L	<1.00	 	
Dichloroacetic acid	79-43-6	E750/WT	1.00	μg/L	5.59	 	
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	6.74	 	
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.

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



QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:VA24A7541	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	Address	: 8081 Lougheed Highway
	Ladysmith BC Canada V9G 1A2		Burnaby, British Columbia Canada V5A 1W9
Telephone	;	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment - Monthly Sampling	Date Samples Received	: 10-Apr-2024 12:35
PO	: 10880	Issue Date	: 16-Apr-2024 10:58
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.

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DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- <u>No</u> Method Blank value outliers occur.
- <u>No</u> 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)

• <u>No</u> Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

• <u>No</u> Quality Control Sample Frequency Outliers occur.



CERTIFICATE OF ANALYSIS							
Work Order	: VA24A7540	Page	: 1 of 3				
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver				
Contact	: Shawn Baker	Account Manager	: Thomas Chang				
Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway				
	Ladysmith BC Canada V9G 1A2		Burnaby BC Canada V5A 1W9				
Telephone	:	Telephone	: +1 604 253 4188				
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 10-Apr-2024 12:35				
PO	: 10880	Date Analysis Commenced	: 10-Apr-2024				
C-O-C number	:	Issue Date	: 16-Apr-2024 15:48				
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

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

Signatories

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

Signatories	Position	Laboratory Department
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Microbiology, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia



General Comments

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

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

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Water			C	lient sample ID	Raw Water	DAF Effluent	UF Effluent	Treated Water	
(Matrix: Water)								(post reservoir)	
			Client samp	ling date / time	09-Apr-2024 10:30	09-Apr-2024 10:30	09-Apr-2024 10:30	09-Apr-2024 10:30	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A7540-001	VA24A7540-002	VA24A7540-003	VA24A7540-004	
					Result	Result	Result	Result	
Physical Tests									
Alkalinity, total (as CaCO3)		E290/VA	1.0	mg/L				15.2	
Colour, true		E329/VA	5.0	CU				<5.0	
Conductivity		E100/VA	2.0	μS/cm				62.9	
рН		E108/VA	0.10	pH units				7.38	
Turbidity		E121/VA	0.10	NTU				<0.10	
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]		E358-L/VA	0.50	mg/L	2.54	1.18	1.23		
Carbon, total organic [TOC]		E355-L/VA	0.50	mg/L	2.85	1.19	1.40		
Microbiological Tests									
Heterotrophic plate count [HPC]		E020/VA	1	CFU/mL				<1	
Coliforms, Escherichia coli [E. coli]		E010/VA	1	MPN/100mL				<1	
Coliforms, total		E010/VA	1	MPN/100mL				<1	

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

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



QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:VA24A7540	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	Address	: 8081 Lougheed Highway
	Ladysmith BC Canada V9G 1A2		Burnaby, British Columbia Canada V5A 1W9
Telephone	;	Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 10-Apr-2024 12:35
PO	: 10880	Issue Date	: 16-Apr-2024 15:49
C-O-C number	:		
Sampler	:		
Site	: Town of Ladysmith		
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20		
No. of samples received	:4		
No. of samples analysed	:4		

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

Key

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

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

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers Outliers : Quality Control Samples

- <u>No</u> 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	: VA24A8131	Page	: 1 of 3				
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver				
Contact	: Shawn Baker	Account Manager	: Thomas Chang				
Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway				
	Ladysmith BC Canada V9G 1A2		Burnaby BC Canada V5A 1W9				
Telephone	:	Telephone	: +1 604 253 4188				
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 17-Apr-2024 11:45				
PO	: PO #10880	Date Analysis Commenced	: 17-Apr-2024				
C-O-C number	:	Issue Date	: 23-Apr-2024 13:21				
Sampler	:						
Site	: Town of Ladysmith						
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20						
No. of samples received	: 4						
No. of samples analysed	: 4						

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Laboratory Department
Monica Ko	Lab Assistant	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Microbiology, Burnaby, British Columbia



General Comments

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

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

<: less than.

>: greater than.

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

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

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

Workorder Comments

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



Analytical Results

Sub-Matrix: Water Client sample ID			Raw Water	DAF Effluent	UF Effluent	Treated Water			
(Matrix: Water)								(post reservoir)	
			Client samp	oling date / time	16-Apr-2024 10:30	16-Apr-2024 10:30	16-Apr-2024 10:30	16-Apr-2024 10:30	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A8131-001	VA24A8131-002	VA24A8131-003	VA24A8131-004	
					Result	Result	Result	Result	
Physical Tests									
Alkalinity, total (as CaCO3)		E290/VA	1.0	mg/L				15.2	
Colour, true		E329/VA	5.0	CU				<5.0	
Conductivity		E100/VA	2.0	µS/cm				66.1	
рН		E108/VA	0.10	pH units				7.49	
Turbidity		E121/VA	0.10	NTU				<0.10	
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]		E358-L/VA	0.50	mg/L	2.29	1.36	1.36		
Carbon, total organic [TOC]		E355-L/VA	0.50	mg/L	2.66	1.59	1.20		
Microbiological Tests									
Heterotrophic plate count [HPC]		E020/VA	1	CFU/mL				<1	
Coliforms, Escherichia coli [E. coli]		E010/VA	1	MPN/100mL				<1	
Coliforms, total		E010/VA	1	MPN/100mL				<1	

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



QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:VA24A8131	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	Address	: 8081 Lougheed Highway
	Ladysmith BC Canada V9G 1A2		Burnaby, British Columbia Canada V5A 1W9
Telephone		Telephone	: +1 604 253 4188
Project	: Arbutus Water Treatment Plant - Weekly Sampling	Date Samples Received	: 17-Apr-2024 11:45
PO	: PO #10880	Issue Date	: 23-Apr-2024 13:29
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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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

- <u>No</u> 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

• <u>No</u> Quality Control Sample Frequency Outliers occur.



CERTIFICATE OF ANALYSIS							
Work Order	: VA24A8779	Page	: 1 of 3				
Client	: Town of Ladysmith	Laboratory	: ALS Environmental - Vancouver				
Contact	: Shawn Baker	Account Manager	: Thomas Chang				
Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway				
	Ladysmith BC Canada V9G 1A2		Burnaby BC Canada V5A 1W9				
Telephone		Telephone	: +1 604 253 4188				
Project		Date Samples Received	: 24-Apr-2024 09:55				
PO	: PO #10880	Date Analysis Commenced	: 24-Apr-2024				
C-O-C number	:	Issue Date	: 30-Apr-2024 09:20				
Sampler	:						
Site	: Town of Ladysmith						
Quote number	: VA22-GMSM100-001 Tender# 2022-IS-20						
No. of samples received	: 4						
No. of samples analysed	: 4						

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This Certificate of Analysis contains the following information:

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Signatories

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Signatories	Position	Laboratory Department
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Microbiology, Burnaby, British Columbia



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Workorder Comments

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



Analytical Results

Sub-Matrix: Water Client sample ID			Raw Water	DAF Effluent	UF Effluent	Treated Water			
(Matrix: Water)								(post reservoir)	
			Client samp	oling date / time	23-Apr-2024 10:30	23-Apr-2024 10:30	23-Apr-2024 10:30	23-Apr-2024 10:30	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA24A8779-001	VA24A8779-002	VA24A8779-003	VA24A8779-004	
					Result	Result	Result	Result	
Physical Tests									
Alkalinity, total (as CaCO3)		E290/VA	1.0	mg/L				15.2	
Colour, true		E329/VA	5.0	CU				<5.0	
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рН		E108/VA	0.10	pH units				7.52	
Turbidity		E121/VA	0.10	NTU				<0.10	
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]		E358-L/VA	0.50	mg/L	2.32	1.30	0.98		
Carbon, total organic [TOC]		E355-L/VA	0.50	mg/L	2.41	1.32	1.06		
Microbiological Tests									
Heterotrophic plate count [HPC]		E020/VA	1	CFU/mL				<1	
Coliforms, Escherichia coli [E. coli]		E010/VA	1	MPN/100mL				<1	
Coliforms, total		E010/VA	1	MPN/100mL				<1	

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	:VA24A8779	Page	: 1 of 7
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Address	: 410 Esplanade PO Box 220	Address	: 8081 Lougheed Highway
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Telephone	:	Telephone	: +1 604 253 4188
Project		Date Samples Received	: 24-Apr-2024 09:55
PO	: PO #10880	Issue Date	: 30-Apr-2024 09:20
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 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.