

Your C.O.C. #: V018626

Attention: Donna Muir

Cowichan Bay Waterworks
1760 Pavenham Rd
Cowichan Bay, BC
Canada VOR 1N1

Report Date: 2015/12/18

Report #: R2100048

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5A9557

Received: 2015/12/09, 14:30

Sample Matrix: DRINKING WATER

Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water (1)	1	2015/12/15	2015/12/15	BBY6SOP-00026	SM2320B
Chloride by Automated Colourimetry	1	N/A	2015/12/14	BBY6SOP-00011	SM 22 4500-Cl- G m
True Colour (Single Wavelength) (1)	1	N/A	2015/12/10	VIC SOP-00010	Based on SM-2120 C
Conductance - water (1)	1	N/A	2015/12/15	BBY6SOP-00026	SM-2510B
Fluoride	1	N/A	2015/12/12	BBY6SOP-00048	SM 22 4500-F C m
Iron Bacteria (1)	1	N/A	2015/12/10	VIC SOP-00114	SM 22 9240 m
Hardness Total (calculated as CaCO ₃)	1	N/A	2015/12/15	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Total) by CVAF	1	2015/12/14	2015/12/14	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Heterotropic Plate Count Water Mem. Filt (1)	1	N/A	2015/12/10	BBY4 SOP-00003	Based on SM-9215
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2015/12/15	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (total)	1	N/A	2015/12/15	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	1	2015/12/14	2015/12/15	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2015/12/15	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate + Nitrite (N)	1	N/A	2015/12/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2015/12/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2015/12/12	BBY6SOP-00010	SM 22 4500-NO3 I m
Nitrogen (Organic) (Cal. TKN, NH ₄ ,N/N)	1	N/A	2015/12/16	BBY WI-00033	Auto Calc
pH Water (1, 2)	1	N/A	2015/12/15	BBY6SOP-00026	SM-4500H+B
Sat. pH and Langelier Index (@ 4.4C)	1	N/A	2015/12/16	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C)	1	N/A	2015/12/16	BBY WI-00033	Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2015/12/14	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate Reducing Bacteria (1)	1	N/A	2015/12/10	VIC SOP-00114	SM 22 9240 m
Sulphide	1	N/A	2015/12/14	BBY6SOP-00006	SM 22 4500-S2- D m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2015/12/14	VIC SOP-00008	Based on SM 2540C
Total coliform and E. by MF (Chromocult) (1)	1	N/A	2015/12/10	VIC SOP 00112	Based on SM-9222
Carbon (Total Organic) (3)	1	N/A	2015/12/14	BBY6SOP-00003	SM 22 5310 C m
Turbidity (1)	1	N/A	2015/12/10	VIC SOP-00011	Based on SM - 2130

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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- (1) This test was performed by Maxxam Victoria
- (2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.
- (3) TOC present in the sample should be considered as non-purgeable TOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Debbie Nordbruket, Project Manager
Email: DNordbruket@maxxam.ca
Phone# (250)385-6112

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This report has been generated and distributed using a secure automated process.
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RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID					NU7252		
Sampling Date					2015/12/09 09:00		
COC Number					V018626		
	UNITS	MAC	AO	OG	OFFICE DISTRIBUTION	RDL	QC Batch
ANIONS							
Nitrite (N)	mg/L	1	-	-	<0.0050	0.0050	8142090
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	75.2	0.50	8138518
Nitrate (N)	mg/L	10	-	-	0.212	0.020	8138904
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.056	0.010	8142510
Alkalinity (Total as CaCO3)	mg/L	-	-	-	72.6	0.5	8144081
Total Organic Carbon (C)	mg/L	-	-	-	<0.50	0.50	8143723
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	8144081
Bicarbonate (HCO3)	mg/L	-	-	-	88.6	0.5	8144081
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	8144081
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	8144081
Anions							
Dissolved Sulphate (SO4)	mg/L	-	500	-	6.45	0.50	8143548
Dissolved Chloride (Cl)	mg/L	-	250	-	7.5	0.50	8143545
MISCELLANEOUS							
True Colour	Col. Unit	-	15	-	<5	5	8143506
Nutrients							
Total Ammonia (N)	mg/L	-	-	-	0.017	0.0050	8144723
Total Organic Nitrogen (N)	mg/L	-	-	-	<0.020	0.020	8139600
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.212	0.020	8142089
Total Nitrogen (N)	mg/L	-	-	-	0.221	0.020	8143840
Physical Properties							
Conductivity	uS/cm	-	-	-	170	1	8144085
pH	pH	-	6.5:8.5	-	7.8	N/A	8144086
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	93	10	8140291
Turbidity	NTU	see remark	see remark	see remark	0.3	0.1	8143500
RDL = Reportable Detection Limit N/A = Not Applicable							

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Cowichan Bay Waterworks

MERCURY BY COLD VAPOR (DRINKING WATER)

Maxxam ID			NU7252		
Sampling Date			2015/12/09 09:00		
COC Number			V018626		
	UNITS	MAC	OFFICE DISTRIBUTION	RDL	QC Batch
Elements					
Total Mercury (Hg)	ug/L	1	<0.010	0.010	8143388
RDL = Reportable Detection Limit					

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID					NU7252		
Sampling Date					2015/12/09 09:00		
COC Number					V018626		
	UNITS	MAC	AO	OG	OFFICE DISTRIBUTION	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	<3.0	3.0	8143123
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	8143123
Total Arsenic (As)	ug/L	10	-	-	1.64	0.10	8143123
Total Barium (Ba)	ug/L	1000	-	-	3.1	1.0	8143123
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	8143123
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	8143123
Total Boron (B)	ug/L	5000	-	-	<50	50	8143123
Total Cadmium (Cd)	ug/L	5	-	-	<0.010	0.010	8143123
Total Chromium (Cr)	ug/L	50	-	-	2.3	1.0	8143123
Total Cobalt (Co)	ug/L	-	-	-	<0.50	0.50	8143123
Total Copper (Cu)	ug/L	-	1000	-	9.67	0.20	8143123
Total Iron (Fe)	ug/L	-	300	-	<5.0	5.0	8143123
Total Lead (Pb)	ug/L	10	-	-	<0.20	0.20	8143123
Total Manganese (Mn)	ug/L	-	50	-	<1.0	1.0	8143123
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	8143123
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	8143123
Total Selenium (Se)	ug/L	50	-	-	0.20	0.10	8143123
Total Silicon (Si)	ug/L	-	-	-	10900	100	8143123
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	8143123
Total Strontium (Sr)	ug/L	-	-	-	49.2	1.0	8143123
Total Thallium (Tl)	ug/L	-	-	-	<0.050	0.050	8143123
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	8143123
Total Titanium (Ti)	ug/L	-	-	-	<5.0	5.0	8143123
Total Uranium (U)	ug/L	20	-	-	0.14	0.10	8143123
Total Vanadium (V)	ug/L	-	-	-	7.4	5.0	8143123
Total Zinc (Zn)	ug/L	-	5000	-	6.5	5.0	8143123
Total Zirconium (Zr)	ug/L	-	-	-	<0.50	0.50	8143123
Total Calcium (Ca)	mg/L	-	-	-	17.1	0.050	8138903
Total Magnesium (Mg)	mg/L	-	-	-	7.86	0.050	8138903
Total Potassium (K)	mg/L	-	-	-	0.663	0.050	8138903
Total Sodium (Na)	mg/L	-	200	-	6.00	0.050	8138903
Total Sulphur (S)	mg/L	-	-	-	<3.0	3.0	8138903
RDL = Reportable Detection Limit							

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MICROBIOLOGY (DRINKING WATER)

Maxxam ID			NU7252		
Sampling Date			2015/12/09 09:00		
COC Number			V018626		
	UNITS	MAC	OFFICE DISTRIBUTION	RDL	QC Batch
Parameter					
Iron Bacteria	CFU/mL	-	<25	25	8148357
Sulphate reducing bacteria	CFU/mL	-	<200	200	8148359
Microbiological Param.					
Heterotrophic Plate Count	CFU/mL	-	1	1	8143729
Total Coliforms	CFU/100mL	<1	<1	1	8143706
E. coli	CFU/100mL	<1	<1	1	8143706
RDL = Reportable Detection Limit					

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Cowichan Bay Waterworks

CALCULATED PARAMETERS (DRINKING WATER)

Maxxam ID		NU7252	
Sampling Date		2015/12/09 09:00	
COC Number		V018626	
	UNITS	OFFICE DISTRIBUTION	QC Batch
Parameter			
Langelier Index (@ 4.4C)	N/A	-1.01	8139606
Langelier Index (@ 60C)	N/A	0.0300	8139607
Saturation pH (@ 4.4C)	N/A	8.80	8139606
Saturation pH (@ 60C)	N/A	7.76	8139607

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MISCELLANEOUS (DRINKING WATER)

Maxxam ID			NU7252		
Sampling Date			2015/12/09 09:00		
COC Number			V018626		
	UNITS	AO	OFFICE DISTRIBUTION	RDL	QC Batch
MISCELLANEOUS					
Sulphide	mg/L	0.05	0.0084	0.0050	8143062
RDL = Reportable Detection Limit					

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
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MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, October 2014.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG)
It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:

1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

Cowichan Bay Waterworks

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8140291	Total Dissolved Solids	2015/12/14			89	80 - 120	<10	mg/L	5.6	20
8142089	Nitrate plus Nitrite (N)	2015/12/11	NC	80 - 120	106	80 - 120	<0.020	mg/L	2.9	25
8142090	Nitrite (N)	2015/12/11	98	80 - 120	101	80 - 120	<0.0050	mg/L	0.36	20
8142510	Fluoride (F)	2015/12/12	97	80 - 120	102	80 - 120	0.011, RDL=0.010	mg/L	0	20
8143062	Sulphide	2015/12/14	103	80 - 120	100	80 - 120	0.0052, RDL=0.0050	mg/L	NC	20
8143123	Total Aluminum (Al)	2015/12/15	111	80 - 120	103	80 - 120	<3.0	ug/L	NC	20
8143123	Total Antimony (Sb)	2015/12/15	103	80 - 120	102	80 - 120	<0.50	ug/L	NC	20
8143123	Total Arsenic (As)	2015/12/15	100	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
8143123	Total Barium (Ba)	2015/12/15	96	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
8143123	Total Beryllium (Be)	2015/12/15	99	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
8143123	Total Bismuth (Bi)	2015/12/15	96	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
8143123	Total Boron (B)	2015/12/15	107	80 - 120	98	80 - 120	<50	ug/L	NC	20
8143123	Total Cadmium (Cd)	2015/12/15	100	80 - 120	100	80 - 120	<0.010	ug/L	NC	20
8143123	Total Chromium (Cr)	2015/12/15	102	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
8143123	Total Cobalt (Co)	2015/12/15	100	80 - 120	100	80 - 120	<0.50	ug/L	NC	20
8143123	Total Copper (Cu)	2015/12/15	NC	80 - 120	99	80 - 120	<0.20	ug/L	2.6	20
8143123	Total Iron (Fe)	2015/12/15	100	80 - 120	104	80 - 120	<5.0	ug/L	NC	20
8143123	Total Lead (Pb)	2015/12/15	96	80 - 120	100	80 - 120	<0.20	ug/L	NC	20
8143123	Total Manganese (Mn)	2015/12/15	96	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
8143123	Total Molybdenum (Mo)	2015/12/15	103	80 - 120	100	80 - 120	<1.0	ug/L	NC	20
8143123	Total Nickel (Ni)	2015/12/15	97	80 - 120	103	80 - 120	<1.0	ug/L	NC	20
8143123	Total Selenium (Se)	2015/12/15	96	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
8143123	Total Silicon (Si)	2015/12/15					<100	ug/L	3.4	20
8143123	Total Silver (Ag)	2015/12/15	98	80 - 120	100	80 - 120	<0.020	ug/L	NC	20
8143123	Total Strontium (Sr)	2015/12/15	NC	80 - 120	101	80 - 120	<1.0	ug/L	0.83	20
8143123	Total Thallium (Tl)	2015/12/15	96	80 - 120	98	80 - 120	<0.050	ug/L	NC	20
8143123	Total Tin (Sn)	2015/12/15	99	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
8143123	Total Titanium (Ti)	2015/12/15	121 (1)	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
8143123	Total Uranium (U)	2015/12/15	104	80 - 120	104	80 - 120	<0.10	ug/L	NC	20
8143123	Total Vanadium (V)	2015/12/15	101	80 - 120	98	80 - 120	<5.0	ug/L	NC	20
8143123	Total Zinc (Zn)	2015/12/15	NC	80 - 120	101	80 - 120	<5.0	ug/L	3.4	20

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QUALITY ASSURANCE REPORT(CONT'D)

Cowichan Bay Waterworks

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8143123	Total Zirconium (Zr)	2015/12/15					<0.50	ug/L	NC	20
8143388	Total Mercury (Hg)	2015/12/14	92	80 - 120	96	80 - 120	<0.010	ug/L	NC	20
8143500	Turbidity	2015/12/10			99	80 - 120	<0.1	NTU		
8143506	True Colour	2015/12/10			104	80 - 120	<5	Col. Unit		
8143545	Dissolved Chloride (Cl)	2015/12/14	NC	80 - 120	105	80 - 120	<0.50	mg/L	1.2	20
8143548	Dissolved Sulphate (SO4)	2015/12/14	NC	80 - 120	96	80 - 120	<0.50	mg/L	2.7	20
8143706	E. coli	2015/12/10							NC	N/A
8143706	Total Coliforms	2015/12/10							NC	N/A
8143723	Total Organic Carbon (C)	2015/12/14	95	80 - 120	95	80 - 120	<0.50	mg/L	NC	20
8143729	Heterotrophic Plate Count	2015/12/10							NC	N/A
8143840	Total Nitrogen (N)	2015/12/15	NC	80 - 120	94	80 - 120	<0.020	mg/L	4.1	20
8144081	Alkalinity (PP as CaCO3)	2015/12/15	21	N/A			<0.5	mg/L	NC	20
8144081	Alkalinity (Total as CaCO3)	2015/12/15	NC	80 - 120	92	80 - 120	<0.5	mg/L	0.45	20
8144081	Bicarbonate (HCO3)	2015/12/15					<0.5	mg/L	0.45	20
8144081	Carbonate (CO3)	2015/12/15					<0.5	mg/L	NC	20
8144081	Hydroxide (OH)	2015/12/15					<0.5	mg/L	NC	20
8144085	Conductivity	2015/12/15			101	90 - 110	<1	uS/cm	0.60	20
8144086	pH	2015/12/15			101	96 - 104			0.12	N/A
8144723	Total Ammonia (N)	2015/12/15	NC	80 - 120	109	80 - 120	<0.0050	mg/L	4.2	20
8148357	Iron Bacteria	2015/12/10							NC	N/A

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Sample run past hold time due to excessive growth on initial analysis

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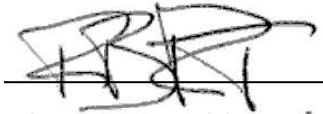
Cowichan Bay Waterworks

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



David Nadler, AASc, Victoria Operations Manager



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.