



Cartier Regional Water Co-op Inc. -
Headingley
ATTN: DAVID EPLER
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Headingley MB R4H 1E8

Date Received: 26-MAR-19
Report Date: 02-APR-19 15:58 (MT)
Version: FINAL

Client Phone: 204-832-2555

Certificate of Analysis

Lab Work Order #: L2249343
Project P.O. #: NOT SUBMITTED
Job Reference: HEADINGLY REGIONAL WATER SYSTEM 89.40
C of C Numbers:
Legal Site Desc:

Hua Wo
Chemistry Laboratory Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2249343-1 TRUE RAW SURFACE WATER							
Sampled By: DE on 26-MAR-19 @ 09:30							
Matrix: water							
MB Chemistry for PWS							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	371		1.2	mg/L		29-MAR-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		29-MAR-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		29-MAR-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	304		1.0	mg/L		28-MAR-19	R4586867
Ammonia by colour							
Ammonia, Total (as N)	0.023		0.010	mg/L		01-APR-19	R4588997
Bromide in Water by IC (Low Level)							
Bromide (Br)	0.063		0.010	mg/L		27-MAR-19	R4586951
Chloride in Water by IC (Low Level)							
Chloride (Cl)	23.9		0.10	mg/L		27-MAR-19	R4586951
Colour, True							
Colour, True	10.9		5.0	CU		27-MAR-19	R4585632
Conductivity							
Conductivity	1020		1.0	umhos/cm		28-MAR-19	R4586867
Dissolved Organic Carbon by Combustion							
Dissolved Organic Carbon	9.16		0.50	mg/L		29-MAR-19	R4588168
Fluoride in Water by IC							
Fluoride (F)	0.172		0.020	mg/L		27-MAR-19	R4586951
Hardness Calculated							
Hardness (as CaCO3)	460	HTC	0.20	mg/L		01-APR-19	
Langelier Index 4C							
Langelier Index (4 C)	0.64					02-APR-19	
Langelier Index 60C							
Langelier Index (60 C)	1.4					02-APR-19	
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.900		0.0050	mg/L		27-MAR-19	R4586951
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	0.0034		0.0010	mg/L		27-MAR-19	R4586951
Sulfate in Water by IC							
Sulfate (SO4)	240		0.30	mg/L		27-MAR-19	R4586951
Total Dissolved Solids (TDS)							
Total Dissolved Solids	696		20	mg/L		28-MAR-19	R4587054
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.170		0.0030	mg/L	29-MAR-19	29-MAR-19	R4587914
Antimony (Sb)-Total	0.00017		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Arsenic (As)-Total	0.00310		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Barium (Ba)-Total	0.0924		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Boron (B)-Total	0.100		0.010	mg/L	29-MAR-19	29-MAR-19	R4587914
Cadmium (Cd)-Total	0.0000137		0.0000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Calcium (Ca)-Total	96.1		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Cesium (Cs)-Total	0.000027		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Chromium (Cr)-Total	0.00037		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Cobalt (Co)-Total	0.00024		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Copper (Cu)-Total	0.0220		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Iron (Fe)-Total	0.298		0.010	mg/L	29-MAR-19	29-MAR-19	R4587914
Lead (Pb)-Total	0.000157		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2249343-1 TRUE RAW SURFACE WATER Sampled By: DE on 26-MAR-19 @ 09:30 Matrix: water							
Total Metals in Water by CRC ICPMS							
Lithium (Li)-Total	0.0604		0.0010	mg/L	29-MAR-19	29-MAR-19	R4587914
Magnesium (Mg)-Total	53.5		0.0050	mg/L	29-MAR-19	29-MAR-19	R4587914
Manganese (Mn)-Total	0.0226		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Molybdenum (Mo)-Total	0.00316		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Nickel (Ni)-Total	0.00332		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Potassium (K)-Total	12.3		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Phosphorus (P)-Total	0.203		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Rubidium (Rb)-Total	0.00250		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Selenium (Se)-Total	0.000414		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Silicon (Si)-Total	11.0		0.10	mg/L	29-MAR-19	29-MAR-19	R4587914
Silver (Ag)-Total	0.000019		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Sodium (Na)-Total	50.8		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Strontium (Sr)-Total	0.383		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Thorium (Th)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Tin (Sn)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Titanium (Ti)-Total	0.00522		0.00030	mg/L	29-MAR-19	29-MAR-19	R4587914
Tungsten (W)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Uranium (U)-Total	0.00394		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Vanadium (V)-Total	0.00166		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Zinc (Zn)-Total	0.0073		0.0030	mg/L	29-MAR-19	29-MAR-19	R4587914
Zirconium (Zr)-Total	0.000410		0.000060	mg/L	29-MAR-19	29-MAR-19	R4587914
Total Organic Carbon by Combustion							
Total Organic Carbon	9.77		0.50	mg/L		27-MAR-19	R4586188
Turbidity							
Turbidity	7.02		0.10	NTU		27-MAR-19	R4586948
UV Transmittance (Calculated)							
Transmittance, UV (254 nm)	62.4		1.0	%T/cm		27-MAR-19	R4586947
pH							
pH	7.94		0.10	pH units		28-MAR-19	R4586867
L2249343-2 TREATED TAP WATER Sampled By: DE on 26-MAR-19 @ 09:30 Matrix: water							
MB Chemistry for PWS							
Alkalinity, Bicarbonate							
Bicarbonate (HCO3)	44.7		1.2	mg/L		29-MAR-19	
Alkalinity, Carbonate							
Carbonate (CO3)	<0.60		0.60	mg/L		29-MAR-19	
Alkalinity, Hydroxide							
Hydroxide (OH)	<0.34		0.34	mg/L		29-MAR-19	
Alkalinity, Total (as CaCO3)							
Alkalinity, Total (as CaCO3)	36.6		1.0	mg/L		28-MAR-19	R4586867
Ammonia by colour							
Ammonia, Total (as N)	<0.010		0.010	mg/L		01-APR-19	R4588997
Bromide in Water by IC (Low Level)							
Bromide (Br)	<0.010		0.010	mg/L		27-MAR-19	R4586951
Chloride in Water by IC (Low Level)							
Chloride (Cl)	1.54		0.10	mg/L		27-MAR-19	R4586951
Colour, True							
Colour, True	<5.0		5.0	CU		27-MAR-19	R4585632

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2249343-2 TREATED TAP WATER							
Sampled By: DE on 26-MAR-19 @ 09:30							
Matrix: water							
Conductivity							
Conductivity	178		1.0	umhos/cm		28-MAR-19	R4586867
Dissolved Organic Carbon by Combustion							
Dissolved Organic Carbon	<0.50		0.50	mg/L		01-APR-19	R4588688
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		27-MAR-19	R4586951
Hardness Calculated							
Hardness (as CaCO3)	69.1	HTC	0.20	mg/L		01-APR-19	
Langelier Index 4C							
Langelier Index (4 C)	-1.6					02-APR-19	
Langelier Index 60C							
Langelier Index (60 C)	-0.79					02-APR-19	
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.143		0.0050	mg/L		27-MAR-19	R4586951
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		27-MAR-19	R4586951
Sulfate in Water by IC							
Sulfate (SO4)	45.3		0.30	mg/L		27-MAR-19	R4586951
Total Dissolved Solids (TDS)							
Total Dissolved Solids	108		13	mg/L		28-MAR-19	R4587054
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	<0.0030		0.0030	mg/L	29-MAR-19	29-MAR-19	R4587914
Antimony (Sb)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Arsenic (As)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Barium (Ba)-Total	0.00151		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Beryllium (Be)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Bismuth (Bi)-Total	<0.000050		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Boron (B)-Total	0.070		0.010	mg/L	29-MAR-19	29-MAR-19	R4587914
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Calcium (Ca)-Total	26.5		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Cesium (Cs)-Total	<0.000010		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Chromium (Cr)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Cobalt (Co)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Copper (Cu)-Total	0.0116		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Iron (Fe)-Total	<0.010		0.010	mg/L	29-MAR-19	29-MAR-19	R4587914
Lead (Pb)-Total	0.000239		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Lithium (Li)-Total	0.0031		0.0010	mg/L	29-MAR-19	29-MAR-19	R4587914
Magnesium (Mg)-Total	0.745		0.0050	mg/L	29-MAR-19	29-MAR-19	R4587914
Manganese (Mn)-Total	0.00344		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Molybdenum (Mo)-Total	<0.000050		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Nickel (Ni)-Total	0.00094		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Potassium (K)-Total	0.344		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Phosphorus (P)-Total	<0.050		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Rubidium (Rb)-Total	<0.00020		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Selenium (Se)-Total	<0.000050		0.000050	mg/L	29-MAR-19	29-MAR-19	R4587914
Silicon (Si)-Total	0.28		0.10	mg/L	29-MAR-19	29-MAR-19	R4587914
Silver (Ag)-Total	0.000013		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Sodium (Na)-Total	5.41		0.050	mg/L	29-MAR-19	29-MAR-19	R4587914
Strontium (Sr)-Total	0.0591		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	29-MAR-19	29-MAR-19	R4587914
Thallium (Tl)-Total	<0.000010		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Thorium (Th)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Tin (Sn)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2249343-2 TREATED TAP WATER Sampled By: DE on 26-MAR-19 @ 09:30 Matrix: water							
Total Metals in Water by CRC ICPMS							
Titanium (Ti)-Total	<0.00030		0.00030	mg/L	29-MAR-19	29-MAR-19	R4587914
Tungsten (W)-Total	<0.00010		0.00010	mg/L	29-MAR-19	29-MAR-19	R4587914
Uranium (U)-Total	0.000028		0.000010	mg/L	29-MAR-19	29-MAR-19	R4587914
Vanadium (V)-Total	<0.00050		0.00050	mg/L	29-MAR-19	29-MAR-19	R4587914
Zinc (Zn)-Total	0.0140		0.0030	mg/L	29-MAR-19	29-MAR-19	R4587914
Zirconium (Zr)-Total	<0.000060		0.000060	mg/L	29-MAR-19	29-MAR-19	R4587914
Total Organic Carbon by Combustion							
Total Organic Carbon	<0.50		0.50	mg/L		28-MAR-19	R4587131
Turbidity							
Turbidity	<0.10		0.10	NTU		27-MAR-19	R4586948
UV Transmittance (Calculated)							
Transmittance, UV (254 nm)	97.9		1.0	%T/cm		27-MAR-19	R4586947
pH							
pH	7.05		0.10	pH units		28-MAR-19	R4586867
L2249343-3 U.F. PERMEATE EFF. (T.O.C.) Sampled By: DE on 26-MAR-19 @ 09:30 Matrix: water							
Miscellaneous Parameters							
Total Organic Carbon	8.37		0.50	mg/L		28-MAR-19	R4587131

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-CO3CO3-CALC-WP	Water	Alkalinity, Carbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by carbonate is calculated and reported as mg CO ₃ 2-/L.			
ALK-HCO3HCO3-CALC-WP	Water	Alkalinity, Bicarbonate	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by bicarbonate is calculated and reported as mg HCO ₃ -/L			
ALK-OHOH-CALC-WP	Water	Alkalinity, Hydroxide	CALCULATION
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. The fraction of alkalinity contributed by hydroxide is calculated and reported as mg OH-/L.			
ALK-TITR-WP	Water	Alkalinity, Total (as CaCO ₃)	APHA 2320B
The Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. Total alkalinity is determined by titration with a strong standard mineral acid to the successive HCO ₃ - and H ₂ CO ₃ endpoints indicated electrometrically.			
BR-L-IC-N-WP	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)-LR
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
C-DOC-HTC-WP	Water	Dissolved Organic Carbon by Combustion	APHA 5310 B-WP
Filtered (0.45 um) sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO ₂ which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
C-TOC-HTC-WP	Water	Total Organic Carbon by Combustion	APHA 5310 B-WP
Sample is acidified and purged to remove inorganic carbon, then injected into a heated reaction chamber where organic carbon is oxidized to CO ₂ which is then transported in the carrier gas stream and measured via a non-dispersive infrared analyzer.			
CL-L-IC-N-WP	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COLOUR-TRUE-WP	Water	Colour, True	APHA 2120C
True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method (450 - 465 nm) after filtration of sample through a 0.45 um filter. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.			
EC-SCREEN-WP	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other test eg. IC, TDS, TSS, etc			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
ETL-LANGELIER-4-WP	Water	Langelier Index 4C	Calculated
ETL-LANGELIER-60-WP	Water	Langelier Index 60C	Calculated
F-IC-N-WP	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-WP	Water	Hardness Calculated	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E
<p>Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.</p> <p>Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance (as % difference) cannot be calculated accurately for waters with very low electrical conductivity (EC), and is reported as "Low EC" where EC < 100 uS/cm (umhos/cm). Ion Balance is calculated as:</p> <p>Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]</p>			
MET-T-CCMS-WP	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020B (mod.)
<p>Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.</p> <p>Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.</p>			
NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
<p>Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.</p>			
NO2-L-IC-N-WP	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
NO3-L-IC-N-WP	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
PH-WP	Water	pH	APHA 4500H
<p>The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.</p>			
SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)
<p>Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.</p>			
TDS-WP	Water	Total Dissolved Solids (TDS)	APHA 2540 SOLIDS C,E
<p>A well-mixed sample is filtered through a glass fiber filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2C. The increase in vial weight represents the total dissolved solids.</p>			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
<p>Turbidity in aqueous matrices is determined by the nephelometric method.</p>			
UV-%TRANS-WP	Water	UV Transmittance (Calculated)	APHA 5910B
<p>Test method is adapted from APHA Method 5910B. A sample is filtered through a 0.45 um polyethersulfone (PES) filter and its UV Absorbance is measured in a quartz cell at 254 nm. UV Transmittance is calculated from the UV Absorbance result and reported as UV Transmittance per cm. The analysis is carried out without pH adjustment.</p>			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg wwt - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2249343

Report Date: 02-APR-19

Page 1 of 8

Client: Cartier Regional Water Co-op Inc. - Headingley
 6000 Portage Avenue
 Headingley MB R4H 1E8

Contact: DAVID EPLER

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
ALK-TITR-WP		Water							
Batch R4586867									
WG3016984-9	LCS								
Alkalinity, Total (as CaCO3)			105.9		%		85-115	28-MAR-19	
WG3016984-6	MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	28-MAR-19	
BR-L-IC-N-WP		Water							
Batch R4586951									
WG3015342-3	DUP	L2249343-2							
Bromide (Br)			<0.010		mg/L	RPD-NA	N/A	20	27-MAR-19
WG3015342-2	LCS								
Bromide (Br)			102.9		%		85-115	27-MAR-19	
WG3015342-1	MB								
Bromide (Br)			<0.010		mg/L		0.01	27-MAR-19	
WG3015342-4	MS	L2249343-2							
Bromide (Br)			87.4		%		75-125	27-MAR-19	
C-DOC-HTC-WP		Water							
Batch R4588168									
WG3018250-2	LCS								
Dissolved Organic Carbon			101.5		%		80-120	29-MAR-19	
WG3018250-1	MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-MAR-19	
Batch R4588688									
WG3018994-2	LCS								
Dissolved Organic Carbon			100.4		%		80-120	01-APR-19	
WG3018994-1	MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	01-APR-19	
C-TOC-HTC-WP		Water							
Batch R4586188									
WG3016153-6	DUP	L2249343-1							
Total Organic Carbon			9.77		mg/L	11	20	27-MAR-19	
WG3016153-5	LCS								
Total Organic Carbon			103.6		%		80-120	27-MAR-19	
WG3016153-4	MB								
Total Organic Carbon			<0.50		mg/L		0.5	27-MAR-19	
Batch R4587131									
WG3016976-6	LCS								
Total Organic Carbon			97.6		%		80-120	28-MAR-19	
WG3016976-5	MB								
Total Organic Carbon			<0.50		mg/L		0.5	28-MAR-19	

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-L-IC-N-WP								
Water								
Batch	R4586951							
WG3015342-3	DUP	L2249343-2						
Chloride (Cl)		1.54	1.54		mg/L	0.0	20	27-MAR-19
WG3015342-2	LCS							
Chloride (Cl)			99.6		%		90-110	27-MAR-19
WG3015342-1	MB							
Chloride (Cl)			<0.10		mg/L		0.1	27-MAR-19
WG3015342-4	MS	L2249343-2						
Chloride (Cl)			112.5		%		75-125	27-MAR-19
COLOUR-TRUE-WP								
Water								
Batch	R4585632							
WG3015494-2	LCS							
Colour, True			99.6		%		85-115	27-MAR-19
WG3015494-1	MB							
Colour, True			<5.0		CU		5	27-MAR-19
EC-WP								
Water								
Batch	R4586867							
WG3016984-8	LCS							
Conductivity			100.7		%		90-110	28-MAR-19
WG3016984-6	MB							
Conductivity			<1.0		umhos/cm		1	28-MAR-19
F-IC-N-WP								
Water								
Batch	R4586951							
WG3015342-3	DUP	L2249343-2						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	27-MAR-19
WG3015342-2	LCS							
Fluoride (F)			99.98		%		90-110	27-MAR-19
WG3015342-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	27-MAR-19
WG3015342-4	MS	L2249343-2						
Fluoride (F)			117.2		%		75-125	27-MAR-19
MET-T-CCMS-WP								
Water								
Batch	R4587914							
WG3017095-2	LCS							
Aluminum (Al)-Total			99.2		%		80-120	29-MAR-19
Antimony (Sb)-Total			101.4		%		80-120	29-MAR-19
Arsenic (As)-Total			96.3		%		80-120	29-MAR-19
Barium (Ba)-Total			98.8		%		80-120	29-MAR-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP								
	Water							
Batch	R4587914							
WG3017095-2	LCS							
Beryllium (Be)-Total			100.9		%		80-120	29-MAR-19
Bismuth (Bi)-Total			96.4		%		80-120	29-MAR-19
Boron (B)-Total			90.5		%		80-120	29-MAR-19
Cadmium (Cd)-Total			98.4		%		80-120	29-MAR-19
Calcium (Ca)-Total			98.6		%		80-120	29-MAR-19
Cesium (Cs)-Total			104.5		%		80-120	29-MAR-19
Chromium (Cr)-Total			97.6		%		80-120	29-MAR-19
Cobalt (Co)-Total			96.3		%		80-120	29-MAR-19
Copper (Cu)-Total			97.5		%		80-120	29-MAR-19
Iron (Fe)-Total			94.3		%		80-120	29-MAR-19
Lead (Pb)-Total			100.9		%		80-120	29-MAR-19
Lithium (Li)-Total			103.6		%		80-120	29-MAR-19
Magnesium (Mg)-Total			105.2		%		80-120	29-MAR-19
Manganese (Mn)-Total			98.1		%		80-120	29-MAR-19
Molybdenum (Mo)-Total			102.2		%		80-120	29-MAR-19
Nickel (Ni)-Total			95.7		%		80-120	29-MAR-19
Potassium (K)-Total			94.1		%		80-120	29-MAR-19
Phosphorus (P)-Total			106.0		%		80-120	29-MAR-19
Rubidium (Rb)-Total			99.2		%		80-120	29-MAR-19
Selenium (Se)-Total			98.0		%		80-120	29-MAR-19
Silicon (Si)-Total			102.0		%		80-120	29-MAR-19
Silver (Ag)-Total			103.6		%		80-120	29-MAR-19
Sodium (Na)-Total			101.5		%		80-120	29-MAR-19
Strontium (Sr)-Total			106.7		%		80-120	29-MAR-19
Tellurium (Te)-Total			98.1		%		80-120	29-MAR-19
Thallium (Tl)-Total			97.4		%		80-120	29-MAR-19
Thorium (Th)-Total			97.8		%		80-120	29-MAR-19
Tin (Sn)-Total			99.3		%		80-120	29-MAR-19
Titanium (Ti)-Total			96.2		%		80-120	29-MAR-19
Tungsten (W)-Total			103.6		%		80-120	29-MAR-19
Uranium (U)-Total			107.3		%		80-120	29-MAR-19
Vanadium (V)-Total			98.6		%		80-120	29-MAR-19
Zinc (Zn)-Total			95.2		%		80-120	29-MAR-19
Zirconium (Zr)-Total			100.4		%		80-120	29-MAR-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP								
	Water							
Batch	R4587914							
WG3017095-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	29-MAR-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	29-MAR-19
Boron (B)-Total			<0.010		mg/L		0.01	29-MAR-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	29-MAR-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	29-MAR-19
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	29-MAR-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	29-MAR-19
Iron (Fe)-Total			<0.010		mg/L		0.01	29-MAR-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	29-MAR-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	29-MAR-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	29-MAR-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	29-MAR-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-MAR-19
Potassium (K)-Total			<0.050		mg/L		0.05	29-MAR-19
Phosphorus (P)-Total			<0.030		mg/L		0.03	29-MAR-19
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	29-MAR-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	29-MAR-19
Silicon (Si)-Total			<0.10		mg/L		0.1	29-MAR-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	29-MAR-19
Sodium (Na)-Total			<0.050		mg/L		0.05	29-MAR-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	29-MAR-19
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	29-MAR-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	29-MAR-19
Thorium (Th)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	29-MAR-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	29-MAR-19
Tungsten (W)-Total			<0.00010		mg/L		0.0001	29-MAR-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP								
Water								
Batch	R4587914							
WG3017095-1	MB							
Uranium (U)-Total			<0.000010		mg/L		0.00001	29-MAR-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	29-MAR-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-MAR-19
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	29-MAR-19
NH3-COL-WP								
Water								
Batch	R4588997							
WG3019354-3	DUP	L2249343-2						
Ammonia, Total (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	01-APR-19
WG3019354-2	LCS							
Ammonia, Total (as N)			97.5		%		85-115	01-APR-19
WG3019354-1	MB							
Ammonia, Total (as N)			<0.010		mg/L		0.01	01-APR-19
WG3019354-4	MS	L2249343-2						
Ammonia, Total (as N)			93.0		%		75-125	01-APR-19
NO2-L-IC-N-WP								
Water								
Batch	R4586951							
WG3015342-3	DUP	L2249343-2						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-MAR-19
WG3015342-2	LCS							
Nitrite (as N)			100.2		%		90-110	27-MAR-19
WG3015342-1	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	27-MAR-19
WG3015342-4	MS	L2249343-2						
Nitrite (as N)			82.8		%		75-125	27-MAR-19
NO3-L-IC-N-WP								
Water								
Batch	R4586951							
WG3015342-3	DUP	L2249343-2						
Nitrate (as N)		0.143	0.142		mg/L	0.5	20	27-MAR-19
WG3015342-2	LCS							
Nitrate (as N)			100.1		%		90-110	27-MAR-19
WG3015342-1	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	27-MAR-19
WG3015342-4	MS	L2249343-2						
Nitrate (as N)			118.6		%		75-125	27-MAR-19
PH-WP	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WP								
Water								
Batch	R4586867							
WG3016984-7	LCS							
pH			7.38		pH units		7.3-7.5	28-MAR-19
SO4-IC-N-WP								
Water								
Batch	R4586951							
WG3015342-3	DUP	L2249343-2						
Sulfate (SO4)		45.3	45.4		mg/L	0.1	20	27-MAR-19
WG3015342-2	LCS							
Sulfate (SO4)			100.1		%		90-110	27-MAR-19
WG3015342-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	27-MAR-19
WG3015342-4	MS	L2249343-2						
Sulfate (SO4)			110.2		%		75-125	27-MAR-19
TDS-WP								
Water								
Batch	R4587054							
WG3015958-2	LCS							
Total Dissolved Solids			95.3		%		85-115	28-MAR-19
WG3015958-1	MB							
Total Dissolved Solids			<4.0		mg/L		4	28-MAR-19
TURBIDITY-WP								
Water								
Batch	R4586948							
WG3017112-2	DUP	L2249343-1						
Turbidity		7.02	7.07		NTU	0.7	15	27-MAR-19
WG3017112-3	LCS							
Turbidity			101.0		%		85-115	27-MAR-19
WG3017112-1	MB							
Turbidity			<0.10		NTU		0.1	27-MAR-19
UV-%TRANS-WP								
Water								
Batch	R4586947							
WG3016315-1	IRM	BLANK						
Transmittance, UV (254 nm)			100.0		%		99.5-100.5	27-MAR-19
WG3016315-2	LCS							
Transmittance, UV (254 nm)			94.0		%		85-115	27-MAR-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	26-MAR-19 09:30	28-MAR-19 12:00	0.25	50	hours	EHTR-FM
	2	26-MAR-19 09:30	28-MAR-19 12:00	0.25	50	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2249343 were received on 26-MAR-19 14:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Environmental Division



L2249343-COFC

WORK ORDER NO: _____

FOR LABORATORY USE

Sample Condition Upon Receipt

Frozen Cold Ambient Broken Leakage Incorrect Sample Container

COMMENT:

TABLE

LAB NO.:

DATE RECEIVED: 26-3-19

TIME RECEIVED: 2:25

BY: MH

Date Sampled: MAR. 26/2019 Time: 9:30 A.M. P.M.

Date Required: N/A

Location: HEADINGLEY REGIONAL WATER SYSTEM
(Town, Community, City)

Submitter's Name Printed: DAVID EPLER

Sample Submitted By: David Epler

Community Code Number: 89.40

Rural Municipality/LGC/UVDC: CARTIER REGIONAL WATER CO-OP

SAMPLE TYPE

DRINKING WATER

- Untreated Well
- Treated Well
- Treated Municipal
- Non-Treated Municipal
- Water-Surface-Raw
- Water-Surface-Treated

PURPOSE OF TEST

- Private Real Estate Water Main

PLEASE PRINT & PRESS FIRMLY

NON-DRINKING WATER

- Sewage/Waste Water
- Lake/River
- Swimming Pool
- Whirl Pool
- Other

NOTES & CONDITIONS

1. Quote number must be provided to insure proper pricing.
2. Failure to properly complete all portions of this form may delay analysis.
3. ALS's liability limited to cost of analysis.

SERVICE REQUESTED

- REGULAR PRIORITY (50% SURCHARGE) EMERGENCY (100% SURCHARGE)

LAB NUMBER	SAMPLE IDENTIFICATION	ALS CUSTOMER #:	QUOTE #:
		<u>W1243</u>	<u>N/A</u>
REPORT TO BE SENT TO			
		NAME: <u>DAVID EPLER</u>	
		COMPANY: <u>CARTIER REGIONAL WATER COOP</u>	
		ADDRESS: <u>6000 PORTAGE AVE</u>	
		CITY/TOWN: <u>HEADINGLEY</u> / PROV.: <u>MB</u>	
		POSTAL CODE: <u>R4H 1E8</u>	
		PHONE: <u>204-832-2555</u>	
		BY: MAIL <input type="checkbox"/> FAX <input type="checkbox"/> <u>headingleywp@crwc.ca</u>	
		PICKUP <input type="checkbox"/> E-MAIL <input checked="" type="checkbox"/> <u>dvaillant@crwc.ca</u>	
		CC: <u>angela.meier@cpu.mb.ca</u>	
		NAME: _____	
		ADDRESS: _____	
		CITY/TOWN: _____ / PROV.: _____	
		POSTAL CODE: _____	
		PHONE: _____	
		BY: MAIL <input type="checkbox"/> FAX <input type="checkbox"/> _____	
		PICKUP <input type="checkbox"/> E-MAIL <input type="checkbox"/> _____	

Analyses required - PWS CHEMISTRY (MB-CH-PWS-WP) ON SAMPLES #1 & #2
- T.O.C. ON SAMPLE #3

BILLING ADDRESS SAME AS REPORT TO
NAME: ACCOUNT # W1243
COMPANY: _____
ADDRESS: _____
CITY/TOWN: _____ / PROV.: _____
POSTAL CODE: _____

SAMPLING INSTRUCTIONS ON REVERSE SIDE

Manitoba Technology Centre Ltd.
Part of the **ALS Laboratory Group**
12 - 1329 Niakwa Rd. E., Winnipeg, MB Canada R2J 3T4
Phone: +1 204 255 9720 Fax: +1 204 255 9721 www.alsglobal.com
A Campbell Brothers Limited Company

PAYMENT PARTICULARS

- INVOICE NEEDED / CLIENT'S P.O. NO. _____
- INTERAC
- CASH Subtotal \$ _____
- CHEQUE G.S.T. \$ _____
- VISA / MASTERCARD Total \$ _____

* OUR POLICY IS NOT TO ACCEPT SAMPLES FROM THE PRIVATE CITIZEN WITHOUT PREPAYMENT

SUBMITTER COPY

ENTERED IN LIMS BY: _____