Manitoba Water Services Board - CRWC
ATTN: GRANT MCGORMAN
Cartier Regional Water Co-op
Box 217
St. Eustache MB R0H 1H0

Date Received: 15-NOV-16
Report Date: 24-NOV-16 09:37 (MT)
Version: FINAL

Client Phone: 204-353-4055

Certificate of Analysis

Lab Work Order #: L1857659

Project P.O. #: 28128
Job Reference: CARTIER REGIONAL - PWS 36.00
C of C Numbers:
Legal Site Desc: 28128

Hua Wo
Chemistry Laboratory Manager

Physical Tests (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1857659-1 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 1 - RAW	ALS ID: L1857659-2 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 2 TREATED
Colour, True	CU	15	-	22.3	<5.0
Conductivity	umhos/cm	-	-	891	154
Hardness (as CaCO3)	mg/L	-	-	427 HTC	25.0 HTC
Langelier Index (4 C)	No Unit	-	-	0.87	-1.6
Langelier Index (60 C)	No Unit	-	-	1.6	-0.86
pH	pH units	6.5-8.5	-	8.34	7.54
Total Dissolved Solids	mg/L	500	-	630	85
Transmittance, UV (254 nm)	%T/cm	-	-	48.9	94.0
Turbidity	NTU	-	-	11.1	<0.10

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective
#2: GCDWQ - Maximum Acceptable Concentrations (Pre-2003)

Anions and Nutrients (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1857659-1 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 1 - RAW	ALS ID: L1857659-2 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 2 TREATED
Alkalinity, Total (as CaCO3)	mg/L	-	-	242	52.7
Ammonia, Total (as N)	mg/L	-	-	0.067	<0.010
Bicarbonate (HCO3)	mg/L	-	-	286	64.3
Bromide (Br)	mg/L	-	-	<0.20 DLM	<0.10
Carbonate (CO3)	mg/L	-	-	4.68	<0.60
Chloride (Cl)	mg/L	250	-	23.9	4.50
Fluoride (F)	mg/L	-	1.5	0.185	0.552
Hydroxide (OH)	mg/L	-	-	<0.34	<0.34
Nitrate (as N)	mg/L	-	10	0.261	0.0819
Nitrite (as N)	mg/L	-	1	0.0089	<0.0010
Sulfate (SO4)	mg/L	500	-	250	18.2

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective
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Organic / Inorganic Carbon (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1857659-1 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 1 - RAW	ALS ID: L1857659-2 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: CARTIER REGIONAL 2 TREATED
Dissolved Organic Carbon	mg/L	-	-	11.3	1.11
Total Organic Carbon	mg/L	-	-	11.0	1.12

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective
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Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.
Analytical result for this parameter exceeds Guide Limit listed on this report.
* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	L1857659-1 15-NOV-16 - **CARTIER REGIONAL 1 - RAW**	L1857659-2 15-NOV-16 - **CARTIER REGIONAL 2 TREATED**
ALS ID					
Sampled Date					
Sampled Time					
Sample ID					
Aluminum (Al)-Total	mg/L	0.1	-	0.307	<0.0050
Antimony (Sb)-Total	mg/L	-	0.006	0.00026	<0.00020
Arsenic (As)-Total	mg/L	-	0.01	0.00510	0.00039
Barium (Ba)-Total	mg/L	-	1	0.0681	0.00405
Beryllium (Be)-Total	mg/L	-	-	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L	-	-	<0.00020	<0.00020
Boron (B)-Total	mg/L	-	-	0.106	0.082
Cadmium (Cd)-Total	mg/L	-	0.005	0.000016	<0.000010
Calcium (Ca)-Total	mg/L	-	-	81.2	4.82
Cesium (Cs)-Total	mg/L	-	-	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L	-	0.05	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	-	-	0.00045	<0.00020
Copper (Cu)-Total	mg/L	1	-	0.00350	0.0919
Iron (Fe)-Total	mg/L	0.3	-	0.471	<0.010
Lead (Pb)-Total	mg/L	-	0.01	0.000269	<0.000090
Lithium (Li)-Total	mg/L	-	-	0.0685	0.0082
Magnesium (Mg)-Total	mg/L	-	-	54.4	3.16
Manganese (Mn)-Total	mg/L	0.05	-	0.0619	0.00160
Molybdenum (Mo)-Total	mg/L	-	-	0.00273	<0.00020
Nickel (Ni)-Total	mg/L	-	-	0.0042	<0.0020
Phosphorus (P)-Total	mg/L	-	-	0.14	0.34
Potassium (K)-Total	mg/L	-	-	12.6	1.26
Rubidium (Rb)-Total	mg/L	-	-	0.00256	0.00023
Selenium (Se)-Total	mg/L	-	0.05	<0.0010	<0.0010
Silicon (Si)-Total	mg/L	-	-	7.82	1.05
Silver (Ag)-Total	mg/L	-	-	<0.00010	<0.00010
Sodium (Na)-Total	mg/L	200	-	62.0	25.0
Strontium (Sr)-Total	mg/L	-	-	0.324	0.0188
Tellurium (Te)-Total	mg/L	-	-	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	-	-	<0.00010	<0.00010
Thorium (Th)-Total	mg/L	-	-	0.00010	<0.00010
Tin (Sn)-Total	mg/L	-	-	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L	-	-	0.00825	<0.00050

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
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Analytical result for this parameter exceeds Guide Limit listed on this report.
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ANALYTICAL REPORT

Total Metals (WATER)

Analyte	Unit	Guide Limit #1	Guide Limit #2	ALS ID: L1857659-1 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: **CARTIER REGIONAL 1 - RAW**	ALS ID: L1857659-2 Sampled Date: 15-NOV-16 Sampled Time: - Sample ID: **CARTIER REGIONAL 2 TREATED**
Tungsten (W)-Total	mg/L	-	-	<0.00010	<0.00010
Uranium (U)-Total	mg/L	-	0.02	0.00471	0.00019
Vanadium (V)-Total	mg/L	-	-	0.00376	0.00021
Zinc (Zn)-Total	mg/L	5	-	0.0052	<0.0020
Zirconium (Zr)-Total	mg/L	-	-	0.00055	<0.00040

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)
#1: GCDWQ - Aesthetic Objective
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Detection Limit for result exceeds Guide Limit. Assessment against Guide Limit cannot be made.
Analytical result for this parameter exceeds Guide Limit listed on this report.
* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

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 CO3 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 HCO3-/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 CaCO3)	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 HCO3- and H2CO3 endpoints indicated electrometrically.

BR-IC-N-WP	Water	Bromide in Water by IC	EPA 300.1 (mod)

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 CO2 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 CO2 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-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 CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

IONBALANCE-CALC-WP	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**

Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

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:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-T-L-MS-WP	Water	Total Metals by ICP-MS	APHA 3030E/EPA 6020A-TL

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F

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.

NO2-L-IC-N-WP	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-WP	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH-WP	Water	pH	APHA 4500H

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.

SO4-IC-N-WP	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-WP	Water	Total Dissolved Solids (TDS)	APHA 2540 SOLIDS C,E

A well-mixed sample is filtered through a glass fiber filter paper. The filtrate is then evaportaed to dryness in a pre-weighed vial and dried at 180 – 2C. The increase in vial weight represents the total dissolved solids.

TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)

Turbidity in aqueous matrices is determined by the nephelometric method.

UV-%TRANS-WP	Water	UV Transmittance (Calculated)	APHA 5910B

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.

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

Chain of Custody Numbers:

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

Reference Information

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.

Manitoba Conservation Water Stewardship
Office of Drinking Water
1007 Century Street, Winnipeg, Manitoba,
Canada R3H 0W4

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L1857659-COFC

Samples

Report to Operator (email pdf):				**Regular Service (default):**	✓ **Regular Service (is 5-7 Days):**
Contact:	Grant McGorman, Lead Operator - CRWC	Contact:	Kim Davey - MWSB		
Address:	Box 217 St. Eustache MB R0H 1H0	Address:	Unit #1A - 2010 Currie Blvd. Brandon MB R7B 4E7	**Unless otherwise requested:**	☐ **1 Day, rush / priority**
Phone:	204-353-4055	Phone:	204-729-6094		☐ **2 Day, rush / priority**
Email:	gmcgorman@crwc.ca; cartierwtp@crwc.ca; dvaillant@crw	Email:	kim.davey@gov.mb.ca		☐ **3 Day, rush / priority**

Operator contact update (if different then above):		**Owner contact update (if different then above):**		**Email pdf copy to:**	
Contact:	same as for thm samples - as above	Contact:	as above	DWO:	John Cronk
Address:		Address:		DWO Address:	309 - 25 Tupper St. N. Portage la Prairie MB R1N 3K1
Phone:		Phone:		DWO Phone:	204-239-3186
Email:		Email:		DWO Email:	john.cronk@gov.mb.ca

Account:	**W7640**	ODW Report type:	**EMS (Lab-MWS)**
Agency Code:	**382**	Project:	**DWQ-C**
Lab:	ALS	Lab Work Order # / Job # (lab use only)	

Client / Project Information:	
Operation Name:	CARTIER REGIONAL - PWS
Operation Code (com code):	36.00
Operation Id:	28128
Sampled by:	Grant McGorman

Lab Sample # (lab use only)	**Sample Number** (YYMMII9999)	**Station Number** (MB99XXD999) / (MB99XXY999)	**Sample Identification**	**Date** dd-mmm-yyyy	**Time** hh:mm	**Sample Matrix**	**Sample Type**	**Analysis Request** MB-CH-PWS-V2013		Number of Containers
	1611JC0265	MB05MJD041	Cartier regional 1 - Raw	15/11/16	9:05 am	6	1	X		5
	1611JC0266	MB05MJD042	Cartier regional 2 - Treated	15/11/16	9:10 am	10	1	X		5

Sample Matrix:	Sample Type:
6-Raw Water, 10-Treated Water	1-Grab Sample

Failure to complete all portions of this form may delay analysis.
Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified by the Laboratory.
For ALL other testing, please use Laboratory specific forms.

DO NOT COPY or RE-USE this form. Sample Numbers are unique to the Office of Drinking Water and provided by DWO.

Relinquished By:	Jason Thiessen	Date & Time: november 15 2016		Received By: (lab use only)	Jas	Date & Time: (lab use only)	Nov 15. 10:45.	Sample Condition (lab use only)	
								Temperature	Samples Received in Good Condition? Y / N (if no provide details)
Relinquished By:		Date & Time: 9:05am		Received By: (lab use only)		Date & Time: (lab use only)		12°C	

Operator mandatory Operator optional Operator to fill, if information above has changed Opr to fill, Lab specific pre-filled by DWO

Note: Cyanide and Mercury are not required and have been removed from the list.
Please use the Rev. July 29, 2013 Water System Chemistry List.