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

Date Received: 19-APR-17
Report Date: 27-APR-17 11:24 (MT)
Version: FINAL

Client Phone: 204-353-4055

# Certificate of Analysis

## Lab Work Order #: L1914800

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: L1914800-1<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 1 - RAW | ALS ID: L1914800-2<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 2 - TREATED |
|---|---|---|---|---|---|
| Colour, True | CU | 15 | - | 22.4 | <5.0 |
| Conductivity | umhos/cm | - | - | 785 | 216 |
| Hardness (as CaCO3) | mg/L | - | - | 318 HTC | 48.4 HTC |
| Langelier Index (4 C) | No Unit | - | - | 0.77 | -1.3 |
| Langelier Index (60 C) | No Unit | - | - | 1.5 | -0.51 |
| pH | pH units | 7.00-10.5 | - | 8.37 | 7.53 |
| Total Dissolved Solids | mg/L | 500 | - | 531 | 124 |
| Transmittance, UV (254 nm) | %T/cm | - | - | 56.6 | 94.6 |
| Turbidity | NTU | - | - | 25.9 | 0.10 |

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

## Anions and Nutrients (WATER)

| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | ALS ID: L1914800-1<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 1 - RAW | ALS ID: L1914800-2<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 2 - TREATED |
|---|---|---|---|---|---|
| Alkalinity, Total (as CaCO3) | mg/L | - | - | 216 | 63.3 |
| Ammonia, Total (as N) | mg/L | - | - | 0.022 | <0.010 |
| Bicarbonate (HCO3) | mg/L | - | - | 254 | 77.2 |
| Bromide (Br) | mg/L | - | - | <0.10 | <0.10 |
| Carbonate (CO3) | mg/L | - | - | 4.56 | <0.60 |
| Chloride (Cl) | mg/L | 250 | - | 16.8 | 5.10 |
| Fluoride (F) | mg/L | - | 1.5 | 0.132 | 0.467 |
| Hydroxide (OH) | mg/L | - | - | <0.34 | <0.34 |
| Nitrate (as N) | mg/L | - | 10 | 0.300 | 0.106 |
| Nitrite (as N) | mg/L | - | 1 | 0.0089 | <0.0010 |
| Sulfate (SO4) | mg/L | 500 | - | 191 | 36.8 |

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

| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | ALS ID: L1914800-1<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 1 - RAW | ALS ID: L1914800-2<br>Sampled Date: 19-APR-17<br>Sampled Time: 13:30<br>Sample ID: CARTIER REGIONAL 2 - TREATED |
|---|---|---|---|---|---|
| Dissolved Organic Carbon | mg/L | - | - | 10.1 | 1.41 |
| Total Organic Carbon | mg/L | - | - | 9.42 | 1.40 |

**Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)**
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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 | ALS ID / Sampled Date / Sampled Time / Sample ID: L1914800-1 / 19-APR-17 / 13:30 / CARTIER REGIONAL 1 - RAW | ALS ID / Sampled Date / Sampled Time / Sample ID: L1914800-2 / 19-APR-17 / 13:30 / CARTIER REGIONAL 2 - TREATED |
|---|---|---|---|---|---|
| Aluminum (Al)-Total | mg/L | 0.1 | - | 0.602 | <0.0050 |
| Antimony (Sb)-Total | mg/L | - | 0.006 | 0.00022 | <0.00020 |
| Arsenic (As)-Total | mg/L | - | 0.01 | 0.00246 | 0.00035 |
| Barium (Ba)-Total | mg/L | - | 1 | 0.0611 | 0.00829 |
| Beryllium (Be)-Total | mg/L | - | - | <0.00020 | <0.00020 |
| Bismuth (Bi)-Total | mg/L | - | - | <0.00020 | <0.00020 |
| Boron (B)-Total | mg/L | - | - | 0.062 | 0.050 |
| Cadmium (Cd)-Total | mg/L | - | 0.005 | 0.000025 | <0.000010 |
| Calcium (Ca)-Total | mg/L | - | - | 63.1 | 9.72 |
| 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 | - | - | 0.00052 | <0.00020 |
| Copper (Cu)-Total | mg/L | 1 | - | 0.00305 | 0.0274 |
| Iron (Fe)-Total | mg/L | 0.3 | - | 0.833 | <0.010 |
| Lead (Pb)-Total | mg/L | - | 0.01 | 0.000496 | <0.000090 |
| Lithium (Li)-Total | mg/L | - | - | 0.0455 | 0.0091 |
| Magnesium (Mg)-Total | mg/L | - | - | 38.9 | 5.86 |
| Manganese (Mn)-Total | mg/L | 0.05 | - | 0.0705 | 0.00108 |
| Molybdenum (Mo)-Total | mg/L | - | - | 0.00199 | 0.00028 |
| Nickel (Ni)-Total | mg/L | - | - | 0.0038 | <0.0020 |
| Phosphorus (P)-Total | mg/L | - | - | 0.11 | 0.32 |
| Potassium (K)-Total | mg/L | - | - | 10.1 | 1.77 |
| Rubidium (Rb)-Total | mg/L | - | - | 0.00295 | 0.00035 |
| Selenium (Se)-Total | mg/L | - | 0.05 | <0.0010 | <0.0010 |
| Silicon (Si)-Total | mg/L | - | - | 7.17 | 1.11 |
| Silver (Ag)-Total | mg/L | - | - | <0.00010 | <0.00010 |
| Sodium (Na)-Total | mg/L | 200 | - | 41.3 | 24.1 |
| Strontium (Sr)-Total | mg/L | - | - | 0.246 | 0.0372 |
| Tellurium (Te)-Total | mg/L | - | - | <0.00020 | <0.00020 |
| Thallium (Tl)-Total | mg/L | - | - | <0.00010 | <0.00010 |
| Thorium (Th)-Total | mg/L | - | - | 0.00019 | <0.00010 |
| Tin (Sn)-Total | mg/L | - | - | <0.00020 | <0.00020 |
| Titanium (Ti)-Total | mg/L | - | - | 0.0156 | <0.00050 |

**Federal Guidelines for Canadian Drinking Water Quality (MAR, 2015)**
**#1: GCDWQ - Aesthetic Objective/Other Value**
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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 | L1914800-1<br>19-APR-17<br>13:30<br>**CARTIER REGIONAL 1 - RAW** | L1914800-2<br>19-APR-17<br>13:30<br>**CARTIER REGIONAL 2 - TREATED** |
|---|---|---|---|---|---|
| ALS ID | | | | L1914800-1 | L1914800-2 |
| Sampled Date | | | | 19-APR-17 | 19-APR-17 |
| Sampled Time | | | | 13:30 | 13:30 |
| Sample ID | | | | **CARTIER REGIONAL 1 - RAW** | **CARTIER REGIONAL 2 - TREATED** |
| Tungsten (W)-Total | mg/L | - | - | <0.00010 | <0.00010 |
| Uranium (U)-Total | mg/L | - | 0.02 | 0.00383 | 0.00039 |
| Vanadium (V)-Total | mg/L | - | - | 0.00339 | <0.00020 |
| Zinc (Zn)-Total | mg/L | 5 | - | 0.0061 | 0.0020 |
| Zirconium (Zr)-Total | mg/L | - | - | 0.00073 | <0.00040 |

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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). |

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

# Reference Information

**Methods Listed (if applicable):**

| ALS Test Code | Matrix | Test Description | Method Reference** |
|---|---|---|---|

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

ON L1914800-COFC

**VOC Samples**

| **Report to Operator (email pdf):** | | **Owner billing (Email):** | | **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@crv | 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: | Michaela Samek |
| Address: | | Address: | | DWO Address: | 309 - 25 Tupper St. N. Portage la Prairie MB R1N 3K1 |
| Phone: | | Phone: | | DWO Phone: | 204-362-2704 |
| Email: | | Email: | | DWO Email: | Michaela.Samek@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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1704MS0001 | MB05MJD041 | Cartier regional 1 - Raw | 19-APR-2017 | 1:30 PM | 6 | 1 | X | | 6 |
| | 1704MS0002 | MB05MJD042 | Cartier regional 2 - Treated | 19-APR-2017 | 1:30 PM | 10 | 1 | X | | 6 |

| 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: | Grant McGorman | Date & Time: | 3:30 PM April 19/17 | Received By: (lab use only) | David I. | Date & Time: (lab use only) | 4/19/17 3:45 pm | Sample Condition (lab use only) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Temperature | Samples Received in Good Condition? Y / N (if no provide details) |
| Relinquished By: | $ | Date & Time: | | Received By: (lab use only) | | Date & Time: (lab use only) | | 11.5°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.**