

RIVERDALE MUNICIPALITY PUBLIC WATER SYSTEM **ANNUAL REPORT - 2022**

Riverdale Municipality strives to provide high quality drinking water in sufficient quantity to meet the needs of the public. It is our goal to do so in a safe, cost-effective manner while remaining in compliance with the regulatory requirements governing the provision of drinking water.

The operation of our water system is regulated in part by the Drinking Water Safety Act (MR40/2007), which came into force on March 1, 2007. Section 32(1) of the regulation stipulates that water systems serving 1,000 or more persons must prepare an annual report to its water users. Therefore, the following report has been prepared for the Town of Rivers water consumers.

Where does our water come from?

The Town of Rivers used water from four deep wells in the late 1940's but abandoned the wells when it bought the CNR dam on the Little Saskatchewan River south of town.

In 1991 the town began pumping water from Lake Wahtopah, abandoning the reservoir at the river. This change has improved water quality thus reducing the cost of the treatment process.

How does the water get to our tap?

Source:

- Two 23 horse submersible pumps pump the raw water from Lake Wahtopah to the water treatment plant through 2.5 kms of 250 mm C-900 PVC pipe.

Treatment:

- The raw water enters a pre-filter/strainer in the treatment facility that limits the quantity of larger particles entering the Membrane Filtration Units (MFU) and reduces the frequency of backwash cycles required to clean the units.
- After the pre-filters, the water goes through the MFU's. The MFU's consist of two sets of eight ultrafiltration (UF) modules each.
- Each UF module has hundreds of hollow straws (membranes) that the water is forced through.
- The water enters the module where pressure is applied to force water through the membranes. Most of the water passes out of the module through the inside of the membranes, while particles larger than the pore size of the membrane are rejected.
- This process removes bacteria, viruses, colloids, parasites such as Giardia and Cryptosporidium, and similar sized particles from the water.
- From the UF modules, the water is placed in a reservoir used to supply the Membrane Treatment Units (MTU). This reservoir is now being chlorinated to reduce biofouling in the RO membranes. Biofouling is biological growth that inhibits the flow of water through the membranes. As the water is pumped to the MTU's, Sodium Bisulfite is added to dechlorinate the water as chlorine will damage the membranes.
- The MTU's consist of two sets of four reverse osmosis (RO) modules and two Nano-filtration (NF) modules.

- The water from the UF reservoir is pumped to the modules where pressure is applied to the membranes, forcing the water through the membranes, leaving behind the small amount of water that will not pass through due to the dissolved substances that are too large for the membrane pore size, (concentrate).
- The concentrate is stored in a waste chamber where it is neutralized before being pumped out to the Little Saskatchewan River.
- The pure water (permeate) passes through the RO/NF membranes, removing dissolved contaminants such as salts and organics.

Distribution:

- The treated water is stored in a 1000m³/three chamber reservoir under the treatment facility.
- Chlorine is injected as the treated water enters the reservoir. This allows the chlorine adequate contact time to maintain the required residual.
- Treated water is pumped to the distribution system by 4-25 hp pumps which alternate between cycles and during low demand periods, a 7.5 hp “Jockey pump” is used.
- The distribution system pressure is currently set at 45 psi. (Pounds per square inch).
- The distribution piping is comprised of 150mm Transite water main and ¾ inch to 2-inch service connections. There are currently a total of 590 services which are all metered.
- An on-site backup generator at the treatment facility is used to run the distribution pumps in the event of a power outage.

What chemicals are used in the treatment of our water?

The clarity of surface water changes each season and is dependent on the weather (amount of precipitation, temperature, spring runoff, etc.). As the water changes, adjustments are made to the process to ensure the best possible finished water. The following is a list of the chemicals we currently use and a brief description of their function.

Anti-Scalant – Fed into the feed water of the MTU to control scaling of the membranes.

Sodium Hydroxide – Used for high PH cleanings on the UF’s and fed into the permeate water of the MTU for PH adjustment.

Hydrochloric Acid - Used for low PH cleanings on the UF’s and caustic neutralization.

Sodium Hypochlorite – Used in the UF membrane cleaning process. Also, an adequate amount of chlorine is added before the water enters the storage reservoir to provide a disinfectant residual throughout the distribution piping.

Corrosion Inhibitor – A liquid inhibitor formulated to control corrosion in our distribution lines.

Sodium Bisulphite- Injected into the MTU feed lines to dechlorinate the feed water and to dechlorinate CIP (clean in place) and CEB (chemically enhanced backwash) water in the UF’s.

Is our water tested? What for? When?

Water tests are taken on a routine basis to ensure that the water is safe and to monitor how well the treatment process is working. We test the water at the water treatment facility every day. We also test the water in the distribution system, as well as the raw water regularly. It is a regulatory requirement that all water test results associated with water safety be submitted to the provincial Office of Drinking Water for review.

Disinfectant Testing: On line chlorine analyzers in the treatment process continuously monitor the level of chlorine in the treated water, in addition to manual chlorine tests done by the operator several times per day to ensure that the water leaving the water treatment plant has enough chlorine to ensure proper disinfection throughout the system. We also test chlorine levels in the distribution system every time we take water samples for bacterial testing.

Turbidity Testing: Turbidity is defined as the cloudiness of a fluid caused by individual particles. Turbidity testing is a measurement of the clarity of water. We use turbidity to tell us how well our treatment process is working and to make adjustments to our chemical feed rates throughout the year as the water changes. Six on line turbidity analyzers continuously monitor the water as it goes through the treatment process, in addition to daily manual turbidity testing done by the operator.

Bacterial Testing: We test the raw water (untreated lake water), the treated water (leaving the water treatment plant) and the water in the distribution system at two locations every two weeks (bi-weekly) for the presences of Total Coliform and E. coli bacteria. If these bacteria are present in the water, it is an indication that disease-causing organisms may be present. If the laboratory results are positive, we resample and test again. If the results are still positive, a boil water advisory may be issued to the town at which time the public would be notified by the various media.

Trihalomethane (THM)/Haloacetic Acid (HAA) Testing: Trihalomethanes (THMs) and Haloacetic Acid (HAA) are by-products of the water treatment process. They are formed when natural organic material, such as the decaying vegetation commonly found in lakes and reservoirs, reacts with chlorine used to treat the water. This reaction produces "disinfection by-products," the most common of which are THMs and HAA's. Sampling is done four times per year, every second year, and the standard is based on these tests.

Chemical Testing: We test the raw and treated water for 60 chemical parameters on an annual basis. Sampling was completed in November, 2022. Testing indicated that the treated water met all health and aesthetic guidelines. A copy of the chemical analysis report can be obtained from the Municipal office.

Microcystin Testing: During the summer months, we do visual inspections for algae near the raw water intake. If an algae bloom is present, we test for microcystin toxins every three days until the bloom has passed. In 2022, no microcystin was detected in the raw water.

Lead Testing: New for 2023 is the implementation of lead testing in the distribution system. 20 samples will be collected at varying residences throughout the year. Test results will be sent directly to the homeowner as well as the Municipality and Manitoba Office of Drinking Water.

What are the results of the tests?

The following list summarizes all the treated water test results for 2022:

Table 1. Treated Water Test Results and Standards

| Testing Parameter | Standard | Frequency | Test Results |
|------------------------------|-----------------|------------------|---------------------|
| Bacterial | 0-TC*, 0-EC* | Bi-weekly | 96% Compliance |
| Chlorine (leaving reservoir) | 0.5mg/L | Continuous | 99.7% Compliance |
| Chlorine (in town) | 0.1mg/L | Bi-weekly | 100% Compliance |
| Turbidity | <0.1 NTU | Continuous | 92% Compliance |

| | | | |
|--------------------------|----------|-------------------------|-----------------|
| THM (Trihalomethanes) | 0.1mg/L | Quarterly (2022 result) | .006 mg/L |
| HAA (Haloacetic Acids) | 0.08mg/L | Quarterly (2022 result) | .002mg/L |
| Microbial | 3 LRV* | Daily | 100% Compliance |

How do we alert Public Utilities Staff to water emergencies?

The new Water Treatment Plant utilizes a SCADA program. SCADA is an acronym for Supervisory Control and Data Acquisition. SCADA generally refers to an industrial computer system that monitors and controls all the processes in the plant and through an alarm system alert Utilities Staff to any emergencies that might affect the town's water supply. There is an operator on call 24 hours a day, 7 days a week. The operator is available via cell phone at all times.

Were there any emergencies, regulatory compliance issues or other operational issues to report in 2022?

- June 19th/22-Failure to maintain a free chlorine reading of at least 0.5 mg/l in accordance with the operating licence. This was due to an injector malfunction. Lowest manual test was recorded as 0.53 mg/l.
- Week of September 11th/22- Failure to meet Bacteriological Standards: Total Coliform (TC) and E. coli (EC) as a result of failing to submit bacteriological samples following a Presence/Absence analysis. This was due to the sample time being exceeded at the lab. (Sample results were absent for bacteria.)
- Month of December/22-Failure to maintain less than or equal to 0.1 NTU in 99% of the measurements in a month as specified. This was due to the raw water line break and instrumentation issues.

Future system expansion or expenses expected?

Currently we have applied for funding for a rural water pipeline to provide potable water to the rural population.

Who can we call with questions or concerns regarding our drinking water?

For general questions during regular business hours, call the Riverdale Municipality Office from 9:00 am to 5:00 pm at 204-328-5300 or the Water Treatment Plant operator at 204-328-7480.

For after hour's emergencies, the operator-on-call is Jeff Worth @ 204-573-7840 or Mike Beaulé @ 204-573-7841.

Attached is a list of all chemical water quality standards that apply to the water system, microsystem test results and a summary of analysis results for each parameter before and after treatment.



Riverdale Municipality - Water Treatment
Plant
ATTN: JEFF WORTH
Rivers - PWS
Box 520
Rivers MB R0K 1X0

Date Received: 24-NOV-22
Report Date: 08-DEC-22 16:12 (MT)
Version: FINAL

Client Phone: 204-328-7480

Certificate of Analysis

Lab Work Order #: L2741428
Project P.O. #: NOT SUBMITTED
Job Reference: RIVERS - PWS 181.00
C of C Numbers:
Legal Site Desc: 16843

Christine Mason
Account Manager

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ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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ANALYTICAL REPORT

Physical Tests (WATER)

| | | ALS ID | | L2741428-1 | L2741428-2 |
|----------------------------|----------|----------------|----------------|--------------------|---------------------|
| | | Sampled Date | | 23-NOV-22 | 23-NOV-22 |
| | | Sampled Time | | 09:15 | 09:00 |
| | | Sample ID | | RIVERS 1 - RAW | RIVERS 2 - TREATED |
| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | | |
| Colour, True | CU | 15 | - | 29.8 | 5.5 |
| Conductivity | umhos/cm | - | - | 784 | 37.2 |
| Hardness (as CaCO3) | mg/L | - | - | 390 ^{HTC} | 5.34 ^{HTC} |
| Langelier Index (4 C) | No Unit | - | - | 1.2 | -2.6 |
| Langelier Index (60 C) | No Unit | - | - | 2.0 | -1.8 |
| pH | pH units | 7.00-10.5 | - | 8.57 | 7.74 |
| Total Dissolved Solids | mg/L | 500 | - | 664 | 14.7 |
| Transmittance, UV (254 nm) | %T/cm | - | - | 42.6 | 100 |
| Turbidity | NTU | - | - | 0.84 | <0.10 |

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2021)

#1: GCDWQ - Aesthetic Objective/Other Value (Jan.2020)

#2: GCDWQ - Maximum Acceptable Concentrations (MACs-Jan.2020)

Anions and Nutrients (WATER)

| | | ALS ID | | L2741428-1 | L2741428-2 |
|------------------------------|------|----------------|----------------|----------------|--------------------|
| | | Sampled Date | | 23-NOV-22 | 23-NOV-22 |
| | | Sampled Time | | 09:15 | 09:00 |
| | | Sample ID | | RIVERS 1 - RAW | RIVERS 2 - TREATED |
| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | | |
| Alkalinity, Total (as CaCO3) | mg/L | - | - | 321 | 14.7 |
| Ammonia, Total (as N) | mg/L | - | - | 0.043 | 0.011 |
| Bicarbonate (HCO3) | mg/L | - | - | 356 | 17.9 |
| Bromide (Br) | mg/L | - | - | 0.030 | <0.010 |
| Carbonate (CO3) | mg/L | - | - | 17.8 | <0.60 |
| Chloride (Cl) | mg/L | 250 | - | 7.86 | 1.55 |
| Fluoride (F) | mg/L | - | 1.5 | 0.161 | <0.020 |
| Hydroxide (OH) | mg/L | - | - | <0.34 | <0.34 |
| Nitrate (as N) | mg/L | - | 10 | 0.0120 | <0.0050 |
| Nitrite (as N) | mg/L | - | 1 | <0.0010 | <0.0010 |
| Sulfate (SO4) | mg/L | 500 | - | 126 | 1.93 |

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2021)

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#2: GCDWQ - Maximum Acceptable Concentrations (MACs-Jan.2020)

Organic / Inorganic Carbon (WATER)

| | | ALS ID | | L2741428-1 | L2741428-2 |
|--------------------------|------|----------------|----------------|----------------|--------------------|
| | | Sampled Date | | 23-NOV-22 | 23-NOV-22 |
| | | Sampled Time | | 09:15 | 09:00 |
| | | Sample ID | | RIVERS 1 - RAW | RIVERS 2 - TREATED |
| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | | |
| Dissolved Organic Carbon | mg/L | - | - | 16.0 | 0.90 |
| Total Organic Carbon | mg/L | - | - | 15.5 | 1.08 |

Federal Guidelines for Canadian Drinking Water Quality (MAR, 2021)

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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)

| | | ALS ID | | L2741428-1 | L2741428-2 | L2741428-3 |
|-----------------------|------|----------------|----------------|----------------|--------------------|-------------------------|
| | | Sampled Date | | 23-NOV-22 | 23-NOV-22 | 23-NOV-22 |
| | | Sampled Time | | 09:15 | 09:00 | 09:30 |
| | | Sample ID | | RIVERS 1 - RAW | RIVERS 2 - TREATED | RIVERS 3 - DISTRIBUTION |
| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | | | |
| Aluminum (Al)-Total | mg/L | 0.1 | 2.9 | 0.0124 | 0.0041 | 0.0624 |
| Antimony (Sb)-Total | mg/L | - | 0.006 | 0.00015 | <0.00010 | <0.00010 |
| Arsenic (As)-Total | mg/L | - | 0.01 | 0.00435 | 0.00019 | 0.00020 |
| Barium (Ba)-Total | mg/L | - | 2 | 0.0504 | 0.00080 | 0.00083 |
| Beryllium (Be)-Total | mg/L | - | - | <0.00010 | <0.00010 | <0.00010 |
| Bismuth (Bi)-Total | mg/L | - | - | <0.000050 | <0.000050 | <0.000050 |
| Boron (B)-Total | mg/L | - | 5 | 0.137 | 0.085 | 0.084 |
| Cadmium (Cd)-Total | mg/L | - | 0.005 | <0.0000050 | <0.0000050 | <0.0000050 |
| Calcium (Ca)-Total | mg/L | - | - | 80.7 | 1.12 | 1.26 |
| Cesium (Cs)-Total | mg/L | - | - | <0.000010 | <0.000010 | <0.000010 |
| Chromium (Cr)-Total | mg/L | - | 0.05 | <0.00010 | <0.00010 | <0.00010 |
| Cobalt (Co)-Total | mg/L | - | - | 0.00026 | <0.00010 | <0.00010 |
| Copper (Cu)-Total | mg/L | 1 | 2 | 0.00086 | 0.00058 | 0.00084 |
| Iron (Fe)-Total | mg/L | 0.3 | - | 0.034 | <0.010 | <0.010 |
| Lead (Pb)-Total | mg/L | - | 0.005 | <0.000050 | <0.000050 | 0.000052 |
| Lithium (Li)-Total | mg/L | - | - | 0.0638 | 0.0055 | 0.0053 |
| Magnesium (Mg)-Total | mg/L | - | - | 45.8 | 0.616 | 0.611 |
| Manganese (Mn)-Total | mg/L | 0.02 | 0.12 | 0.0653 | 0.00067 | 0.00058 |
| Molybdenum (Mo)-Total | mg/L | - | - | 0.00169 | <0.000050 | <0.000050 |
| Nickel (Ni)-Total | mg/L | - | - | 0.00172 | <0.00050 | <0.00050 |
| Phosphorus (P)-Total | mg/L | - | - | 0.129 | 0.188 | 0.183 |
| Potassium (K)-Total | mg/L | - | - | 7.64 | 0.609 | 0.618 |
| Rubidium (Rb)-Total | mg/L | - | - | 0.00254 | 0.00023 | 0.00021 |
| Selenium (Se)-Total | mg/L | - | 0.05 | 0.000230 | <0.000050 | <0.000050 |
| Silicon (Si)-Total | mg/L | - | - | 3.31 | 0.21 | 0.27 |
| Silver (Ag)-Total | mg/L | - | - | <0.000010 | <0.000010 | <0.000010 |
| Sodium (Na)-Total | mg/L | 200 | - | 36.6 | 5.84 | 6.00 |
| Strontium (Sr)-Total | mg/L | - | 7 | 0.338 | 0.00469 | 0.00487 |
| Sulfur (S)-Total | mg/L | - | - | | | 0.65 |
| Tellurium (Te)-Total | mg/L | - | - | <0.00020 | <0.00020 | <0.00020 |
| Thallium (Tl)-Total | mg/L | - | - | <0.000010 | <0.000010 | <0.000010 |
| Thorium (Th)-Total | mg/L | - | - | <0.00010 | <0.00010 | <0.00010 |
| Tin (Sn)-Total | mg/L | - | - | <0.00010 | <0.00010 | <0.00010 |

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#2: GCDWQ - Maximum Acceptable Concentrations (MACs-Jan.2020)

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* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Total Metals (WATER)

| | | ALS ID | | L2741428-1 | L2741428-2 | L2741428-3 |
|----------------------|------|----------------|----------------|----------------|--------------------|-------------------------|
| | | Sampled Date | | 23-NOV-22 | 23-NOV-22 | 23-NOV-22 |
| | | Sampled Time | | 09:15 | 09:00 | 09:30 |
| | | Sample ID | | RIVERS 1 - RAW | RIVERS 2 - TREATED | RIVERS 3 - DISTRIBUTION |
| Analyte | Unit | Guide Limit #1 | Guide Limit #2 | | | |
| Titanium (Ti)-Total | mg/L | - | - | 0.00036 | <0.00030 | <0.00030 |
| Tungsten (W)-Total | mg/L | - | - | <0.00010 | <0.00010 | <0.00010 |
| Uranium (U)-Total | mg/L | - | 0.02 | 0.00180 | 0.000026 | 0.000026 |
| Vanadium (V)-Total | mg/L | - | - | 0.00208 | 0.00078 | 0.00085 |
| Zinc (Zn)-Total | mg/L | 5 | - | <0.0030 | <0.0030 | <0.0030 |
| Zirconium (Zr)-Total | mg/L | - | - | <0.00020 | <0.00020 | <0.00020 |

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

Reference Information

Methods Listed (if applicable):

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

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.

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:

$$\text{Ion Balance (\%)} = [\text{Cation Sum} - \text{Anion Sum}] / [\text{Cation Sum} + \text{Anion Sum}]$$

MET-T-CCMS-WP Water Total Metals in Water by CRC ICPMS EPA 200.2/6020B (mod.)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

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 evaporated 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.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

Page 1 of 11

Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|------------------------------|-----------------|-------------------|--------|-----------|-------|-----|--------|-----------|
| ALK-TITR-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5897518 | | | | | | | |
| WG3774112-10 | DUP | L2741321-2 | | | | | | |
| Alkalinity, Total (as CaCO3) | | 26.8 | 26.8 | | mg/L | 0.0 | 20 | 24-NOV-22 |
| WG3774112-9 | LCS | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | 97.8 | | % | | 85-115 | 24-NOV-22 |
| WG3774112-6 | MB | | | | | | | |
| Alkalinity, Total (as CaCO3) | | | <1.0 | | mg/L | | 1 | 24-NOV-22 |
| BR-L-IC-N-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 | LCS | | | | | | | |
| Bromide (Br) | | | 100.6 | | % | | 85-115 | 24-NOV-22 |
| WG3773999-1 | MB | | | | | | | |
| Bromide (Br) | | | <0.010 | | mg/L | | 0.01 | 24-NOV-22 |
| C-DOC-HTC-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5902957 | | | | | | | |
| WG3775372-2 | LCS | | | | | | | |
| Dissolved Organic Carbon | | | 102.9 | | % | | 80-120 | 06-DEC-22 |
| WG3775372-1 | MB | | | | | | | |
| Dissolved Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 06-DEC-22 |
| WG3775372-3 | MS | L2741080-2 | | | | | | |
| Dissolved Organic Carbon | | | 102.8 | | % | | 70-130 | 06-DEC-22 |
| Batch | R5903598 | | | | | | | |
| WG3775511-3 | DUP | L2741719-1 | | | | | | |
| Dissolved Organic Carbon | | N/A | 4.08 | | mg/L | 7.3 | 20 | 08-DEC-22 |
| WG3775511-2 | LCS | | | | | | | |
| Dissolved Organic Carbon | | | 111.7 | | % | | 80-120 | 08-DEC-22 |
| WG3775511-1 | MB | | | | | | | |
| Dissolved Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 08-DEC-22 |
| WG3775511-4 | MS | L2741719-2 | | | | | | |
| Dissolved Organic Carbon | | | 94.3 | | % | | 70-130 | 08-DEC-22 |
| C-TOC-HTC-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5902958 | | | | | | | |
| WG3775373-2 | LCS | | | | | | | |
| Total Organic Carbon | | | 102.7 | | % | | 80-120 | 06-DEC-22 |
| WG3775373-1 | MB | | | | | | | |
| Total Organic Carbon | | | <0.50 | | mg/L | | 0.5 | 06-DEC-22 |
| WG3775373-3 | MS | L2741080-2 | | | | | | |
| Total Organic Carbon | | | 104.4 | | % | | 70-130 | 06-DEC-22 |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|-----------------------|------------|--------------------|-----------|-----------|----------|-----|--------|-----------|
| CL-L-IC-N-WP | | Water | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 | LCS | | | | | | | |
| Chloride (Cl) | | | 100.5 | | % | | 90-110 | 24-NOV-22 |
| WG3773999-1 | MB | | | | | | | |
| Chloride (Cl) | | | <0.10 | | mg/L | | 0.1 | 24-NOV-22 |
| COLOUR-TRUE-WP | | Water | | | | | | |
| Batch | R5898016 | | | | | | | |
| WG3774236-3 | DUP | L2741197-1 | | | | | | |
| Colour, True | | 14.9 | 13.1 | | CU | 13 | 20 | 24-NOV-22 |
| WG3774236-2 | LCS | | | | | | | |
| Colour, True | | | 100.8 | | % | | 85-115 | 24-NOV-22 |
| WG3774236-1 | MB | | | | | | | |
| Colour, True | | | <5.0 | | CU | | 5 | 24-NOV-22 |
| EC-WP | | Water | | | | | | |
| Batch | R5897518 | | | | | | | |
| WG3774112-10 | DUP | L2741321-2 | | | | | | |
| Conductivity | | 156 | 155 | | umhos/cm | 0.2 | 10 | 24-NOV-22 |
| WG3774112-8 | LCS | | | | | | | |
| Conductivity | | | 99.9 | | % | | 90-110 | 24-NOV-22 |
| WG3774112-6 | MB | | | | | | | |
| Conductivity | | | <1.0 | | umhos/cm | | 1 | 24-NOV-22 |
| F-IC-N-WP | | Water | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 | LCS | | | | | | | |
| Fluoride (F) | | | 104.1 | | % | | 90-110 | 24-NOV-22 |
| WG3773999-1 | MB | | | | | | | |
| Fluoride (F) | | | <0.020 | | mg/L | | 0.02 | 24-NOV-22 |
| MET-T-CCMS-WP | | Water | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-4 | DUP | WG3774353-3 | | | | | | |
| Aluminum (Al)-Total | | <0.0030 | 0.0050 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Antimony (Sb)-Total | | <0.00010 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Arsenic (As)-Total | | 0.00395 | 0.00393 | | mg/L | 0.5 | 20 | 28-NOV-22 |
| Barium (Ba)-Total | | 0.0112 | 0.0112 | | mg/L | 0.4 | 20 | 28-NOV-22 |
| Beryllium (Be)-Total | | <0.00010 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Bismuth (Bi)-Total | | 0.000083 | <0.000050 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Boron (B)-Total | | 0.505 | 0.507 | | mg/L | 0.5 | 20 | 28-NOV-22 |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|-----------------------|-----------------|--------------------|-----------|-----------|-------|-----------|---------|-----------|
| MET-T-CCMS-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-4 | DUP | WG3774353-3 | | | | | | |
| Cadmium (Cd)-Total | | 0.0000136 | 0.0000067 | J | mg/L | 0.0000068 | 0.00001 | 28-NOV-22 |
| Calcium (Ca)-Total | | 118 | 119 | | mg/L | 0.8 | 20 | 28-NOV-22 |
| Cesium (Cs)-Total | | <0.000010 | <0.000010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Chromium (Cr)-Total | | 0.00012 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Cobalt (Co)-Total | | 0.00049 | 0.00050 | | mg/L | 2.4 | 20 | 28-NOV-22 |
| Copper (Cu)-Total | | 0.00227 | 0.00226 | | mg/L | 0.4 | 20 | 28-NOV-22 |
| Iron (Fe)-Total | | 0.706 | 0.698 | | mg/L | 1.2 | 20 | 28-NOV-22 |
| Lead (Pb)-Total | | 0.000122 | 0.000114 | | mg/L | 6.3 | 20 | 28-NOV-22 |
| Lithium (Li)-Total | | 0.126 | 0.126 | | mg/L | 0.5 | 20 | 28-NOV-22 |
| Magnesium (Mg)-Total | | 87.9 | 87.9 | | mg/L | 0.1 | 20 | 28-NOV-22 |
| Manganese (Mn)-Total | | 0.0465 | 0.0458 | | mg/L | 1.7 | 20 | 28-NOV-22 |
| Molybdenum (Mo)-Total | | 0.00111 | 0.00109 | | mg/L | 1.5 | 20 | 28-NOV-22 |
| Nickel (Ni)-Total | | 0.00112 | 0.00114 | | mg/L | 1.5 | 20 | 28-NOV-22 |
| Potassium (K)-Total | | 9.81 | 9.71 | | mg/L | 1.0 | 20 | 28-NOV-22 |
| Phosphorus (P)-Total | | 0.031 | 0.032 | | mg/L | 5.9 | 20 | 28-NOV-22 |
| Rubidium (Rb)-Total | | 0.00431 | 0.00425 | | mg/L | 1.3 | 20 | 28-NOV-22 |
| Selenium (Se)-Total | | <0.000050 | <0.000050 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Silicon (Si)-Total | | 8.04 | 8.02 | | mg/L | 0.3 | 20 | 28-NOV-22 |
| Silver (Ag)-Total | | <0.000010 | <0.000010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Sodium (Na)-Total | | 156 | 156 | | mg/L | 0.0 | 20 | 28-NOV-22 |
| Strontium (Sr)-Total | | 0.939 | 0.944 | | mg/L | 0.6 | 20 | 28-NOV-22 |
| Sulfur (S)-Total | | 174 | 171 | | mg/L | 1.3 | 20 | 28-NOV-22 |
| Tellurium (Te)-Total | | <0.00020 | <0.00020 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Thallium (Tl)-Total | | 0.000014 | <0.000010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Thorium (Th)-Total | | <0.00010 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Tin (Sn)-Total | | <0.00010 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Titanium (Ti)-Total | | <0.00030 | <0.00030 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Tungsten (W)-Total | | <0.00010 | <0.00010 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Uranium (U)-Total | | 0.00123 | 0.00125 | | mg/L | 1.3 | 20 | 28-NOV-22 |
| Vanadium (V)-Total | | <0.00050 | <0.00050 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| Zinc (Zn)-Total | | 0.0643 | 0.0631 | | mg/L | 1.9 | 20 | 28-NOV-22 |
| Zirconium (Zr)-Total | | <0.00020 | <0.00020 | RPD-NA | mg/L | N/A | 20 | 28-NOV-22 |
| WG3774353-2 | LCS | | | | | | | |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
 Rivers - PWS Box 520
 Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|-----------------------|-----------------|--------------|--------|-----------|-------|-----|--------|-----------|
| MET-T-CCMS-WP | | Water | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-2 | LCS | | | | | | | |
| Aluminum (Al)-Total | | | 103.5 | | % | | 80-120 | 28-NOV-22 |
| Antimony (Sb)-Total | | | 99.5 | | % | | 80-120 | 28-NOV-22 |
| Arsenic (As)-Total | | | 101.1 | | % | | 80-120 | 28-NOV-22 |
| Barium (Ba)-Total | | | 100.3 | | % | | 80-120 | 28-NOV-22 |
| Beryllium (Be)-Total | | | 99.4 | | % | | 80-120 | 28-NOV-22 |
| Bismuth (Bi)-Total | | | 99.8 | | % | | 80-120 | 28-NOV-22 |
| Boron (B)-Total | | | 97.3 | | % | | 80-120 | 28-NOV-22 |
| Cadmium (Cd)-Total | | | 101.5 | | % | | 80-120 | 28-NOV-22 |
| Calcium (Ca)-Total | | | 99.0 | | % | | 80-120 | 28-NOV-22 |
| Cesium (Cs)-Total | | | 94.9 | | % | | 80-120 | 28-NOV-22 |
| Chromium (Cr)-Total | | | 102.7 | | % | | 80-120 | 28-NOV-22 |
| Cobalt (Co)-Total | | | 100.4 | | % | | 80-120 | 28-NOV-22 |
| Copper (Cu)-Total | | | 101.8 | | % | | 80-120 | 28-NOV-22 |
| Iron (Fe)-Total | | | 98.3 | | % | | 80-120 | 28-NOV-22 |
| Lead (Pb)-Total | | | 96.3 | | % | | 80-120 | 28-NOV-22 |
| Lithium (Li)-Total | | | 95.9 | | % | | 80-120 | 28-NOV-22 |
| Magnesium (Mg)-Total | | | 110.6 | | % | | 80-120 | 28-NOV-22 |
| Manganese (Mn)-Total | | | 101.4 | | % | | 80-120 | 28-NOV-22 |
| Molybdenum (Mo)-Total | | | 97.2 | | % | | 80-120 | 28-NOV-22 |
| Nickel (Ni)-Total | | | 99.7 | | % | | 80-120 | 28-NOV-22 |
| Potassium (K)-Total | | | 107.8 | | % | | 80-120 | 28-NOV-22 |
| Phosphorus (P)-Total | | | 103.4 | | % | | 80-120 | 28-NOV-22 |
| Rubidium (Rb)-Total | | | 101.3 | | % | | 80-120 | 28-NOV-22 |
| Selenium (Se)-Total | | | 96.6 | | % | | 80-120 | 28-NOV-22 |
| Silicon (Si)-Total | | | 98.9 | | % | | 80-120 | 28-NOV-22 |
| Silver (Ag)-Total | | | 91.8 | | % | | 80-120 | 28-NOV-22 |
| Sodium (Na)-Total | | | 104.4 | | % | | 80-120 | 28-NOV-22 |
| Strontium (Sr)-Total | | | 98.3 | | % | | 80-120 | 28-NOV-22 |
| Sulfur (S)-Total | | | 80.6 | | % | | 80-120 | 28-NOV-22 |
| Tellurium (Te)-Total | | | 95.0 | | % | | 80-120 | 28-NOV-22 |
| Thallium (Tl)-Total | | | 96.7 | | % | | 80-120 | 28-NOV-22 |
| Thorium (Th)-Total | | | 92.6 | | % | | 80-120 | 28-NOV-22 |
| Tin (Sn)-Total | | | 97.2 | | % | | 80-120 | 28-NOV-22 |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|-----------------------|-----------------|-----------|------------|-----------|-------|-----|----------|-----------|
| MET-T-CCMS-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-2 | LCS | | | | | | | |
| Titanium (Ti)-Total | | | 100.3 | | % | | 80-120 | 28-NOV-22 |
| Tungsten (W)-Total | | | 97.9 | | % | | 80-120 | 28-NOV-22 |
| Uranium (U)-Total | | | 99.6 | | % | | 80-120 | 28-NOV-22 |
| Vanadium (V)-Total | | | 102.1 | | % | | 80-120 | 28-NOV-22 |
| Zinc (Zn)-Total | | | 97.5 | | % | | 80-120 | 28-NOV-22 |
| Zirconium (Zr)-Total | | | 87.1 | | % | | 80-120 | 28-NOV-22 |
| WG3774353-1 | MB | | | | | | | |
| Aluminum (Al)-Total | | | <0.0030 | | mg/L | | 0.003 | 28-NOV-22 |
| Antimony (Sb)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Arsenic (As)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Barium (Ba)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Beryllium (Be)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Bismuth (Bi)-Total | | | <0.000050 | | mg/L | | 0.00005 | 28-NOV-22 |
| Boron (B)-Total | | | <0.010 | | mg/L | | 0.01 | 28-NOV-22 |
| Cadmium (Cd)-Total | | | <0.0000050 | | mg/L | | 0.000005 | 28-NOV-22 |
| Calcium (Ca)-Total | | | <0.050 | | mg/L | | 0.05 | 28-NOV-22 |
| Cesium (Cs)-Total | | | <0.000010 | | mg/L | | 0.00001 | 28-NOV-22 |
| Chromium (Cr)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Cobalt (Co)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Copper (Cu)-Total | | | <0.00050 | | mg/L | | 0.0005 | 28-NOV-22 |
| Iron (Fe)-Total | | | <0.010 | | mg/L | | 0.01 | 28-NOV-22 |
| Lead (Pb)-Total | | | <0.000050 | | mg/L | | 0.00005 | 28-NOV-22 |
| Lithium (Li)-Total | | | <0.0010 | | mg/L | | 0.001 | 28-NOV-22 |
| Magnesium (Mg)-Total | | | <0.0050 | | mg/L | | 0.005 | 28-NOV-22 |
| Manganese (Mn)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Molybdenum (Mo)-Total | | | <0.000050 | | mg/L | | 0.00005 | 28-NOV-22 |
| Nickel (Ni)-Total | | | <0.00050 | | mg/L | | 0.0005 | 28-NOV-22 |
| Potassium (K)-Total | | | <0.050 | | mg/L | | 0.05 | 28-NOV-22 |
| Phosphorus (P)-Total | | | <0.030 | | mg/L | | 0.03 | 28-NOV-22 |
| Rubidium (Rb)-Total | | | <0.00020 | | mg/L | | 0.0002 | 28-NOV-22 |
| Selenium (Se)-Total | | | <0.000050 | | mg/L | | 0.00005 | 28-NOV-22 |
| Silicon (Si)-Total | | | <0.10 | | mg/L | | 0.1 | 28-NOV-22 |
| Silver (Ag)-Total | | | <0.000010 | | mg/L | | 0.00001 | 28-NOV-22 |
| Sodium (Na)-Total | | | <0.050 | | mg/L | | 0.05 | 28-NOV-22 |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
 Rivers - PWS Box 520
 Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|-----------------------|-----------------|--------------------|-----------|-----------|-------|-----|---------|-----------|
| MET-T-CCMS-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-1 MB | | | | | | | | |
| Strontium (Sr)-Total | | | <0.00020 | | mg/L | | 0.0002 | 28-NOV-22 |
| Sulfur (S)-Total | | | <0.50 | | mg/L | | 0.5 | 28-NOV-22 |
| Tellurium (Te)-Total | | | <0.00020 | | mg/L | | 0.0002 | 28-NOV-22 |
| Thallium (Tl)-Total | | | <0.000010 | | mg/L | | 0.00001 | 28-NOV-22 |
| Thorium (Th)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Tin (Sn)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Titanium (Ti)-Total | | | <0.00030 | | mg/L | | 0.0003 | 28-NOV-22 |
| Tungsten (W)-Total | | | <0.00010 | | mg/L | | 0.0001 | 28-NOV-22 |
| Uranium (U)-Total | | | <0.000010 | | mg/L | | 0.00001 | 28-NOV-22 |
| Vanadium (V)-Total | | | <0.00050 | | mg/L | | 0.0005 | 28-NOV-22 |
| Zinc (Zn)-Total | | | <0.0030 | | mg/L | | 0.003 | 28-NOV-22 |
| Zirconium (Zr)-Total | | | <0.00020 | | mg/L | | 0.0002 | 28-NOV-22 |
| WG3774353-5 MS | | WG3774353-3 | | | | | | |
| Aluminum (Al)-Total | | | 114.0 | | % | | 70-130 | 28-NOV-22 |
| Antimony (Sb)-Total | | | 111.3 | | % | | 70-130 | 28-NOV-22 |
| Arsenic (As)-Total | | | 112.0 | | % | | 70-130 | 28-NOV-22 |
| Barium (Ba)-Total | | | 112.0 | | % | | 70-130 | 28-NOV-22 |
| Beryllium (Be)-Total | | | 110.5 | | % | | 70-130 | 28-NOV-22 |
| Bismuth (Bi)-Total | | | 103.2 | | % | | 70-130 | 28-NOV-22 |
| Boron (B)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Cadmium (Cd)-Total | | | 107.9 | | % | | 70-130 | 28-NOV-22 |
| Calcium (Ca)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Cesium (Cs)-Total | | | 108.0 | | % | | 70-130 | 28-NOV-22 |
| Chromium (Cr)-Total | | | 111.3 | | % | | 70-130 | 28-NOV-22 |
| Cobalt (Co)-Total | | | 106.5 | | % | | 70-130 | 28-NOV-22 |
| Copper (Cu)-Total | | | 102.7 | | % | | 70-130 | 28-NOV-22 |
| Iron (Fe)-Total | | | 106.5 | | % | | 70-130 | 28-NOV-22 |
| Lead (Pb)-Total | | | 95.9 | | % | | 70-130 | 28-NOV-22 |
| Lithium (Li)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Magnesium (Mg)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Manganese (Mn)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Molybdenum (Mo)-Total | | | 112.8 | | % | | 70-130 | 28-NOV-22 |
| Nickel (Ni)-Total | | | 102.6 | | % | | 70-130 | 28-NOV-22 |
| Potassium (K)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|------------------------|-----------------|--------------------|---------|-----------|-------|-----|--------|-----------|
| MET-T-CCMS-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5899336 | | | | | | | |
| WG3774353-5 MS | | WG3774353-3 | | | | | | |
| Phosphorus (P)-Total | | | 120.6 | | % | | 70-130 | 28-NOV-22 |
| Rubidium (Rb)-Total | | | 110.8 | | % | | 70-130 | 28-NOV-22 |
| Selenium (Se)-Total | | | 110.6 | | % | | 70-130 | 28-NOV-22 |
| Silicon (Si)-Total | | | 113.1 | | % | | 70-130 | 28-NOV-22 |
| Silver (Ag)-Total | | | 101.5 | | % | | 70-130 | 28-NOV-22 |
| Sodium (Na)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Strontium (Sr)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Sulfur (S)-Total | | | N/A | MS-B | % | | - | 28-NOV-22 |
| Tellurium (Te)-Total | | | 106.4 | | % | | 70-130 | 28-NOV-22 |
| Thallium (Tl)-Total | | | 95.6 | | % | | 70-130 | 28-NOV-22 |
| Thorium (Th)-Total | | | 104.9 | | % | | 70-130 | 28-NOV-22 |
| Tin (Sn)-Total | | | 108.3 | | % | | 70-130 | 28-NOV-22 |
| Titanium (Ti)-Total | | | 117.4 | | % | | 70-130 | 28-NOV-22 |
| Tungsten (W)-Total | | | 106.2 | | % | | 70-130 | 28-NOV-22 |
| Uranium (U)-Total | | | 103.7 | | % | | 70-130 | 28-NOV-22 |
| Vanadium (V)-Total | | | 115.0 | | % | | 70-130 | 28-NOV-22 |
| Zinc (Zn)-Total | | | 100.4 | | % | | 70-130 | 28-NOV-22 |
| Zirconium (Zr)-Total | | | 114.5 | | % | | 70-130 | 28-NOV-22 |
| NH3-COL-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5899299 | | | | | | | |
| WG3774436-7 DUP | | L2741255-1 | | | | | | |
| Ammonia, Total (as N) | | 0.034 | 0.030 | | mg/L | 11 | 20 | 29-NOV-22 |
| WG3774436-6 LCS | | | 104.1 | | % | | 85-115 | 29-NOV-22 |
| Ammonia, Total (as N) | | | | | | | | |
| WG3774436-5 MB | | | <0.010 | | mg/L | | 0.01 | 29-NOV-22 |
| Ammonia, Total (as N) | | | | | | | | |
| WG3774436-8 MS | | L2741255-1 | 93.4 | | % | | 75-125 | 29-NOV-22 |
| Ammonia, Total (as N) | | | | | | | | |
| NO2-L-IC-N-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 LCS | | | 99.9 | | % | | 90-110 | 24-NOV-22 |
| Nitrite (as N) | | | | | | | | |
| WG3773999-1 MB | | | <0.0010 | | mg/L | | 0.001 | 24-NOV-22 |
| Nitrite (as N) | | | | | | | | |
| NO3-L-IC-N-WP | | | | | | | | |
| | Water | | | | | | | |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
 Rivers - PWS Box 520
 Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|----------------------------|-----------------|-------------------|---------|-----------|----------|------|---------|-----------|
| NO3-L-IC-N-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 | LCS | | | | | | | |
| Nitrate (as N) | | | 100.5 | | % | | 90-110 | 24-NOV-22 |
| WG3773999-1 | MB | | | | | | | |
| Nitrate (as N) | | | <0.0050 | | mg/L | | 0.005 | 24-NOV-22 |
| PH-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5897518 | | | | | | | |
| WG3774112-10 | DUP | L2741321-2 | | | | | | |
| pH | | 6.96 | 6.97 | J | pH units | 0.01 | 0.2 | 24-NOV-22 |
| WG3774112-7 | LCS | | | | | | | |
| pH | | | 7.01 | | pH units | | 6.9-7.1 | 24-NOV-22 |
| SO4-IC-N-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5897697 | | | | | | | |
| WG3773999-2 | LCS | | | | | | | |
| Sulfate (SO4) | | | 101.4 | | % | | 90-110 | 24-NOV-22 |
| WG3773999-1 | MB | | | | | | | |
| Sulfate (SO4) | | | <0.30 | | mg/L | | 0.3 | 24-NOV-22 |
| TDS-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5899757 | | | | | | | |
| WG3774393-3 | DUP | L2741074-1 | | | | | | |
| Total Dissolved Solids | | 972 | 969 | | mg/L | 0.4 | 20 | 28-NOV-22 |
| WG3774393-2 | LCS | | | | | | | |
| Total Dissolved Solids | | | 99.5 | | % | | 85-115 | 28-NOV-22 |
| WG3774393-1 | MB | | | | | | | |
| Total Dissolved Solids | | | <4.0 | | mg/L | | 4 | 28-NOV-22 |
| TURBIDITY-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5897597 | | | | | | | |
| WG3773890-3 | DUP | L2741395-1 | | | | | | |
| Turbidity | | <0.10 | <0.10 | RPD-NA | NTU | N/A | 15 | 24-NOV-22 |
| WG3773890-2 | LCS | | | | | | | |
| Turbidity | | | 99.0 | | % | | 85-115 | 24-NOV-22 |
| WG3773890-1 | MB | | | | | | | |
| Turbidity | | | <0.10 | | NTU | | 0.1 | 24-NOV-22 |
| UV-%TRANS-WP | | | | | | | | |
| Water | | | | | | | | |
| Batch | R5897579 | | | | | | | |
| WG3774137-3 | DUP | L2741271-1 | | | | | | |
| Transmittance, UV (254 nm) | | 64.6 | 64.9 | | %T/cm | 0.5 | 20 | 24-NOV-22 |
| WG3774137-1 | IRM | BLANK | | | | | | |



Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

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Client: Riverdale Municipality - Water Treatment Plant
 Rivers - PWS Box 520
 Rivers MB R0K 1X0

Contact: JEFF WORTH

| Test | Matrix | Reference | Result | Qualifier | Units | RPD | Limit | Analyzed |
|----------------------------|-----------------|--------------|--------|-----------|-------|-----|------------|-----------|
| UV-%TRANS-WP | | | | | | | | |
| | Water | | | | | | | |
| Batch | R5897579 | | | | | | | |
| WG3774137-1 | IRM | BLANK | | | | | | |
| Transmittance, UV (254 nm) | | | 100.0 | | % | | 99.5-100.5 | 24-NOV-22 |
| WG3774137-2 | LCS | | | | | | | |
| Transmittance, UV (254 nm) | | | 99.5 | | % | | 85-115 | 24-NOV-22 |

Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

Client: Riverdale Municipality - Water Treatment Plant

Rivers - PWS Box 520

Rivers MB R0K 1X0

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Contact: JEFF WORTH

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 |
|-----------|--|
| J | Duplicate results and limits are expressed in terms of absolute difference. |
| MS-B | Matrix Spike recovery could not be accurately calculated due to high analyte background in sample. |
| RPD-NA | Relative Percent Difference Not Available due to result(s) being less than detection limit. |

Quality Control Report

Workorder: L2741428

Report Date: 08-DEC-22

Client: Riverdale Municipality - Water Treatment Plant
Rivers - PWS Box 520
Rivers MB R0K 1X0

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Contact: JEFF WORTH

Hold Time Exceedances:

| ALS Product Description | Sample ID | Sampling Date | Date Processed | Rec. HT | Actual HT | Units | Qualifier |
|-------------------------|-----------|-----------------|-----------------|---------|-----------|-------|-----------|
| Physical Tests | | | | | | | |
| pH | | | | | | | |
| | 1 | 23-NOV-22 09:15 | 24-NOV-22 08:43 | 0.25 | 24 | hours | EHTR-FM |
| | 2 | 23-NOV-22 09:00 | 24-NOV-22 08:43 | 0.25 | 24 | hours | EHTR-FM |

Legend & Qualifier Definitions:

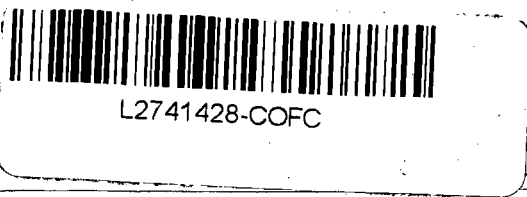
EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended 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 L2741428 were received on 24-NOV-22 09:00.

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.



| | |
|----------------------------|--|
| Regular Service (default): | <input checked="" type="checkbox"/> Regular Service (is 5-7 Days): |
| Unless otherwise requested | <input type="checkbox"/> 1 Day, rush / priority |
| | <input type="checkbox"/> 2 Day, rush / priority |
| | <input type="checkbox"/> 3 Day, rush / priority |

Report to Operator (email PDF):
 Contact: Jeff Worth
 Address: Box 520, Rivers, MB R0K1X0
 Phone: (204) ~~328-7000~~ 710-7000
 Email: riverswtp@riverdalemb.ca

Report to Owner (email PDF):
 Contact: Kathryn Bridgeman
 Address: Box 520, Rivers, MB R0K1X0
 Phone: (204) 328-5250
 Email: cao@riverdalemb.ca

Email PDF copy to:
 DWO: Christine Gerardy
 DWO Address: 1129 Queen's Ave., Brandon, MB R7A1L9
 DWO Phone: (204) 570-1405
 DWO Email: Christine.Gerardy@gov.mb.ca
 Additional Email: Joern.Muenster@gov.mb.ca;
 Nancy.Eidse@gov.mb.ca

If an update in Owner or Operator contact information is required, please contact your Drinking Water Officer

| | | | | | |
|--------------------------------------|-----------------------|-----------------|-------------------------|-----------------------------------|-----------------------|
| Client / Project Information: | Lab: | Account: | Agency Code: 382 | Report Type: EMS (Lab-MWS) | Project: DWQ-C |
| Operation Name: RIVERS - PWS | Expected Sample Time: | | January-2022 | | |
| Operation Code: 181.00 | | | | | |
| Operation ID: 16843 | | | | | |
| Sampled by: JEFF WORTH | | | | | |

Please record Free & Total Chlorine residuals for Distribution By-product Sampling
DO NOT COPY or RE-USE this form. Sample Number are unique to the Office of Drinking Water
and provided by Drinking Water Officer.

| Sample Number | Station Number | Sample Identification | Free Chlorine (mg/L) | Total Chlorine (mg/L) | Sample Date dd-mmm-yyyy | Sample Time hh:mm | Sample Matrix | Sample Type | MB-CH-PWS-V2013 | MB-MET-T-CCMS | # of Containers |
|---------------|----------------|------------------------------|----------------------|-----------------------|-------------------------|-------------------|---------------|-------------|-----------------|---------------|-----------------|
| 2201CG5001 | MB05MFD041 | Rivers 1 - Raw | 0 | 0 | 23-NOV-22 | 0915 | 6 | 1 | X | | 4 |
| 2201CG5002 | MB05MFD042 | Rivers 2 - Treated | 1.23 | 1.26 | 23-NOV-22 | 0900 | 10 | 1 | X | | 4 |
| 2201CG5003 | MB05MFD043 | Rivers 3 - Distributon (mid) | 1.16 | 1.19 | 23-NOV-22 | 0930 | 9 | 1 | | X | 1 |

Failure to complete all portions of this form may delay analysis.

Please fill in this form LEGIBLY.

Sample Matrix: 6-Raw Water, 9-Distributed Water, 10-Treated Water
 Sample Type: 1-Grab Sample

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.

| | | | |
|---------------------------------|------------------------------|------------------------------|---|
| Relinquished By: <i>JW</i> | Date & Time: NOV. 23/22 0930 | Validated By (lab use only): | Date & Time: |
| Received By: <i>[Signature]</i> | Date & Time: NOV 24 2022 | Temperature: 12.2 | Samples Received in Good Condition? Y/N |