

RIVERDALE MUNICIPALITY PUBLIC WATER SYSTEM **ANNUAL REPORT - 2023**

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 September 2023. 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.

Microbial Testing: The UF modules are tested on a daily basis to ensure membrane integrity. This test produces Log Removal Value that must be higher than 3.0 to ensure microbes such as Cryptosporidium and Giardia are being removed.

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 2023, no microcystin was detected in the raw water.

Lead Testing: This is new for 2023. The Office of Drinking Water began phasing in lead testing requirements in 2019. We started participating in 2023. The Guidelines for Canadian Drinking Water Quality recommend that the lead content of drinking water not exceed 0.005 milligrams per litre (mg/L). All 20 homes sampled in 2023 were below the recommended limit.

What are the results of the tests?

The following list summarizes all the treated water test results for 2021:

Table 1. Treated Water Test Results and Standards

Testing Parameter	Standard	Frequency	Test Results
Bacterial	0-TC*, 0-EC*	Bi-weekly	100% Compliance

Chlorine (leaving reservoir)	0.5mg/L	Continuous	100% Compliance
Chlorine (in town)	0.1mg/L	Bi-weekly	100% Compliance
Turbidity	<0.1 NTU	Continuous	96 % Compliance
THM (Trihalomethanes)	0.1mg/L	Quarterly (2022 result)	0.006 mg/L
HAA (Haloacetic Acids)	0.08mg/L	Quarterly (2022 result)	0.002 mg/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 2023?

There was one water related emergency in 2023.

- On Wednesday, April 19th/23, there was a power failure which lasted 31 hrs which resulted in our reservoir being emptied and as a result we had to stop distributing water to the Town for a period of 11 hrs until power and a sufficient amount of water was available to pump to the distribution system. We were on a boil water advisory from startup 6am Friday April 21st/23 until 3:30pm Saturday April 22nd /23. The advisory was lifted once we had passed the required bacteriological sampling to determine the water was safe for consumption.
- **There were no regulatory compliance issues in 2023.**

Future system expansion or expenses expected?

A Municipal bulk water station, lake supply upgrades, and rural pipeline are being considered in the near future.

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 204-720-7000

For after hour's emergencies, the operators-on-call are Jeff Worth @ 204-573-7840 or Mark Freeman or Ian Brennan @ 204-573-7841.

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



CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

<p>Work Order : WP2323348</p> <p>Client : Manitoba Conservation & Climate</p> <p>Contact : Marc Balcaen</p> <p>Address : 14 Fultz Boulevard Winnipeg MB Canada R3Y 0L6</p> <p>Telephone : 204 945 5776</p> <p>Project : Rivers - PWS 181.00</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Rivers - PWS 181.00 Op Id: 16843</p> <p>Quote number : WTP Chemistry</p> <p>No. of samples received : 3</p> <p>No. of samples analysed : 3</p>	<p>Page : 1 of 5</p> <p>Laboratory : ALS Environmental - Winnipeg</p> <p>Account Manager : Sheriza Rajack-Ahamed</p> <p>Address : 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4</p> <p>Telephone : +1 204 255 9720</p> <p>Date Samples Received : 15-Sep-2023 11:10</p> <p>Date Analysis Commenced : 15-Sep-2023</p> <p>Issue Date : 25-Sep-2023 11:01</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<u>Signatories</u>	<u>Position</u>	<u>Laboratory Department</u>
Lee McTavish		Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Metals, Winnipeg, Manitoba



No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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. Guidelines 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.

Key : LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
% T/cm	% transmittance per centimetre
µg/L	micrograms per litre
µS/cm	microsiemens per centimetre
AU/cm	absorbance units per centimetre
CU	colour units (1 cu = 1 mg/l pt)
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

>: greater than.

<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).

For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.



Analytical Results Evaluation

				Client sample ID	RIVERS 1 - RAW	RIVERS 2 - TREATED	RIVERS 3 - DISTRIBUTION (MID)	----	----	----	----
Matrix: Water				Sampling date/time	15-Sep-2023 00:00	15-Sep-2023 00:00	15-Sep-2023 00:00	----	----	----	----
				Sub-Matrix	Water	Water	Water	----	----	----	----
Analyte	CAS Number	Method/Lab	Unit	WP2323348-001	WP2323348-002	WP2323348-003	-----	-----	-----	-----	
Physical Tests											
Absorbance, UV (@ 254nm)	----	E404/WP	AU/cm	0.327	0.0050	----	----	----	----	----	----
Alkalinity, bicarbonate (as CaCO3)	----	E290/WP	mg/L	208	16.2	----	----	----	----	----	----
Alkalinity, carbonate (as CaCO3)	----	E290/WP	mg/L	20.2	<1.0	----	----	----	----	----	----
Alkalinity, hydroxide (as CaCO3)	----	E290/WP	mg/L	<1.0	<1.0	----	----	----	----	----	----
Alkalinity, total (as CaCO3)	----	E290/WP	mg/L	228	16.2	----	----	----	----	----	----
Colour, true	----	E329/WP	CU	22.7	<5.0	----	----	----	----	----	----
Conductivity	----	E100/WP	µS/cm	669	48.4	----	----	----	----	----	----
pH	----	E108/WP	pH units	8.56	7.61	----	----	----	----	----	----
Solids, total dissolved [TDS]	----	E162-L/WP	mg/L	452	24.2	----	----	----	----	----	----
Turbidity	----	E121/WP	NTU	1.35	<0.10	----	----	----	----	----	----
Transmittance, UV (@ 254nm)	----	E404/WP	% T/cm	47.1	98.8	----	----	----	----	----	----
Anions and Nutrients											
Ammonia, total (as N)	7664-41-7	E298/WP	mg/L	0.0552	<0.0050	----	----	----	----	----	----
Bromide	24959-67-9	E235.Br-L/WP	mg/L	<0.050	<0.050	----	----	----	----	----	----
Chloride	16887-00-6	E235.Cl-L/WP	mg/L	7.48	2.13	----	----	----	----	----	----
Fluoride	16984-48-8	E235.F/WP	mg/L	0.144	<0.020	----	----	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3-L/WP	mg/L	0.224	0.0784	----	----	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2-L/WP	mg/L	0.0072	<0.0010	----	----	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WP	mg/L	128	3.17	----	----	----	----	----	----
Organic / Inorganic Carbon											
Carbon, dissolved organic [DOC]	----	E358-L/WP	mg/L	15.4	1.09	----	----	----	----	----	----
Carbon, total organic [TOC]	----	E355-L/WP	mg/L	14.4	1.26	----	----	----	----	----	----
Total Metals											
Aluminum, total	7429-90-5	E420/WP	µg/L	----	----	3.2	----	----	----	----	----
Antimony, total	7440-36-0	E420/WP	µg/L	----	----	<0.10	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WP	µg/L	----	----	0.16	----	----	----	----	----



Analytical Results Evaluation

Matrix: Water				Client sample ID	RIVERS 1 - RAW	RIVERS 2 - TREATED	RIVERS 3 - DISTRIBUTION (MID)	----	----	----	----
				Sampling date/time	15-Sep-2023 00:00	15-Sep-2023 00:00	15-Sep-2023 00:00	----	----	----	----
Sub-Matrix				Water	Water	Water	----	----	----	----	
Analyte	CAS Number	Method/Lab	Unit	WP2323348-001	WP2323348-002	WP2323348-003	-----	-----	-----	-----	
Total Metals											
Barium, total	7440-39-3	E420/WP	µg/L	----	----	1.22	----	----	----	----	
Beryllium, total	7440-41-7	E420/WP	µg/L	----	----	<0.020	----	----	----	----	
Bismuth, total	7440-69-9	E420/WP	µg/L	----	----	<0.050	----	----	----	----	
Boron, total	7440-42-8	E420/WP	µg/L	----	----	109	----	----	----	----	
Cadmium, total	7440-43-9	E420/WP	µg/L	----	----	<0.0050	----	----	----	----	
Calcium, total	7440-70-2	E420/WP	µg/L	----	----	1360	----	----	----	----	
Cesium, total	7440-46-2	E420/WP	µg/L	----	----	<0.010	----	----	----	----	
Chromium, total	7440-47-3	E420/WP	µg/L	----	----	<0.50	----	----	----	----	
Cobalt, total	7440-48-4	E420/WP	µg/L	----	----	<0.10	----	----	----	----	
Copper, total	7440-50-8	E420/WP	µg/L	----	----	9.16	----	----	----	----	
Iron, total	7439-89-6	E420/WP	µg/L	----	----	<10	----	----	----	----	
Lead, total	7439-92-1	E420/WP	µg/L	----	----	<0.050	----	----	----	----	
Lithium, total	7439-93-2	E420/WP	µg/L	----	----	7.5	----	----	----	----	
Magnesium, total	7439-95-4	E420/WP	µg/L	----	----	970	----	----	----	----	
Manganese, total	7439-96-5	E420/WP	µg/L	----	----	1.07	----	----	----	----	
Molybdenum, total	7439-98-7	E420/WP	µg/L	----	----	0.053	----	----	----	----	
Nickel, total	7440-02-0	E420/WP	µg/L	----	----	<0.50	----	----	----	----	
Phosphorus, total	7723-14-0	E420/WP	µg/L	----	----	132	----	----	----	----	
Potassium, total	7440-09-7	E420/WP	µg/L	----	----	1100	----	----	----	----	
Rubidium, total	7440-17-7	E420/WP	µg/L	----	----	0.38	----	----	----	----	
Selenium, total	7782-49-2	E420/WP	µg/L	----	----	<0.050	----	----	----	----	
Silicon, total	7440-21-3	E420/WP	µg/L	----	----	1420	----	----	----	----	
Silver, total	7440-22-4	E420/WP	µg/L	----	----	<0.010	----	----	----	----	
Sodium, total	7440-23-5	E420/WP	µg/L	----	----	7380	----	----	----	----	
Strontium, total	7440-24-6	E420/WP	µg/L	----	----	6.20	----	----	----	----	
Sulfur, total	7704-34-9	E420/WP	µg/L	----	----	1180	----	----	----	----	
Tellurium, total	13494-80-9	E420/WP	µg/L	----	----	<0.20	----	----	----	----	
Thallium, total	7440-28-0	E420/WP	µg/L	----	----	<0.010	----	----	----	----	



Analytical Results Evaluation

Matrix: Water				Client sample ID	RIVERS 1 - RAW	RIVERS 2 - TREATED	RIVERS 3 - DISTRIBUTION (MID)	----	----	----	----
				Sampling date/time	15-Sep-2023 00:00	15-Sep-2023 00:00	15-Sep-2023 00:00	----	----	----	----
Sub-Matrix				Water	Water	Water	----	----	----	----	
Analyte	CAS Number	Method/Lab	Unit	WP2323348-001	WP2323348-002	WP2323348-003	-----	-----	-----	-----	
Total Metals											
Thorium, total	7440-29-1	E420/WP	µg/L	----	----	<0.10	----	----	----	----	
Tin, total	7440-31-5	E420/WP	µg/L	----	----	<0.10	----	----	----	----	
Titanium, total	7440-32-6	E420/WP	µg/L	----	----	<0.30	----	----	----	----	
Tungsten, total	7440-33-7	E420/WP	µg/L	----	----	<0.10	----	----	----	----	
Uranium, total	7440-61-1	E420/WP	µg/L	----	----	0.044	----	----	----	----	
Vanadium, total	7440-62-2	E420/WP	µg/L	----	----	<0.50	----	----	----	----	
Zinc, total	7440-66-6	E420/WP	µg/L	----	----	3.8	----	----	----	----	
Zirconium, total	7440-67-7	E420/WP	µg/L	----	----	<0.20	----	----	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Key:



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : WP2323348</p> <p>Client : Manitoba Conservation & Climate</p> <p>Contact : Marc Balcaen</p> <p>Address : 14 Fultz Boulevard Winnipeg MB Canada R3Y 0L6</p> <p>Telephone : ----</p> <p>Project : Rivers - PWS 181.00</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : Rivers - PWS 181.00 Op Id: 16843</p> <p>Quote number : WTP Chemistry</p> <p>No. of samples received : 3</p> <p>No. of samples analysed : 3</p>	<p>Page : 1 of 12</p> <p>Laboratory : ALS Environmental - Winnipeg</p> <p>Account Manager : Sheriza Rajack-Ahamed</p> <p>Address : 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4</p> <p>Telephone : +1 204 255 9720</p> <p>Date Samples Received : 15-Sep-2023 11:10</p> <p>Issue Date : 25-Sep-2023 11:01</p>
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This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
- DQO: Data Quality Objective.
- LOR: Limit of Reporting (detection limit).
- RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Anions and Nutrients	Anonymous	Anonymous	Ammonia, total (as N)	7664-41-7	E298	49.5 %	75.0-125%	Recovery less than lower data quality objective



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RIVERS 1 - RAW	E298	15-Sep-2023	19-Sep-2023	28 days	5 days	✔	19-Sep-2023	28 days	5 days	✔
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) RIVERS 2 - TREATED	E298	15-Sep-2023	19-Sep-2023	28 days	5 days	✔	19-Sep-2023	28 days	5 days	✔
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RIVERS 1 - RAW	E235.Br-L	15-Sep-2023	15-Sep-2023	28 days	1 days	✔	15-Sep-2023	28 days	1 days	✔
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE RIVERS 2 - TREATED	E235.Br-L	15-Sep-2023	15-Sep-2023	28 days	1 days	✔	15-Sep-2023	28 days	1 days	✔
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RIVERS 1 - RAW	E235.Cl-L	15-Sep-2023	15-Sep-2023	28 days	1 days	✔	15-Sep-2023	28 days	1 days	✔
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE RIVERS 2 - TREATED	E235.Cl-L	15-Sep-2023	15-Sep-2023	28 days	1 days	✔	15-Sep-2023	28 days	1 days	✔
Anions and Nutrients : Fluoride in Water by IC										
HDPE RIVERS 1 - RAW	E235.F	15-Sep-2023	15-Sep-2023	28 days	1 days	✔	15-Sep-2023	28 days	1 days	✔



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE RIVERS 2 - TREATED	E235.F	15-Sep-2023	15-Sep-2023	28 days	1 days	✓	15-Sep-2023	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RIVERS 1 - RAW	E235.NO3-L	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE RIVERS 2 - TREATED	E235.NO3-L	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RIVERS 1 - RAW	E235.NO2-L	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE RIVERS 2 - TREATED	E235.NO2-L	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RIVERS 1 - RAW	E235.SO4	15-Sep-2023	15-Sep-2023	28 days	1 days	✓	15-Sep-2023	28 days	1 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE RIVERS 2 - TREATED	E235.SO4	15-Sep-2023	15-Sep-2023	28 days	1 days	✓	15-Sep-2023	28 days	1 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
HDPE - unspecified dissolved (lab preserved) RIVERS 1 - RAW	E358-L	15-Sep-2023	19-Sep-2023	3 days	4 days	* EHT	19-Sep-2023	3 days	4 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
HDPE - unspecified dissolved (lab preserved) RIVERS 2 - TREATED	E358-L	15-Sep-2023	19-Sep-2023	3 days	4 days	* EHT	19-Sep-2023	3 days	4 days	✓



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RIVERS 1 - RAW	E355-L	15-Sep-2023	18-Sep-2023	28 days	3 days	✓	18-Sep-2023	28 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) RIVERS 2 - TREATED	E355-L	15-Sep-2023	18-Sep-2023	28 days	3 days	✓	18-Sep-2023	28 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RIVERS 1 - RAW	E290	15-Sep-2023	15-Sep-2023	14 days	0 days	✓	15-Sep-2023	14 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE RIVERS 2 - TREATED	E290	15-Sep-2023	15-Sep-2023	14 days	0 days	✓	15-Sep-2023	14 days	0 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE RIVERS 1 - RAW	E329	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Physical Tests : Colour (True) by Spectrometer (5 CU)										
HDPE RIVERS 2 - TREATED	E329	15-Sep-2023	15-Sep-2023	3 days	1 days	✓	15-Sep-2023	3 days	1 days	✓
Physical Tests : Conductivity in Water										
HDPE RIVERS 1 - RAW	E100	15-Sep-2023	15-Sep-2023	28 days	0 days	✓	15-Sep-2023	28 days	0 days	✓
Physical Tests : Conductivity in Water										
HDPE RIVERS 2 - TREATED	E100	15-Sep-2023	15-Sep-2023	28 days	0 days	✓	15-Sep-2023	28 days	0 days	✓
Physical Tests : pH by Meter										
HDPE RIVERS 1 - RAW	E108	15-Sep-2023	15-Sep-2023	0.25 hrs	7 hrs	* EHTR-FM	15-Sep-2023	0.25 hrs	7 hrs	* EHTR-FM



Matrix: **Water** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter											
HDPE RIVERS 2 - TREATED	E108	15-Sep-2023	15-Sep-2023	0.25 hrs	7 hrs	* EHTR-FM	15-Sep-2023	0.25 hrs	7 hrs	* EHTR-FM	
Physical Tests : TDS by Gravimetry (Low Level)											
HDPE RIVERS 1 - RAW	E162-L	15-Sep-2023	----	----	----		20-Sep-2023	7 days	5 days	✓	
Physical Tests : TDS by Gravimetry (Low Level)											
HDPE RIVERS 2 - TREATED	E162-L	15-Sep-2023	----	----	----		20-Sep-2023	7 days	5 days	✓	
Physical Tests : Turbidity by Nephelometry											
HDPE RIVERS 1 - RAW	E121	15-Sep-2023	----	----	----		15-Sep-2023	3 days	1 days	✓	
Physical Tests : Turbidity by Nephelometry											
HDPE RIVERS 2 - TREATED	E121	15-Sep-2023	----	----	----		15-Sep-2023	3 days	1 days	✓	
Physical Tests : UV Absorbance and Transmittance by Spectrometry											
HDPE RIVERS 1 - RAW	E404	15-Sep-2023	----	----	----		18-Sep-2023	3 days	4 days	✓	
Physical Tests : UV Absorbance and Transmittance by Spectrometry											
HDPE RIVERS 2 - TREATED	E404	15-Sep-2023	----	----	----		18-Sep-2023	3 days	4 days	✓	
Total Metals : Total Metals in Water by CRC ICPMS											
HDPE total (nitric acid) RIVERS 3 - DISTRIBUTION (MID)	E420	15-Sep-2023	20-Sep-2023	180 days	5 days	✓	20-Sep-2023	180 days	5 days	✓	

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended
 EHT: Exceeded ALS recommended hold time prior to analysis.
 Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: * = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	1138924	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	1141797	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1139321	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	1139322	1	2	50.0	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1136913	1	12	8.3	5.0	✓
Conductivity in Water	E100	1138923	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1141019	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	1139320	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1139323	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1139324	1	2	50.0	5.0	✓
pH by Meter	E108	1138922	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1139318	1	13	7.6	5.0	✓
TDS by Gravimetry (Low Level)	E162-L	1145635	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1143253	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1138990	1	20	5.0	5.0	✓
UV Absorbance and Transmittance by Spectrometry	E404	1140318	1	7	14.2	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	1138924	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	1141797	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	1139321	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	1139322	1	2	50.0	5.0	✓
Colour (True) by Spectrometer (5 CU)	E329	1136913	1	12	8.3	5.0	✓
Conductivity in Water	E100	1138923	1	15	6.6	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1141019	1	19	5.2	5.0	✓
Fluoride in Water by IC	E235.F	1139320	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	1139323	1	2	50.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	1139324	1	2	50.0	5.0	✓
pH by Meter	E108	1138922	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1139318	1	13	7.6	5.0	✓
TDS by Gravimetry (Low Level)	E162-L	1145635	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1143253	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1138990	1	20	5.0	5.0	✓
UV Absorbance and Transmittance by Spectrometry	E404	1140318	1	7	14.2	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	1138924	1	15	6.6	5.0	✓



Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
<i>Analytical Methods</i>							
Method Blanks (MB) - Continued							
Ammonia by Fluorescence	E298	1141797	1	20	5.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	1139321	1	2	50.0	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	1139322	1	2	50.0	5.0	✔
Colour (True) by Spectrometer (5 CU)	E329	1136913	1	12	8.3	5.0	✔
Conductivity in Water	E100	1138923	1	15	6.6	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1141019	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1139320	1	8	12.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1139323	1	2	50.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1139324	1	2	50.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1139318	1	13	7.6	5.0	✔
TDS by Gravimetry (Low Level)	E162-L	1145635	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1143253	1	20	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1138990	1	20	5.0	5.0	✔
UV Absorbance and Transmittance by Spectrometry	E404	1140318	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	1141797	1	20	5.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	1139321	1	2	50.0	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	1139322	1	2	50.0	5.0	✔
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	1141019	1	19	5.2	5.0	✔
Fluoride in Water by IC	E235.F	1139320	1	8	12.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	1139323	1	2	50.0	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	1139324	1	2	50.0	5.0	✔
Sulfate in Water by IC	E235.SO4	1139318	1	13	7.6	5.0	✔
Total Metals in Water by CRC ICPMS	E420	1143253	1	20	5.0	5.0	✔
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	1138990	1	20	5.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 ALS Environmental - Winnipeg	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Winnipeg	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Winnipeg	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry (Low Level)	E162-L ALS Environmental - Winnipeg	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Winnipeg	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 ALS Environmental - Winnipeg	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Winnipeg	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Colour (True) by Spectrometer (5 CU)	E329 ALS Environmental - Winnipeg	Water	APHA 2120 C (mod)	Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L ALS Environmental - Winnipeg	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Winnipeg	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO ₂ . NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
UV Absorbance and Transmittance by Spectrometry	E404 ALS Environmental - Winnipeg	Water	APHA 5910 B (mod)	UV Absorbance is determined by first filtering a sample through a 0.45 micron filter, followed by UV absorbance measurement in a quartz cell at 254 nm. The analysis is carried out without pH adjustment.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Winnipeg	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Winnipeg	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 ALS Environmental - Winnipeg	Water		Preparation for Total Organic Carbon by Combustion

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Work Order : WP2323348
Client : Manitoba Conservation & Climate
Project : Rivers - PWS 181.00



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Winnipeg	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon

QUALITY CONTROL REPORT

Work Order	: WP2323348	Page	: 1 of 13
Client	: Manitoba Conservation & Climate	Laboratory	: ALS Environmental - Winnipeg
Contact	: Marc Balcaen	Account Manager	: Sheriza Rajack-Ahamed
Address	: 181.00 - Rivers - PWS Box 520 Rivers MB Canada R0K 1X0	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:	Telephone	: +1 204 255 9720
Project	: Rivers - PWS 181.00	Date Samples Received	: 15-Sep-2023 11:10
PO	: ----	Date Analysis Commenced	: 15-Sep-2023
C-O-C number	: ----	Issue Date	: 25-Sep-2023 11:03
Sampler	: ----		
Site	: Rivers - PWS 181.00 Op Id: 16843		
Quote number	: WTP Chemistry		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lee McTavish		Winnipeg Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Winnipeg Inorganics, Winnipeg, Manitoba
Oleksandr Busel		Winnipeg Metals, Winnipeg, Manitoba



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1136913)											
WP2323311-001	Anonymous	Colour, true	----	E329	5.0	CU	<5.0	<5.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 1138922)											
WP2323310-005	Anonymous	pH	----	E108	0.10	pH units	7.48	7.47	0.134%	4%	----
Physical Tests (QC Lot: 1138923)											
WP2323310-005	Anonymous	Conductivity	----	E100	1.0	µS/cm	110	110	0.0911%	10%	----
Physical Tests (QC Lot: 1138924)											
WP2323310-005	Anonymous	Alkalinity, total (as CaCO ₃)	----	E290	1.0	mg/L	54.5	54.4	0.184%	20%	----
Physical Tests (QC Lot: 1140318)											
WP2323428-002	Anonymous	Absorbance, UV (@ 254nm)	----	E404	0.0050	AU/cm	0.0240	0.0260	0.0020	Diff <2x LOR	----
Physical Tests (QC Lot: 1145635)											
WP2323310-012	Anonymous	Solids, total dissolved [TDS]	----	E162-L	10.0	mg/L	83.9	88.2	4.3	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1139318)											
WP2323348-001	RIVERS 1 - RAW	Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.30	mg/L	128	128	0.120%	20%	----
Anions and Nutrients (QC Lot: 1139320)											
WP2323348-001	RIVERS 1 - RAW	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.144	0.139	0.005	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1139321)											
WP2323348-001	RIVERS 1 - RAW	Bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1139322)											
WP2323348-001	RIVERS 1 - RAW	Chloride	16887-00-6	E235.Cl-L	0.10	mg/L	7.48	7.45	0.379%	20%	----
Anions and Nutrients (QC Lot: 1139323)											
WP2323348-001	RIVERS 1 - RAW	Nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.224	0.224	0.0474%	20%	----
Anions and Nutrients (QC Lot: 1139324)											
WP2323348-001	RIVERS 1 - RAW	Nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0072	0.0072	0.00007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1141797)											
WP2323335-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0121	0.0127	0.0006	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1138990)											
WP2322629-001	Anonymous	Carbon, total organic [TOC]	----	E355-L	0.50	mg/L	1.51	1.55	0.04	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1141019)											
WP2323333-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	10.3	10.6	2.59%	20%	----
Total Metals (QC Lot: 1143253)											



Sub-Matrix: **Water**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 1143253) - continued											
WP2323310-009	Anonymous	Aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0180	0.0204	0.0024	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00036	0.00034	0.00002	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00010	mg/L	0.0276	0.0267	3.09%	20%	----
		Beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.010	mg/L	0.024	0.025	0.00009	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.050	mg/L	12.9	13.0	0.132%	20%	----
		Cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.010	mg/L	0.200	0.202	1.09%	20%	----
		Lead, total	7439-92-1	E420	0.000050	mg/L	0.000057	0.000053	0.000004	Diff <2x LOR	----
		Lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, total	7439-95-4	E420	0.0050	mg/L	3.50	3.48	0.453%	20%	----
		Manganese, total	7439-96-5	E420	0.00010	mg/L	0.0105	0.0104	1.28%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000081	0.000082	0.000001	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, total	7440-09-7	E420	0.050	mg/L	1.72	1.74	0.852%	20%	----
		Rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00278	0.00290	4.08%	20%	----
		Selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, total	7440-21-3	E420	0.10	mg/L	0.27	0.28	0.01	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.050	mg/L	17.5	17.4	0.591%	20%	----
		Strontium, total	7440-24-6	E420	0.00020	mg/L	0.0638	0.0679	6.16%	20%	----
		Sulfur, total	7704-34-9	E420	0.50	mg/L	1.09	1.22	0.13	Diff <2x LOR	----
		Tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00030	mg/L	0.00039	0.00035	0.00004	Diff <2x LOR	----



Sub-Matrix: Water					<i>Laboratory Duplicate (DUP) Report</i>						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Total Metals (QC Lot: 1143253) - continued											
WP2323310-009	Anonymous	Tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000010	mg/L	0.000013	0.000013	0.0000006	Diff <2x LOR	----
		Vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1136913)						
Colour, true	---	E329	5	CU	<5.0	---
Physical Tests (QCLot: 1138923)						
Conductivity	---	E100	1	µS/cm	<1.0	---
Physical Tests (QCLot: 1138924)						
Alkalinity, total (as CaCO3)	---	E290	1	mg/L	<1.0	---
Physical Tests (QCLot: 1140318)						
Absorbance, UV (@ 254nm)	---	E404	0.005	AU/cm	<0.0050	---
Physical Tests (QCLot: 1145635)						
Solids, total dissolved [TDS]	---	E162-L	3	mg/L	<3.0	---
Anions and Nutrients (QCLot: 1139318)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	---
Anions and Nutrients (QCLot: 1139320)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	---
Anions and Nutrients (QCLot: 1139321)						
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	---
Anions and Nutrients (QCLot: 1139322)						
Chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	---
Anions and Nutrients (QCLot: 1139323)						
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	---
Anions and Nutrients (QCLot: 1139324)						
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	---
Anions and Nutrients (QCLot: 1141797)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	---
Organic / Inorganic Carbon (QCLot: 1138990)						
Carbon, total organic [TOC]	---	E355-L	0.5	mg/L	<0.50	---
Organic / Inorganic Carbon (QCLot: 1141019)						
Carbon, dissolved organic [DOC]	---	E358-L	0.5	mg/L	<0.50	---
Total Metals (QCLot: 1143253)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	---
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	---
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	---
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	---



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 1143253) - continued						
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----





Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 1136913)									
Colour, true	----	E329	5	CU	250 CU	100	85.0	115	----
Physical Tests (QCLot: 1138922)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 1138923)									
Conductivity	----	E100	1	µS/cm	1412 µS/cm	100	90.0	110	----
Physical Tests (QCLot: 1138924)									
Alkalinity, total (as CaCO ₃)	----	E290	1	mg/L	100 mg/L	99.9	85.0	115	----
Physical Tests (QCLot: 1140318)									
Absorbance, UV (@ 254nm)	----	E404	0.005	AU/cm	0.463 AU/cm	102	85.0	115	----
Physical Tests (QCLot: 1145635)									
Solids, total dissolved [TDS]	----	E162-L	3	mg/L	1000 mg/L	92.0	85.0	115	----
Anions and Nutrients (QCLot: 1139318)									
Sulfate (as SO ₄)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 1139320)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	106	90.0	110	----
Anions and Nutrients (QCLot: 1139321)									
Bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	92.3	85.0	115	----
Anions and Nutrients (QCLot: 1139322)									
Chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	98.7	90.0	110	----
Anions and Nutrients (QCLot: 1139323)									
Nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 1139324)									
Nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1141797)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	99.7	85.0	115	----
Organic / Inorganic Carbon (QCLot: 1138990)									
Carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	91.7	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1141019)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	94.4	80.0	120	----



Sub-Matrix: **Water**

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Total Metals (QCLot: 1143253)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	106	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
Bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	108	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.9	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.2	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.8	80.0	120	----
Magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	107	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.7	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
Rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	110	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
Silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.1	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
Strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
Sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	100	80.0	120	----
Tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	89.1	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
Thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.9	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.8	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	106	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 1143253) - continued									
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.2	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1139318)										
WP2323348-001	RIVERS 1 - RAW	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1139320)										
WP2323348-001	RIVERS 1 - RAW	Fluoride	16984-48-8	E235.F	1.09 mg/L	1 mg/L	109	75.0	125	----
Anions and Nutrients (QCLot: 1139321)										
WP2323348-001	RIVERS 1 - RAW	Bromide	24959-67-9	E235.Br-L	0.484 mg/L	0.5 mg/L	96.9	75.0	125	----
Anions and Nutrients (QCLot: 1139322)										
WP2323348-001	RIVERS 1 - RAW	Chloride	16887-00-6	E235.Cl-L	103 mg/L	100 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 1139323)										
WP2323348-001	RIVERS 1 - RAW	Nitrate (as N)	14797-55-8	E235.NO3-L	2.45 mg/L	2.5 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 1139324)										
WP2323348-001	RIVERS 1 - RAW	Nitrite (as N)	14797-65-0	E235.NO2-L	0.496 mg/L	0.5 mg/L	99.3	75.0	125	----
Anions and Nutrients (QCLot: 1141797)										
WP2323335-002	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0495 mg/L	0.1 mg/L	49.5	75.0	125	----
Organic / Inorganic Carbon (QCLot: 1138990)										
WP2322629-002	Anonymous	Carbon, total organic [TOC]	----	E355-L	4.93 mg/L	5 mg/L	98.6	70.0	130	----
Organic / Inorganic Carbon (QCLot: 1141019)										
WP2323333-002	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 1143253)										
WP2323310-009	Anonymous	Aluminum, total	7429-90-5	E420	0.250 mg/L	0.2 mg/L	125	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0249 mg/L	0.02 mg/L	124	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0249 mg/L	0.02 mg/L	125	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.0448 mg/L	0.04 mg/L	112	70.0	130	----
		Bismuth, total	7440-69-9	E420	0.0119 mg/L	0.01 mg/L	119	70.0	130	----
		Boron, total	7440-42-8	E420	0.115 mg/L	0.1 mg/L	115	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00497 mg/L	0.004 mg/L	124	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, total	7440-46-2	E420	0.0115 mg/L	0.01 mg/L	115	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----



Sub-Matrix: Water

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 1143253) - continued										
WP2323310-009	Anonymous	Cobalt, total	7440-48-4	E420	0.0255 mg/L	0.02 mg/L	128	70.0	130	----
		Copper, total	7440-50-8	E420	0.0254 mg/L	0.02 mg/L	127	70.0	130	----
		Iron, total	7439-89-6	E420	2.03 mg/L	2 mg/L	101	70.0	130	----
		Lead, total	7439-92-1	E420	0.0232 mg/L	0.02 mg/L	116	70.0	130	----
		Lithium, total	7439-93-2	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0255 mg/L	0.02 mg/L	128	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0246 mg/L	0.02 mg/L	123	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0511 mg/L	0.04 mg/L	128	70.0	130	----
		Phosphorus, total	7723-14-0	E420	12.8 mg/L	10 mg/L	128	70.0	130	----
		Potassium, total	7440-09-7	E420	4.98 mg/L	4 mg/L	124	70.0	130	----
		Rubidium, total	7440-17-7	E420	0.0253 mg/L	0.02 mg/L	126	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		Silicon, total	7440-21-3	E420	12.2 mg/L	10 mg/L	122	70.0	130	----
		Silver, total	7440-22-4	E420	0.00480 mg/L	0.004 mg/L	120	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, total	7704-34-9	E420	26.1 mg/L	20 mg/L	130	70.0	130	----
		Tellurium, total	13494-80-9	E420	0.0508 mg/L	0.04 mg/L	127	70.0	130	----
		Thallium, total	7440-28-0	E420	0.00472 mg/L	0.004 mg/L	118	70.0	130	----
		Thorium, total	7440-29-1	E420	0.0256 mg/L	0.02 mg/L	128	70.0	130	----
		Tin, total	7440-31-5	E420	0.0249 mg/L	0.02 mg/L	124	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0506 mg/L	0.04 mg/L	126	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.0240 mg/L	0.02 mg/L	120	70.0	130	----
		Uranium, total	7440-61-1	E420	0.00487 mg/L	0.004 mg/L	122	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.128 mg/L	0.1 mg/L	128	70.0	130	----
		Zinc, total	7440-66-6	E420	0.510 mg/L	0.4 mg/L	128	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.0465 mg/L	0.04 mg/L	116	70.0	130	----



Environment, Climate and Parks
Office of Drinking Water
1007 Century Street, Winnipeg, Manitoba,
Canada R3H 0W4

Chain of Custody (COC)
Manitoba Drinking Water Systems

Regular Service (default):	<input 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):		Report to Owner (email PDF):		Email PDF copy to:	
Contact: Jeff Worth	Address: Box 520, Rivers, MB R0K1X0	Phone: (204) 328-7480	Email: riverswtp@riverdalemb.ca	Contact: Kat Bridgeman	Address: Box 520, Rivers, MB R0K1X0
				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; Melanie.Betsill@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	Operation Code: 181.00	Operation ID: 16843	Expected Sample Time:	January-2023	
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
2301CG5010	MB05MFD041	Rivers 1 - Raw	0	0	15-SEPT-23	1:00 pm	6	1	X		4
2301CG5011	MB05MFD042	Rivers 2 - Treated	1.00	1.09	15-Sept-23	11:15 pm	10	1	X		4
2301CG5012	MB05MFD043	Rivers 3 - Distributon (mid)	0.95	0.98	15-Sept-23	1:30 pm	9	1		X	1

Failure to complete all portions of this form may delay analysis. Sample Matrix: 6-Raw Water, 9-Distributed V

Please fill in this form LEGIBLY. 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>[Signature]</i>	Date & Time: Sept. 15/23 1:30pm	Validated By (lab use only):	Date:
Received By: (lab use only)	Date & Time: 11/0 SEP 15 2023	Temperature: 20.4	Samples Received in Good C

Environmental Division
Winnipeg
Work Order Reference
WP2323348

Telephone: +1 204 255 9720

SAMPLE RECEIPT NOTIFICATION (SRN)

<p>Work Order : WP2323349</p> <p>Client : Riverdale Municipality</p> <p>Contact : Jeff Worth</p> <p>Address : 181.00 - Rivers - PWS Box 520 Rivers, MB Canada R0K 1X0</p> <p>E-mail : riverswtp@riverdalemb.ca</p> <p>Telephone : 204 710 7000</p> <p>Facsimile : 204 328 5374</p> <p>Project : Rivers - PWS 181.00</p> <p>Purchase order number : ----</p> <p>C-O-C number : ----</p> <p>Site : Rivers - PWS 181.00 Op Id: 16843</p> <p>Sampler :</p>	<p>Laboratory : ALS Environmental - Winnipeg</p> <p>Contact : Sheriza Rajack-Ahamed</p> <p>Address : 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4</p> <p>E-mail : Sheriza.RajackAhamed@alsglobal.com</p> <p>Telephone : +1 204 255 9720</p> <p>Facsimile : +1 204 255 9721</p> <p>Page : 1 of 4</p> <p>Quote number : WP2023RDMU1000003 (WTP Chemistry)</p> <p>QC Level : ALS Canada Standard Quality Control</p>
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Dates

Date Samples Received : 15-Sep-2023 11:10	Issue Date : 15-Sep-2023
Client Requested Due Date : 29-Sep-2023	Scheduled Reporting Date : 29-Sep-2023

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : ----	Temperature : 20.4
Receipt Detail :	No. of samples received / analyzed : 1 / 1

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances (if any)
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- *Where possible, ALS will store samples for the following durations, measured from date of sample submission: 30 days for Soil and Water samples; 6 months for Tissue/Biota samples; 14 days for air samples collected on re-usable media; and 3 days for water samples submitted for microbiological testing. Longer storage times are available upon request.*
- **Temperature is recorded in °C unless otherwise noted.**



Requested Deliverables

Christine Gerardy - Manitoba Conservation & Climate

ALS Excel Report (ALS_MTABXL_CAN)	Email	christine.gerardy@gov.mb.ca
Certificate of Analysis Guideline (Standard) (COA - Guideline (CAN))	Email	christine.gerardy@gov.mb.ca
Interpretive Quality Control Report (QCI (CAN))	Email	christine.gerardy@gov.mb.ca
Quality Control (QC (CAN))	Email	christine.gerardy@gov.mb.ca

EDD - Manitoba Conservation & Climate

Manitoba Water Stewardship EMS compatible file. (MBMWS_EMS_CAN)	Email	WQEMSdata@gov.mb.ca
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Jeff Worth

ALS Excel Report (ALS_MTABXL_CAN)	Email	riverswtp@riverdalemb.ca
Certificate of Analysis Guideline (Standard) (COA - Guideline (CAN))	Email	riverswtp@riverdalemb.ca
Interpretive Quality Control Report (QCI (CAN))	Email	riverswtp@riverdalemb.ca
Quality Control (QC (CAN))	Email	riverswtp@riverdalemb.ca
Sample Receipt Notification (standard format) (SRN - Short (CAN))	Email	riverswtp@riverdalemb.ca

Joern Muenster - Manitoba Conservation & Climate

ALS Excel Report (ALS_MTABXL_CAN)	Email	joern.muenster@gov.mb.ca
Certificate of Analysis Guideline (Standard) (COA - Guideline (CAN))	Email	joern.muenster@gov.mb.ca
Interpretive Quality Control Report (QCI (CAN))	Email	joern.muenster@gov.mb.ca
Quality Control (QC (CAN))	Email	joern.muenster@gov.mb.ca

Kat Bridgeman

ALS Excel Report (ALS_MTABXL_CAN)	Email	cao@riverdalemb.ca
Certificate of Analysis Guideline (Standard) (COA - Guideline (CAN))	Email	cao@riverdalemb.ca
Interpretive Quality Control Report (QCI (CAN))	Email	cao@riverdalemb.ca
Quality Control (QC (CAN))	Email	cao@riverdalemb.ca
Sample Receipt Notification (standard format) (SRN - Short (CAN))	Email	cao@riverdalemb.ca
Tax Invoice (INVOICE (CAN))	Email	cao@riverdalemb.ca

Marc Balcaen - Manitoba Conservation & Climate

ALS Excel Report (ALS_MTABXL_CAN)	Email	marc.balcaen@gov.mb.ca
Certificate of Analysis Guideline (Standard) (COA - Guideline (CAN))	Email	marc.balcaen@gov.mb.ca
Interpretive Quality Control Report (QCI (CAN))	Email	marc.balcaen@gov.mb.ca
Quality Control (QC (CAN))	Email	marc.balcaen@gov.mb.ca

Issue Date : 15-Sep-2023
Page : 4 of 4
Work Order : WP2323349 Amendment 0
Client : Riverdale Municipality



Methods with Laboratory

Sale item

Method	Laboratory	Address	City	Province	Country
Microcystin by ELISA (Extraction by Sonication) E576	Winnipeg	1329 Niakwa Road East, Unit 1:	Winnipeg	Manitoba	Canada
