



City of Morden Public Water System Annual Report 2023

This report is available online at the City of Morden website www.mymorden.ca as of March 25, 2024.

City of Morden Email address info@mymorden.ca

Paper copies are available at the Morden Civic Center office at 100-195 Stephen St.

Notifications will be sent in the quarterly water bills, the Quarterly Newsletter and also posted on the City of Morden website, indicating how users can acquire copies of the report.



City of Morden Annual Water System Operation Report 2023

1. *Where does our water come from?*

The City of Morden gets its water supply from Lake Minnewasta. Lake Minnewasta is a reservoir created by the construction of a PFRA dam on Dead horse Creek. The reservoir is approximately 1.4 km long and 500m wide at its widest point. The watershed of the creek upstream from the reservoir encompasses about 130 sq km of land area.

2. *Why do we treat our water?*

We treat our water to ensure that safe and pleasing drinking water is supplied to the homes and businesses in the City of Morden. Provincial Regulations have set health-based drinking water standards for all public water systems and are becoming more stringent all the time. The City of Morden is committed to meeting or exceeding these new standards set by the province to provide the best tap water possible to the City of Morden.

3. *What type of treatment do we use?*

Due to the high hardness count (400- 900 Mg/l) of Morden's raw water supply we use a Lime- Soda Ash softening process followed by filtration, UV disinfection and chlorination. These processes are designed to soften and clarify the water and remove microbial contaminants, such as bacteria and organic materials that are naturally found in lake waters.

4. *Why and how do we disinfect our water?*

The final step in the treatment of safe drinking water is disinfection. Disinfection is the selective destruction or inactivation of disease-causing organisms in water. The Drinking Water Safety Act and Office of Drinking Water require that water is disinfected to a set standard before it leaves the water treatment plant and that an adequate amount is maintained in the distribution system to ensure the water is safe right to the consumer's tap. The City of Morden disinfects its water through chlorination. Chlorine is added to kill bacteria and viruses that are commonly found in surface waters such as rivers and lakes. An adequate amount of Chlorine is added before the water leaves the treatment plant to ensure an effective kill of bacteria and to provide a disinfectant residual throughout the distribution system to combat any contamination in the system.

In 2016 the City of Morden added UV light disinfection as an added barrier of

disinfection to treat pathogens- bacteria that are resistant to chlorine.

Are chemicals added to our water? Why?

We add Powder Activated Carbon and Fluoride to the water.

Powder Activated Carbon is added to the water to help control taste and odour issues caused by Algae etc.

Fluoride is added as part of the Provincial Fluoridation Program at regulated levels to help prevent tooth decay. This process is monitored by Manitoba Health and Healthy Living. Note the optimum level of Fluoride in water used to be 1 mg/l (part per million) with a Maximum containment level of 1.5 mg/l. As of March 15, 2011, Manitoba Health changed the optimum level to 0.7 ppm with a range of 0.5 to 0.9 ppm. This change was brought about to acknowledge the fact that consumers are getting other sources of Fluoride such as toothpastes and mouthwashes etc. While there is naturally occurring Fluoride in our source water this is considered, and the final total amount is kept as close to .7ppm as possible.

5. How much water storage do we have?

When the new water plant was built in 1998 a 500,000-gal reservoir was built underneath it. Another underground reservoir with a capacity of 880,000 gal was constructed and put in service in May 2014. In addition to these reservoirs the Morden WTP has a standpipe with a design capacity of 400,000 gal. The total storage is available is 1.78 million gals which is sufficient to address the City of Morden's water storage needs for years to come. The standpipe condition, however, is deteriorated and replacement is needed in the coming couple of years.

6. What is the “distribution system”?

The system is a network of underground pipes that supply water to all areas of City. The chart shown below identifies the type and length of watermain piping in service.

Type of Waterline	Total Meters
Asbestos cement	33778
Ductile iron	1583
Plastic	46759
HDPE	3224

The mains are flushed through hydrants and regular maintenance including hydrant testing is done annually usually in fall.

7. Is our water tested? What for? When?

Water tests are taken on a routine basis to ensure the quality and safety of our water and to monitor how well the treatment facility is operating. We daily test the water at the water plant for: Chlorine residual, hardness, PH, turbidity, Alkalinity, Fluoride. All water test results associated with water safety are submitted to the Office of Drinking Water for review. The tests sent to The Office of Drinking Water are: Bacterial tests, Trihalomethane, Haloacetic acid, Fluoride tests, Turbidity, and chlorine residuals.

Bacterial testing: We test the raw water (untreated lake water), the treated water leaving the plant, and the water in the distribution system, every two weeks for the

presence of Total coliforms and E-Coli bacteria at a provincially accredited lab in Wpg.

Disinfectant testing is done daily on the treated water leaving the water plant and chlorine levels are also tested in the distribution system every time we take samples for bacterial sampling to ensure there is a proper Chlorine residual in the system. The Morden WTP also has online chlorine analyzers that track chlorine levels in “real time” and notify Operators of any abnormal condition related to free chlorine levels in real time.

Turbidity testing is done via on-line continuously monitoring equipment and verified daily by desktop testing. Turbidity is measurement of the clarity of the water and is used to determine how well our treatment system is working.

Trihalomethane (THM) testing: Trihalomethanes are formed when chlorine reacts with naturally occurring organic matter in the water. The province has set a standard based on an average of four samples per year. We test THM levels in two locations on a quarterly basis.

Haloacetic Acid testing: The Office of Drinking Water initiated a Haloacetic Acid testing program in 2016. Haloacetic Acid is a disinfection by- product formed by a reaction with Chlorine. Testing is done at the same time as THMs on a quarterly basis.

Fluoride sampling: Daily sampling of Fluoride levels are done at the water plant and every two weeks a composite sample for that period is submitted for testing and verification at a provincially credited lab.

In addition to the above a detailed chemical analysis is performed annually.

8. *What are the results of the tests? Are copies available?*

As a result of the testing the Office of Drinking Water has determined that “The City of Morden has been fulfilling its obligations with regard to bacteriological and disinfection monitoring and reporting”

Copies of test results are kept at the Water plant and copies can be made available by contacting the Supervisor at the Water plant. Ph# 204-822-5707.

Below are the test results for the main water quality parameters that have Maximum Acceptable Concentration limits as guidelines for Canadian Drinking Water Quality (GCDWQ). A copy of the report for complete physical and chemical analysis of raw and treated water is attached as Annexure-A.

9. 2023 ANNUAL WATER ANALYSIS

Parameter		Raw	Treated	Distribution	MAC limit	Units
Nitrite-N		0.0720	<0.0020	-	1	Ug/L
Dissolved Fluoride	F	0.281	0.707	-	1.5	Mg/L
Nitrate-N		0.533	0.650	-	10	Mg/L
Antimony	Sb	0.00049	0.00043	<0.00045	0.006	Mg/L
Arsenic	As	0.00704	0.00108	0.0009	0.010	Mg/L
Barium	Ba	0.0324	0.0120	0.0119	2.0	Mg/L
Boron	B	0.100	0.082	0.082	5	Mg/L
Cadmium	Cd	0.0000325	0.0000146	<0.0000050	0.005	Mg/L
Chromium	Cr	<0.00050	<0.00050	<0.00050	0.05	Mg/L
Lead	Pb	0.000113	<0.000050	0.00155	0.005	Mg/L
Selenium	Se	0.00191	0.00180	.000163	0.05	Mg/L
Strontium	Sr	0.462	0.241	0.244	7.0	Mg/l
Uranium	U	0.00871	0.000344	0.00032	0.02	Mg/L

10. BI-WEEKLY BACTERIAL TESTS

Date	#1 Raw	#2 Treated	#3 Distribution @PWG	#4 Dist. @PVWC	#5 Dist. @Morden Rec.	#6 Dist. @ Civic centre	#7 Dist. @ Fire Hall
January 11/2023							
Chlorine Free	0	1.00	0.27	0.78	0.25	0.67	0.42
Chlorine Total	0	1.39	0.87	1.42	0.72	1.06	0.79
Total Coliforms	5	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity		0.009	0.26	0.19	0.42	0.39	0.31
January 23/2023							
Chlorine Free	0	1.05	0.49	0.91	0.42	0.99	0.60
Chlorine Total	0	1.43	0.88	1.62	0.87	1.44	1.03
Total Coliforms	8	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity		0.09	0.38	0.23	0.31	0.47	0.27
February 7/2023							
Chlorine Free	0	1.02	0.57	0.51	0.41	0.81	0.15
Chlorine Total	0	1.45	0.89	0.96	0.80	1.36	0.78
Total Coliforms	18	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity		0.06	0.25	0.16	0.20	0.19	0.59
February 24/2023							
Chlorine Free	0	1.14	0.28	0.74	0.44	0.74	0.23
Chlorine Total	0	1.53	0.71	1.31	0.85	1.26	0.88
Total Coliforms	10	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity		0.05	0.28	0.28	0.27	0.31	0.21
March 6/ 2023							
Chlorine Free	0	1.08	0.38	0.83	0.52	0.56	0.38
Chlorine Total	0	1.46	0.79	1.43	0.93	1.03	0.82
Total Coliforms	4	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity	6.38	0.05	0.27	0.20	0.23	0.47	0.42
March 21/2023							
Chlorine Free	0	1.31	0.46	0.71	0.45	0.81	0.32
Chlorine Total	0	1.68	0.83	1.35	0.88	1.23	0.73
Total Coliforms	10	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity		0.07	0.27	0.15	0.30	0.33	0.28

April 17 / 2023							
Chlorine Free	0	1.37	0.98	0.59	0.96	1.23	0.81
Chlorine Total	0	1.76	1.57	1.09	1.43	1.72	1.37
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity		0.11	0.30	0.15	0.31	0.35	0.38
April / 2023							
Chlorine Free	0	1.09	0.79	0.78	0.43	0.70	0.36
Chlorine Total	0	1.56	1.20	1.37	0.85	1.13	0.72
Total Coliforms	5	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1
Turbidity		0.10	0.16	0.25	0.35	0.23	0.45
May 1/ 2023							
Chlorine Free	0	1.04	0.75	1.06	0.60	0.55	0.75
Chlorine Total	0	1.41	1.23	1.45	1.13	1.12	1.23
Total Coliforms	<200	<1	<1	<1	<1	<1	<1
Escherichia Coli	2	<1	<1	<1	<1	<1	<1
Turbidity			0.37	0.22	0.33	0.31	0.37
May 15 / 2023							
Chlorine Free	0	1.07	0.23	1.28	0.47	0.73	0.56
Chlorine Total	0	1.40	0.81	1.65	0.92	1.15	1.04
Total Coliforms	34	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity	-	0.18	0.25	0.18	0.20	0.25	0.27
May 29 / 2023							
Chlorine Free	0	1.03	0.28	0.91	0.34	0.63	0.49
Chlorine Total	0	1.29	0.71	1.27	0.71	1.04	0.73
Total Coliforms	56	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity		0.19	0.33	0.26	0.34	0.39	0.34
June 13 / 2023					Camp Site #69		
Chlorine Free	0	0.89	0.63	1.17	0.83	0.61	0.39
Chlorine Total	0	1.45	0.98	1.58	1.17	0.93	0.79
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	2	<1	<1	<1	<1	<1	<1
Turbidity		0.15	0.27	0.22	0.28	0.20	0.24
June 26 / 2023				Camp Site#69			
Chlorine Free	0	1.06	0.26	1.04	0.37	0.76	0.26
Chlorine Total	0	1.61	0.66	1.48	0.80	1.19	0.71
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1
Turbidity		0.21	0.35	0.39	0.33	0.28	0.29
July 10 / 2023				Camp Site # 68			
Chlorine Free	0	1.05	0.33	0.91	0.43	0.63	0.48
Chlorine Total	0	1.45	0.79	1.33	0.82	1.00	0.92
Total Coliforms	200	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity		0.29	0.39	0.39	0.34	0.42	0.39
July 24 / 2023							
Chlorine Free	0	1.13	0.35	0.78	0.30	0.57	0.50
Chlorine Total	0	1.61	0.74	1.29	0.70	1.12	0.90
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1

Turbidity		0.24	0.43	0.12	0.48	0.31	0.48
August 8 / 2023					Camp Site # 68		
Chlorine Free	0	1.59	1.31	0.53	.96	1.29	1.03
Chlorine Total	0	2.68	2.15	0.97	1.93	2.06	1.81
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity	11.9	0.41	0.54	0.27	.49	0.42	0.44
August 21 / 2023					Camp Site # 68		
Chlorine Free	0	1.25	0.10	0.57	0.78	0.41	0.37
Chlorine Total	0	2.28	0.50	1.03	1.31	0.93	0.98
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity		0.29	0.37	0.28	0.51	0.51	0.57
Sept 5 / 2023					Camp Site#69		
Chlorine Free	0	0.97	0.17	0.61	1.04	0.39	0.21
Chlorine Total	0	1.51	0.59	1.13	1.65	0.92	0.72
Total Coliforms	1	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	<1	<1	<1	<1
Turbidity		0.36	0.70	0.24	0.54	0.50	0.54
Sept 18 / 2023							
Chlorine Free	0	1.06	0.24	0.82	0.33	0.74	0.29
Chlorine Total	0	1.59	0.66	1.31	0.75	1.15	0.65
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	3	<1	<1	<1	<1	<1	<1
Turbidity		0.41	0.46	0.13	0.42	0.36	0.64
October 3 / 2023				117 Grant St.			
Chlorine Free	0	1.20	0.88	0.56	0.30	0.91	0.29
Chlorine Total	0	1.75	1.40	0.97	0.73	1.39	0.69
Total Coliforms	>200	<1	<1	<1	<1	<1	<1
Escherichia Coli	9	<1	<1	<1	<1	<1	<1
Turbidity		0.26	0.31	0.32	0.29	0.19	0.26
October 16 /2023							
Chlorine Free	0	1.30	0.77	0.10	0.51	1.03	0.45
Chlorine Total	0	1.84	1.27	0.42	0.97	1.48	0.90
Total Coliforms	83	<1	<1	<1	<1	<1	<1
Escherichia Coli	9	<1	<1	<1	<1	<1	<1
Turbidity		0.23	0.25	0.70	0.34	0.34	0.23
Oct 31 / 2023				177 Grant St.			
Chlorine Free	0	1.02	0.81	0.72	0.46	0.90	0.63
Chlorine Total	0	1.46	1.21	1.14	0.92	1.37	1.10
Total Coliforms	43	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1
Turbidity		0.17	0.29	0.19	0.20	0.20	0.27
Nov 14 / 2023							
Chlorine Free	0	0.67	0.43	0.57	0.39	0.87	0.52
Chlorine Total	0	1.22	0.88	1.10	0.85	1.36	0.96
Total Coliforms	50	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1
Turbidity		0.15	0.28	0.41	0.40	0.18	0.49
Nov 23 / 2023							
Chlorine Free	0	.39	0.38	0.83	0.52	0.56	0.38
Chlorine Total	0	8.2	0.79	1.43	0.93	1.03	0.82

Total Coliforms	4	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Turbidity	6.38	0.05	0.27	0.20	0.23	0.47	0.42
Dec. 11 / 2023							
Chlorine Free	0	1.12	0.67	0.64	0.41	0.73	0.45
Chlorine Total	0	1.68	1.17	1.20	0.87	1.18	0.89
Total Coliforms	9	<1	<1	<1	<1	<1	<1
Escherichia Coli	1	<1	<1	>1	<1	<1	<1
Turbidity		0.14	0.42	0.25	0.21	0.36	0.43
Dec. 27 / 2023							
Chlorine Free	0	1.05	0.15	0.60	0.12	0.63	0.54
Chlorine Total	0	1.67	1.42	1.16	0.57	1.07	1.01
Total Coliforms	4	<1	<1	<1	<1	<1	<1
Escherichia Coli	<1	<1	<1	<1	<1	<1	<1
Turbidity		0.18	0.54	0.21	0.26	0.33	0.34

11. How well Morden complied with standards and license during 2021?

The table below provides the city's compliance with the license/standards.

Parameter	Monitoring Requirement	Quality Standard	Performance
Total Coliform	Biweekly sampling program with each set of samples consisting of one raw, one treated and a minimum of 5 distribution samples	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water	100% Compliance
E. coli		Less than one E. coli bacteria detectable per 100 mL in all treated and distributed water	100% Compliance
Chlorine Residuals			
Free chlorine (treated water)	Treated water – Continuous sampling (online monitoring) of water entering the distribution system following 20 minutes of contact time. A confirmatory sample to be taken daily at the online analyzer sampling or effluent point	A free chlorine residual of at least 0.5 mg/L in water entering the distribution system following a minimum contact time of 20 minutes.	100% Compliance
Free chlorine (distribution system)	At the same times and location(s) as bacteriological distribution sampling	A free chlorine residual of at least 0.1 mg/L at all times at any point in the water distribution system	100% Compliance
Total chlorine (treated water)	One sample per day of water entering the distribution system following at least 20 minutes of contact time		100% Compliance
Total chlorine	At the same times and		

(distribution system)	location(s) as bacteriological distribution sampling		
Ultraviolet Disinfection	Continuous monitoring of UV dosage for each operating UV unit	95% of water produced per month is disinfected within validated conditions.	100% Compliance
Turbidity	One raw water sample per day Continuous (online monitoring) sampling of the effluent from each operating particulate filter A confirmatory sample to be taken daily at the online turbidity analyzer sampling or effluent point	Less than or equal to 0.3 NTU in 95% of the measurements in a month of the effluent from each operating filter Not exceed 0.3 NTU for more than 12 consecutive hours of filter operation Not exceed 1.0 NTU for any measurement	100% compliance
Total trihalomethanes (THMs)	Two preserved samples taken on a quarterly basis during February, May, August and November, every year at the furthest points in the distribution system.	Less than or equal to 0.10 mg/L as locational running annual average of quarterly samples	Non-compliant (results below)
Total Haloacetic Acids (HAAs)	Two preserved samples taken on a quarterly basis during February, May, August and November, every year at the furthest points in the distribution system.	Less than or equal to 0.08 mg/L as locational running annual average of quarterly samples	100% Compliance
Arsenic	One raw and one treated sample taken every year	Less than or equal to 0.01 mg/L	100% Compliance
Lead	As per instructions of the Drinking Water Officer	Less than or equal to 0.005 mg/L	100% Compliance
Manganese	One raw and one treated water sample every year. One distribution sample taken on a quarterly basis during February, May, August and November	Less than or equal to 0.12 mg/L	100% Compliance
Total Microcystins	One raw water sample in August every year and event-based testing as per ODW guidelines	Less than or equal to 0.0015 mg/L	100% Compliance

12. How do we plan to meet Standards for Trihalomethanes? (THM's)

As stated previously Trihalomethanes are formed when chlorine reacts with naturally occurring organic matter in the water. Because of the nature of Lime Soda-Ash softening plants and the amount of chemicals we need to add for softening the water. Treating surface water to meet trihalomethane standards can be challenging. The standard for total THMS is 0.1 mg/l based on a running average of quarterly samples.

The City of Morden is currently exceeding this standard based on the running average of our quarterly samples with results of 0.157 and 0.147 mg/l, which are above the regulated limit.

The City of Morden through assistance from Water Services Board and Associated Engineering is working on exploring the best option for future upgrades to Morden Water treatment Plant to address THM issues. A pilot plant study using three different water filter/treatment systems was conducted in 2021 to determine which treatment process is best suited for our raw water. Suez ran the pilot system from April to October and observed their performance during various water quality situations throughout the spring and summer. Associated Engineering is now in the process of finalizing its recommendations for the WTP upgrades. The City is also considering the ultrasonic algae treatment for lake Minnewasta to improve the raw water quality and to reduce the organic content in the raw water and a new standpipe with air stripping option to address THM issue.

Haloacetic acids are currently below regulatory guidelines.

13. THM and HAA Test Results

THMs

Location	February Result:	May Result:	August result:	November Result:	2023 Average:
Public Works Garage	0.145	0.1060	0.1290	0.1450	0.13125
Rec Centre	0.144	0.1060	0.123	0.138	0.12850

HAAs

Location	February Result:	May Result:	August result:	November Result:	2023 Average:
Public Works Garage	0.0515	0.0694	0.0798	0.0544	0.06378
Rec Centre	0.0567	0.0679	0.0793	0.0580	0.06548

14. Manganese Testing Results

Analyte	Units	Aesthetic Limit	Max Limit
Manganese	Mg/l	0.02	0.12

Date	PWG	Fire Hall	Civic Center
Feb 06 / 23	0.00111	0.00137	0.00090
May 01 / 23	0.00759	0.00564	0.00599
July 24/23	0.013	0.0134	0.0142
Nov 14 / 23	0.010	0.00961	0.0088

15. Does the City of Morden have certified trained personnel?

The water plant is a Level III Water Treatment Facility. We currently have one Certified Level III WT / Level II Distribution operator and one Level II WT / Level I Distribution Operator and one Operator in Training working at the water treatment plant.

The distribution system is a Level II facility. There are two certified distribution Level II operators and one Level I at the water plant. Public Works has 3 operators, who have Water Distribution Class II, Wastewater collection II, and Wastewater treatment class I. One of the operators in Public Works also has Water Treatment Class III. Public Works also has 2 operators-in-training.

16. How do we alert Public Works Staff to water emergencies?

The Public Works Department has staff on call 24 hrs. When emergencies arise after hours, residents who call the regular office no. are transferred to the on-call staff.

17. Were there emergencies, water breaks, regulatory compliance issues or other operational issues to report for 2023?

The city experienced 2 watermain breaks and 28 service breaks in 2023. There were 4 precautionary boil water advisories during the planned replacement/repair work of the above leaks. Water samples were taken and sent for testing after the work was completed. Boil water advisories were rescinded after a satisfactory test report was received.

18. Were there any major expenses incurred in 2023?

Following major expenses were incurred in 2023.

- Preliminary design of Pembina River Raw Water Supply project.
- Water Model
- Replacement of about 360m of watermains along Alvey Street at Dead Horse creek crossing.

19. Future system expansion or expenses expected?

City has budgeted for following projects in 2024.

- Ultrasonic algae treatment to improve raw water quality.
- Detailed design of Standpipe replacement and air stripping for THM removal

- (TRS) and construction of the Standpipe and TRS
- Raw water meter replacement at the water treatment plant.
 - Environment Act application for Pembina River Raw Water Supply project.
 - Preliminary Design of 2nd Reservoir for raw water supply.
 - 6th Street watermain renewal

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

*For general questions during business hours , call the City of Morden office from
9:00 a.m. to 4:30 p.m. or email info@mymorden.ca*

Annexure-A



CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

<p>Work Order : WP2316658</p> <p>Amendment : 3</p> <p>Client : Manitoba Conservation & Climate</p> <p>Contact : RETIRED Melanie Betsill</p> <p>Address : 14 Fultz Boulevard Winnipeg MB Canada R3Y 0L6</p> <p>Telephone : 204 945 5776</p> <p>Project : Morden - PWS - 145.00</p> <p>PO : ----</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : WTP Chemistry</p> <p>No. of samples received : 2</p> <p>No. of samples analysed : 2</p>	<p>Page : 1 of 8</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 : 25-Jul-2023 09:10</p> <p>Date Analysis Commenced : 25-Jul-2023</p> <p>Issue Date : 05-Dec-2023 11:51</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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Lee McTavish		Inorganics, Winnipeg, Manitoba
Lee McTavish		Metals, Winnipeg, Manitoba
Neha Kamran		Organics, Winnipeg, Manitoba
Oleksandr Busel		Inorganics, Winnipeg, Manitoba
Rouzelle Velasco		Inorganics, Winnipeg, Manitoba

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>
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>: 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 .

Workorder Comments

Amendment (5-DEC-23): This report has been amended following minor LIMS report formatting corrections. Re-issued report with CDWQG Guidelines. All analysis results are as per the previous report.

Amended report - 03-Aug-23 - Added agency and project information

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



Analytical Results

Sub-Matrix: Drinking Water (Matrix: Water)	Method/Lab	LOR	Unit	Client sample ID						
				MORDEN 1 - RAW	25-Jul-2023 00:00					
Analyte	Method/Lab	LOR	Unit	WP2316658-001	--	--	--	--	--	--
Physical Tests										
Absorbance, UV (@ 254nm)	E404/WP	0.0050	AU/cm	0.312	--	--	--	--	--	--
Alkalinity, bicarbonate (as CaCO3)	E290/WP	1.0	mg/L	216	--	--	--	--	--	--
Alkalinity, carbonate (as CaCO3)	E290/WP	1.0	mg/L	2.6	--	--	--	--	--	--
Alkalinity, hydroxide (as CaCO3)	E290/WP	1.0	mg/L	<1.0	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	E290/WP	1.0	mg/L	219	--	--	--	--	--	--
Colour, true	E329/WP	5.0	CU	29.2	--	--	--	--	--	--
Conductivity	E100/WP	2.0	µS/cm	892	--	--	--	--	--	--
Hardness (as CaCO3), from total Ca/Mg	EC100A/WP	0.50	mg/L	371	--	--	--	--	--	--
Langelier index (@ 4°C)	EC105A/WP	0.010	-	0.840	--	--	--	--	--	--
Langelier index (@ 60°C)	EC105A/WP	0.010	-	1.59	--	--	--	--	--	--
pH	E108/WP	0.10	pH units	8.31	--	--	--	--	--	--
Solids, total dissolved [TDS]	E162-L/WP	3.0	mg/L	614	--	--	--	--	--	--
Turbidity	E121/WP	0.10	NTU	6.97	--	--	--	--	--	--
pH, saturation (@ 4°C)	EC105A/WP	0.010	pH units	7.47	--	--	--	--	--	--
Transmittance, UV (@ 254nm)	E404/WP	1.0	% T/cm	48.8	--	--	--	--	--	--
pH, saturation (@ 60°C)	EC105A/WP	0.010	pH units	6.72	--	--	--	--	--	--
Anions and Nutrients										
Ammonia, total (as N)	E303/WP	0.010	mg/L	1.03	--	--	--	--	--	--
Bromide	E235.Br-T/WP	0.010	mg/L	0.026	--	--	--	--	--	--
Chloride	E235.Cl-L/WP	0.10	mg/L	14.0	--	--	--	--	--	--
Fluoride	E235.F/WP	0.020	mg/L	0.281	--	--	--	--	--	--
Nitrate (as N)	E235.NO3-L/WP	0.0050	mg/L	0.533	--	--	--	--	--	--
Nitrite (as N)	E235.NO2-L/WP	0.0010	mg/L	0.0720	--	--	--	--	--	--
Sulfate (as SO4)	E235.SO4/WP	0.30	mg/L	266	--	--	--	--	--	--
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	E358-L/WP	0.50	mg/L	10.1	--	--	--	--	--	--
Carbon, total organic [TOC]	E355-L/WP	0.50	mg/L	11.3	--	--	--	--	--	--
Ion Balance										



Analyte	Method/Lab	LOR	Unit	WP2316658-001 (Continued)	--	--	--	--	--	--
Ion Balance - Continued										
Anion sum	EC101A/WP	0.10	meq/L	10.4	--	--	--	--	--	--
Cation sum (total)	EC101A/WP	0.10	meq/L	9.61	--	--	--	--	--	--
Ion balance (cations/anions)	EC101A/WP	0.01	%	92.4	--	--	--	--	--	--
Ion balance (APHA)	EC101A/WP	0.010	%	-3.95	--	--	--	--	--	--
Total Metals										
Aluminum, total	E420/WP	3.0	µg/L	79.3	--	--	--	--	--	--
Antimony, total	E420/WP	0.10	µg/L	0.49	--	--	--	--	--	--
Arsenic, total	E420/WP	0.10	µg/L	7.04	--	--	--	--	--	--
Barium, total	E420/WP	0.10	µg/L	32.4	--	--	--	--	--	--
Beryllium, total	E420/WP	0.020	µg/L	<0.020	--	--	--	--	--	--
Bismuth, total	E420/WP	0.050	µg/L	<0.050	--	--	--	--	--	--
Boron, total	E420/WP	10	µg/L	100	--	--	--	--	--	--
Cadmium, total	E420/WP	0.0050	µg/L	0.0325	--	--	--	--	--	--
Calcium, total	E420/WP	50	µg/L	86300	--	--	--	--	--	--
Cesium, total	E420/WP	0.010	µg/L	0.039	--	--	--	--	--	--
Chromium, total	E420/WP	0.50	µg/L	<0.50	--	--	--	--	--	--
Cobalt, total	E420/WP	0.10	µg/L	0.66	--	--	--	--	--	--
Copper, total	E420/WP	0.50	µg/L	7.33	--	--	--	--	--	--
Iron, total	E420/WP	10	µg/L	121	--	--	--	--	--	--
Lead, total	E420/WP	0.050	µg/L	0.113	--	--	--	--	--	--
Lithium, total	E420/WP	1.0	µg/L	59.5	--	--	--	--	--	--
Magnesium, total	E420/WP	5.0	µg/L	37700	--	--	--	--	--	--
Manganese, total	E420/WP	0.10	µg/L	2110	--	--	--	--	--	--
Molybdenum, total	E420/WP	0.050	µg/L	7.90	--	--	--	--	--	--
Nickel, total	E420/WP	0.50	µg/L	6.39	--	--	--	--	--	--
Phosphorus, total	E420/WP	50	µg/L	450	--	--	--	--	--	--
Potassium, total	E420/WP	50	µg/L	8030	--	--	--	--	--	--
Rubidium, total	E420/WP	0.20	µg/L	3.30	--	--	--	--	--	--
Selenium, total	E420/WP	0.050	µg/L	1.91	--	--	--	--	--	--
Silicon, total	E420/WP	100	µg/L	9440	--	--	--	--	--	--
Silver, total	E420/WP	0.010	µg/L	<0.010	--	--	--	--	--	--
Sodium, total	E420/WP	50	µg/L	42200	--	--	--	--	--	--
Strontium, total	E420/WP	0.20	µg/L	462	--	--	--	--	--	--
Sulfur, total	E420/WP	500	µg/L	91400	--	--	--	--	--	--
Tellurium, total	E420/WP	0.20	µg/L	<0.20	--	--	--	--	--	--
Thallium, total	E420/WP	0.010	µg/L	<0.010	--	--	--	--	--	--



Analyte	Method/Lab	LOR	Unit	WP2316658-001 (Continued)	--	--	--	--	--	--
Total Metals - Continued										
Thorium, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Tin, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Titanium, total	E420/WP	0.30	µg/L	1.32	--	--	--	--	--	--
Tungsten, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Uranium, total	E420/WP	0.010	µg/L	8.71	--	--	--	--	--	--
Vanadium, total	E420/WP	0.50	µg/L	3.52	--	--	--	--	--	--
Zinc, total	E420/WP	3.0	µg/L	13.3	--	--	--	--	--	--
Zirconium, total	E420/WP	0.20	µg/L	0.33	--	--	--	--	--	--
Organic Parameters										
Microcystin	E576/WP	0.20	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.

No Breaches Found

Key:



Analytical Results

Sub-Matrix: Drinking Water (Matrix: Water)	Client sample ID	MORDEN 2 - TREATED								
		Sampling date/time	25-Jul-2023 00:00							
Analyte	Method/Lab	LOR	Unit	WP2316658-002	--	--	--	--	--	--
Physical Tests										
Absorbance, UV (@ 254nm)	E404/WP	0.0050	AU/cm	0.0960	--	--	--	--	--	--
Alkalinity, bicarbonate (as CaCO3)	E290/WP	1.0	mg/L	37.3	--	--	--	--	--	--
Alkalinity, carbonate (as CaCO3)	E290/WP	1.0	mg/L	<1.0	--	--	--	--	--	--
Alkalinity, hydroxide (as CaCO3)	E290/WP	1.0	mg/L	<1.0	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	E290/WP	1.0	mg/L	37.3	--	--	--	--	--	--
Colour, true	E329/WP	5.0	CU	<5.0	--	--	--	--	--	--
Conductivity	E100/WP	2.0	µS/cm	738	--	--	--	--	--	--
Hardness (as CaCO3), from total Ca/Mg	EC100A/WP	0.50	mg/L	203	--	--	--	--	--	--
Langelier index (@ 4°C)	EC105A/WP	0.010	-	-0.854	--	--	--	--	--	--
Langelier index (@ 60°C)	EC105A/WP	0.010	-	-0.093	--	--	--	--	--	--
pH	E108/WP	0.10	pH units	7.55	--	--	--	--	--	--
Solids, total dissolved [TDS]	E162-L/WP	3.0	mg/L	482	--	--	--	--	--	--
Turbidity	E121/WP	0.10	NTU	0.18	--	--	--	--	--	--
pH, saturation (@ 4°C)	EC105A/WP	0.010	pH units	8.40	--	--	--	--	--	--
Transmittance, UV (@ 254nm)	E404/WP	1.0	% T/cm	80.2	--	--	--	--	--	--
pH, saturation (@ 60°C)	EC105A/WP	0.010	pH units	7.64	--	--	--	--	--	--
Anions and Nutrients										
Ammonia, total (as N)	E303/WP	0.010	mg/L	0.037	--	--	--	--	--	--
Bromide	E235.Br-T/WP	0.010	mg/L	<0.020	DLM	--	--	--	--	--
Chloride	E235.Cl-L/WP	0.10	mg/L	26.6	--	--	--	--	--	--
Fluoride	E235.F/WP	0.020	mg/L	0.707	--	--	--	--	--	--
Nitrate (as N)	E235.NO3-L/WP	0.0050	mg/L	0.650	--	--	--	--	--	--
Nitrite (as N)	E235.NO2-L/WP	0.0010	mg/L	<0.0020	DLM	--	--	--	--	--
Sulfate (as SO4)	E235.SO4/WP	0.30	mg/L	280	--	--	--	--	--	--
Organic / Inorganic Carbon										
Carbon, dissolved organic [DOC]	E358-L/WP	0.50	mg/L	5.80	--	--	--	--	--	--
Carbon, total organic [TOC]	E355-L/WP	0.50	mg/L	6.23	--	--	--	--	--	--
Ion Balance										



Analyte	Method/Lab	LOR	Unit	WP2316658-002 (Continued)	--	--	--	--	--	--
Ion Balance - Continued										
Anion sum	EC101A/WP	0.10	meq/L	7.41	--	--	--	--	--	--
Cation sum (total)	EC101A/WP	0.10	meq/L	6.76	--	--	--	--	--	--
Ion balance (cations/anions)	EC101A/WP	0.01	%	91.2	--	--	--	--	--	--
Ion balance (APHA)	EC101A/WP	0.010	%	-4.59	--	--	--	--	--	--
Total Metals										
Aluminum, total	E420/WP	3.0	µg/L	24.3	--	--	--	--	--	--
Antimony, total	E420/WP	0.10	µg/L	0.43	--	--	--	--	--	--
Arsenic, total	E420/WP	0.10	µg/L	1.08	--	--	--	--	--	--
Barium, total	E420/WP	0.10	µg/L	12.0	--	--	--	--	--	--
Beryllium, total	E420/WP	0.020	µg/L	<0.020	--	--	--	--	--	--
Bismuth, total	E420/WP	0.050	µg/L	<0.050	--	--	--	--	--	--
Boron, total	E420/WP	10	µg/L	82	--	--	--	--	--	--
Cadmium, total	E420/WP	0.0050	µg/L	0.0146	--	--	--	--	--	--
Calcium, total	E420/WP	50	µg/L	54900	--	--	--	--	--	--
Cesium, total	E420/WP	0.010	µg/L	0.028	--	--	--	--	--	--
Chromium, total	E420/WP	0.50	µg/L	<0.50	--	--	--	--	--	--
Cobalt, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Copper, total	E420/WP	0.50	µg/L	11.5	--	--	--	--	--	--
Iron, total	E420/WP	10	µg/L	<10	--	--	--	--	--	--
Lead, total	E420/WP	0.050	µg/L	<0.050	--	--	--	--	--	--
Lithium, total	E420/WP	1.0	µg/L	62.5	--	--	--	--	--	--
Magnesium, total	E420/WP	5.0	µg/L	16100	--	--	--	--	--	--
Manganese, total	E420/WP	0.10	µg/L	13.2	--	--	--	--	--	--
Molybdenum, total	E420/WP	0.050	µg/L	7.90	--	--	--	--	--	--
Nickel, total	E420/WP	0.50	µg/L	1.78	--	--	--	--	--	--
Phosphorus, total	E420/WP	50	µg/L	<50	--	--	--	--	--	--
Potassium, total	E420/WP	50	µg/L	8630	--	--	--	--	--	--
Rubidium, total	E420/WP	0.20	µg/L	3.65	--	--	--	--	--	--
Selenium, total	E420/WP	0.050	µg/L	1.80	--	--	--	--	--	--
Silicon, total	E420/WP	100	µg/L	4990	--	--	--	--	--	--
Silver, total	E420/WP	0.010	µg/L	<0.010	--	--	--	--	--	--
Sodium, total	E420/WP	50	µg/L	56800	--	--	--	--	--	--
Strontium, total	E420/WP	0.20	µg/L	241	--	--	--	--	--	--
Sulfur, total	E420/WP	500	µg/L	95100	--	--	--	--	--	--
Tellurium, total	E420/WP	0.20	µg/L	<0.20	--	--	--	--	--	--
Thallium, total	E420/WP	0.010	µg/L	<0.010	--	--	--	--	--	--



Analyte	Method/Lab	LOR	Unit	WP2316658-002 (Continued)	--	--	--	--	--	--
Total Metals - Continued										
Thorium, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Tin, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Titanium, total	E420/WP	0.30	µg/L	<0.30	--	--	--	--	--	--
Tungsten, total	E420/WP	0.10	µg/L	<0.10	--	--	--	--	--	--
Uranium, total	E420/WP	0.010	µg/L	0.344	--	--	--	--	--	--
Vanadium, total	E420/WP	0.50	µg/L	3.24	--	--	--	--	--	--
Zinc, total	E420/WP	3.0	µg/L	3.7	--	--	--	--	--	--
Zirconium, total	E420/WP	0.20	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.

No Breaches Found

Key: