City of Morden
Public Water System Annual Report 2020

This report is available online at the City of Morden website www.mymorden.ca as of March 31st, 2021

Email Town address info@mymorden.ca

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

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

City of Morden
Annual Water System Operation Report 2020

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.

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.

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. 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.

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 the 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, Seniors and Active 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 toothpaste and mouthwashes etc. While there are naturally occurring Fluoride in our source water this is taken into account and the final total amount is kept as close to .7ppm as possible.

How much water storage do we have?

When the new water plant was built, a 450,000 gallons reservoir was constructed underneath it. The City of Morden also used a water tower and elevated standpipe with a combined capacity of 750,000 gallons for a total capacity of 1.2 million gallons. As a result of having the towers inspected, it was recommended to us that the elevated tower needed extensive repairs to remain in operation. The tower was deemed to have reached its service length and was removed from service. This reduced our current water storage capacity by 250,000 gallons, to 950,000 gallons, or approximately 1 day of storage at peak demand periods. Associated Engineering was hired to do a study on Morden's water supply and as a result, was commissioned to design and build a new 880,000-gallon inground concrete water reservoir. Construction on the reservoir commenced in the fall of 2013 with the expectation that it would be put into service by May 2014. Construction was completed on schedule and with the addition of this new reservoir, Morden now has 1.8 million gallons of water in reserve addressing the City of Morden's water storage needs for years to come. It has now been six years since the new reservoir was put into service and it has been operating as designed with no issues.

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

Type of Waterline	Total Length (Meters)
Asbestos cement	36273.21
Ductile iron	1760.08
Plastic	30101.00

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

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

Bacteriological testing: We test the raw water (untreated lake water) and the treated water leaving the plant, as well as 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 Winnipeg.

Disinfectant residual testing is done daily on the treated water leaving the water plant and chlorine levels are also tested in the distribution system each time samples are collected for bacteriological testing to ensure there is adequate chlorine residual in the distribution system.

Turbidity testing is done via online continuously monitoring equipment and verified daily by desktop testing. Turbidity is a measurement of the clarity of the water and is used as one indicator as to 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 every quarter.

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

Fluoride sampling: Daily sampling of Fluoride levels is 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. Manitoba Health, Seniors and Active Living provides funding and monitoring for this program.

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

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 concerning 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 foreman at the Water plant. Ph# 204-822-5707.
Below are the test results for components that have Maximum Acceptable Concentration limits (MAC). For a copy of the complete analysis report, please contact the above number.

Operating License

An Operating License is issued by the Office of Drinking which dictates how we are to run the plant and what parameters we are regulated to meet. Regulations are set as follows and we are obligated to meet them. In situations where we exceed the limits, we must inform the Office of Drinking and also fill out a corrective actions report identifying the issue and how we were able to remedy the problem and get back into compliance. The Office of Drinking water then decides if a boil water advisory is necessary or not. Below are the quality and monitoring requirements of the license.

Parameter	Quality Standard
Total Coliform	Less than one total coliform bacteria detectable per 100 mL in all treated and distributed water
E. coli	Less than one *E. coli* bacteria detectable per 100 mL in all treated and distributed water
Chlorine Residual	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 A free chlorine residual of at least 0.1 mg/L at all times at any point in the water distribution system
Ultraviolet Disinfection	95% of water produced per month is disinfected within validated conditions
Turbidity *)	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
Total Trihalomethanes (THMs)	Less than or equal to 0.10 mg/L as locational running annual average of quarterly samples
Total Haloacetic Acids (HAAs)	Less than or equal to 0.08 mg/L as locational running annual average of quarterly samples
Lead	Less than or equal to 0.005 mg/L
Manganese	Less than or equal to 0.12 mg/L
Total Microcystins	Less than or equal to 0.0015 mg/L

*) The standard applied will be dependent upon the technology selected

Parameter	Monitoring Requirement
Bacteriological (total coliform and *E. coli*)	Biweekly sampling program with each set of samples consisting of one raw, one treated, and a minimum of 5 distribution samples Consecutive samples sets to be separated by at least 12 days
Free Chlorine (treated water)	One sample per day of water entering the distribution system following at least 20 minutes of contact time
Free Chlorine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling
Total Chlorine (treated water)	One sample per day of water entering the distribution system following at least 20 minutes of contact time
Total Chlorine (distribution system)	At the same times and location(s) as bacteriological distribution system sampling
Ultraviolet Disinfection	Continuous monitoring of UV dosage for each operating UV unit
Turbidity	One raw water sample per day Continuous 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
Turbidity (distribution system)	At the same times and location(s) as bacteriological distribution system sampling
General Chemistry (parameter list provided by Office of Drinking Water)	One raw and one treated water sample every year
Total Trihalomethanes (THMs) (distribution system)	Two preserved samples taken on a quarterly basis during February, May, August, and November, every year at the furthest points in the distribution system
Total Haloacetic Acids (HAAs) (distribution system)	Two preserved samples taken on a quarterly basis during February, May, August, and November, every year at the furthest points in the distribution system
Lead	As per the instructions of the Drinking Water Officer
Total Microcystins	As per ODW-OG-20 Monitoring for Total Microcystins in Drinking Water (will be added to the Operating Licence when it is renewed)
Other Parameters	As per the instructions of the Drinking Water Officer

ANNUAL WATER ANALYSIS

Type		Raw	Treated	Distribution	Max Acceptable Concentration	Units
Nitrite-N		<0.0051	<0.0020	-	1	Ug/L
Dissolved Fluoride	F	0.300	0.637	-	1.5	Mg/L
Nitrate-N		<0.025	0.376	-	10	Mg/L
Antimony	Sb	0.00067	0.00060	0.00059	0.006	Mg/L
Arsenic	As	0.0102	00.00197	0.00211	0.010	Mg/L
Barium	Ba	0.0408	0.00965	0.0103	1.0	Mg/L
Boron	B	0.149	0.118	0.121	5	Mg/L
Cadmium	Cd	0.0000160	<0.0000050	0.0000063	0.005	Mg/L
Chromium	Cr	0.00018	0.00051	0.00055	0.05	Mg/L
Lead	Pb	0.005	<0.000050	0.000974	0.01	Mg/L
Selenium	Se	0.05	0.00170	0.00123	0.01	Mg/L
Strontium	Sr	0.552	0.270	0.265	7.0	Mg/l
Uranium	U	0.0139	0.000481	0.000388	0.02	Mg/L

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 13, 2020							
Chlorine Free	0	1.27	0.99	0.69	0.62		
Chlorine Total	0	1.62	1.19	1.23	1.00		
Total Coliforms	14	0	0	0	0		
Escherichia Coli	2	0	0	0	0		
January 27, 2020							
Chlorine Free	0	0.94	0.25	0.69	0.46		
Chlorine Total	0	1.22	0.45	1.89	0.86		
Total Coliforms	29	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
February 10/2020							
Chlorine Free	0	1.40	0.79	0.24	0.81		
Chlorine Total	0	1.76	1.12	0.62	1.18		
Total Coliforms	25	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
February 25,2020							
Chlorine Free	0	1.14	0.37	1.10	0.47		
Chlorine Total	0	1.59	0.73	1.52	0.83		
Total Coliforms	29	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
March 9 , 2020							
Chlorine Free	0	1.02	0.32	0.72	0.44		
Chlorine Total	0	1.16	0.71	1.17	0.82		
Total Coliforms	27	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
March 23,2020							
Chlorine Free	0	1.03	0.21	0.55	0.60		
Chlorine Total	0	1.42	0.60	0.99	1.03		
Total Coliforms	34	0	0	0	0		

Escherichia Coli		0	0	0	0		
April 6.2020							
Chlorine Free	0	0.95	0.22	.67	0.57		
Chlorine Total	0	1.13	0.61	1.12	1.00		
Total Coliforms	>200	0	0	0	0		
Escherichia Coli	1	0	0	0	0		
April 20,2020							
Chlorine Free	0	0.92	0.40	0.59	0.38		
Chlorine Total	0	1.38	0.79	0.95	0.79		
Total Coliforms	48	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
May 4,2020							
Chlorine Free	0	1.39	0.27	1.08	0.70		
Chlorine Total	0	1.61	0.68	1.46	1.13		
Total Coliforms	45	0	0	0	0		
Escherichia Coli	1	0	0	0	0		
May 19,2020							
Chlorine Free	0	1.13	0.62	0.78	0.49		
Chlorine Total	0	1.58	1.03	1.18	0.92		
Total Coliforms	19	0	0	0	0		
Escherichia Coli	1	0	0	0	0		
June 1, 2020							
Chlorine Free	0	0.94	0.55	0.88	0.57		
Chlorine Total	0	1.41	1.00	1.34	1.10		
Total Coliforms	38	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
June 15,2020							
Chlorine Free	0	1.06	0.17	0..88	0.56		
Chlorine Total	0	1.62	0.47	1.30	0.88		
Total Coliforms	>200	0	0	0	0		
Escherichia Coli	1	0	0	0	0		
June 29, 2020							
Chlorine Free	0	1.23	0.26	0.75	0.55		
Chlorine Total	0	1.75	0.74	1.20	0.92		
Total Coliforms	>200	0	0	0	0		
Escherichia Coli	0	0	0	0	0		
July 13,2020							
Chlorine Free	0	1.03	0.60	0.8	0.42		
Chlorine Total	0	1.36	0.88	1.30	0.85		
Total Coliforms	>200	0	0	0	0		
Escherichia Coli	2	0	0	0	0		
July 27,2020							
Chlorine Free	0	1.42	0.22	0.40	0.31	0.50	0.26
Chlorine Total	0	1.91	0.62	0.81	0.85	1.02	0.68
Total Coliforms	>200	0	0	0	0	0	0
Escherichia Coli	1	0	0	0	0	0	0
August 10,2020							
Chlorine Free	0	1.25	0.34	0.31	0.31	0.49	0.37
Chlorine Total	0	1.90	0.86	0.84	0.85	1.02	0.90
Total Coliforms	>200	0	0	0	0	0	0
Escherichia Coli	4	0	0	0	0	0	0
August 24,2020							
Chlorine Free	0	1.27	0.26	0.35	0.37	0.58	0.58
Chlorine Total	0	1.87	0.76	0.79	0.89	1.09	1.09
Total Coliforms	>200	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0

Sept 8,2020							
Chlorine Free	0	1.76	0.28	0.47	0.59	0.57	0.69
Chlorine Total	0	2.58	0.75	0.91	1.10	1.04	1.18
Total Coliforms	>200	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Sept 21,2020							
Chlorine Free	0	0.96	0..15	0.11	0.16	0.26	0.11
Chlorine Total	0	1.45	0.52	0.53	0.52	0.58	0.46
Total Coliforms	200	0	0	0	0	0	0
Escherichia Coli	3	0	0	0	0	0	0
October 5, 2020							
Chlorine Free	0	1.12	0.27	0.25	0.13	0.29	0.29
Chlorine Total	0	1.61	0.69	0.63	0.55	0.72	0.73
Total Coliforms	165	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
October 19,2020							
Chlorine Free	0	1.04	0.33	0.26	0.10	0.43	0.29
Chlorine Total	0	1.46	0.82	0.77	0.53	0.92	0.75
Total Coliforms	19	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Nov 2 , 2020							
Chlorine Free	0	1.13	0.47	0.16	0.20	0.21	0.49
Chlorine Total	0	1.61	0.97	0.69	0.68	0.72	1.02
Total Coliforms	19	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Nov 16, 2020							
Chlorine Free	0	1.07	0.48	0.14	0.16	0.41	0.45
Chlorine Total	0	1.58	1.03	0.61	0.70	0.97	1.01
Total Coliforms	9	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Nov 30, 2020							
Chlorine Free	0	0.90	0.30	0.60	0.22	0.31	0.28
Chlorine Total	0	1.70	0.96	1.20	0.88	0.88	0.98
Total Coliforms	10	0	0	0	0	0	0
Escherichia Coli	3	0	0	0	0	0	0
Dec. 14, 2020							
Chlorine Free	0	1.21	0.60	0.84	0.34	0.38	0.73
Chlorine Total	0	1.91	1.21	1.49	0.94	1.13	1.35
Total Coliforms	5	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0
Dec. 29, 2020							
Chlorine Free	0	0.97	0.39	1.01	0.11	0.21	0.43
Chlorine Total	0	1.55	0.97	1.72	0.67	0.80	1.02
Total Coliforms	8	0	0	0	0	0	0
Escherichia Coli	0	0	0	0	0	0	0

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.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 0.144 mg/L and 0.147 mg/L, which are above the regulated limit.

As a result of this, The City of Morden initiated an RFP through the Manitoba Water Services Board to see which treatment process would be the best option to explore for future upgrades in the Morden Water treatment Plant. Haloacetic acids are currently below regulatory guidelines.

Trihalomethane and Haloacetic Acid Test Results

Date	#1 Public Works Garage	#2 Recreation Centre	Average THM and HAA
February 28, 2020 THM Preserved • Bromodichloromethane mg/l • Bromoform mg/l • Chloroform mg/l • Chlorodibromomethane mg/l • Difluorobenzene • **THMs mg/l** • **Total Haloacetic Acid**	 0.0226 <0.00010 0.0963 0.00508 104.1 **0.124** **0.0717 (Firehall)**	 0.0266 <0.00010 0.0964 0.00446 122.2 **0.127** **0.0762 (civic centre)**	 **0.1255** **0.0739**
May 04,2020 THM Preserved • Bromodichloromethane mg/l • Bromoform mg/l • Chloroform mg/l • Chlorodibromomethane mg/l • **THMs mg/l** • **Total Haloacetic acid**	 0.0249 <0.00010 0.111 0.00531 **0.141** **0.0571 (firehall)**	 0.0225 <0.00010 0.0960 0.00512 **0.124** **0.0515 (civic center)**	 **0.1325** **0.0543**
August 10, 2020 THM Preserved • Bromodichloromethane mg/l • Bromoform mg/l • Chloroform mg/l • Chlorodibromomethane mg/l • **THMs mg/l** • **Total Haloacetic Acid**	 0.0316 <0.0010 0.121 0.00979 **0.153** **0.0589 (firehall)**	 0.0298 <0.0010 0..115 0.00916 **0.155** **0.0813**	 **0.1540** **0.0701**

November 02, 2020 THM Preserved • Bromodichloromethane mg/l • Bromoform mg/l • Chloroform mg/l • Chlorodibromomethane mg/l • **THMs mg/l** • **Total Haloacetic Aci**	 0.0334 <0.0010 0.126 0.00654 **0.156** **0.0424 (firehall)**	 0.0368 <0.0010 0.137 0.00725 **0.181** **0.0496 (civic center)**	 **0.1685** **0.0460**

The City of Morden met their obligations in submitting the required amount of sampling for Turbidity, Chlorine residuals and UV disinfection reports to the ODW

Does the City of Morden have certified trained personnel?

The water plant is classified as a Level III Water Treatment Facility. We currently have two Certified Level III Water Treatment / Level II Water Distribution operators and one operator-in-training.

The water distribution system is classified as Level II. The City of Morden currently has two certified Level II water distribution system operators and one operator in training.

Operator Certification is regulated under the Environment Act's *Water and Wastewater Facility Operators Regulation*

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.

Were there emergencies, regulatory compliance issues or other operational issues to report for 2020?

There was a boil water advisory issue to the City as a result of one of the chemical feeders failing and causing turbidity levels in the finished water to rise above max containment level. We have UV light disinfection in service and we raised the chlorine levels as an extra precautionary level. No issues were encountered. Water samples were sent to the lab and came back clear. The boil water advisory was rescinded.

The following water main related incidents took place:

- March 4 1st street @ Rampton for fire hydrant replacement
- June 29 9th street south for fire hydrant replacement
- Aug 22 15th street 200 block for fire hydrant replacement
- On 9th St south We removed one fire hydrant, installed 3 new ones and removed the tee for the discontinued line to the old canary.

Were there any major expenses incurred in 2020?

We replaced the pebble lime slaker at a cost of $130,000.00 USD.

We started a program replacing water meters in the city. The contract started in October 2020 and will be completed around March 1st, 2021. All items were accounted for in the budget.

Future system expansion or expenses expected?

The City of Morden has issued an RFP for preliminary and functional designs of the upgrades to the WTP to ensure THM compliance and increase the capacity to meet future 20-year demand with the funding support from MWSB. The design is expected to be completed by January 2022.

The City of Morden has also planned to replace the water main on 9th St Block 100 and 4th and 5th Street Block 400. A total of about 800m water main will be replaced.

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

For general questions during business hours, call the City Office at 204- 822-4434 from 9 am to 4 pm or call the Water Treatment plant at 204-822-5707 .