

Carman Water Treatment Plant 2018 Annual Public Report



Town of Carman

Box 160

Carman, Mb

R0G 0J0

Town Office: 204-745-2443 Water Treatment Plant: 204-745-2481

Superintendent: Joe Richardson Senior WTP operator: Darcy Hayward

Table of Contents

Pages 2 – 6 Overview of Carmans water treatment processes

- a. Our source
- b. Outline of the treatment process
- c. Storage and Distribution
- d. Water testing the why, where, and how
- e. Carman's compliance and what we are doing to stay in compliance

Page 7 - 15 Summaries of annual inspection, Water Chemistry, Metals, THM, & HAA

The Town of Carman, Manitoba strives to provide high quality drinking water in sufficient quantity to meet needs of the public. It is our goal to do so in a safe, cost effective manner while remaining in compliance with regulatory requirements governing the provision of drinking water. It is our belief that the public has a right to access information related to the drinking water they consume. To that end, the following report has been prepared for the Community of Carman public water system.

Where do we get our water?

The Boyne River is Carman's water source, entering town on the west side coming from Stephenfield Lake. River flow is controlled by a rock damn located near the golf course. The water enters an intake located near the water treatment plant. A portion of Carman's drinking water is piped into town through the Pembina Valley Water Co-op's Pipeline. This water comes to Carman from the Water Plant located at Stephenfield Lake. Just like Carman, Stephenfield's Water Plant must also adhere to the same provincial testing and water quality guidelines. With the growth of the PVWC pipe line they now have the means to feed water into Carman via their Morris water plant as well. Morris has a Membrane Filtration plan, providing a higher water quality than what either Stephenfield or the town of Carmans water plants are capable of providing.

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 Carman. In addition, new Provincial Regulations have set health based drinking water standards for all public water systems. The Town of Carman is committed to meeting and exceeding the water quality standards set by the province.

What type of water treatment do we use?

We use lime/soda softening, integrated with coagulation, flocculation, and sedimentation in our solids contacting unit. This process is then followed by filtration. This allows us to clarify, and soften the water. The removal of the microbial contaminants such as viruses and organic materials that are naturally found in river waters is removed with the filtration process.

Why and how do we disinfect our water?

The final step in the treatment of safe water is disinfections. Disinfection is the selective destruction or inactivation of disease causing bacterial organisms in water. **The Drinking Water Safety Act** and supporting regulations require that the water be disinfected before it leaves the water treatment facility and that adequate amounts of disinfectant are present in the distribution system to ensure the water is safe to the consumer's tap. The treated water is disinfected using chlorination. It is added to kill bacteria and viruses that are commonly found in surface water such as rivers. An adequate amount of chlorine is added before the water enters the storage reservoir and water tower to ensure effective kill and to provide a disinfectant residual in the 22 km of water piping throughout the town of Carman.

Are any other chemicals added to our water? Why?

The addition of fluoride chemicals to water supplies at rigidly controlled concentrations reduces dental cavities in younger children. Fluoride ion, naturally or artificially present in drinking water, is absorbed to some degree by tooth enamel. This absorption protects the teeth from decay.

Manitoba health and Healthy living closely monitor the concentrations that are in the drinking water leaving the water plant. Bi-weekly reports are supplied to ensure proper dosing. In 2011 Manitoba health and Healthy living reduced the optimum concentration, from 1.00 mg/L to 0.7 mg/L with acceptable levels ranging from 0.6 – 0.9 mg/L

How much water storage do we have?

A reservoir was built underneath the Carman Water Treatment Facility where the water is held and then passes through to the tower. Carman's water tower is what we use to pressurize the distribution system through gravitational force. The reservoir and tower combine to hold approximately 1,350 cubic meters of water, which satisfies the water users' needs. The reservoir is designed so that the water is always moving and never gets stale.

What is the “distribution system”?

The water distribution system is the network of underground pipes used to carry the treated water from the water treatment facility to the homes and businesses in Carman. We have 22km of cast iron, AC and PVC piping. The piping is interconnected to ensure that fresh safe water is continuously supplied. We carry out regular maintenance in the distribution system including our seasonal fire hydrant flushing program in September/October.

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 facility is performing. We test the water at the plant and in the distribution system at various locations and times. 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.

Bacterial testing: We test the raw water (untreated river water), the treated water (leaving the water treatment plant) and the water in the distribution system (within the Town of Carman) every two weeks for the presence of Total Coliforms (non-harmful bacteria). If these bacteria are present in the water, it is an indication that disease-causing bacteria may also be present. Tests for the presence of E-Coli (most common harmful bacteria) are also conducted at the same time.

Disinfectant tests: We test the level of chlorine in the treated water every day to ensure that the water leaving the treatment facility has enough chlorine to ensure proper disinfections. As of mid-2010 the Water Plant has had online monitoring for the free chlorine levels. This means that the levels are continuously monitored with a reading being logged every 5 minutes. We also test chlorine levels in the distribution system every time we take water samples for bacterial testing.

Turbidity testing: Turbidity is a measurement of the clarity of water. We use turbidity to tell us how well our treatment system is working to remove particles and other contaminants that can cause the water to look cloudy and affect our disinfection process. Turbidity is tested daily as the raw river water enters the treatment facility and with the addition of online turbidity monitors, it is measured continuously and a reading logged every 5 minutes after each filter.

Hardness testing: There are 2 main types of Carbonate Hardness, calcium hardness and magnesium hardness; we test for the Calcium and the Total hardness of the raw water coming into the plant. We can calculate the magnesium hardness by subtraction. We use these two tests of the raw water to determine the general amount of Lime is required to soften the water. We test for hardness once again after the Clarifier to determine the finer setting of the Lime dosage.

Alkalinity testing: Alkalinity is the measure of how reactive the water is with acid. We test for this because we can determine the amount of Non-Carbonate Hardness in the water and this determines the general setting of the Soda Ash dosage for softening. Like in the Hardness testing we test the raw water to get a general dosage amount and the Clarified water to fine tune the dosage amount.

Trihalomethane (THM) tests: Trihalomethanes are formed when chlorine reacts with naturally occurring organic matter in the water. Studies have shown a link between high levels of THMs and cancer. For that reason, the province has set a health based standard for THMs of 100 micrograms per liter of water or 0.100 ppm. The THM standard is based on an average of four samples per year. We test THM levels in one location in the distribution system on a seasonal basis. THM testing was done quarterly in 2018. Due to the type of water that Carman uses for its drinking water (Boyne River) the levels for THMs is above the provincial standard of 0.100 ppm. The town of Carman is looking into alternate and further processes to reduce these levels to meet the provincial standards, possibly below the standards.

Haloacetic Acid (HAA) tests: Haloacetic acids (HAAs) are a common undesirable by-product of using Chlorine to disinfect drinking water. Exposure to such by-products in drinking water, at high levels over many years, has been associated with a number of health outcomes by epidemiological studies; due to this the provincial and federal governments have set a limit of 80 micrograms per liter of water or 0.08 mg/L. HAAs can be formed by chlorination, ozonation or chloramination of water with formation promoted by slightly acidic water, high organic matter content and elevated temperature. Chlorine from the water disinfection process can react with organic matter and small amounts of bromide present in water to produce various HAAs. The town of Carman is looking into alternate and further processes to reduce these levels to meet the provincial standards, possibly below the standards.

What are the results of the tests?

The following table summarizes all the treated water results for 2016:

Testing Parameter	Standard	Carman WTP Performance	Standard Met
Bacterial	0/100 mL Coliforms 0/100 mL E. Coli	100 %	Yes
Chlorine Leaving Res.	0.5 mg/L	100 %	Yes
Chlorine in distribution	0.1 mg/L	100 %	Yes
Turbidity	0.3 NTU 95% of the time, Never exceed 1.0 NTU	98.5%	Yes
Total Trihalomethanes (THM's)	<0.100 mg/L	.164	No
Total Haloacetic Acids (HAA's)	<0.08 mg/L	.115	No

What do we have in place to alert water plant staff to water emergencies?

There is a dialer alarm in place to alert staff of certain mechanical and structural emergencies that might affect our water system. We are also currently developing an Emergency Response Plan for our water system. Some of the issues that are to be included in the ERP for the Water Treatment Plant include, water shortage, power outages, chemical spills, flooding, and low or no disinfection residuals in the water distribution system. We have operators available 24 hours a day to respond to these emergencies should they arise.

Were there any major expenses incurred in 2018?

We continued on with the water meter replacement program. AT the end of 2018 we have around 650-700 of the new meters installed.

We issued a boil water advisory for the town on Dec.4th and it was in effect until Dec.13th. Our plant was making good water but once it hit the reservoir something was reacting with the chlorine that would affect our turbidity levels. The evening of Dec. 4th our res turb had jumped to around 5NTU so we reported it that evening and there was an advisory issued. We tried numerous different things in the plant incl. chem adjustments, cleaning of tanks, etc. We talked to different plants and operators and nobody had seen anything like this. We cut a hole in the Boyne river by our raw intake on Sunday Dec 9th and put an aeration pump in to aerate the water and by the next afternoon we noticed a diffence in our turbs. Everything was back down to normal by the Wednesday and they lifted the advisory on the Thursday.

ODW (Office of Drinking Water) annual inspection:

TOWN OF CARMAN WATER CHEMISTRY REPORT

Physical Tests						
<i>Analysis</i>	<i>Unit</i>	<i>A.O.</i>	<i>MAC/IMAC</i>	<i>Raw</i>	<i>Treated</i>	
Color, true	T.C.U.	15		32.4	<5.0	
Conductivity	umhos/cm			661	435	
Langelier index (4 C)				0.40	-0.64	
Langelier index (60 C)				1.2	0.13	
pH	pH units	6.5-8.5		7.85	7.57	
TDS (Total Dissolved Solids)	mg/L	500		437	286	
Turbidity	NTU			9.78	0.11	
Transmittance, UV (254 nm)	% T			48.3	78.2	
Anions and Nutrients						
Total Alkalinity (as CaCO3)	mg/L			264	79.2	
Ammonia (NH3) Dissolved	mg/L			0.083	0.013	
Bicarbonate (HCO3)	mg/L			322	96.6	
Carbonate (CO3)	mg/L			<0.60	<0.60	
Chloride (CL) Dissolved	mg/L	250		18.8	25.5	
Fluoride (F) Dissolved	mg/L		1.5	0.270	0.751	
Hardness (as CaCO3)	mg/L			335	159	
Hydroxide (OH)	mg/L			<0.34	<0.34	
Nitrate-N	mg/L		10	0.0127	0.0540	
Nitrite-N	mg/L		1	0.0021	<0.0010	
Sulphate (SO4) Dissolved	mg/L	500		90.8	106	
Organic/Inorganic Carbon						
Dissolved inorganic carbon	mg/L					
Dissolved Organic Carbon	mg/L			11.9	7.45	
Total Carbon	mg/L					
Total inorganic Carbon	mg/L					
Total Organic Carbon	mg/L			12.0	7.22	
	mg/L					

TOWN OF CARMAN WATER CHEMISTRY REPORT

Total Metals						
Analysis	Unit	A.O.	MAC/IMAC	Raw	Treated	
Aluminum (Al)	mg/L	0.1		0.0116	0.0331	
Antimony (Sb)	mg/L		0.006	0.00036	0.00035	
Arsenic (As)	mg/L		0.01	0.0143	0.00173	
Barium (Ba)	mg/L		1	0.0581	0.00748	
Beryllium (Be)	mg/L			<0.00010	<0.00010	
Bismuth (Bi)	mg/L			<0.00005	<0.00005	
Boron (B)	mg/L		5	0.066	0.055	
Cadmium (Cd)	mg/L		0.005	0.000007	<0.000005	
Calcium (Ca)	mg/L			70.4	35.9	
Cesium (Cs)	mg/L			<0.00001	0.000023	
Chromium (Cr)	mg/L		0.05	0.00047	0.00102	
Cobalt (Co)	mg/L			0.00026	0.00010	
Copper (Cu)	mg/L	1		0.00379	0.00416	
Iron (Fe)	mg/L	0.3		0.071	<0.010	
Lead (Pb)	mg/L		0.01	0.000146	<0.00005	
Lithium (Li)	mg/L			0.0422	0.0410	
Magnesium (Mg)	mg/L			38.7	16.9	
Manganese (Mn)	mg/L	0.05		0.731	0.00332	
Molybdenum (Mo)	mg/L			0.00526	0.00535	
Nickel (Ni)	mg/L			0.00402	0.00178	
Phosphorus (P)	mg/L			0.387	<0.050	
Potassium (K)	mg/L			8.37	8.68	
Rubidium (Rb)	mg/L			0.00203	0.00275	
Selenium (Se)	mg/L		0.05	0.000601	0.000384	
Silicon (Si)	mg/L			8.64	5.31	
Silver (Ag)	mg/L			<0.00001	<0.00001	
Sodium (Na)	mg/L	200		24.0	26.5	
Strontium (Sr)	mg/L			0.328	0.101	
Tellurium (Te)	mg/L			<0.00020	<0.00020	
Thallium (Tl)	mg/L			<0.00001	<0.00001	
Thorium (Th)	mg/L			<0.00010	<0.00010	
Tin (Sn)	mg/L			<0.00010	<0.00010	
Titanium (Ti)	mg/L			0.00048	<0.00030	
Tungsten (W)	mg/L			<0.00010	<0.00010	
Uranium (U)	mg/L		0.02	0.00361	0.000203	
Vanadium (V)	mg/L			0.00185	0.00139	
Zinc (Zn)	mg/L	5		0.0060	<0.0030	

Zirconium (Zr)	mg/L		0.000111	<0.000060
----------------	------	--	----------	-----------

Result is above acceptable levels

A.O. Aesthetic Objective

MAC Maximum Acceptable Level



Sustainable Development

Kale Black

309 – 25 Tupper Street North

Portage La Prairie, MB. R1N 3K1

204-795-6908

Kale.Black@gov.mb.ca

Inspection - Carman Public Water System

September 4, 2018. PWS Code: 35.00

Cheryl Young, C.A.O.

Town of Carman

Box 160, Carman, MB.

R0G 0J0

Dear Ms. Young:

This letter is in follow-up to the August 28th inspection of the Carman public water system. The primary focus of the inspection was to confirm compliance with the terms and conditions of the Carman Public Water System Operating Licence PWS-08-102-02.

Mr. Darcy Hayward, water plant operator was in attendance.

Water System Overview:

The Town of Carman receives its water from two sources. Approximately 75% of its potable water supply is drawn from the Boyne River. The Carman water treatment plant consists of one lime softening clarifier followed by carbon dioxide addition for pH adjustment, filtration and chlorine disinfection. The Carman water treatment plant is capable of producing 19 litres of treated water per second. The remaining 25% of the potable water supplied to the Town of Carman is purchased from the Pembina Valley Water Cooperative via the Stephenfield water treatment plant.

The water treatment plant is classified as a Class III Water Treatment and II Distribution under the Water and Wastewater Facility Operators Regulation pursuant to The Environment Act. The regulation requires all operators to hold a certificate. At least one operator, (operator-in-charge (OIC)) must hold a certificate that is at least the same class as the facility. Other operators can be certified to a lower, same or higher class as the facility; or can hold an operator-in-training (OIT) certificate.

Water system owners are reminded that water system classification and valid operator certification certificates must be posted at the water treatment plant or made available for inspection. In addition, water system owners are responsible for updating and submitting a Table of Organization as required under the Water and Wastewater Facility Operators Regulation. For more information on the Water and Wastewater Facility Operators Regulation please contact Donna Garcia, Certification Program Specialist, Sustainable Development at 204-945-7065 or donna.garcia@gov.mb.ca.

Compliance:

The Carman public water system is meeting the regulatory operating and monitoring obligations of the Operating Licence issued under the Drinking Water Safety Act and its supporting regulations with respect to:

- Monitoring and recording disinfection residuals and turbidities daily
- Submitting disinfection and turbidity reports within the first seven days of each calendar month
- Submitting samples for microbiological analysis bi-weekly
- Recording distribution disinfection residuals and turbidity levels on the bacterial sample submission forms (COCs)
- Preparing and submitting an Annual Water System Report
- Submitting samples for THM and HAA analysis quarterly
- Free and total chlorine residuals were tested at the time of inspection and compared well to those of the Drinking Water Officer's. Free chlorine was found to be 1.40 mg/L and total chlorine residual was found to be 2.08 mg/L, well within the Operating Licence requirement.

Required for Compliance:

- Update and resubmit a Compliance Plan with information regarding the timeline and construction of the new treated water storage reservoir at Carman

Recommended Actions:

- Install an emergency eyewash station in the laboratory at the water treatment plant.

Important Information:

The Office of Drinking Water participates in the Federal-Provincial-Territorial Committee on Drinking Water that approves the Guidelines for Canadian Drinking Water Quality. Drinking water quality standards applied in Manitoba regulations be consistent with current Health Canada guidelines, and the Office therefore monitors the potential impact of proposed changes to Manitoba water systems.

Health Canada has completed their review on National Guidelines, including algae (total microcystin toxins), manganese, and lead. The new guidelines are expected to be finalized and posted in 2018 with minor changes following the public consultation stage. Owners and operators are encouraged to discuss this information and to determine what impact they may have on the water supply.

If you have any questions, please do not hesitate to contact me at 204-795-6908.

Sincerely,



Kale Black
Senior Drinking Water Officer

February 2018

THMs			
Analyte	Limit	Unit	
Bromodichloromethane		Mg/L	0.0345
Bromoform		Mg/L	<0.00050
Dibromochloromethane		Mg/L	0.00977
Chloroform		Mg/L	0.118
Surrogate: 4-Bromofluorobenzene (SS)		%	87.1
Surrogate: 1, 4-Difluorobenzene (SS)		%	95.6
Total Trihalomethanes (THMs)	0.10	Mg/L	0.162

Haloacetic Acids			
Analyte	Limit	Unit	
Bromochloroacetic Acid		Mg/L	0.0135
Dibromoacetic Acid		Mg/L	0.0015
Dichloroacetic Acid		Mg/L	0.0431
Monobromoacetic Acid		Mg/L	<0.0010
Monochloroacetic Acid		Mg/L	<0.0050
Trichloroacetic Acid		Mg/L	0.0659
Surrogate: 2,3-Dibromopropionic Acid (SS)		%	97.8
Total Haloacetic Acids 5	0.08	Mg/L	0.110

May 2018

THMs			
Analyte	Limit	Unit	
Bromodichloromethane		Mg/L	0.0194
Bromoform		Mg/L	<0.00050
Dibromochloromethane		Mg/L	0.00315
Chloroform		Mg/L	0.119
Surrogate: 4-Bromofluorobenzene (SS)		%	93.9

Surrogate: 1, 4-Difluorobenzene (SS)		%	104.5
Total Trihalomethanes (THMs)	0.10	Mg/L	0.142

Haloacetic Acids			
Analyte	Limit	Unit	
Bromochloroacetic Acid		Mg/L	0.0073
Dibromoacetic Acid		Mg/L	<0.0010
Dichloroacetic Acid		Mg/L	0.0466
Monobromoacetic Acid		Mg/L	<0.0010
Monochloroacetic Acid		Mg/L	<0.0050
Trichloroacetic Acid		Mg/L	0.0727
Surrogate: 2,3-Dibromopropionic Acid (SS)		%	93.8
Total Haloacetic Acids 5	0.08	Mg/L	0.119

August 2018

THMs			
Analyte	Limit	Unit	
Bromodichloromethane		Mg/L	0.0355
Bromoform		Mg/L	<0.00050
Dibromochloromethane		Mg/L	0.00601
Chloroform		Mg/L	0.178
Surrogate: 4-Bromofluorobenzene (SS)		%	88.8
Surrogate: 1, 4-Difluorobenzene (SS)		%	102.2
Total Trihalomethanes (THMs)	0.10	Mg/L	0.220

Haloacetic Acids			
Analyte	Limit	Unit	
Bromochloroacetic Acid		Mg/L	0.0112
Dibromoacetic Acid		Mg/L	<0.0010
Dichloroacetic Acid		Mg/L	0.0540
Monobromoacetic Acid		Mg/L	0.0011
Monochloroacetic Acid		Mg/L	<0.0050
Trichloroacetic Acid		Mg/L	0.0888
Surrogate: 2,3-Dibromopropionic Acid (SS)		%	111.8
Total Haloacetic Acids 5	0.08	Mg/L	0.144

November 2018

THMs			
Analyte	Limit	Unit	
Bromodichloromethane		Mg/L	0.0169
Bromoform		Mg/L	0.00050
Dibromochloromethane		Mg/L	0.00265
Chloroform		Mg/L	0.116
Surrogate: 4-Bromofluorobenzene (SS)		%	85.2
Surrogate: 1, 4-Difluorobenzene (SS)		%	101.2
Total Trihalomethanes (THMs)	0.10	Mg/L	0.135

Haloacetic Acids			
Analyte	Limit	Unit	
Bromochloroacetic Acid		Mg/L	0.0049
Dibromoacetic Acid		Mg/L	<0.0010
Dichloroacetic Acid		Mg/L	0.0347
Monobromoacetic Acid		Mg/L	<0.0010
Monochloroacetic Acid		Mg/L	<0.0050
Trichloroacetic Acid		Mg/L	0.0509
Surrogate: 2,3-Dibromopropionic Acid (SS)		%	116.3
Total Haloacetic Acids 5	0.08	Mg/L	0.0856

