

Carman Water Treatment Plant 2017 Annual Public Report



Town of Carman

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Carman, Mb

ROG OJO

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

Superintendent: Joe Richardson Senior WTP operator: Darcy Hayward

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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 dam 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 plant, providing a higher water quality than what either Stephenfield or the town of Carman's 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 2016. 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 2017:

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	92%	No
Chlorine in distribution	0.1 mg/L	100 %	Yes
Turbidity	0.3 NTU 95% of the time, Never exceed 1.0 NTU	95%	No
Total Trihalomethanes (THM's)	<0.100 mg/L	N/A	N/A
Total Haloacetic Acids (HAA's)	<0.08 mg/L	N/A	N/A

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 2017?

We continued on with the water meter replacement program. We now have approx. 450 out of 1200 meters changed over. We had a raw water pump go down in the fall so we had a new one installed. We had turbidity issues in the spring right at break up time. We exceeded the 1.0 NTU limit and our plant had trouble keeping up with water supply and then the flood happened so they shut down our plant and PVWC fed the town for a few days while we got an emergency clean of our reservoir and clarifier. We also had 2 new filter actuating valves and a new online chlorine analyzer installed and both have been working really well.



February 3rd, 2017.

PWS Code: 35.00

Ms. Cheryl Young, CAO
Town of Carman
Box 160, Carman, MB.
R0G 0J0

Dear Ms. Young,

This letter is in follow-up to the January 25th, 2017 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 License: PWS-08-102-01 A.

Mr. Darcy Hayward and Mr. Robert Rankin, water plant operators were in attendance as well as Ms. Melanie Betsill Manager, Field Operations with the Office of Drinking Water.

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 has a capacity of 19 liters per second. The remaining 25% of the potable water supply supplied to the Town of Carman is received from the Stephenfield water treatment plant.

Compliance: The Carman public water system is meeting the regulatory operating and monitoring obligations of the Operating License 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 on the bacterial sample submission form
- Preparing and submitting an Annual Water System Report

Required for Compliance:

1. The water system is required to monitor chlorine residuals following 20 minute contact time on a continuous basis.

The water supply is to ensure that the on-line chlorine analyzer is cleaned and maintained on a regular basis. Specific standard operating procedures must be developed to ensure that all operators can perform maintenance and calibration procedures when necessary.

2. The water system is required to meet turbidity standards as specified in the operating licence

When the water system shuts down, the filters are drained to below the top of the filter media and below the turbidity analyzers. This is causing air to enter the analyzer. When the filter is in operation, air bubbles are creating a turbidity spike. These turbidity spikes have been reported above the never to exceed standard of 1.0 NTU.

The air actuated valves on the filter effluent piping must be repaired to ensure that upon plant shut-down, water is not draining below the level of the turbidity meters.

Turbidity spikes and other turbidity excursions are not to be omitted from the daily average and maximum calculations required on the monthly turbidity report forms.

Operators are instructed that to immediately notify the Office of Drinking Water if the turbidity exceeds 0.3 NTU for over 12 hours or at any time turbidity is above 1 NTU during normal operations (this does not include the turbidity spike due to air in filters). Filter spikes due to air, the operator must complete a Corrective Action Report Form and submit the form at the same time as the monthly chlorination and turbidity reports.

Turbidity alarm set points must be set below the normal operating standard of 0.3 NTU to a level where if the operator is called out there will be time for corrective actions thus avoiding exceedance of the turbidity standard.

3. The water system is required to meet the microbial and chemical standards; an updated compliance plan must be submitted to the Office of Drinking Water

The microbial standard is based on demonstrating the system is meeting disinfectant and turbidity standards. A critical component of disinfection is the ability to monitor the residuals on a continuous basis. The water system must also demonstrate that the system has effective filtration processes in place and is continually meeting the turbidity standard.

The Carman water has not historically met the trihalomethane (THM) or haloacetic acid (HAA) standard for water in the distribution system. Carman's compliance plan must be updated to provide specific timelines with respect to exceedances of THMs, HAAs and turbidity. A revised compliance plan is to be submitted to the Office of Drinking Water by July 31, 2017.

4. Seasonal parts of the distribution system must follow Seasonal shut-down and start up procedures

The King's Park Campground and parts of the Carman Golf and Curling Club water lines are seasonally operated. Seasonally operated water systems must follow seasonal shut-down and start-up procedures with respect to its water supply. An Operational Guideline for seasonal startup and shutdown procedures can be found at:

www.gov.mb.ca/sd/waterstewardship/odw/reg-info/operations-monitor/odw_seasonal_startup_shutdown_2009.pdf

Ensure appropriate cross connection or back flow protection is in place between river water used at the golf course for irrigation purposes and the Carman water supply.

5. Advisory Notification Plan due May 1st – Licence Condition

As per the Clause 6.12 of the licence, an Advisory Notification Plan must be developed to ensure that in the event a boil water advisory is issued, water users can be notified in a timely manner.

6. Permit to alter or construct

As per Clause 2.1 of the Operating License (**PWS-08-102-01 A**), the Licensee shall obtain approval from the Office of Drinking Water prior to making any significant alterations to the water source, the water treatment process, the water storage facilities, or the water distribution system. This would include changes to any filter effluent piping or a changing to a permanent supply of treated water from the Stephenfield Water Treatment Plant. Approvals can be requested through The Office of Drinking Water by contacting Kim Barlishen, Senior Approvals Engineer at 1-204- 945-5936.

7. Use of antifreeze is prohibited in fire hydrants

During the site visit on January 25th, mention of the use of antifreeze in at least one hydrant was mentioned and is prohibited when connected to a public water supply. Hydrants must either be pumped dry after use or removed and replaced with a self-draining style hydrant.

Recommended Actions:

- Snow clearing activities should be directed away or downstream of an intake to a water treatment plant. Spring snowmelt may contain volatile components that the water treatment facility was not designed to remove.
- It was observed during the inspection that the lime slaker at the water treatment plant may not be running at peak efficiency. When running optimally, the use of alum and polymer is minimal. There are several examples of the lime softening process that use slaked lime in nearby water systems and it is recommended that the operators tour another lime softening process in the area such as Stephenfield, Morden, or Portage La Prairie.
- The Town of Carman water meter replacement program was discussed with the water plant and distribution operators during this site visit. This replacement plan offers an opportune time to record and document any features of the distribution system that may be detrimental to public health including lead service lines and possible cross connections to alternate source waters within the distribution system.
- The Stephenfield water treatment plant is nearing completion of upgrades and is expected to be commissioned in the Spring. Consideration should be given to provide advanced notice to customers that they may experience a change in water quality.

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 must, by law, be consistent with current guidelines, and the Office therefore monitors the potential impact of proposed changes to Manitoba water systems. There are several guidelines under review at present that have potential to impact Manitoba water supplies. The following is provided for information only, and is intended only to provide you with a "heads-up" on items you should be aware of .

Zebra Mussels

Zebra mussels have been found in numerous locations in Lake Winnipeg, the Red River and in Cedar Lake, and are expected to spread throughout the Manitoba portion of the Nelson River basin within the next several years. Because zebra mussels colonize hard surfaces in

infested water bodies, surface water intakes and pipes are at risk from fouling and clogging due to this rapidly-multiplying aquatic invasive species.

Manganese

Health Canada is currently in the process of reviewing the available evidence for health effects associated with manganese in drinking water. Early indications suggest that a health-based guideline for manganese will be adopted. Manganese can precipitate out and build up inside the distribution system piping, and later be re-suspended when conditions (ex: flow rate, temperature or water chemistry) change in the distribution system. As a result, the level of manganese at household water taps may vary and may be higher than the raw or treated water levels.

Lead

The Canadian guideline for lead is also currently under review. Lead was a common component in distribution piping, fittings and fixtures. Older neighbourhoods may be serviced by lead service connections and homes built before 1990 could have lead solder used to connect household pipes and some plumbing fixtures. Lead levels in drinking water depend on the chemistry of the water supply and tend to increase as it sits in the pipes when the water is not used for several hours.

Owners and operators are encouraged to discuss this information and to determine what impact they may have on your water supply. You will receive notification of any changes to Health Canada's Guidelines for Canadian Drinking Water Quality and Manitoba Standards should they affect your water supply.

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

Sincerely,
Kale Black

Kale Black
Senior Drinking Water Officer

cc. Darcy Hayward

ODW (Office of Drinking Water) annual inspection:

TOWN OF CARMAN WATER CHEMISTRY REPORT

Physical Tests					
Analysis	Unit	A.O.	MAC/IMAC	Raw	Treated
Color, true	T.C.U.	15		21.6	<5.0
Conductivity	umhos/cm			794	490
Langelier index (4 C)				1.2	-1.2
Langelier index (60 C)				1.9	-0.47
pH	pH units	6.5-8.5		8.35	6.99
TDS (Total Dissolved Solids)	mg/L	500		544	303
Turbidity	NTU			10.1	0.13
Transmittance, UV (254 nm)	% T			52.6	84.7
Anions and Nutrients					
Total Alkalinity (as CaCO3)	mg/L			343	78.6
Ammonia (NH3) Dissolved	mg/L			0.021	<0.010
Bicarbonate (HCO3)	mg/L			407	95.9
Carbonate (CO3)	mg/L			5.76	<0.60
Chloride (CL) Dissolved	mg/L	250		16.0	19.9
Fluoride (F) Dissolved	mg/L		1.5	0.259	0.545

Hardness (as CaCO3)	mg/L			428	179
Hydroxide (OH)	mg/L			<0.34	<0.34
Nitrate-N	mg/L		10	<0.0050	0.0054
Nitrite-N	mg/L		1	0.0010	<0.0010
Sulphate (SO4) Dissolved	mg/L	500		112	132
Organic/Inorganic Carbon					
Dissolved inorganic carbon	mg/L				
Dissolved Organic Carbon	mg/L			10.1	5.72
Total Carbon	mg/L				
Total inorganic Carbon	mg/L				
Total Organic Carbon	mg/L			10.3	5.49
	mg/L				

TOWN OF CARMAN WATER CHEMISTRY REPORT

Total Metals					
Analysis	Unit	A.O.	MAC/IMAC	Raw	Treated
Aluminum (Al)	mg/L	0.1		0.0862	0.0563
Antimony (Sb)	mg/L		0.006	0.00044	0.00040
Arsenic (As)	mg/L		0.01	0.00255	0.00072
Barium (Ba)	mg/L		1	0.0784	0.0101
Beryllium (Be)	mg/L			<0.00020	<0.00020
Bismuth (Bi)	mg/L			<0.00020	<0.00020
Boron (B)	mg/L		5	0.085	0.0075
Cadmium (Cd)	mg/L		0.005	0.000025	<.000010
Calcium (Ca)	mg/L			101	35.8
Cesium (Cs)	mg/L			<0.00010	<0.00010
Chromium (Cr)	mg/L		0.05	<0.0010	<0.0010
Cobalt (Co)	mg/L			0.00049	<0.00020
Copper (Cu)	mg/L	1		0.00311	0.0100
Iron (Fe)	mg/L	0.3		0.262	<0.10
Lead (Pb)	mg/L		0.01	0.000265	<0.000090
Lithium (Li)	mg/L			0.0448	0.0400
Magnesium (Mg)	mg/L			42.6	21.7
Manganese (Mn)	mg/L	0.05		0.616	0.00318

Molybdenum (Mo)	mg/L			0.00490	0.00497
Nickel (Ni)	mg/L			0.0050	<0.0020
Phosphorus (P)	mg/L			<0.10	<0.10
Potassium (K)	mg/L			6.83	6.78
Rubidium (Rb)	mg/L			0.00182	0.00209
Selenium (Se)	mg/L		0.05	0.0013	<0.0010
Silicon (Si)	mg/L			3.37	2.68
Silver (Ag)	mg/L			<0.00010	<0.00010
Sodium (Na)	mg/L	200		27.7	29.5
Strontium (Sr)	mg/L			0.399	0.119
Tellurium (Te)	mg/L			<0.00020	<0.00020
Thallium (Tl)	mg/L			<0.00010	<0.00010
Thorium (Th)	mg/L			<0.00010	<0.00010
Tin (Sn)	mg/L			<0.00020	<0.00020
Titanium (Ti)	mg/L			0.00285	<0.00050
Tungsten (W)	mg/L			<0.00010	<0.00010
Uranium (U)	mg/L		0.02	0.00952	0.00038
Vanadium (V)	mg/L			0.00230	0.00167
Zinc (Zn)	mg/L	5		0.0054	0.0036
Zirconium (Zr)	mg/L			<0.00040	<0.00040

Result is above acceptable levels

A.O. Aesthetic Objective

MAC Maximum Acceptable Level

IMAC Interim Maximum Acceptable Level

