



Annual Compliance Report 2018

| | | |
|------------------|----------------|---------------------------------|
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- (204) 304-1603 (Kirt)

Pembina Valley Water Co-op (PVWC) ownership - 14 municipalities

Water Plants in operation

| | | |
|---|----------------|--------------|
| Red River Regional Water Treatment Plant | - | Letellier |
| Emergency contact number: | (204) 324-7118 | |
| Morris Regional Water Treatment Plant | - | Morris |
| Emergency contact number: | (204) 324-7561 | |
| Stephenfield Regional Water Treatment Plant | - | Stephenfield |
| Emergency contact number: | (204) 745-8791 | |

Date report prepared: Feb 8, 2019

Jake Fehr
 Chief Systems Manager
 Pembina Valley Water Co-op

Introduction:

In the early 90's, a number of municipalities in south central Manitoba joined to form the Pembina Valley Water Cooperative Inc. (PVWC). The purpose was to develop a regional approach to supplying potable water in an area which lacked wide distribution of good, plentiful water resources, but which also exhibited the highest rate of economic growth of any region in Manitoba. Municipalities that were members of the cooperative as of December, 2018 include:

| | |
|------------------|------------------------------------|
| Town of Altona | City of Winkler |
| R.M. of Dufferin | Town of Carman |
| R.M. of Grey | Municipality of Emerson - Franklin |
| R.M. of Montcalm | R.M. of Morris |
| Town of Morris | Municipality of Rhineland |
| R.M. of Roland | City of Morden |
| R.M. of Stanley | R.M. of Thompson |

The mandate of the PVWC is to provide treated/potable water that meets all of the Canadian Drinking Water standards to its municipal members. It is governed by a board of 14 members, one representative from each municipal member.

The PVWC is a wholesaler of water which is distributed through its pipelines to its municipal customers. The municipalities then sell this water to the end user, their customers, which is then delivered through their own distribution system. The service area covers 9,000 square kilometers with a population base of approximately 50,000. The existing water supply system is shown in Figure 1.

Existing Water Supply

The Letellier water treatment plant (WTP) withdraws water from the Red River, pumps it into an oxbow with an approximate storage of two (2) months and has the ability to produce up to 96 litres per second (l/s) of treated water. From there, treated water is provided to the Town of Altona, and to the Cities of Winkler and Morden. Treated water is also provided from this plant to the Municipalities of Emerson-Franklin, Rhineland, Montcalm, Stanley, and to the Roseau River First Nation.

PVWC Distribution

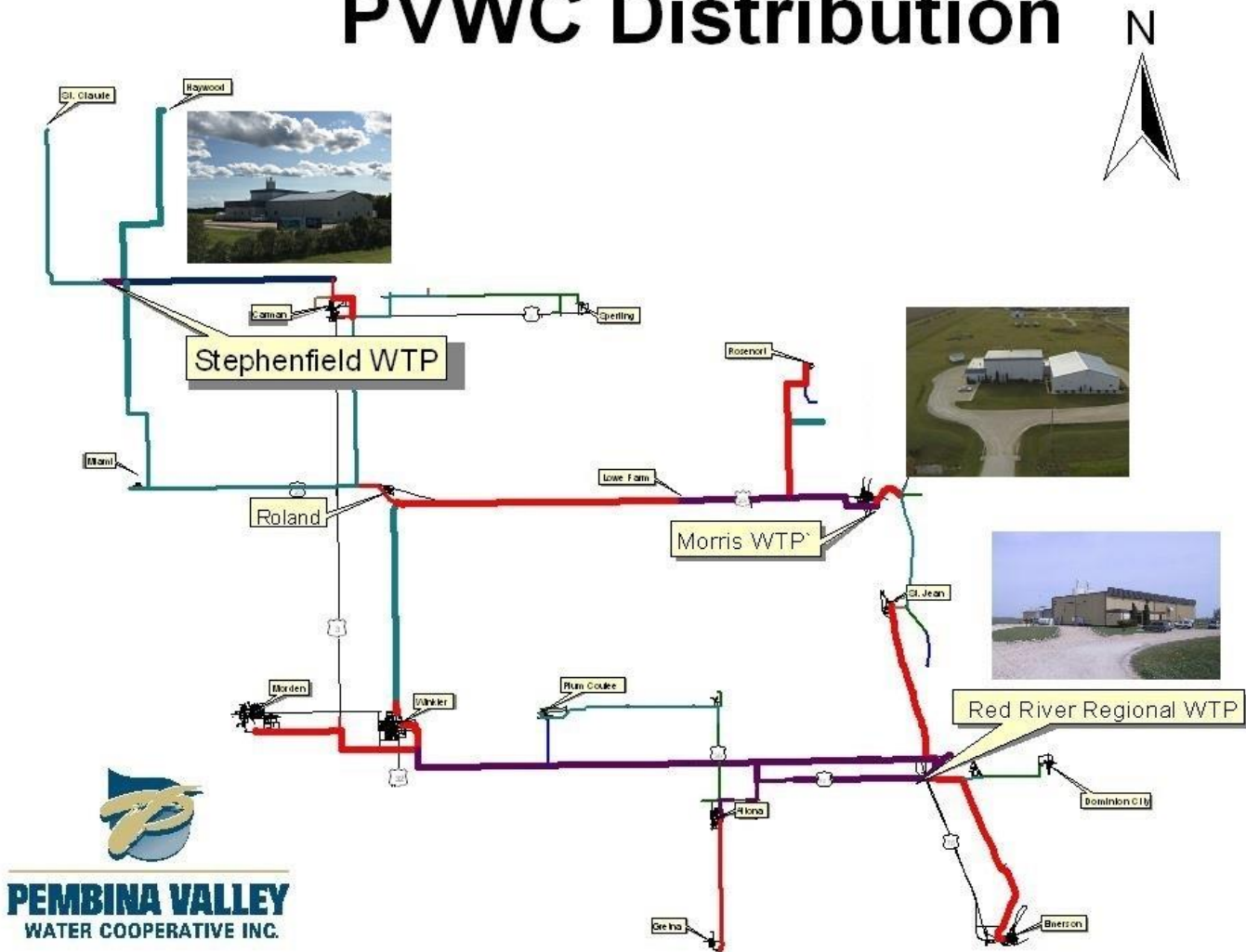


Figure 1: Model of PVWC distribution system, including the three water treatment plants.

The water treatment plant at Morris also withdraws water from the Red River and pumps it into a large holding pond of 1,000 acre feet. It currently has the capacity to produce up to 67 l/s of treated water. From there, treated water is provided to the Town of Morris, the R.M.s of Morris, Montcalm, Roland, Thompson, and Dufferin and a partial supply to the City of Winkler and the R.M. of Stanley.

The Stephenfield water treatment plant withdraws water from the Stephenfield Lake and has a capacity to produce up to 40 l/s of treated water. This plant provides water to St. Claude and Haywood and to the R.M.s of Dufferin, Grey, Thompson and a partial supply to the R.M.s of Roland, Morris and the Town of Carman.

All of the regions' existing supplies are utilized to their sustainable yield with the exception of the water treatment plant in Morris. The pond at Morris allows for growth and some drought resistance in the future. Additional options are being investigated. The City of Morden receives approximately 5% of their water supply from the PVWC with the

remainder coming from Lake Minnewasta. The City of Winkler receives approximately 35% of their supply from the PVWC and the remainder is withdrawn from the Winkler Aquifer. The Town of Carman receives 25% of their water supply from the PVWC and the rest of their supply comes from the Boyne River.

The PVWC is a user-pay water supply system. The price includes the cost of production, operation and maintenance, principal and interest. There is no decreasing scale or other discounting in the pricing system. The price charged to deliver the water to the municipal system in 2018 was \$8.16 per thousand gallons.

Red River Regional Water Treatment Plant - Letellier

- Red River used as water source
- Raw water storage of approx 250 acre-feet
- Rated for 96 litres per second
- Storage capacity 2,450,000 litres or 540,000 gallons
- Senior plant operator- Trevor Hodgins
- Drinking Water Officer- Kale Black



The following (Figure 2) is a description of the major treatment process for the Red River Regional Water Treatment Plant: This lime softening plant, which is typical of those commonly found throughout the Manitoba prairies, is used to treat the water from the Red River.

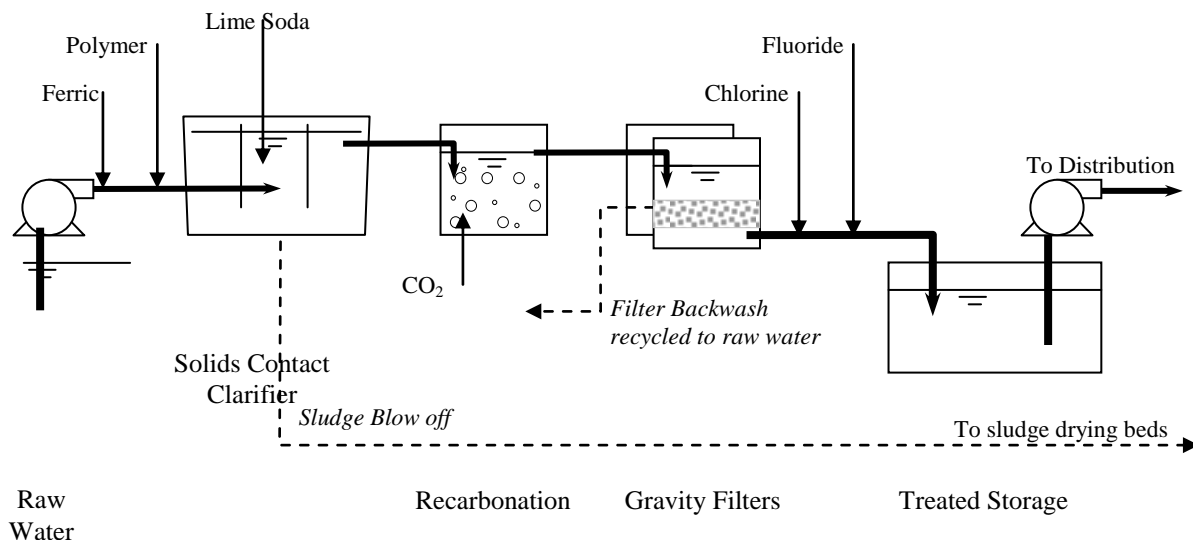


Figure 2: Schematic of the existing process.

The current process consists of a screened raw water intake located off the Red River that pumps to an off stream storage reservoir beside the plant which is then pumped directly to the solids contact clarifier. The cold lime softening clarifier then reduces hardness and

turbidity. The subsequent re-carbonation step stabilizes the clarifier effluent and the gravity filters polish the water for final turbidity and pathogen reduction.

The filtered water is then dosed with chlorine for disinfection and fluoride for dental maintenance. The fluoridation program is monitored by Manitoba Health.

Disinfection Monitoring and Reporting

The treated water leaving the water plant is tested continuously for a level of chlorine that is high enough for proper disinfection in the distribution system and leaving a minimum chlorine residual of greater than 0.1 mg/l.

These values are closely monitored by the operators along with bacterial test results. Changes in any of these values can result in lower chlorine residuals. **Compliance requirements were met.**

Bacteriological Monitoring and Reporting

The raw and treated water is tested on a weekly basis at four locations, for the presence of total coliform and E. coli bacteria. If these bacteria are present in the water, it is an indication that disease causing organisms may also be present. **Compliance requirements were met.**

Turbidity Monitoring and Reporting

Turbidity is a measurement of the clarity of water. Turbidity is used to tell us if the treatment process and filtration is working to remove particles and other contaminants from the water. A high turbidity can cause the water to look cloudy and affect the disinfection process. Turbidity is continuously tested after the filtering process and before disinfection.

Turbidity, which is measured and reported in nephelometric turbidity units (NTU), is an optical measurement of water’s ability to scatter and absorb light rather than transmit it in straight lines.

| | Requirement |
|---|--|
| Chemically assisted, rapid gravity filtration process for water treatment | ≤ 0.3 NTU in at least 95% of the samples taken per month |
| | Not to exceed 0.3 NTU for more than 12 continuous hours |
| | Not to exceed 1.0 NTU at any time |

There was 1 incident throughout the year that exceeded 1.0 NTU. The incident was due to the filter to waste system not working properly. The water did not enter into the treated reservoir but was recorded as high turbidity. This issue has been resolved.

Disinfection By-products Monitoring and Reporting

Trihalomethanes (THMs) 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. The province has set a standard for THMs of 100 micrograms per litre of water. The THM standard is based on an average of four samples per year. Our water from the Letellier plant is tested at four locations in the distribution system - Emerson, St. Jean Baptiste, Gretna and Morden.

Trihalomethane quarterly sampling

| Locations | Requirement | Test Results |
|-------------------|--|--------------|
| Emerson | Less than or equal to 100 µg/L as an annual average of quarterly samples | 136 µg/L |
| St. Jean Baptiste | | 140 µg/L |
| Gretna | | 163 µg/L |
| Morden | | 152µg/L |

One factor in the increase in THM’s is the regulatory requirements to maintain greater than 0.1 mg/l of chlorine residual in the water distribution system. This has made it necessary to increase the chlorine concentration leaving the water treatment plant which has the direct result of increasing the THM’s. The future reservoir will help reduce the disinfection by-products created by chlorine.

Major Expenses for the Red River Regional Water Treatment Plant in 2018

A drought plan was created with the 14 municipalities. A pre-engineering report was completed for future distribution and water treatment. This has led to the development of a 5 year Capital Plan.

Future Projects for the Red River Regional Water Treatment Plant

A regional coordinated advisory notification plan, compliance plan, and a sampling plan for the distribution system is a major initiative. The Morris to St. Jean pipeline with an additional booster is being planned for 2019. A treated water reservoir with increased capacity and the potential for upgraded treatment is being planned. PVWC is requesting government funding for these projects.

Red River Regional Water Treatment Plant Water Analysis

| RRRWTP Chemistry | | Aesthetic | MACs | Raw | Treated | Raw | Treated |
|------------------------------|----------|-----------|--------|-----------|-----------|-----------|------------|
| Analyte | Units | Objective | limits | February | February | September | September |
| Colour, True | CU | 15 | | 22.5 | <5.0 | 21.3 | 6.1 |
| Conductivity | umhos/cm | | | 1110 | 900 | 1040 | 838 |
| Hardness (as CaCO3) | mg/L | | | 574 | 311 | 445 | 241 |
| Langelier Index (4 C) | | | | 0.92 | -0.17 | 1.2 | -0.74 |
| Langelier Index (60 C) | | | | 1.7 | 0.59 | 1.9 | 0.023 |
| pH | pH units | 7.0-10.5 | | 8.15 | 7.75 | 8.63 | 7.49 |
| Total Dissolved Solids | mg/L | 500 | | 895 | 684 | 750 | 580 |
| Transmittance, UV (254 nm) | % T | | | 57.3 | 81.1 | 51.5 | 80.9 |
| Turbidity | NTU | | | 3.47 | 1.04 | 19.9 | <0.10 |
| Alkalinity, Total (as CaCO3) | mg/L | | | 356 | 106 | 244 | 43 |
| Ammonia, Total (as N) | mg/L | | | 0.246 | 0.016 | 0.027 | 0.017 |
| Bicarbonate (HCO3) | mg/L | | | 434 | 129 | 262 | 52.5 |
| Bromide (Br) | mg/L | | | 0.132 | <0.010 | 0.113 | 0.039 |
| Carbonate (CO3) | mg/L | | | <0.60 | <0.60 | 17.5 | <0.60 |
| Chloride (Cl) | mg/L | 250 | | 81.7 | 88.6 | 42.2 | 47.8 |
| Fluoride (F) | mg/L | | 1.5 | 0.198 | 0.493 | 0.22 | 0.532 |
| Hydroxide (OH) | mg/L | | | <0.34 | <0.34 | <0.34 | <0.34 |
| Nitrate (as N) | mg/L | | 10 | 1.36 | 1.55 | <0.010 * | 0.078 |
| Nitrite (as N) | mg/L | | 1 | 0.0175 | <0.0010 | <0.0020 * | <0.0020 * |
| Sulfate (SO4) | mg/L | 500 | | 278 | 289 | 305 | 311 |
| Dissolved Organic Carbon | mg/L | | | 11.7 | 7.93 | 12 | 6.02 |
| Total Organic Carbon | mg/L | | | 11.6 | 7.4 | 10.9 | 6.05 |
| Aluminum (Al)-Total | mg/L | 0.1 | | 0.0622 | <0.0030 | 0.343 | <0.0030 |
| Arsenic (As)-Total | mg/L | | 0.01 | 0.00312 | 0.001 | 0.00867 | 0.00117 |
| Barium (Ba)-Total | mg/L | | 1 | 0.0761 | 0.0142 | 0.0943 | 0.0288 |
| Boron (B)-Total | mg/L | | 5 | 0.154 | 0.077 | 0.146 | 0.096 |
| Cadmium (Cd)-Total | mg/L | | 0.005 | 0.0000389 | 0.0000131 | 0.0000291 | <0.0000050 |
| Calcium (Ca)-Total | mg/L | | | 105 | 64.3 | 81.6 | 74 |
| Copper (Cu)-Total | mg/L | 1 | 2 | 0.00203 | 0.00637 | 0.00324 | 0.0133 |
| Iron (Fe)-Total | mg/L | 0.3 | | 0.157 | <0.010 | 0.47 | <0.010 |
| Lead (Pb)-Total | mg/L | | | 0.000073 | <0.000050 | 0.00049 | 0.000414 |
| Lithium (Li)-Total | mg/L | | | 0.0737 | 0.0721 | 0.0776 | 0.074 |
| Magnesium (Mg)-Total | mg/L | | | 75.8 | 36.6 | 58.6 | 13.7 |
| Manganese (Mn)-Total | mg/L | 0.05 | | 0.0616 | 0.00031 | 0.193 | 0.00045 |
| Phosphorus (P)-Total | mg/L | | | 0.369 | <0.050 | 0.198 | <0.050 |
| Potassium (K)-Total | mg/L | | | 17.3 | 17.1 | 10.3 | 10.3 |
| Silicon (Si)-Total | mg/L | | | 10.4 | 5.25 | 6.39 | 1.95 |
| Sodium (Na)-Total | mg/L | 200 | | 109 | 115 | 64 | 71.5 |
| Strontium (Sr)-Total | mg/L | | | 0.423 | 0.202 | 0.378 | 0.27 |
| Uranium (U)-Total | mg/L | | 0.02 | 0.00541 | 0.000333 | 0.00594 | 0.000097 |
| Zinc (Zn)-Total | mg/L | 5 | | 0.0164 | 0.0048 | 0.0031 | 0.0109 |

Morris Regional Water Treatment Plant

- Red River used as water source
- Raw water storage of 1,000 acre feet
- Rated for 67 litres per second
- Storage capacity 2,800,000 litres or 616,000 gallons
- Senior plant operator- Byron Klassen
- Drinking Water Officer- Kale Black



The following is a description of the major treatment process for the Morris Regional Water Treatment Plant which was commissioned on March 17, 2010.

The plant is a microfiltration and membrane plant. Figure 4.2 is a schematic of the process.

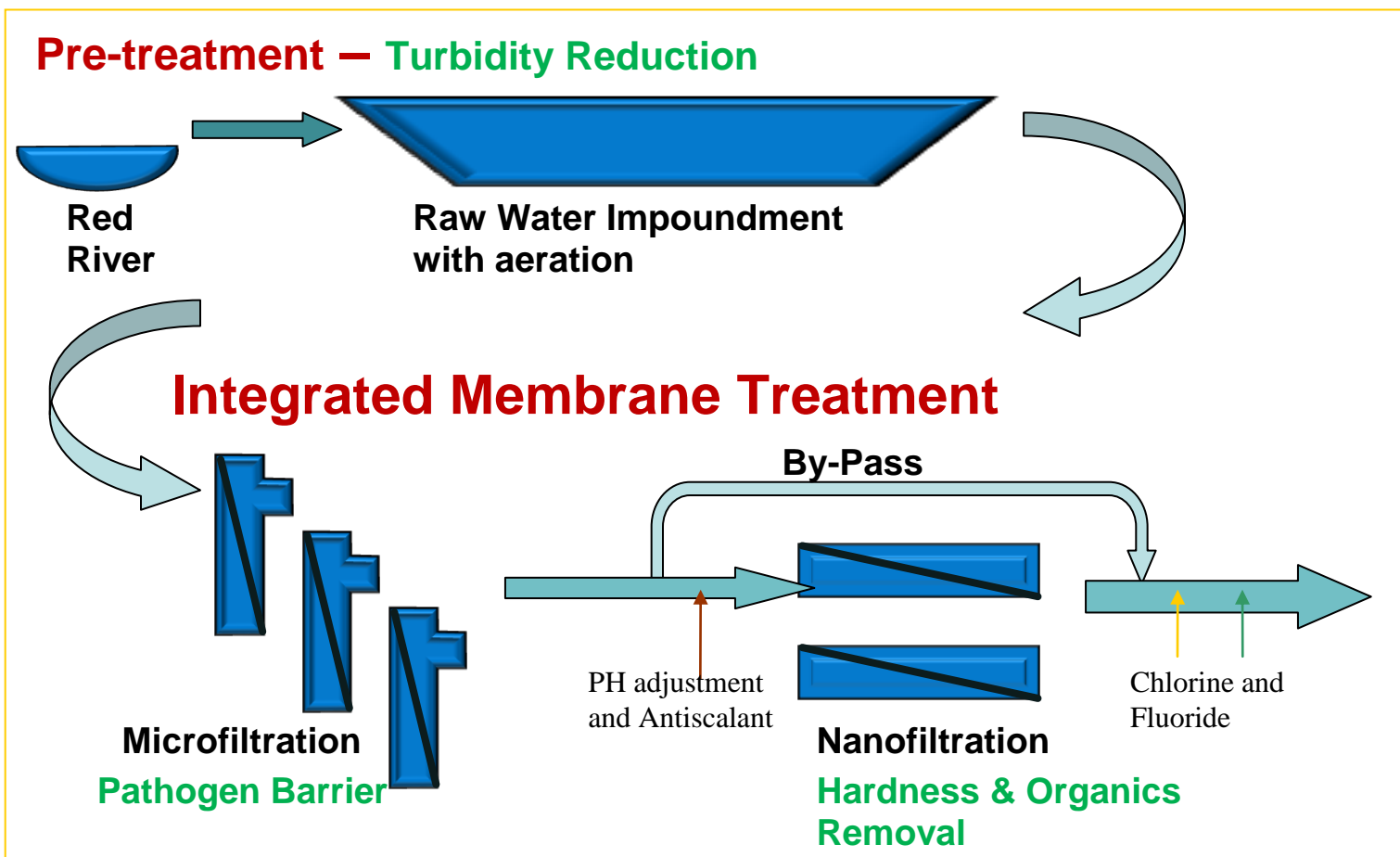


Figure 4.2

The process consists of a screened raw water intake located in the Red River that pumps into a raw water impound for off stream storage and settling. The microfiltration removes the pathogens and reduces the turbidity to a point where it is potable. A partial percentage

of the water is bypassed and put into the distribution system. The subsequent nano membrane step removes the hardness and the organics so that when the water is blended it meets all of the Manitoba Drinking Water guidelines. The blended water is then dosed with chlorine for disinfection and fluoride for dental maintenance. The fluoridation program is monitored by Manitoba Health.

Disinfection Monitoring and Reporting

The treated water leaving the water plant is tested continuously for a level of chlorine that is high enough for proper disinfection in the distribution system. **Compliance requirements were met.**

Bacteriological Monitoring and Reporting

The raw and treated water is tested on a weekly basis for the presence of total coliform and E. coli bacteria. If these bacteria are present in the water it is an indication that disease causing organisms may also be present.

A copy of the water test results are kept at the water treatment plant and at the main office in Altona. **Compliance requirements were met.**

Turbidity Monitoring and Reporting

Turbidity is a measurement of the clarity of water. Turbidity is used to tell us if the treatment process and filtration is working to remove particles and other contaminants from the water. A high turbidity can cause the water to look cloudy and affect the disinfection process. Turbidity is continuously tested after the microfiltration process and before disinfection.

Turbidity, which is measured and reported in nephelometric turbidity units (NTU), is an optical measurement of water's ability to scatter and absorb light rather than transmit it in straight lines. **Compliance requirements were met.**

| | Requirement |
|---|--|
| Continuous sampling of the effluent from each of the microfiltration skids. | ≤ 0.1 NTU in at least 99% of the samples taken per month |
| | Not to exceed 0.3 NTU for any continuous time |
| Frequency of testing | Continuous |
| Report submissions | Monthly |

Morris Regional Water Treatment Plant Water Analysis

| MWTP Chemistry | | Aesthetic | MACs | Raw | Treated |
|---|----------|-----------|-------|----------|-----------|
| Analytes | Units | Objective | Limit | August | August |
| Colour, True | CU | 15 | | 18 | 7.8 |
| Conductivity | umhos/cm | | | 1020 | 225 |
| Hardness (as CaCO ₃) | mg/L | | | 423 | 68.0 |
| Langelier Index (4 C) | | | | 1 | -1.3 |
| Langelier Index (60 C) | | | | 1.8 | -0.55 |
| pH | pH units | 7.0-10.5 | | 8.52 | 7.58 |
| Total Dissolved Solids | mg/L | 500 | | 732 | 158 |
| Transmittance, UV (254 nm) | % T | | | 58.1 | 90.2 |
| Turbidity | NTU | | | 5.86 | 0.32 |
| Alkalinity, Total (as CaCO ₃) | mg/L | | | 242 | 42.5 |
| Ammonia, Total (as N) | mg/L | | | 0.276 | 0.018 |
| Bicarbonate (HCO ₃) | mg/L | | | 273 | 51.9 |
| Bromide (Br) | mg/L | | | 0.104 | <0.010 |
| Carbonate (CO ₃) | mg/L | | | 10.7 | <0.60 |
| Chloride | mg/L | 250 | | 53.2 | 14.4 |
| Fluoride | mg/L | | 1.5 | 0.206 | 0.591 |
| Hydroxide (OH) | mg/L | | | <0.34 | <0.34 |
| Nitrate-N | mg/L | | 10 | 0.251 | 0.109 |
| Nitrite-N | mg/L | | 1 | 0.0484 | <0.0010 |
| Sulfate | mg/L | 500 | | 240 | 41.1 |
| Dissolved Organic Carbon | mg/L | | | 10.2 | 1.61 |
| Total Organic Carbon | mg/L | | | 10.6 | 1.51 |
| Aluminum (Al)-Total | mg/L | 0.1 | | 0.0984 | <0.0030 |
| Arsenic (As)-Total | mg/L | | 0.01 | 0.0106 | 0.00174 |
| Barium (Ba)-Total | mg/L | | 1 | 0.0785 | 0.012 |
| Boron (B)-Total | mg/L | | 5 | 0.122 | 0.105 |
| Cadmium (Cd)-Total | mg/L | | 0.005 | 0.000167 | 0.0000055 |
| Calcium (Ca)-Total | mg/L | | | 73.6 | 11.9 |
| Copper (Cu)-Total | mg/L | 1 | 2 | 0.108 | 0.0124 |
| Iron (Fe)-Total | mg/L | 0.3 | | 0.175 | <0.010 |
| Lead (Pb)-Total | mg/L | | | 0.00605 | <0.000050 |
| Lithium (Li)-Total | mg/L | | | 0.0613 | 0.0138 |
| Magnesium (Mg)-Total | mg/L | | | 58.1 | 9.3 |
| Manganese (Mn)-Total | mg/L | 0.05 | | 0.363 | 0.027 |
| Phosphorus (P)-Total | mg/L | | | 0.257 | 1.48 |
| Potassium (K)-Total | mg/L | | | 10.9 | 2.16 |
| Silicon (Si)-Total | mg/L | | | 6.07 | 1.43 |
| Sodium (Na)-Total | mg/L | 200 | | 75.3 | 17.5 |
| Strontium (Sr)-Total | mg/L | | | 0.337 | 0.0539 |
| Sulfur (S)-Total | mg/L | | | 87.6 | 13.8 |
| Uranium (U)-Total | mg/L | | 0.02 | 0.0042 | 0.000667 |
| Zinc (Zn)-Total | mg/L | 5 | | 0.401 | <0.0030 |

Disinfection By-products Monitoring and Reporting

Trihalomethane (THMs) 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. The province has set a standard for THMs of 100 micrograms per litre of water. The THM standard is based on an average of four samples per year. Our water is tested at two locations in the distribution system - Miami and Rosenort.

| | Requirement | Performance |
|--------------------------------------|---|-------------|
| Trihalomethane sampling requirements | 2 sample locations 4 times a year | 100% |
| Miami | <100 µg/L as an annual average of quarterly samples | 68.5 µg/L |
| Rosenort | | 56.2 µg/L |

Major Expenses for the Morris Regional Water Treatment Plant in 2018

Zebra mussels continue to be found in the river and pond intake screens. We are in the process of developing a plan to reduce the effects of zebra mussels. The distribution system was expanded on the east side of the Red River feeding into the Municipality of Emerson-Franklin. Different types of media were piloted to remove the manganese to prevent coloured water. Growth, drought and regulatory studies were completed.

Future Expenses for the Morris Regional Water Treatment Plant

The Morris to St. Jean Pipeline with an additional booster and a green sand like media filter are planned to be installed in 2019. This will help reduce the discolouration of the water. A third reverse osmosis skid is also planned for 2019 upgrading the plant from 67 l/s to 100 l/s capacity. Other improvements include an upgrade to the aeration system in the pond.

Stephenfield Regional Water Treatment Plant

- Stephenfield Lake used as water source
- Rated for 40 litres per second
- Storage capacity 2,350,000 litres or 518,000 gallons
- Senior plant operator- Paul Termeer
- Drinking Water Officer- Kale Black



The following is a description of the treatment process for the Stephenfield Regional Water Treatment Plant. The plant is a membrane technology plant with micro filtration followed by nano filtration. Figure 4.3 is a schematic of the new process.

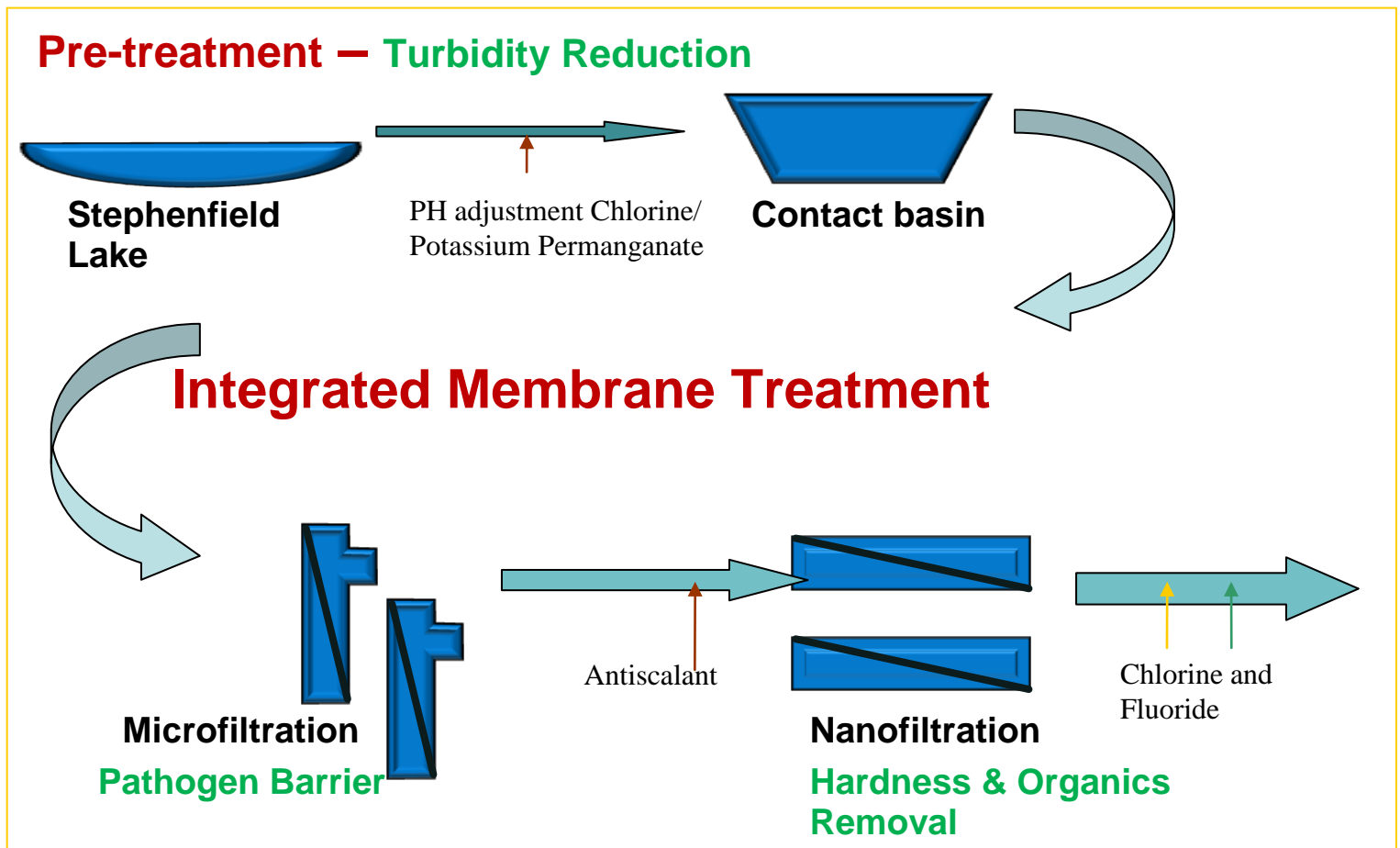


Figure 4.3

The current process consists of a screened raw water intake located in Stephenfield Lake that feeds water directly to the pumps in the water treatment plant. The pumps supply water to the contact basin (clarifier) which provides contact time with oxidants. The subsequent microfiltration removes the pathogens and reduces the turbidity to a point where it is potable. The nano membrane step then removes most of the hardness and organics.

The filtered water is then dosed with chlorine for disinfection and fluoride for dental maintenance. The fluoridation program is monitored by Manitoba Health.

Disinfection Monitoring and Reporting

The treated water leaving the water plant is tested continuously for a level of chlorine that is high enough for proper disinfection in the distribution system.

Free chlorine at the end of a distribution system is dependent on the initial chlorine injected at the source, the rate of flow in the distribution system and the time spent in the distribution system. These parameters are closely monitored by the operators along with bacterial test results. Changes in any of these factors can result in lower chlorine residuals. **Compliance requirements were met.**

Bacteriological Monitoring and Reporting

The raw and treated water is tested on a bi-weekly basis for the presence of total coliform and E. coli bacteria. If this bacteria is present in the water it is an indication that disease causing organisms may also be present.

A copy of the water test results is kept at the water treatment plant and at the main office in Altona. **Compliance requirements were met.**

Turbidity Monitoring and Reporting

Turbidity is a measurement of the clarity of water. Turbidity is used to tell us if the treatment process and filtration is working to remove particles and other contaminants from the water. A high turbidity can cause the water to look cloudy and affect the disinfection process. Turbidity is continuously tested after the microfilters and before disinfection. Turbidity, which is measured and reported in nephelometric turbidity units (NTU), is an optical measurement of water's ability to scatter and absorb light rather than transmit it in straight lines. **Compliance requirements were met.**

Disinfection By-products Monitoring and Reporting

Trihalomethane (THMs) 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. The province has set a standard for THMs of 100 micrograms per litre of water. The THM standard is based on an average of four samples per year. Our water is tested at two locations in the distribution system, St. Claude and the Dufferin Booster north of Carman.

| | Requirement | Performance |
|--|---|-------------|
| Trihalomethane sampling requirements Location | 2 sample locations 4 times a year | |
| St. Claude | ≤100 µg/L as annual average of quarterly samples | 77.5µg/L |
| Dufferin Booster | | 72.3 µg/L |

Major Expenses for the Stephenfield Regional Water Treatment Plant in 2018

The Stephenfield WTP was commissioned on June 26, 2017. The intake screen was upgraded and it includes an air burst clean off system. Bio-growth and poor raw water quality continue to be dealt with through process improvements.

The R.M. of Dufferin and PVWC worked together to monitor water losses and PVWC is working with Carman on their plan to build a larger reservoir with several days' storage.

Future Projects for the Stephenfield Regional Water Treatment Plant

The La Salle Red Boyne Conservation District and PVWC are working together to utilize the aeration system during the winter in order to improve water quality for drinking and the ecosystem.

PVWC is anticipating upgrading from 40 l/s to 60 l/s to provide 100% of Carman supply to support their plan to build a larger reservoir and decommission the Carman Water Treatment Plant.

Health Canada has completed its review on Canadian Drinking Water Guidelines, including algae (total microcystin toxins), manganese and lead. The new guidelines are expected to be finalized and posted with minor changes following the public consultation stage. This may require additional equipment or plant changes.

Stephenfield Regional WTP Water Analysis

| SWTP Chemistry New Plant | | Aesthetic | | Raw | Treated |
|---|----------|-----------|-------|-----------|------------|
| Analytes | Units | Objective | | May | May |
| Colour, True | CU | 15 | | 24.7 | <5.0 |
| Conductivity | umhos/cm | | | 612 | 235 |
| Hardness (as CaCO ₃) | mg/L | | | 281 | 75.2 |
| Langelier Index (4 C) | | | | -0.29 | -0.75 |
| Langelier Index (60 C) | | | | 0.47 | 0.029 |
| pH | pH units | 7.0-10.5 | | 7.39 | 7.79 |
| Total Dissolved Solids | mg/L | 500 | | 410 | 123 |
| Transmittance, UV (254 nm) | % T | | | 52.1 | 99.1 |
| Turbidity | NTU | | | 17.6 | <0.10 |
| Alkalinity, Total (as CaCO ₃) | mg/L | | | 200 | 87.6 |
| Ammonia, Total (as N) | mg/L | | | 0.235 | 0.012 |
| Bicarbonate (HCO ₃) | mg/L | | | 244 | 107 |
| Bromide (Br) | mg/L | | | 0.048 | <0.010 |
| Carbonate (CO ₃) | mg/L | | | <0.60 | <0.60 |
| Chloride | mg/L | 250 | | 15.7 | 20.1 |
| Fluoride | mg/L | | 1.5 | 0.231 | 0.557 |
| Hydroxide (OH) | mg/L | | | <0.34 | <0.34 |
| Nitrate-N | mg/L | | 10 | 0.0124 | 0.0318 |
| Nitrite-N | mg/L | | 1 | 0.0069 | <0.0010 |
| Sulfate | mg/L | 500 | | 103 | 0.73 |
| Dissolved Organic Carbon | mg/L | | | 11.9 | <0.50 |
| Total Organic Carbon | mg/L | | | 13.4 | <0.50 |
| Aluminum (Al)-Total | mg/L | 0.1 | | 0.0458 | 0.0046 |
| Arsenic (As)-Total | mg/L | | 0.01 | 0.00839 | 0.00023 |
| Barium (Ba)-Total | mg/L | | 1 | 0.067 | 0.0153 |
| Boron (B)-Total | mg/L | | 5 | 0.109 | 0.1 |
| Cadmium (Cd)-Total | mg/L | | 0.005 | 0.0000231 | <0.0000050 |
| Calcium (Ca)-Total | mg/L | | | 52.1 | 13.5 |
| Copper (Cu)-Total | mg/L | 1 | 2 | 0.00186 | 0.0115 |
| Iron (Fe)-Total | mg/L | 0.3 | | 0.217 | <0.010 |
| Lead (Pb)-Total | mg/L | | | 0.000246 | 0.000051 |
| Lithium (Li)-Total | mg/L | | | 0.0378 | 0.0201 |
| Magnesium (Mg)-Total | mg/L | | | 36.7 | 10.1 |
| Manganese (Mn)-Total | mg/L | 0.05 | | 0.37 | 0.00106 |
| Phosphorus (P)-Total | mg/L | | | 0.182 | <0.050 |
| Potassium (K)-Total | mg/L | | | 8.48 | 4.42 |
| Silicon (Si)-Total | mg/L | | | 8.45 | 5.63 |
| Sodium (Na)-Total | mg/L | 200 | | 25 | 18.3 |
| Strontium (Sr)-Total | mg/L | | | 0.297 | 0.0833 |
| Sulfur | mg/L | | | 40.1 | <0.50 |
| Uranium (U)-Total | mg/L | | 0.02 | 0.00517 | 0.000052 |
| Zinc (Zn)-Total | mg/L | 5 | | <0.0030 | 0.0066 |

Organizational Resources

