Vermilion Bay Drinking Water System 2014

Annual Report

INTRODUCTION

The Vermilion Bay Drinking Water System (DWS# 210000997) is obligated to meet the requirements of Ontario's *Safe Drinking Water Act* and the regulations therein, in addition to requirements associated with system approvals.

This Annual Report has been prepared in accordance with both Schedule 22 and section 11 of Ontario Regulation 170/03. In this manner, the Summary Reports for Municipalities required by Schedule 22 and the Annual Reports required by section 11 have been consolidated into a single document. This Report is intended to brief the Municipal officials and the residents serviced by the Vermilion Bay Drinking Water System (VBDWS) on the system's performance over the past calendar year (January 1, 2014 to December 31, 2014).

A summary of this Drinking Water System (DWS) is produced with the use of technical terms, some of which the reader may not be familiar with. It is recommended that the reader refer to the *Technical Support Document for Ontario Drinking Water Standards, Objectives (ODWS), and Guidelines*. Within this document the reader will find information on provincial water quality standards, objectives and guidelines, rationale for monitoring, and a brief description of water quality parameters. The Ontario Drinking Water Standards (ODWS) document can be found at the following website address:

https://dr6j45jk9xcmk.cloudfront.net/documents/1140/81-drinking-water-standards-objectives-and.pdf

Users of this Drinking Water System are also encouraged to contact the Municipality of Machin through the Manager of Environmental Service, if you have questions or if you require assistance in interpreting this Annual Report.

Report Availability

In accordance with section 11 of O. Reg. 170/03, this Annual Report must be made available for inspection by any member of the public serviced by the Drinking Water System, without charge, at the Municipal Office. Additionally, the Municipality of Machin is also encouraged to make available this Annual Report on the community's website.

In accordance with Schedule 22 of O. Reg. 170/03, this Annual Report must be distributed to the members of the municipal council. As of January 1, 2013, section 19 (Standard of care, municipal drinking water system) of Ontario's *Safe Drinking Water Act* places certain responsibilities upon those municipal officials who oversee or exercise decision-making authority over a Municipal Water System. Such municipal officials would be exercising diligence by becoming familiar with this Annual Report.

SYSTEM DESCRIPTION

Classified as a large municipal residential system, this drinking water system (DWS) provides a potable water supply to the community of Vermilion Bay. This DWS is composed of the Vermilion Bay Low Lift Pumping Station (VBLLPS), the Vermilion Bay Water Treatment Plant (VBWTP), and the Vermilion Bay distribution system. This DWS is owned and operated by the Corporation of the Municipality of Machin. Potential pathogenic organisms are removed from the source water by coagulation, flocculation, sedimentation, filtration, and primary disinfection processes.

The VBLLPS draws surface water from Eagle Lake, such that two low lift pumps are capable of transferring the raw water from the source to the treatment units located at the VBWTP. Lime solution (pH/alkalinity adjustment) and polyaluminum chloride (primary coagulant) are injected into the raw water upstream from the treatment units. A cationic polymer (flocculation aid) is then injected during the flocculation stage in order to create a strong and dense floc, which will facilitate settling in the sedimentation stage. In the sedimentation tanks, water flows upward through a maintained floc blanket and tube settlers and enters the perforated clarifier effluent pipe which directs flow to the filters. Any suspended particles that did not settle in the sedimentation tanks will be removed by two dual-media filters (composed of anthracite and silica sand, on a layer of support gravel). Filter effluent is then directed to a non-chlorinated reservoir for subsequent transfer through the GAC (granular activated carbon) filter units. Sodium hypochlorite (disinfectant) is then added to the GAC filter effluent water.

The chlorinated water is held in the treated water storage reservoirs to allow for the necessary time required to achieve primary disinfection. Treated water is then transferred to the distribution system by the use of high lift pumps located at the VBWTP. Secondary disinfection requirements in the distribution system are achieved by the maintenance of a residual as free chlorine.

System Expenses

It is within the scope of this Report to describe any major expenses incurred during the reporting period to install, repair or replace required equipment. Such major expenses for the Vermilion Bay DWS include:

Item	Description	Approximate Cost	Status*
AIT 410	Replacement Turbidity analyzer NWI # 0158	2400.00	A Completed
Broken Fire Hydrant Flange	Barrel of Hydrant was cracked and non repairable, Hydrant was removed and barrel capped until replacement can be made	8000.00	N Not Yet Determined

Item	Description	Approximate cost	Status*
PH probe for Chlorine Analyzer	**Replacement PH Probe**	**350.00**	**A Completed**
PH probe for Chlorine Analyzer	**Replacement PH Probe**	**350.00**	**A Completed**
AIT 811 Level Transducer	**Repair and reprogramming**	**674.61**	**A Completed**
Napier Reed PLC CPU	**Remove & replace and reprogram**	**$11017.50**	**A Completed**
Hydrant # 14 Pine Street	**Remove & replace Fire Hydrant and lead pipe Labor $756.00/Back Fill $720.00/ Excavator $910.00/New Hydrant, (Lead Pipe & materials $ 2500.00 taken from stock)**	**$ 4886.00**	**A completed**
Broken service @ 25 Bay street on 10 inch water main	**Remove and replace leaking water service on 10 cast Iron force main. Labor $1134/Backfill $2400.00/Equipment rental $2734.35/(Materials $1500.00 Taken from Stock)**	**$7768.35**	**A Completed**
Repair Aqua Flow units	**Purchase of materials to repair 5 Failed Aqua flow units note: 3 units are in stock at water plant one unit was from the Fire Hall and one unit from 149 Vermilion Bay street. A bleeder line had to be installed at the Home located at Moose Creek as the Aqua flow unit was not appropriate for this location due to frazzle ice formation in the service line due to low Water usage.**	**$ 454.32**	**A Completed**

*A = Approved R= Rejected N = Not Yet Determined

WATER QUALITY

The Vermilion Bay Drinking Water System continued to produce water of exceptional quality in 2014. The descriptions below provide brief summaries of the parameters tested in the VBDWS, and the reader is asked to consult **Appendix A** for a comprehensive summary of 2014 water quality.

In-House Analyses

The Vermilion Bay DWS employs an extensive in-house testing program which includes analyses of water quality indicators beyond that required by Ontario's *Safe Drinking Water Act*. Such analyses are conducted on source, treated, and process water, and include testing for turbidity, colour, pH, temperature, alkalinity, aluminum, and residual free chlorine. Approximately 5377 routine independent in-house water quality tests were conducted with respect to this system in 2014.

Microbiological Analyses in 2014, as required by Schedule 10 of O. Reg. 170/03. These water samples were collected on a weekly basis, and included tests for E. coli, total coliforms, and heterotrophic plate counts. All routine treated samples tested absent for E. coli and total coliform parameters.

Organic Parameters and Trihalomethanes

Organic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 and 24 of O. Reg. 170/03. These parameters include various acids, pesticides, herbicides, PCBs, volatile organics, and other organic chemicals. With respect to the Vermilion Bay DWS, sampling for organic parameters was conducted on February 5, 2014. The results of all organic parameter testing were below the lower detectable limits (with the exception of trihalomethanes).

Trihalomethanes (THMs) are sampled on a quarterly basis from the farthest point in the Vermilion Bay distribution system, in accordance with Schedule 13 of O. Reg. 170/03. Compliance with the provincial standard for trihalomethane concentrations is determined by calculating a running annual average (with a Maximum Acceptable Concentration of 0.100 mg/L or 100 ug/L). In 2014, the running annual average was 72.1 ug/L

Microbiological analyses are conducted on source, treated, and distribution system water. A total of 263 routine water samples were collected for bacteriological analysis by an accredited laboratory

Inorganic Parameters and Nitrate/Nitrite

Inorganic parameters are sampled on an annual basis in treated water in accordance with Schedules 13 and 23 of O. Reg. 170/03. Inorganic sampling includes various parameters such as Antimony, Arsenic, Cadmium, Mercury, and Uranium. With respect to the Vermilion Bay DWS, required annual sampling for inorganic parameters was conducted on February 5, 2014.

Treated water is also tested for nitrate and nitrite concentrations on a quarterly basis in accordance with Schedule 13 of O. Reg. 170/03. There was no exceedance for any inorganic parameter in 2014.

Community Lead Sampling

Based on results of the community lead sampling program in 2012, the Vermilion Bay DWS has qualified for reduced sampling in accordance with Schedule 15.1 of O. Reg. 170/03. Such reduced sampling will resume in the period corresponding to December 15, 2014 to April 15, 2015.

2014 Lead Sampling Results

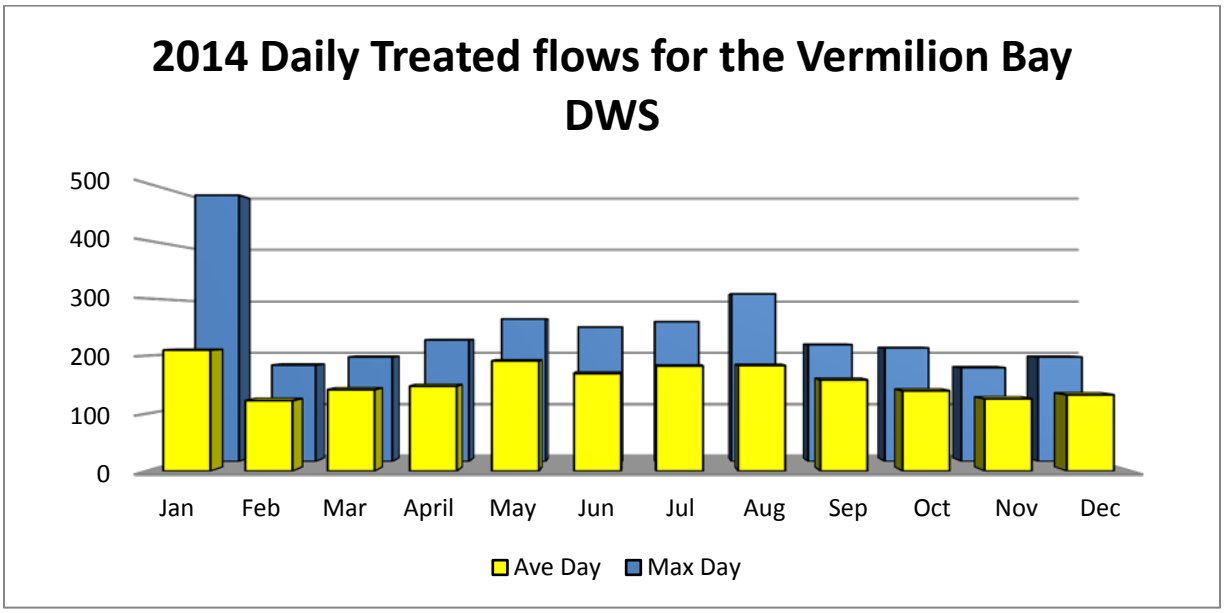
Sample Type	Number of Samples	Minimum Result (ug/L)	Maximum Result (ug/L)	ODWQS[1] (ug/L)	Number of Exceedances	Number of Samples Below LDL[2] (<1.0 ug/L)	Number of Samples Between LDL and ODWQS
Plumbing	0						
Distribution	0						

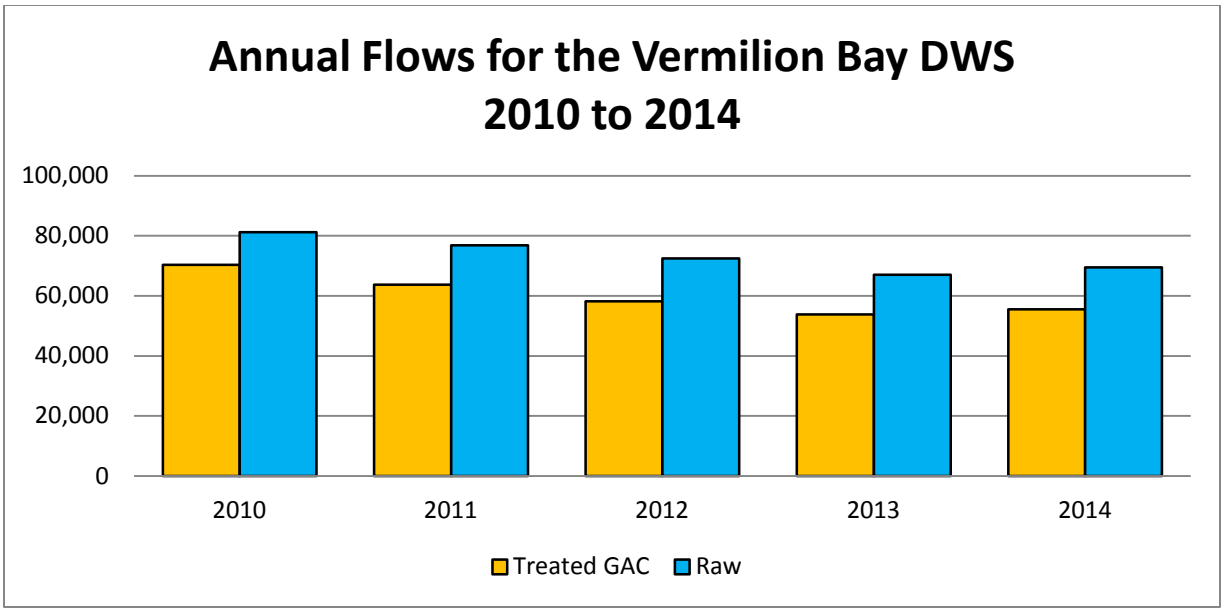
1. ODWQS = Ontario Drinking Water Quality Standard; a value above this threshold is considered to be an exceedance.
2. LDL = lower detectable limit; lead concentrations below the LDL are not detected by current analytical methods.

FLOWS

2014 Flows

Throughout the reporting period, the Vermilion Bay DWS supplied 57971 m^3 of treated water to consumers. On an average day in 2014, 158 m^3 of treated water was supplied to the community. This average daily flow rate in 2014 represented 11.8 % of the rated capacity of the Vermilion Bay WTP (1,360 m^3/day). The maximum daily flow rate in 2014 was 495 m^3/day, which represented 36.4 % of the rated capacity of the Vermilion Bay WTP. The maximum day flow was due to the events of Jan 11th to Jan 19th, when fire hydrant 14 on Pine Street froze and cracked at the base due to the extreme cold and finally broke below the valve base. The reader is asked to consult **Appendix B** for a complete summary of 2014 flow data.





There was a increase in the amount of water supplied in 2014 when compared to the previous calendar year. In 2013, 53,790 m^3 of treated water was supplied to users of the Vermilion Bay DWS, compared to 55476 m^3 in 2014. This represents a 3.1 % increase in the amount of treated water supplied to the community. The reader is asked to consult **Appendix B** for a summary of historical flow data.

Note: The recirculation of treated water via pressure relief valves located downstream of the treated water (distribution) flowmeter had previously resulted in inaccurate estimates with respect to the amount of water being supplied to the community. For this reason, the values for total treated water flow and average treated water daily flow were derived from actual transfer flows through the GAC filter units. In this way, such flows were not derived from data collected from the treated water (distribution) flowmeter.

Chemical Consumptions

Increases in the consumption of lime in recent years are associated with corrosion control measures intended to reduce lead concentrations in premise plumbing. These measures have proven effective in controlling lead release, and it is reasonable to expect that future lime dosages will be similar to those encountered in 2012 and 2013.

The table below summarizes all the water treatment chemicals used during the reporting period and the previous 4 years with their consumption data. All chemicals used in the treatment process are NSF 60 certified for use in potable water, as required by system approvals.

Chemical Consumptions & Average Dosages

Year	Lime		Polyaluminum chloride		Polymer		Sodium hypochlorite	
	Quantity Used (kg)	Average Dosage (mg/L)	Quantity Used (L)	Average Dosage (mg/L)	Quantity Used (kg)	Average Dosage (mg/L)	Quantity Used (L)	Average Dosage[1] (mg/L)
2010	287	3.5	4394	21.7	13.4	0.16	2262	3.86
2011	462	6.0	4306	22.5	7.6	0.10	2256	4.25
2012	417	5.8	3418	18.9	7.0	0.10	2469	5.09
2013	464	6.9	3375	20.2	4.4	0.07	2548	7.75
2014	435	6.3	3948	22.6	5.0	0.07	2633	5.67

1. GAC transfer volumes (as opposed to raw water volumes) are used in the average dosage calculations for sodium hypochlorite. Using such volumes provides a better indication of applied dosages. Discrepancies in the reported dosages between this and previous Annual Reports can be attributed to using raw water volumes in such calculations.

COMPLIANCE

Ensuring Compliance

The Municipality of Machin operates the Vermilion Bay Drinking Water System, and must comply with legislative and regulatory requirements in addition to the terms and conditions of a number of site-specific system License and approvals. Staffing is maintained at levels to ensure that adequate numbers of trained and licensed personnel are available for proper operations, during emergency or upset conditions, for vacation/sick relief, or to deal with equipment breakdown. Emergency response procedures and operations manuals are established and located in the appropriate facilities, and are available to all staff members. Operations manuals include information necessary for the day-to-day operation and maintenance of the treatment and distribution systems, as well as information that may be required to be accessed quickly for various purposes. Emergency response procedures include information that may be required for proper operation of the system during emergency or upset conditions, and contains items such as emergency plans and contact lists.

The operational strategy of the Municipality of Machin includes ensuring that permits and approvals are in place, ensuring efficient maintenance and operations, and ensuring that the quality of water supplied to its customers meets or exceeds the minimum requirements as set out in the *Safe Drinking Water Act*. It is also our responsibility to ensure that permissible flow rates are not exceeded. Flow measuring devices for measuring the amount of water taken and the amount of water supplied are calibrated annually. Accuracy in these measurements ensures that treatment chemicals are precisely applied and that flows do not exceed the capacity at which the system is designed to be effective. These flows are recorded to provide current and historical information for decision making purposes, in addition to being used by the Ministry of the Environment to review treatment operations.

Water quality analyzers are in place to continuously monitor water quality after critical treatment processes. Each filter is equipped with a filter effluent turbidity analyzer which monitors the amount of suspended particles in the water leaving the filter. A chlorine residual analyzer continuously monitors the free chlorine residual at a point where primary disinfection is complete. Each piece of equipment is equipped with an alarm indicating adverse water quality, and is maintained in accordance with manufacturer's recommendations. Additionally, a water sampling program is conducted to exceed the minimum requirements of O. Reg. 170/03 under the *Safe Drinking Water Act*. Raw water sampling is conducted to give operational staff the information required to effectively operate the treatment process, and samples are collected throughout the process to determine the effectiveness of treatment at each stage. Treated and distribution system sampling provide information regarding the quality of water delivered to consumers. All of these samples are analyzed by licensed staff or by an accredited laboratory.

Compliance with System Approvals

The Municipal Drinking Water Licence for the Vermilion Bay DWS requires that effluent discharged into the natural environment has an annual average total suspended solids concentration below 15 mg/L. This effluent is returned to Eagle Lake, and originates from the water consumed for plant process purposes (such as filter backwashing, clarifier "desludging", and filter rinsing-to-waste). In 2014, the annual average concentration for decant effluent total suspended solids was <2 mg/L. The annual average concentration calculation assumes that sample results found to be below the lower detectable limit are equivalent to that limit.

COMPLIANCE (continued)

Incidents of Non-Compliance

There was one known incidents of non-compliance in 2014. Such an incident contravenes regulatory requirements, and corrective actions are required to address such items.

Summary of 2014 Incident of Non-Compliance

Incident Description	AWQI 115790 Broken Fire Hydrant Valve on Pine Street
Explanation	Unable to shut off Hydrant as isolation Valve had been damaged and was not accessible. Leak was allowed to flow until repairs could be made.
Corrective Actions	Isolate street and limit flow to effected area, institute a boil water advisory to the effected homes until repairs were completed so hydrant could be shut off. Hydrant was replaced at a later date.

Incidents of Adverse Water Quality

Under O. Reg 170/03, reporting procedures and corrective actions are required for any instance where a sample result shows that a parameter used to measure water quality exceeded a certain standard, or where other observations indicate that the safety of the water cannot be guaranteed. There was one incident for the Vermilion Bay DWS in 2014 due to a broken Hydrant on Pine street requiring and Boil Water Advisory (BWA). The reader is asked to consult **Appendix C** for a summary of adverse water quality incidents which occurred in 2014.

Although treated water turbidity is considered an "aesthetic objective" and not a reportable parameter, the automated turbidity analyzers on the Filters did not trend data during the Napier Reed Treatment unit's programmable logic controller failure and this incident was reported to the MOE's Spill Action Centre as a precaution. AWQI # 121200 was issued and Turbidity's were monitored manually every 15 mins during manual filter operation until the replacement PLC was installed, reprogrammed and tested then put back in service.

APPENDIX A: WATER QUALITY 2014

Microbiological Parameters 2014

Parameter (Sample Type)	Units	Number of Samples	Minimum	Maximum	ODWQS[1]	Compliant ODWQS
E. Coli (Raw)	MPN/100mL	53	0	1	---	---
E. Coli (Treated)	p/a/100mL	54	absent	Absent	not detectable	✓
E. Coli (Distribution)	p/a/100mL	154	absent	Absent	not detectable	✓
Total Coliforms (Raw)	MPN/100mL	53	0	1010	---	---
Total Coliforms (Treated)	p/a/100mL	54	absent	Absent	not detectable	✓
Total Coliforms (Distribution)	p/a/100mL	154	absent	Absent	not detectable	✓
HPC (Treated)	CFU/mL	54	0	1	---	---
HPC (Distribution)	CFU/mL	109	0	67	---	---

1. ODWQS = Ontario Drinking Water Quality Standard; a value above this threshold is considered to be an exceedance.

Chemical and Physical Parameters (In-House) 2014

Parameter	Units	Number of Samples	Minimum[1]	Maximum	Annual Average[3]	Compliant ODWQS
Turbidity (Filter #1/#2)	NTU	Continuous	0.046/0.048	0.082/0.069	0.058/0.055	✓
Turbidity (Treated)	NTU	Continuous	0.070	5.16[2]	0.086	---
Residual Free Chlorine	mg/L	Continuous	0.84	1.23	1.05	---
pH (Treated)	pH units	Continuous	6.9	7.0	7.1	---
Total Alkalinity (Treated)	mg/L $CaCO_3$	255	16.5	21.4	18.9	---
Residual Aluminum (Treated)	mg/L	255	0.008	0.018	0.014	---

1. The minimum and maximum values for the parameters of Turbidity (Treated), pH (Treated), Total Alkalinity (Treated), and Residual Aluminum (Treated) are given as minimum and maximum monthly averages.
2. Maximum values for Distribution turbidity are associated with fire flows.
3. Annual averages are the averages of all in-house analyses conducted within the year for a given parameter.

Inorganic Parameters 2014

Parameter (Treated Water)	Units	Result	ODWQS	Compliant ODWQS
Antimony	ug/L	<0.60	6	✓
Arsenic	ug/L	<1.0	25	✓
Barium	ug/L	<10	1000	✓
Boron	ug/L	<50	5000	✓
Cadmium	ug/L	<0.10	5	✓
Chromium	ug/L	<1.0	50	✓
Fluoride	mg/L	<0.030	1.5	✓
Mercury	ug/L	<0.10	1	✓
Selenium	ug/L	<1.0	10	✓
Sodium	mg/L	6.95[1]	20[2]	✓
Uranium	ug/L	<2.0	20	✓

1. Treated water must be tested for sodium concentrations once every 5 years. This most recent result pertains to a sample collected on February 22, 2010.
2. This value for the parameter Sodium is not associated with a Standard as prescribed in O. Reg. 169/03, although an exceedance of this value is associated with reporting requirements and corrective actions.

Nitrate & Nitrite 2014

Sample Date (2013)	Nitrate Result (mg/L)	Nitrite Result (mg/L)	Nitrate + Nitrite (mg/L)	Compliant ODWQS
February 5	0.040	<0.020	0.040	✓
May 13	0.067	<0.020	0.067	✓
August 13	<0.030	<0.020	<0.050	✓
November 12	<0.030	<0.020	<0.050	✓
ODWQS (mg/L)	10	1	10	

APPENDIX A: WATER QUALITY (continued)

Organic Parameters 2014

Parameter (Treated Water)	Result (ug/L)	ODWQS (ug/L)	Compliant ODWQS	Parameter (Treated Water)	Result (ug/L)	ODWQS (ug/L)	Compliant ODWQS
Alachlor	<0.10	5	✓	Diquat	<1.0	70	✓
Aldicarb	<1.0	9	✓	Diuron	<1.0	150	✓
Aldrin + Dieldrin	<0.040	0.7	✓	Glyphosate	<5.0	280	✓
Atrazine + N-dealkylated metabolites	<0.20	5	✓	Heptachlor + Heptachlor Epoxide	<0.20	3	✓
Azinphos-methyl	<0.10	20	✓	Lindane (Total)	<0.10	4	✓
Bendiocarb	<0.20	40	✓	Malathion	<0.10	190	✓
Benzene	<0.50	5	✓	Methoxychlor	<0.10	900	✓
Benzo(a)pyrene	<0.010	0.01	✓	Metolachlor	<0.10	50	✓
Bromoxynil	<0.20	5	✓	Metribuzin	<0.10	80	✓
Carbaryl	<0.20	90	✓	Monochlorobenzene	<0.50	80	✓
Carbofuran	<0.20	90	✓	Paraquat	<1.0	10	✓
Carbon Tetrachloride	<0.5	5	✓	Parathion	<0.10	50	✓
Chlordane (Total)	<0.3	7	✓	Pentachlorophenol	<0.50	60	✓
Chlorpyrifos	<0.10	90	✓	Phorate	<0.10	2	✓
Cyanazine	<0.10	10	✓	Picloram	<0.20	190	✓
Diazinon	<0.10	20	✓	Polychlorinated Biphenyls (PCBs)	<0.035	3	✓
Dicamba	<0.20	120	✓	Prometryne	<0.10	1	✓
1,2-Dichlorobenzene	<0.50	200	✓	Simazine	<0.10	10	✓
1,4-Dichlorobenzene	<0.50	5	✓	Temephos	<0.10	280	✓
DDT + metabolites	<0.40	30	✓	Terbufos	<0.20	1	✓
1,2-Dichloroethane	<0.50	5	✓	Tetrachloroethylene	<0.50	30	✓
1,1-Dichloroethylene	<0.50	14	✓	2,3,4,6-Tetrachlorophenol	<0.50	100	✓
Dichloromethane	<5.00	50	✓	Triallate	<0.10	230	✓
2,4 -Dichlorophenol	<0.30	900	✓	Trichloroethylene	<0.50	5	✓
2,4-Dichlorophenoxy acetic acid	<0.20	100	✓	2,4,6-Trichlorophenol	<0.50	5	✓
Diclofop-methyl	<0.20	9	✓	2,4,5-Trichlorophenoxy acetic acid	<0.20	280	✓
Dimethoate	<0.10	20	✓	Trifluralin	<0.10	45	✓
Dinoseb	<0.20	10	✓	Vinyl Chloride	<0.50	2	✓

Trihalomethanes 2014

Sample Date (2014)	Total THMs Result (ug/L)	2014 Annual Average (ug/L)	2013 Annual Average (ug/L)	2012Annual Average (ug/L)	2011 Annual Average (ug/L)	ODWQS[1] (ug/L)	Compliant ODWQS
February 5	58.7	72.1	56.4	74.9	79.9	100	✓
May 13	54.0						
August 14	101.0						
November 12	74.7						

1. ODWQS = Ontario Drinking Water Quality Standard; a value above this threshold is considered to be an exceedance.

APPENDIX B: FLOW STATISTICS

2014 Flow Statistics (values expressed as m^3)

Month	Total Raw Water Flow	Total GAC Treated Water Flow[1]	Average Treated Water Daily Flow[1]	Maximum Treated Water Daily Flow[2]	Plant Efficiency	% Capacity Performance (Average Flows)	% Capacity Performance (Maximum Flows)
Jan.	8533	6703	210	495	78.6	15.5	36.4
Feb.	3993	3147	122	179	78.8	9.0	13.2
March	5306	4147	141	194	78.2	10.4	14.3
April	5180	4184	147	226	80.8	10.8	16.6
May	7089	5786	191	265	81.6	14.0	19.5
June	5907	4759	169	250	80.6	12.4	18.4
July	6419	5364	182	260	83.6	13.4	19.1
Aug.	6652	5408	183	312	81.3	13.4	22.9
Sept.	5706	4479	158	217	78.5	11.6	16.0
Oct.	5285	4086	139	211	77.3	10.2	15.5
Nov.	4459	3488	125	174	78.2	9.2	12.8
Dec.	4977	3925	132	194	78.9	9.7	14.3
Total	**69506.00**	**55476.00**	**---**	**---**	**---**	**---**	**---**
Avg.			**158**	**---**	**79.8**	**11.8**	**18.6**

1. The recirculation of treated water via pressure relief valves located downstream of the treated water (distribution) flowmeter had previously resulted in inaccurate estimates with respect to the amount of water being supplied to the community. For this reason, the values for total treated water flow and average treated water daily flow were derived from actual transfer flows through the GAC filter units. In this way, such flows were not derived from data collected from the treated water (distribution) flowmeter.
2. Values for maximum daily flows were derived from data collected from the treated water (distribution) flowmeter.

Flow Statistics by Year (values expressed as m^3)

Year	Total Raw Water Flow	Total Treated Water Flow[1]	Plant Efficiency	% Change in Total Raw Flow from Previous Year	% Change in Total Treated Flow from Previous Year
2010	81,227	70,388	86.7%	---	---
2011	76,863	63,729	82.9%	-5.4%	-9.5%
2012	72,418	58,217	80.4%	-5.8%	-8.6%
2013	67,038	53,790	79.8%	-8.0%	-8.2%
2014	69,506	55,476	79.8%	3.7%	3.1%

1. Estimates for total treated water annual flow were derived from actual transfer flows through the GAC filter units. Previous Annual Reports derived such estimates from the treated water (distribution) flowmeter, and as such there is discrepancy with the estimates provided above. The estimates provided in this Report are considered to be more accurate in depicting the actual amount of treated water supplied to the community.

APPENDIX C: ADVERSE WATER QUALITY INCIDENTS

2014 Adverse Water Quality Incidents

AWQI#: 115790	Incident Date: January 18, 2014	Resolution Date: January 20,2014
Incident Description	Broken Fire Hydrant Valve on Pine Street unable to isolate valve as the Isolation valve had been damaged and was not accessible. Isolated street and limited flow until repair could be completed and issued a Boil Water Advisory to residents in the affected area. Notified NWHU, MOE and SAC and hand delivered BWA notices to residents.	
Corrective Action(s)	Excavate damaged isolation valve and isolate broken Hydrant then flushed the water main and followed up with Bacteriological testing 24 hours apart and awaited satisfactory results before lifting the BWA after consultation with the NWHU.	

1. MOE SAC – Ministry of the Environment Spills Action Centre

AWQI#: 121200	Incident Date: October 23, 2014	Resolution Date: October 29, 2014
Incident Description	Failure of Napier Reed Filter programmable logic controller (PLC), although the Turbidity analyzers for the filters were operational they could not trend the data due to the loss of the PLC. Manually operated the filters and manually recorded turbidity's every 15 mins during filter operation until replacement parts were obtained.	
Corrective Action(s)	Replaced and reprogrammed PLC and put filters back into auto operation as such this was not a reportable incident but it was reported to ensure compliance with Municipal emergency response measures.	

1. MOE SAC – Ministry of the Environment Spills Action Centre