



Town of Petrolia
Bright's Grove
Water Treatment Plant

2014
Annual Report

Prepared for the Town of Petrolia
By the Ontario Clean Water Agency

Table of Contents

1.	INTRODUCTION.....	
	Background.....	1
	MAINTENANCE COSTS	1
	Terms and Conditions of the MDWL	2
	Terms and Conditions of the DWWP.....	3
2.	CERTIFICATIONS	
	MDWL / DWWP.....	4
	Permit to Take Water.....	4
	Facility Classification	5
	Operator Certification	5
3.	WATER FLOWS	
	Raw Water Flows	6
	Treated Water Flows	7
	WasteWater Flows	8
4.	CHEMICALS	
	Properties	9
	Usage	9
5.	SAMPLING PROGRAM & ANALYTICAL RESULTS	
	Introduction	10
	Turbidity/Disinfection	10
	Distribution Chlorine Residuals.....	10
6.	NON-COMPLIANCE WITH TERMS AND CONDITIONS OF THE MDWL / DWWP	11
7.	DECLARATION OF COUNCIL RESOLUTION	16
8.	REFERENCES	17

APPENDICES

Appendix A Sampling Program

Appendix B Sampling Results

LIST OF TABLES

Table 1-2	Petrolia Water Treatment Plant Maintenance Costs.....	1
Table 1-3	Terms & Conditions of MDWL / DWWP.....	2-3
Table 2-1	Municipal Drinking Water License / Drinking Water Works Permit	4
Table 2-2	Permit To Take Water (PTTW)	4
Table 2-3	Facility Classification	5
Table 2-4	Operator Certification.....	5
Table 3-1	Raw Water Flows for 2014.....	6
Table 3-2	Treated Water Flows for 2014	7
Table 3-3	Wastewater Flows for 2014	8
Table 4-1	Properties of Chemical Feed Systems	9
Table 4-2	Annual Chemical Usage at Petrolia WTP for 2014.....	9
Table 5-2	Distribution Free Chlorine Residuals.....	10
Table 6-1	Non-Compliance Items in the Terms and Conditions of the MDWL/DWWP	11

1. INTRODUCTION

BACKGROUND

The Petrolia WTP is located in the City of Sarnia at Bright's Grove, approximately 20 km from the Town of Petrolia. The municipal street address of the plant is 2701 Old Lakeshore Road.

The Petrolia Water Treatment Plant (WTP) currently supplies potable water to the Town of Petrolia and other area municipalities including the Township of Enniskillen, Village of Oil Springs and Township of Dawn-Euphemia. The total population presently served by the Petrolia WTP is reported at 9,639.

The Petrolia WTP provides treatment for water drawn from Lake Huron. The main treatment processes in the plant are membrane filtration, fluoridation and chlorination. The permitted capacity for the plant to take water from Lake Huron is 15,586m³/d, although the plant is approved for a treatment capacity of 12,000 m³/ d.

This Report is the 2014 Annual Report for the Town of Petrolia Bright's Grove WTP and follows the format presented in Safe Drinking Water Act, O Reg. 170/03.

MAINTENANCE COSTS

Operation and Maintenance costs referred to in this table are costs incurred throughout the calendar year of 2014.

Table 1-2 lists the maintenance costs of the Petrolia Water Treatment Plant.

Table 1-2 Petrolia Water Treatment Plant Maintenance Costs

Item	Cost (\$)
Total	TBD

TERMS AND CONDITIONS OF THE MUNICIPAL DRINKING WATER LICENSE & DRINKING WATER WORKS PERMIT

Table 1-3 lists the headings of the Terms and Conditions of the Municipal Drinking Water License (MDWL) and the Drinking Water Works Permit (DWWP)

Table 1-3 Terms and Conditions of the MDWL / DWWP

Section No.	Heading
MDWL	
Schedule A	Drinking Water System Information -License; Permits To Take Water; Financial Plans; Accredited Operating Authority
Schedule B	General Conditions 1.0 Definitions 2.0 Applicability 3.0 License Expiry 4.0 License Renewal 5.0 Compliance 6.0 License and Drinking Water Works Permit Availability 7.0 Permits To Take Water 8.0 Financial Plan 9.0 Interpretation 10.0 Adverse Effects 11.0 Change of Owner or Operating Authority 12.0 Information to be Provided 13.0 Records Retention 14.0 Chemicals and Material 15.0 Drawings 16.0 Operations and Maintenance Manual
Schedule C	System Specific Conditions 1.0 Performance Limits 2.0 Flow Measurement and Recording Requirements 3.0 Calibration of Flow Measuring Devices 4.0 Additional Sampling, Testing and Monitoring
Schedule D	Conditions for Relief from Regulatory Requirements 1.0 Lead Regulatory Relief

Table 1-3 continued

Section No.	Heading
DWWP	
Schedule A	Drinking Water System Description
Schedule B	General 1.0 Applicability 2.0 Alterations to the Drinking Water System 3.0 Watermain Additions, Modifications, Replacements and Extensions 4.0 Minor Modifications to the Drinking Water System 5.0 Equipment With Emissions to Air 6.0 Previously Approved Works 7.0 System Specific Conditions

2. CERTIFICATIONS

This section covers all certifications related to Petrolia WTP and distribution system, including:

- ◆ Municipal Drinking Water License
- ◆ Drinking Water Works Permit
- ◆ Permits To Take Water;
- ◆ Facility/distribution system classification; and,
- ◆ Operator classification.

LICENSES AND PERMITS

Table 2-1 summarizes the Municipal Drinking Water License and the Drinking Water Works Permit

Table 2-1 Certificates

Certificate Type	Certificate Number	Date Issued	Expiry Date	Application Renewal Date	Brief Description of Works Approved
Municipal Drinking Water License	License Number: 034-101 Issue Number: 4	Aug 23, 2011	Aug 21, 2016	Feb 20, 2016	Contains Drinking Water System information, general conditions, system specific conditions and conditions for relief from regulatory requirements
Drinking Water Works Permit	Permit Number : 034-201 Issue Number : 1	Aug 19, 2011			Contains Drinking Water System description and general information

PERMIT TO TAKE WATER

The Permit to Take Water (PTTW) for the Petrolia WTP is summarized in Table 2-2

Table 2-2 Permit To Take Water (PTTW)

Permit Number	Source	Issued Date	Expiry Date	Permitted Amount of Taking
3431-98DKSC	Lake Huron	June 27, 2014	June 05, 2023	15,586 m3/day

2.3 FACILITY CLASSIFICATION

Details of Petrolia facility certifications are presented in Table 2-3.

Table 2-3 Facility Classification

Facility Type	Facility Name	Facility Level	Certificate No.	Date of Issue
Plant	Petrolia Water Treatment Plant	II	WT #805	November 9, 2005
Distribution	Petrolia Water Distribution System	II	WD #2908	November 9, 2005

OPERATOR CERTIFICATION

The Petrolia Water Supply System (PWSS) was operated by the Town of Petrolia & the Ontario Clean Water Agency. Effective November 15, 2010, the Ontario Clean Water Agency became the operating authority for the Petrolia Water Treatment Plant and the main transmission line up to Discovery Line. Staff members responsible for the water supply and distribution system are licensed operators with their certifications presented in Table 2-4.

Table 2-4 Operator Certification (OCWA)

Name	Position	Certificate Level		Certification Number		Expiry Date	
		Plant	Dist.	Plant	Dist.	Plant	Dist.
Dale LeBritton	Sr. Operations Manager	IIII	III	9514	11644	Sept 30, 2016	July 31, 2016
Dan MacLeod	Operations Manager	III	III	65691	66791	June 30, 2016	July 31, 2016
Jason Verstraeten	Process Compliance Technician	II	I	54107	62389	Nov 30, 2015	Sept 30, 2015
William Brush	Operator	OIT	II	35222	16449	Aug. 31, 2017	May 31, 2016
Adam Taggart	Operator	OIT	OIT	OT79304	OT79313	Feb 28, 2016	Feb 28, 2016
Steve Sundberg	Operator	I	I	86027	86028	July 31, 2017	July 31, 2017
Roger Veenkamp	Operator	I	I	56374	50203	June 30, 2017	Feb 29, 2016

3. WATER FLOWS

This section gives a summary of records made under the permit to take water.

This section also gives a summary and discussion of the quantity of treated water supplied in 2014 compared to the rated capacity specified in the Municipal Drinking Water License and the Drinking Water Works Permit, including monthly average and maximum daily flows.

Additional, this section accounts for the wastewater production from the water treatment process.

RAW WATER FLOWS

A summary of the daily quantities of water being taken from Lake Huron (i.e., raw water flow rates) are shown in Table 3-1.

The permitted capacity for the plant to take water from Lake Huron is 15,586 m³ /d. The raw water supplied to the treatment system should not exceed this value at anytime.

Table 3-1 shows that the maximum daily flow of 7,867m³/d did not exceed the maximum allowable flow in the PTTW of 15,586m³/d.

Table 3-1 Raw Water Flows for 2014

Date	Total (m ³)	Max. Day (m ³ /d)
January	136,318	5,235
February	132,703	5,225
March	152,521	5,490
April	143,029	5,459
May	167,008	6,814
June	185,446	7,528
July	181,423	7,867
August	175,215	7,423
September	154,392	6,019
October	146,743	5,635
November	146,249	5,957
December	138,315	5,324
2014 Total/Max	1,859,362	7,867

TREATED WATER FLOWS

The treated water flows for 2014 are shown in Table 3-2.

Table 3-2 shows that the plant's rated capacity of 12,000m³/d was not exceeded in 2014. The maximum daily flow was 5,825m³ or 48.54 % of rated capacity.

Table 3-2 Treated Water Flows for 2014

Date	Monthly Total (m³)	Max. Day (m³/d)	Max % of Rated Capacity
January	103,793	4,096	34.1
February	99,801	3,987	33.2
March	116,962	4,284	35.7
April	110,302	4,049	33.7
May	129,350	5,216	43.5
June	143,216	5,825	48.5
July	137,551	5,684	47.4
August	131,225	5,404	45.0
September	108,039	4,292	35.8
October	115,909	5,519	46.0
November	105,893	3,863	32.2
December	108,987	4,343	36.2
2014 Total/Max	1,411,028	5,825	48.5

WASTEWATER FLOWS

Wastewater is generated from flushing & cleaning the strainers & racks. Table 3-3 shows the plants monthly wastewater production as a volume & as a percent of the raw water flows.

Table 3-3 Wastewater Flows for 2014

Date	Total Monthly Wastewater Volume (m³)	% Wastewater to Raw Flow
January	16,461	13.7
February	16,968	14.5
March	19,415	14.2
April	20,725	15.8
May	22,717	14.9
June	25,834	15.3
July	28,183	17.0
August	31,553	19.4
September	21,090	14.7
October	21,731	16.0
November	29,087	21.5
December	20,885	16.2
2014 Total / Max.	274,649	21.5

4. CHEMICALS

This section gives a summary of listing treatment chemicals used, including average dosage rates with special reference to any abnormal usage.

PROPERTIES

Table 4-1 shows the properties of the chemicals used at Petrolia WTP.

Table 4-1 Properties of Chemical Feed Systems

Chemical	Purpose	Concentration (%)	Specific Gravity (g/mL)	Target Dosage (mg/L)
Chlorine gas	Pre-chlorination	100	-	1.3-2.5 mg/L
Liquid Polymer	Wastewater settling	50	1.10	4-25 mg/L
Hydrofluorosilicic acid	Fluoridation	25	1.204	0.4 - 0.8 mg/L

USAGE

Table 4-2 summarizes the annual chemical usage

Table 4-2 Annual Chemical Usage at Petrolia WTP for 2014

Chemical	Volume (L) or Weight (kg)	Usage Comments
Chlorine gas	3,478 kg	Varies with raw turbidity
Liquid Polymer	0.0 kg	Varies with raw turbidity
Hydrofluorosilicic acid	2,492 kg	0.2 mg/l exists naturally in feedwater

5. SAMPLING ANALYTICAL RESULTS

SAMPLING PROGRAM - APPENDIX A

SAMPLING RESULTS - APPENDIX B

5.1.1 Introduction

Appendix B contains the sampling results for 2014, which are summarized in tables.

5.1.2 Turbidity/Disinfection

Raw water turbidity is greatest during the spring run-off and fall turnover when temperatures and flows are low. Based on the online surface scatter turbidity meter data, the raw water turbidity reached as high as 220.49 NTU, and had an average of 6.32 NTU.

Filtrate turbidity at Petrolia WTP is measured continuously on the each rack using three separate on-line HACH laser turbidity meters. SCADA captures data every 1 minute. Treated turbidity on the combined turbidity analyzer recorded daily ranged from 0.01 – 1.0 NTU

5.1.3 Distribution Chlorine Residuals

O Reg 170/03 states that a minimum free chlorine residual of 0.2 mg/L or a minimum combined chlorine residual of 1.0 mg/L should be maintained in the water distribution system.

O Reg 170/03 requires and states that the distribution water quality is considered to be adverse if the free chlorine residual is measured to be less than 0.05 mg/L. The corrective action is to restore chlorination immediately and follow the instructions as directed by the Medical Officer of Health.

A statistical analysis of the free chlorine residuals measured in the distribution system is presented in Table 5-2.

Table 5-2 Distribution Free Chlorine Residuals

Location	Sample Count	Minimum	Maximum
Distribution System	8760	0.60	2.43

6. NON-COMPLIANCE WITH TERMS AND CONDITIONS OF THE MUNICIPAL DRINKING WATER LICENSE AND THE DRINKING WATER WORKS PERRMIT

This section provides details of any non-compliance in 2014 with the Terms and Conditions of the latest Municipal Drinking Water License (MDWL) and the Drinking Water Works Permit (DWWP) as well as details of how and when the non-compliance was corrected.

Table 6-1 Non-Compliance Items in the Terms and Conditions of the MDWL / DWWP

	Description	Resolution
1	<p>Records did not indicate that the treatment equipment was operated in a manner that achieved the design capabilities required under O Reg 170/03 or a Permit, Licence or Approval issued under Part V of the SDWA at all times that water was being supplied to consumers.</p> <p>See Action(s) Required in Non-Compliance Item number 4</p>	See Appendix E
2	<p>Records did not confirm that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.</p> <p>See Action(s) Required in Non-Compliance Item number 4</p>	See Appendix E
3	<p>All continuous monitoring equipment utilized for sampling & testing required by O Reg. 170/03, or approval or order, were not equipped with alarms or shut-off mechanisms that satisfied the standards described in Schedule 6</p> <p>It was found that some of the regulatory alarms were not set up to meet the requirements of O. Reg. 170/03 and therefore did not provide an alarm or shutdown the filtration process when it should have had it been set up.</p> <p>1- By May 16, 2014, the owner/ operating authority shall verify in writing that the regulatory alarms (AT THE Brights Grove Water Treatment Plant and the Mandaumin Booster Station / Reservoir) are set up to meet the standards prescribed in Section 6-5(1)5i and section 6-5 (1.1)1 of O. Reg. 170/03</p>	<p>Operating authority staff met on May 08, 2014 at the Petrolia Brights Grove Water Treatment Plant for an Alarm test verification exercise; the summary of the exercise was prepared and delivered to the Sarnia MOE office.</p> <p>Prepare, review, test and implement a Standard Operating Procedure to test regulatory alarms and establish a frequency for verification of min/max set points</p>

	<p>2- By May 30, 2014, the owner/ operating authority shall establish and implement a Standard Operating Procedure, to test the regulatory alarms on an established frequency for verification of minimum/ maximum set points, malfunction and loss of power, to ensure the continuous monitoring equipment is set up to alarm as prescribed in Section 6-5(1)5i and section 6-5 (1.1)1 of O. Reg. 170/03</p>	
<p>4</p>	<p>Continuous monitoring equipment that was being utilized to fulfill O. Reg. 170.03 requirements was not performing tests for the parameters with at least the minimum frequency specified in the Table in Schedule 6 of O. Reg. 170/03 and/or was not recording data with the prescribed format</p> <p>The SCADA upgrades undertaken in 2013 have improved the data recording and collection in the latter portion of the year, September to December 2013. However, the system has still not been sufficiently upgraded/ improved enough to meet the regulatory requirements, specifically the prescribed minimum frequency for testing and recording in the Table in Schedule 6 of O. Reg. 170/03, for continuous monitoring equipment used to fulfill O. Reg. 170.03</p> <p>1- By May 30, 2014, the owner/ operating authority shall review O. Reg. 170/03 Schedule 6, section 6-5(1)1 and the Table in Schedule 6 with all operators who work at (during regular hours or after hours) the Brights Grove Water Plant to ensure an understanding of the legislative requirements.</p> <p>2- See Appendix E – SCADA System , Action(s) Required</p> <p>3- See Appendix E – SCADA System , Action(s) Required</p>	<p>Review, print and present training per O. Reg. 170/03 Schedule 6, section 6-5(1)1 and the Table in Schedule 6 to all operators who work at during regular hours or after hours at the Brights Grove Water Plant</p> <p>See Appendix E- SCADA action(s)</p>

5	<p>Facility logbook records were found to be inadequate at times and did not comply with O. Reg. 128/04 section 26(2)c & d and Section 27 (5) items 3, 5, & 6</p> <p>The owner/ operating authority shall provide training to the operators who are responsible for operations at the Brights Grove water treatment Plant (regular and after hours), of the duties of the operator-in-charge and the records keeping requirements that must be carried out by the operators on duty , as prescribed by Sections 26 and 27 of O Reg. 128/04</p>	<p>Review, print and present training per O. Reg. 128/04 Sections 26 & 27 to all operators along with OCWA Log book power point training presentation</p>
	<p><u>Appendix E – SCADA System</u></p> <p>1- By May 16, 2014, the owner/ operating authority shall provide SCADA data in csv file format, for the period January 1 – April 30, 2014 , to the Ministry for an interim progress review specific to the prescribed minimum frequency for testing and recording in the table in schedule 6 of O. Reg. 170/03</p> <p>2- By May 30, 2014, the owner/operating authority shall review the recommendations in this Appendix E, and provide a course of action / schedule to remedy the computer/ communication issues with the SCADA system.</p>	<p>Operating Authority prepared a csv file containing January 1-April 30, 2014 SCADA data for MOE</p> <p>Operating Authority and owner representatives to schedule meeting and discuss course of action and schedule to remedy issues identified pertaining to the SCADA system</p>
	<p><u>BEST PRACTICES ISSUES & RECOMMENDATIONS</u></p> <p>1- See Appendix E – SCADA System , Action(s) Required</p> <p>2- It is recommended that the owner/ operating authority have the flow indicators on the membrane filter racks calibrate and/or further investigation to undertaken to verify flows back to the SCADA system to rectify discrepancies.</p> <p>3- It is recommended that the owner/ operating authority implement a log sheet to be used when critical control alarm set points / operational alarm set points are changed by the operator</p>	<p>See Appendix E- SCADA action(s)</p> <p>Gathered quotes from competent equipment calibration contractors to complete flow meter calibrations; management will select vendor of choice and schedule calibration of flow meters asap.</p> <p>Create & implement a log sheet to be used when any set point is changed</p> <p>Locate & review AWWA Standard G200-09</p> <p>Operating Authority and owner representatives to discuss this recommendation</p>

	<p>4- A) Recommended that the inspection of the Brights Grove Water Plant clearwell and booster station reservoir meet at minimum AWWA Standard G200-09</p> <p>B) It is recommended that the next comprehensive inspection of the Mandaumin Booster Station/Reservoir include a visual inspection of the tank interior under drained conditions.</p> <p>C) It is recommended that the Brights Grove clearwell be drained and inspected/ cleaned in 2014</p> <p>D) It is recommended that the Town of Petrolia create a similar SOP for the Petrolia Elevated Tower for scheduling inspections and maintenance of the tower</p> <p>E. For the planned 2014 inspection / maintenance of the Brights Grove Water Plant Clearwell and Petrolia Elevated Tower, the owner/operating authority is reminded to ensure compliance with: Conditions 14.1 and 14.2 of the MDWL No. 034-101, which requires that all chemicals and material that come into contact with water within the drinking water system meet all applicable standards set by both the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF/60 and NSF/61 and that the most current chemical and material product registration documents be available at all times for each chemical and material used.</p> <p>-Condition 2.3.2 of the DWWP No. 034-201, which requires that when any parts of the drinking water system in contact with drinking water are taken out of service for inspection, repair or other activities that may lead to contamination, that they shall be disinfected before being put into service in accordance with the provisions of AWWA C653 -Standard for Disinfection of Water Treatment Plants; AWWA C652 – Standard for Disinfection of Water-Storage Facilities.</p> <p>5- It is recommended that the owner/ operating authority decide which equipment will be designated as regulatory analyzers and which as process analyzers, and document such in the operations and maintenance manual</p>	<p>Operating Authority and owner representatives to discuss this recommendation</p> <p>Operating Authority and owner representatives to discuss this recommendation</p> <p>OCWA to review analyzers associated with the Petrolia Water Treatment System and decide which analyzers will be designated as regulatory analyzers and which as process analyzers, revise manuals to reflect this</p>
	<p><u>Findings & Recommendations made only in the body of the Inspection Report</u></p> <p>It is recommended that an alarm / event history data logger, be maintained for all alarms that are</p>	<p>WSP was contacted and directed to add an event history data logger to system. Follow up and determine</p>

	<p>regulatory alarms</p> <p>Enniskillen Office cannot be included in Town of Petrolia Distribution samples for microbiological parameters as it is located in the Township of Enniskillen</p> <p>The Town of Petrolia should select a location for THM sampling that reflects maximum residence time in the town of Petrolia Distribution system; present location being used is within the Enniskillen Distribution system.</p>	<p>availability and location of stored event data</p> <p>Locate a new sample location within the Town of Petrolia Distribution System for use during scheduled system sampling</p> <p>Confirm upcoming THM sampling location is within the Town of Petrolia Distribution System proper.</p>
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DECLARATION OF COUNCIL RESOLUTION

7. DECLARATION OF COUNCIL RESOLUTION

DECLARATION

DECLARATION	
I, the undersigned, hereby declare that, to the best of my knowledge, the information contained in this report and the information in support of this report is complete and accurate in every way.	
Name	Title
Jason Verstraeten	Process & Compliance Tech
2701 Old Lakeshore Road Bright's Grove, Ontario N0N 1C0	Tel: (519) 899-2304 Fax: (519) 899-2306 E-mail: jverstraeten@ocwa.com
February 27, 2014	

COUNCIL RESOLUTION

Note: The author of this report requests that this report be presented to council & a motion to accept the report is included in the official minutes. Please sign this declaration & return a copy to the WTP ORO.

COUNCIL RESOLUTION	
I, the undersigned, hereby declare that this report has been presented to council.	
Name	Title
Address	Contact Numbers
Town of Petrolia 411 Greenfield Street Petrolia, Ontario N0N 1R0	Tel: (519) 882-2350 Fax: (519) 882-3373
Date	Signature

8. REFERENCES

- MOE, 2002 Ministry of the Environment. 2002. Safe Drinking Water Act.
- KMK, 2001 KMK Consultants Limited. February 2001. Petrolia Water Treatment Plant, First Engineers' Report.
- KMK, 2004 KMK Consultants Limited. January 2004. Town of Petrolia, Petrolia Water Treatment Plant Design Report. Membrane Filtration Option to Meet Ontario's New Drinking Water Regulations.
- MOE, 2010 Ministry of the Environment. 2010. Ontario Drinking Water Systems Regulations.
- MOE, 2014 Petrolia 2014 March 5th MOECC Inspection Report

APPENDICES

APPENDIX A

Table C-1 Sampling Protocol

Parameter	Frequency Required	Additional Frequency	Chemicals Analyzed
Raw Water			
Microbiological	Weekly	-	Table A (excluding HPC or BKG)
Turbidity	Continuous	Daily (On-line Reading)	Turbidity
pH	Continuous	Daily (Grab sample measurement)	pH
Temperature	Continuous	Daily (Grab sample)	Temperature
Treated Water			
Microbiological	Weekly	-	Table A
Turbidity	Continuous	Daily (On-line Reading)	Turbidity
Chlorine	Continuous	Daily (Grab sample measurement – free and total)	Free Chlorine
Volatile Organics	Annually	-	Table B
Inorganics	Annually	-	Table C
Nitrates/Nitrites	Quarterly	-	Nitrates/Nitrites
Pesticides & PCB	Annually	-	Table D
Fluoride	Continuous	Daily (Grab sample measurement)	Fluoride
pH	Continuous	Daily (Grab sample measurement)	pH
Distribution Water			
Microbiological	Weekly (Total of 15 Monthly) ¹	Weekly (Total of 24 Monthly) ¹	Table A
Chlorine	Grab samples simultaneous to microbiological samples	-	Free Chlorine
Volatile Organics	Quarterly (THMs at a point reflecting maximum residence time in the distribution system)	-	Only THMs
Inorganics	Annually (Lead at a point reflecting maximum residence time in the distribution system)	-	Only Lead
Backwash/Wastewater Effluent to Lake Huron			
Total Suspended Solids	Quarterly	-	Total Suspended Solids
Note:			
1. A minimum of 8 samples, plus an additional 1 sample per 1,000 population, shall be taken monthly, with at least 1 sample taken every week. Given a population of 7,000 this equals to a minimum of 15 samples.			

APPENDIX A

Table C-2 Tables 1 & 2, Schedules 23 & 24 Ontario Drinking Water O.Reg 170/03

Table 1 - Microbiological		
Total Coliforms	<i>Escherichia coli</i> or fecal coliforms	Heterotrophic plate count or total coliform background count by membrane filter analysis.
Table 2 Schedule 24 – Volatile Organics		
Benzene Carbon Tetrachloride 1,2-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichloroethane	1,1-Dichloroethylene Dichloromethane Ethylbenzene Monochlorobenzene Tetrachloroethylene	Toluene Trihalomethanes Trichloroethylene Vinyl chloride Xylene
Table 2 Schedule 23 – Inorganics		
Arsenic Barium Boron Cadmium Chromium	Copper Fluoride Iron Lead- O.Reg 170/03 (Sched 15.1) Manganese	Mercury Nitrite Nitrate Selenium Uranium
Table 2 Schedule 24 – Pesticides and PCBs		
Alachlor Aldicarb Aldrin+Dieldrin Atrazine Azinphos-methyl Bendiocarb Bromoxynil Carbaryl Carbofuran Chlordane(Total) Chlorpyrifos Cyanazine Diazinon Dicamba 2,4-Dichlorophenol	DDT 2,4-D Diclofop-methyl Dimethoate Dinoseb Diquat Diuron Glyphosate Heptachlor+Heptachlor epoxide Lindane(Total) Malathion Methoxychlor Metolachlor Metribuzin	Paraquat Parathion Pentachlorophenol Phorate Picloram PCB Prometryne Simazine Temephos Terbufos 2,3,4,6-Tetrachlorophenol Triallate 2,4,6-Trichlorophenol Trifluralin 2,4,5-T

APPENDIX B

Table B-1 Chemical/Physical Characteristics of the Distribution Water

Parameter	Units	Criteria	2014				
			SC	Minimum	Maximum	Average	Exceeds
Lead	ug/L	10	6	0.02	1.88	0.56	No
Trihalomethane	ug/L	100 (MAC)	5	18	47	30.5	No

Table B-2 Bacteriological Data

	Number of Samples	Range of E.Coli or Fecal Results (min - max)	Range of Total Coliform (min - max)	Number of HPC Samples	Range of HPC Results (min - max)
Raw	52	0 - 140 cfu/100ml	0 - 1300 cfu/100ml	0	
Treated	52	0-0 cfu/100ml	0-0 cfu/100ml	52	<10 - 260 cfu/100ml
Distribution	259	0-0c fu/100ml	0-0 cfu/100ml	156	<10- 220 cfu/100ml

Table B-3 Operational testing done under Schedule 7, 8 or 9 Regulation 170/03 during the period covered by this annual report

	Number of Grab Samples	Range of Results (min - max)	Unit of Measure
Turbidity	8760	0.01 – 1.00	NTU
Chlorine	8760	1.16 – 2.12	mg/l
Fluoride (If the DWS provides fluoridation)	8760	Avg. 0.61	mg/l

Table B-4 Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
Not Applicable				

APPENDIX B

Annual Raw Water & Treated Water Analysis Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: Half MAC	7: AO/OG	8: MDL	9: RW RW-Waterwork c-Raw Water	10: TW TW-Waterwork c-Treated Water
Heptachlor + Heptachlor Epoxide [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	3	1.5	--	0.01	0.01 <MDL	0.01 <MDL
Heptachlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL
Heptachlor epoxide [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL
Lindane [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	4	2	--	0.01	0.01 <MDL	0.01 <MDL
Malathion [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	190	95	--	0.02	0.02 <MDL	0.02 <MDL
Methoxychlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	900	450	--	0.01	0.01 <MDL	0.01 <MDL
Metolachlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	50	25	--	0.01	0.01 <MDL	0.01 <MDL
Metribuzin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	80	40	--	0.02	0.02 <MDL	0.02 <MDL
Parathion [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	50	25	--	0.02	0.02 <MDL	0.02 <MDL
Phorate [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	2	1	--	0.01	0.01 <MDL	0.01 <MDL
Prometryne [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	1	0.5	--	0.03	0.03 <MDL	0.03 <MDL
Simazine [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	10	5	--	0.01	0.01 <MDL	0.01 <MDL
Temephos [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	280	140	--	0.01	0.01 <MDL	0.01 <MDL
Terbufos [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	1	0.5	--	0.01	0.01 <MDL	0.01 <MDL
Triallate [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	230	115	--	0.01	0.01 <MDL	0.01 <MDL
Trifluralin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	45	22.5	--	0.02	0.02 <MDL	0.02 <MDL
2,4-dichlorophenoxyacetic acid (2,4-D) [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	100	50	--	0.19	0.19 <MDL	0.19 <MDL
2,4,5-trichlorophenoxyacetic acid (2,4,5-T) [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	280	140	20	0.22	0.22 <MDL	0.22 <MDL
Bromoxynil [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	5	2.5	--	0.33	0.33 <MDL	0.33 <MDL
Dicamba [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	120	60	--	0.2	0.20 <MDL	0.20 <MDL
Diclofop-methyl [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	9	4.5	--	0.4	0.40 <MDL	0.40 <MDL
Dinoseb [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	10	5	--	0.36	0.36 <MDL	0.36 <MDL
Picloram [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	190	95	--	1	1 <MDL	1 <MDL
2,4-dichlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	900	450	0.3	0.15	0.15 <MDL	0.15 <MDL
2,4,6-trichlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	5	2.5	2	0.25	0.25 <MDL	0.25 <MDL
2,3,4,6-tetrachlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	100	50	1	0.14	0.14 <MDL	0.14 <MDL
Pentachlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	60	30	30	0.15	0.15 <MDL	0.15 <MDL

APPENDIX B

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	6: MAC	8: Halt MAC	7: AO/OG	8: MDL	9: RW RW-Waterwork c-Raw Water	10: TW TW-Waterwork c-Treated Water
Aluminum [ug/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	100	0.1	3.8	5.2
Calcium [mg/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	--	0.02	28.8	28.6
Copper [ug/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	1000	3	3 <MDL	3 <MDL
Iron [ug/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	300	2	5	2 <MDL
Sodium [mg/L]	13-Feb-14	10:19	14-Feb-14	12:07	20'	--	200	0.01	4.99	4.91
Magnesium [mg/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	--	0.003	8.54	8.41
Manganese [ug/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	50	0.1	0.1 <MDL	0.200
Zinc [ug/L]	13-Feb-14	10:19	14-Feb-14	12:07	--	--	5000	2	2 <MDL	2 <MDL
Antimony [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	6	3	--	0.02	0.02 <MDL	0.02 <MDL
Arsenic [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	25	12.5	--	0.2	0.8	0.6
Barium [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	1000	500	--	0.01	15.3	15.1
Boron [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	5000	2500	--	0.2	65	15
Cadmium [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	5	2.5	--	0.003	0.003	0.019
Chromium [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	50	25	--	0.5	0.5 <MDL	0.5 <MDL
Mercury [ug/L]	14-Feb-14	07:47	14-Feb-14	08:04	1	0.5	--	0.01	0.33	0.01 <MDL
Selenium [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	10	5	--	1	1 <MDL	1 <MDL
Uranium [ug/L]	13-Feb-14	16:09	19-Feb-14	09:48	20	10	--	0.001	0.284	0.315
MIB [ng/L]	13-Feb-14	14:26	18-Feb-14	12:35	--	--	--	3	3 <MDL	3 <MDL
Geosmin [ng/L]	13-Feb-14	14:26	18-Feb-14	12:35	--	--	--	3	3 <MDL	3 <MDL
Methane [L/m3]	18-Feb-14	10:50	19-Feb-14	11:13	--	--	3	0.006	0.006	0.007
Ethylbenzene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	2.4	0.33	0.33 <MDL	0.33 <MDL
Toluene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	24	0.36	0.36 <MDL	0.36 <MDL
Xylene (total) [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	300	0.43	0.43 <MDL	0.43 <MDL
m/p-xylene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.43	0.43 <MDL	0.43 <MDL
o-xylene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.17	0.17 <MDL	0.17 <MDL
Benzene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	5	2.5	--	0.32	0.32 <MDL	0.32 <MDL
Carbon tetrachloride [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	5	2.5	--	0.16	0.16 <MDL	0.16 <MDL
1,2-Dichlorobenzene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	200	100	3	0.41	0.41 <MDL	0.41 <MDL
1,4-Dichlorobenzene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	5	2.5	1	0.36	0.36 <MDL	0.36 <MDL
1,1-Dichloroethylene (vinylidene chloride) [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	14	7	--	0.33	0.33 <MDL	0.33 <MDL
1,2-Dichloroethane [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	5	2.5	--	0.35	0.35 <MDL	0.35 <MDL
Dichloromethane [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	50	25	--	0.35	0.35 <MDL	0.35 <MDL
Monochlorobenzene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	80	40	30	0.30	0.3 <MDL	0.3 <MDL
Tetrachloroethylene (perchloroethylene) [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	30	15	--	0.35	0.35 <MDL	0.35 <MDL
Trichloroethylene [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	5	2.5	--	0.44	0.44 <MDL	0.44 <MDL
Vinyl Chloride [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	2	1	--	0.17	0.17 <MDL	0.17 <MDL

APPENDIX B

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	6: MAC	8: Half MAC	7: AO/OG	8: MDL	8: RW RW-Waterwork c-Raw Water	8: RW TW-Waterwork c-Treated Water	10: TW
Trihalomethanes (total) [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	100	--	--	0.37	0.37 <MDL		7.8
Bromoform [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.34	0.34 <MDL	0.34 <MDL	
Bromodichloromethane [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.26	0.26 <MDL		2.3
Chloroform [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.29	0.29 <MDL		4.2
Dibromochloromethane [ug/L]	14-Feb-14	15:43	18-Feb-14	11:59	--	--	--	0.37	0.37 <MDL		1.3
Diquat [ug/L]	14-Feb-14	09:28	18-Feb-14	14:37	70	35	--	1	1 <MDL		1 <MDL
Paraquat [ug/L]	14-Feb-14	09:28	18-Feb-14	14:37	10	5	--	1	1 <MDL		1 <MDL
Glyphosate [ug/L]	18-Feb-14	14:18	20-Feb-14	08:49	280	140	--	1	1 <MDL		1 <MDL
Polychlorinated Biphenyls (PCBs) - Total [ug/L]	13-Feb-14	15:13	19-Feb-14	11:25	3	1.5	--	0.04	0.04 <MDL	0.04 <MDL	
Benzo(a)pyrene [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	0.01	0.005	--	0.004	0.004 <MDL	0.004 <MDL	
Alachlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	5	2.5	--	0.02	0.02 <MDL	0.02 <MDL	
Aldicarb [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	9	4.5	--	0.01	0.01 <MDL	0.01 <MDL	
Aldrin + Dieldrin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	0.7	0.35	--	0.01	0.01 <MDL	0.01 <MDL	
Aldrin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
Dieldrin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
Atrazine + N-dealkylated metabolites [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	5	2.5	--	0.01	0.03		0.03
Atrazine [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.02		0.02
Desethyl atrazine [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01		0.01
Azinphos-methyl [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	20	10	--	0.02	0.02 <MDL	0.02 <MDL	
Bendiocarb [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	40	20	--	0.01	0.01 <MDL	0.01 <MDL	
Carbaryl [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	90	45	--	0.01	0.01 <MDL	0.01 <MDL	
Carbofuran [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	90	45	--	0.01	0.01 <MDL	0.01 <MDL	
Chlordane (total) [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	7	3.5	--	0.01	0.01 <MDL	0.01 <MDL	
a-chlordane [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
g-chlordane [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
Oxychlordane [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
Chlorpyrifos [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	90	45	--	0.02	0.02 <MDL	0.02 <MDL	
Cyanazine [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	10	5	--	0.03	0.03 <MDL	0.03 <MDL	
Diazinon [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	20	10	--	0.02	0.02 <MDL	0.02 <MDL	
(DDT) + Metabolites [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	30	15	--	0.01	0.01 <MDL	0.01 <MDL	
op-DDT [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
pp-DDD [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
pp-DDE [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
pp-DDT [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	
Dimethoate [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	20	10	--	0.03	0.03 <MDL	0.03 <MDL	
Diuron [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	150	75	--	0.03	0.03 <MDL	0.03 <MDL	

APPENDIX B

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: MAC	6: Half MAC	7: AOI/OG	8: MDL	8: RW-Waterwork c-Raw Water	8: RW TW-Waterwork c-Treated Water	10: TW
Heptachlor + Heptachlor Epoxide [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	3	1.5	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Heptachlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Heptachlor epoxide [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	--	--	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Lindane [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	4	2	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Malathion [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	190	95	--	0.02	0.02 <MDL	0.02 <MDL	0.02 <MDL
Methoxychlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	900	450	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Metolachlor [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	50	25	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Metribuzin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	80	40	--	0.02	0.02 <MDL	0.02 <MDL	0.02 <MDL
Parathion [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	50	25	--	0.02	0.02 <MDL	0.02 <MDL	0.02 <MDL
Phorate [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	2	1	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Prometryne [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	1	0.5	--	0.03	0.03 <MDL	0.03 <MDL	0.03 <MDL
Simazine [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	10	5	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Temephos [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	280	140	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Terbufos [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	1	0.5	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Triallate [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	230	115	--	0.01	0.01 <MDL	0.01 <MDL	0.01 <MDL
Trifluralin [ug/L]	13-Feb-14	07:40	19-Feb-14	10:51	45	22.5	--	0.02	0.02 <MDL	0.02 <MDL	0.02 <MDL
2,4-dichlorophenoxyacetic acid (2,4-D) [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	100	50	--	0.19	0.19 <MDL	0.19 <MDL	0.19 <MDL
2,4,5-trichlorophenoxyacetic acid (2,4,5-T) [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	280	140	20	0.22	0.22 <MDL	0.22 <MDL	0.22 <MDL
Bromoxynil [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	5	2.5	--	0.33	0.33 <MDL	0.33 <MDL	0.33 <MDL
Dicamba [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	120	60	--	0.2	0.20 <MDL	0.20 <MDL	0.20 <MDL
Diclofop-methyl [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	9	4.5	--	0.4	0.40 <MDL	0.40 <MDL	0.40 <MDL
Dinoseb [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	10	5	--	0.36	0.36 <MDL	0.36 <MDL	0.36 <MDL
Picloram [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	190	95	--	1	1 <MDL	1 <MDL	1 <MDL
2,4-dichlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	900	450	0.3	0.15	0.15 <MDL	0.15 <MDL	0.15 <MDL
2,4,6-trichlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	5	2.5	2	0.25	0.25 <MDL	0.25 <MDL	0.25 <MDL
2,3,4,6-tetrachlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	100	50	1	0.14	0.14 <MDL	0.14 <MDL	0.14 <MDL
Pentachlorophenol [ug/L]	14-Feb-14	07:19	20-Feb-14	14:27	60	30	30	0.15	0.15 <MDL	0.15 <MDL	0.15 <MDL