

2012 KL WTP Annual and Summary Report



2012 Annual and Summary Report

Drinking Water System # 220000308

Reporting Period January 1, 2012 to December 31, 2012



Operating Authority: Corporation of the Town of Kirkland Lake

Address: 1 Dunfield Road, Kirkland Lake, ON, P2N 3P4

Contacts: Kyle Sinclair, ORO 705-642-6625

Mark Williams, Director 705-567-9365 ext. 223

TABLE OF CONTENTS

Introduction	3
Executive Summary.....	4
Drinking Water System Description.....	5
Tower inspection:	6
Flow meters and pressure gauge inspection:	6
Preventative Maintenance Program:.....	7
Compliance Information:	7
Water Usage:	8
Water Plant Production 1	Error! Bookmark not defined.
ANNUAL REPORT 2012.....	10
Terms and Definitions:.....	18

INTRODUCTION

As of June 2003, municipalities throughout Ontario have been required to comply with Ontario Regulation 170/03 made under the Safe Drinking Water Act (SDWA 2002). The Act was enacted following recommendations made by Commissioner O'Conner after the Walkerton Inquiry. The Act's purpose is to protect human health through the control and regulation of drinking-water systems. O. Reg. 170/03 regulates drinking water testing, use of licensed laboratories, treatment requirements, and reporting requirements.

Providing a Summary Report is a requirement under Regulation 170/03 (Schedule 22). The 2011 Summary and Annual Report for the Town of Kirkland Lake Water Treatment Plant shall be available at Physical Services, Town Hall, and on the TKL website www.discoverkl.ca after it has been accepted by council.

The Summary Report must be presented & accepted by Council by March 31st of each year for the preceding calendar year reporting period. Required components of the Summary Report for Council can be summarized as follows:

1. List the requirements of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water license, and any orders applicable to the system that were not met at any time during the period covered by the report; and specify the duration of the failure and the measures that were taken to correct the failure.
2. A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows and a comparison of this summary to the rated capacity and flow rates as approved for the system

Regulation 170/03 also requires the owner to produce an Annual Report, under Section 11. This report must include the following:

1. Description of system & chemical used
2. Summary of any adverse water quality reports and corrective actions
3. Summary of all required testing
4. Description of any major expenses incurred to install, repair or replace equipment

This annual report must be completed by February 28th of each year. The two reports will be combined and presented to council as the 2012 Annual and Summary Report.

EXECUTIVE SUMMARY

2012 Review

During 2012, the Kirkland Lake Water Treatment Plant and distribution system continued to provide safe and reliable drinking water to the residents of Kirkland Lake. The MOE performed a detailed inspection on Nov.7&8 2012 (the period included for this inspection was from Dec, 7, 2011 to Nov. 6, 2012). The Town's drinking water system scored 100 per cent as stated in the 2012 MOE Inspection Report.

No major breakdowns occurred in 2012 . Critical spare parts are now a part of our inventory, making repairs safe and efficient.

Plant Classification	Class 3 Water Treatment	
Total Design Capacity	22 500 m3/day (or 260 litres/second)	
Average Daily Flow for this reporting period	10,878 m3/day	48.3% of rated capacity
Maximum Daily Flow for this reporting period	15,171 m3/day	67.4% of rated capacity
Total Treated water for this reporting period	3,982,377 m3	

Updates

The Kirkland Lake Drinking Water Quality Management System (DWQMS) has been implemented. The provincially mandated standard requires municipalities to develop and maintain a quality management system, to ensure consistent water quality now and into the future. The accreditation process has been completed and we received full accreditation.

In 2011, staff sampled for distribution lead levels including residential plumbing. This is a follow-up to our lead testing program in 2008 (which showed no results exceeding the MOE lead standards). The results from 2008 qualified the Town for a reduced sampling rate for the next two periods of sampling. Once again the 2011 lead sampling showed no results in exceedence of the MOE lead standard. We have once again qualified for reduced sampling in 2014.

The wearing of the Standpipe inner liner near the top of the tank (likely caused by surface ice build-up) has been repaired (2011). May 2012 inspections reveiled no further damage.

In July of 2011 the underdrain of filter #2 collapsed. Continental Carbons INC performed the removal of filter media, repair of the underdrain and the replacement of media. The filter is currently performing extremely well in 2012.

DRINKING WATER SYSTEM DESCRIPTION

Water Source:

Kirkland Lake draws its water from Gull Lake on the eastern border of the town. Gull Lake is characteristic of most Northern Ontario lakes classified as eutrophic in nature with relatively high color content. Gull Lake's volume can be supplemented by pumping water from nearby McTavish Lake. In 2012 we did not supplement Gull Lake. Leisure and recreational activity is currently limited in an attempt to ensure the cleanliness and safety of the water source.

Treatment System Overview:

The Kirkland Lake Water Treatment Plant is a Class 3 water treatment plant, which draws raw water from Gull Lake. The process flow schematic for the Water Treatment Plant is shown in Fig. 1 at the end of the document.

Raw water is drawn into the plant via an intake structure approximately 3m deep and 75 m from shore. Water is then pumped to treatment area via 25 Hp low lift vertical turbine pumps. Each pump typically produces 85 L/s, and the number of pumps required depends on water treatment plant demand.

The treatment process involves the following stages:

Coagulation process utilizing aluminum sulfate (alum) - electrochemical preparation of particulates for removal

Flocculation process utilizing activated silica - particulates combined into settleable sludge

Sedimentation process utilizing "Degremont Ultra-Pulsator" clarifiers - solids removal through settling

Filtration process utilizing dual media filters (anthracite coal and silica sand) - filter residual solids

pH adjustment process utilizing sodium hydroxide - restores treated water to neutral pH

Disinfection process - destroy pathogenic microorganisms

Removal – larger microorganisms removed through filtration

Inactivation – chemical disinfection through the use of chlorine

Fluoridation process utilizing fluorosilicic acid – helps prevents dental cavities has been ceased in September 2012

Sludge disposal process - discharged to sanitary sewage system for subsequent treatment

Treated water is distributed to the piping system and the Chaput Hughes stand pipe by (2) 125 Hp and (2) 200 Hp vertical turbine high lift pumps. Under normal operating conditions, one 125 Hp pump is utilized. A Magna-Drive variable speed pumping system was installed in 2009. This variable speed drive allows for a smoother change in water pressure differentials, ensures longer pump life, and reduces power consumption

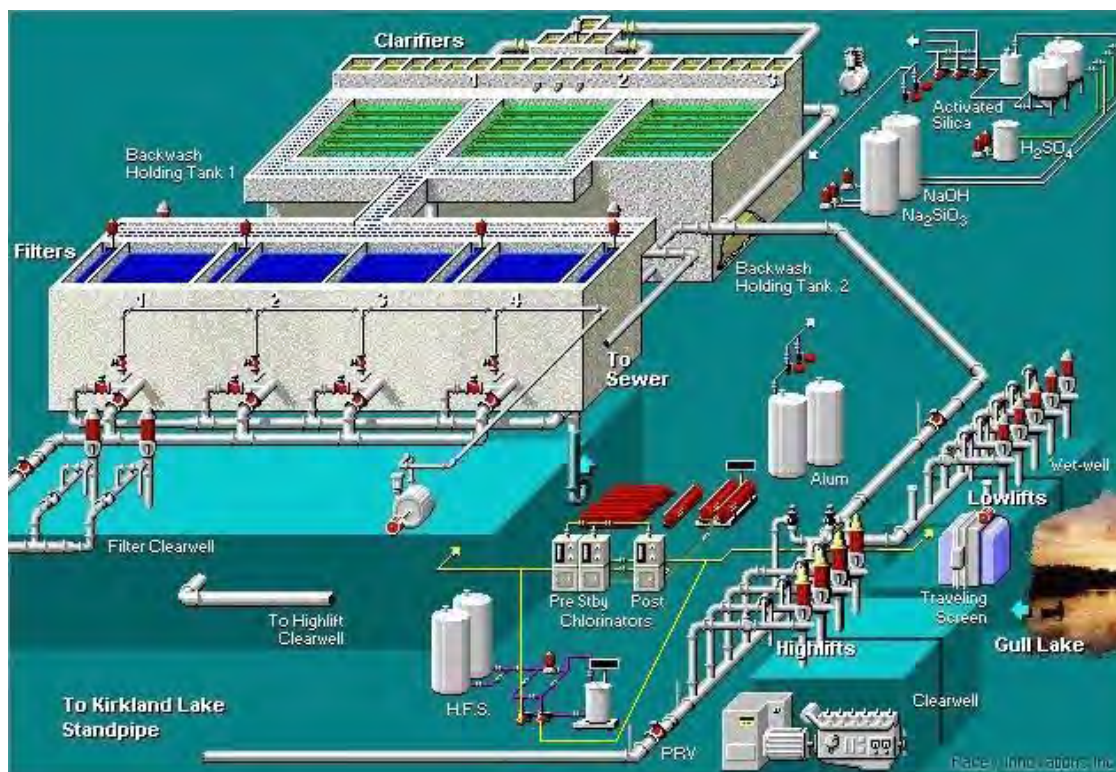
at the pump. More importantly, the drive allows the Chaput standpipe to cycle more frequently, thereby keeping distribution water fresh.

As pressure drops in the system, or the Chaput Tower requires filling, one 200 Hp pump is used. Water pressure is maintained between 60 and 70 psi.

Another important aspect of the Town's water system is the potable water storage tank (standpipe) at Chaput Hughes. It provides storage for approximately 7,115 m³ of water, to help regulate water pressure in the distribution system, and provide extra water in the case of an emergency.

To ensure optimum chlorine residual in the distribution system there are booster chlorinators at the standpipe and Swastika Valve Chamber.

Figure 1. Kirkland Lake Water Treatment Plant Flow Schematic



TOWER INSPECTION:

In June 2012 the Chaput Hughes Water Tower was drained and inspected. The lining of the tank was found to be in good condition and the repairs from 2011 continue to hold. There was very little residue on the bottom of the tank.

FLOW METERS AND PRESSURE GAUGE INSPECTION:

In September 2012 all flow meters and pressure transmitters at the KLWTP were calibrated and adjusted as required. The annual calibration check was performed by DES Systems.

PREVENTATIVE MAINTENANCE PROGRAM:

In October 2006, an initial preventative maintenance (PM) program was developed for the KLWTP. PM programs are essential in preventing unexpected downtime, improving equipment efficiency, reducing costly equipment repairs, and reducing call-out time due to unexpected equipment failure. The program is continually growing.

COMPLIANCE INFORMATION:

This section has been prepared to give Council a synopsis of the Drinking Water System and to evaluate the ability of the process to meet the standards and guidelines set out in legislation. The regulatory testing, sampling, and monitoring is quite complex, and the data handled by the operations staff is extensive. Adverse Water Quality Results must have documented Corrective Actions submitted to the MOE Spills Action Center and the local Health Unit within specific timelines. This data has also been included for your review.

The Kirkland Lake Water Treatment Plant is operated in accordance with several Provincial Regulations. The following is a summary of those Regulations:

Use of Accredited Laboratories: Analytical tests to monitor water quality are conducted at laboratories that are audited by the Canadian Association for Environmental Analytical Laboratories (CAEAL). The Standards Council of Canada (SCC), whom ensures the laboratories use acceptable protocols and test methods, also accredits them. The accreditation process also requires the laboratory to provide evidence and assurances of the proficiency of the analysts performing the tests.

Operation by Licensed Operators: Operations and maintenance personnel at the Kirkland Lake Water Treatment Plant are licensed under the Safe Drinking Water Act, 2002. This mandatory requirement ensures that operators have met academic and experience requirements, as well as passed the examination for the class level of license they hold. Currently, we employ two Class II operators, one Operator-In-Training and one Class III operator, Kyle Sinclair, acting as ORO (Overall Responsible Operator).

Sampling and Analytical Requirements: Sampling and analysis of the various water quality parameters are mandated in the Drinking-Water Systems Regulation 170/03. Information on these sampling and analytical requirements is included in this report or at the Physical Services Offices at 1 Dunfield Road in Kirkland Lake.

All water sample results taken during the review period met the Ontario Drinking Water Quality Standards (O.Reg. 169/03), presence of one total coliform colony in a drinking-water sample

Adherence to Ministry Guidelines and Procedures: The Ministry of the Environment and the Ministry of Health developed guidelines and procedures to ensure operational excellence and the protection of public health. Operation staffs are adhering to these guidelines and procedures and the ministries perform regular audits of the plant. Compliance with Terms and Conditions of the Certificate of Approval

The Kirkland Lake Water Treatment Plant operated during the reporting period in accordance with the Terms and Conditions of Drinking Water Works Permit 214-201 and Municipal Drinking water license 214-101. All conditions under this license and permit have been met.

WATER USAGE:

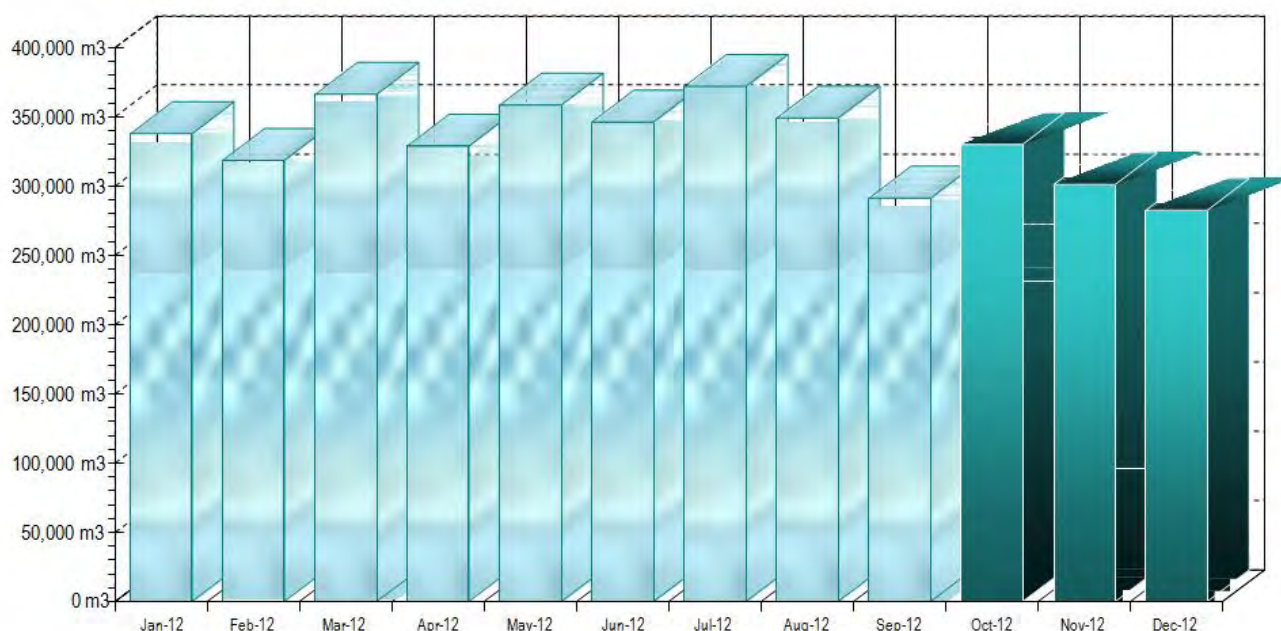
The Town of Kirkland Lake withdraws water in accordance with the Terms and Conditions of Permit To Take Water (PTTW) 214-201. All conditions under this permit have been met.

The following information is provided for the purpose of enabling the owner of the system to assess the capability of the system to meet existing and planned uses of the system:

Average Daily Flow for this reporting period	10878 m ³ /day	48.3% of rated capacity
Maximum Daily Flow for this reporting period	15171m ³ /day	67.4% of rated capacity
Total Treated water for this reporting period	3982377m ³	

The chart on the following page shows monthly water productions as well as peak daily flow.

Plant water production



Mth	plant discharge	average day's pumpage	highest day's pumpage	raw water intake	average day's pumpage	highest day's pumpage
Jan-12	337,876 m3	10,899 m3	11,888 m3	341,928 m3	11,030 m3	12,420 m3
Feb-12	318,535 m3	10,984 m3	11,448 m3	324,046 m3	11,174 m3	11,811 m3
Mar-12	366,366 m3	11,818 m3	13,516 m3	379,904 m3	12,255 m3	14,076 m3
Apr-12	328,839 m3	10,961 m3	12,429 m3	342,010 m3	11,400 m3	13,009 m3
May-12	358,424 m3	11,562 m3	15,171 m3	377,637 m3	12,182 m3	15,987 m3
Jun-12	346,242 m3	11,541 m3	13,800 m3	372,287 m3	12,410 m3	14,500 m3
Jul-12	371,970 m3	11,999 m3	13,490 m3	402,249 m3	12,976 m3	14,891 m3
Aug-12	349,146 m3	11,263 m3	12,969 m3	375,683 m3	12,119 m3	14,093 m3
Sep-12	291,241 m3	9,708 m3	11,549 m3	315,988 m3	10,533 m3	12,794 m3
Oct-12	329,990 m3	10,645 m3	13,397 m3	350,298 m3	11,300 m3	14,084 m3
Nov-12	301,154 m3	10,038 m3	12,341 m3	316,083 m3	10,536 m3	12,884 m3
Dec-12	282,596 m3	9,116 m3	10,831 m3	300,465 m3	9,692 m3	11,771 m3

Annual Total 3,982,377 m3

4,198,577 m3

Maximum month **371,970 m3**
July-12

15,171 m3
16-May-12

402,249 m3
July-12

15,987 m3
16-May-12

Minimum month **282,596 m3**
December-12

300,465 m3
December-12

Average month **331,865 m3**

349,881 m3

Average day for the year

10,878 m3

11,467 m3

NOTE: Discrepancy this year between plant discharge and raw water office flow meters (subtracting wastewater) was -0.39%

ANNUAL REPORT 2012

Drinking-Water System Number:	220000308
Drinking-Water System Name:	L.J. Sherratt Water Filtration Plant
Drinking-Water System Owner:	Corporation of the Town of Kirkland Lake
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 2012 to December 2012

Complete if your Category is Large Municipal Residential or Small Municipal Residential

Does your Drinking-Water System serve more than 10,000 people? Yes [] No [X]

Is your annual report available to the public at no charge on a web site on the Internet?
Yes [X] No []

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

1. Report available at the Department of Physical Services: 1 Dunfield Road, Kirkland Lake, Ont. P2N 3P4
2. TKL website (www.discoverkl.ca)
3. KL Town Hall

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number
None	

Indicate how you notified system users that your annual report is available, and is free of charge.

- [X] Public access/notice via the web**
- [X] Public access/notice via Government Office**
- [X] Public access/notice via a newspaper**
- [] Public access/notice via Public Request**
- [] Public access/notice via a Public Library**
- [] Public access/notice via other method**

Describe your Drinking-Water System

Class 3 water plant, drawing surface water from Gull Lake. Treatment process involves:

- Coagulation using aluminum sulfate (alum): electrochemical preparation of particulates for removal**
- Flocculation using activated silica: particulates combined into settleable solids**
- Sedimentation using “Degremont ultra-pulsator” clarifiers: solids removal through settling**
- Filtration using dual media filters (anthracite coal and silica sand): filter residual solids**
- Disinfection achieved through the use of Chlorine gas**
- pH adjustment using sodium hydroxide: restores filtered water to neutral pH**

List all water treatment chemicals used over this reporting period

Alum, Chlorine gas, Sulfuric acid, Sodium silicate, Sodium hydroxide, , Hydrofluosilicic Acid (System stopped September 28/12. Sodium hypochlorite (booster chlorination)

Were any significant expenses incurred to?

- ☐ Install required equipment
- ☐ Repair required equipment
- ☒ Replace required equipment

Please provide a brief description and a breakdown of monetary expenses incurred

Replaced 5 Rotork valve actuators. Cost \$50,000

Annual Report under O. Reg. 170/03 Sec. 11

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
Feb 16/12	Sodium	24000	Ug/l	THU Notification	Feb 24/12

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw	52	0-24	0-TNTC	N/A	N/A
Treated	52	0	0	52	0-140
Distribution	312	0	0	312	0-TNTC

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.

	Number of Grab Samples	Range of Results (min #)-(max #)
Turbidity	8760	0.01-0.14ntu
Chlorine	8760	0.67-1.89
Chlorine Residual Distribution System	520	0.29-1.57
Booster Stations	260	0.54 – 1.72 Chaput
	260	0.49 – 1.75 Swastika
Fluoride (If the DWS provides fluoridation)	8760	0.00-0.98 (Oct 5/12 Last Test)

NOTE: For continuous monitors use 8760 as the number of samples.

NOTE: Record the unit of measure if it is **not** milligrams per litre.

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
None				

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	Feb 16/12	<0.5	ug/L	No
Arsenic	Feb 16/12	<1	ug/L	No
Barium	Feb 16/12	44.1	ug/L	No
Boron	Feb 16/12	<2	ug/L	No
Cadmium	Feb 16/12	<0.1	ug/L	No
Chromium	Feb 16/12	<1	ug/L	No
*Lead	Feb 16/12	<1	ug/L	No
Mercury	Feb 16/12	<0.01	ug/L	No
Selenium	Feb 16/12	<1	ug/L	No
Sodium	Feb 16/12	28.1	mg/L	Yes
Uranium	Feb 16/12	<1	ug/L	No
Fluoride	N/A			
Nitrite	Quarterly	<0.05	ug/L	No
Nitrate	Quarterly	<0.1	ug/L	No

*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems

Annual Report under O. Reg. 170/03 Sec. 11

Summary of lead testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Number of Exceedances
<i>Plumbing *</i>	44	<1 - 5.1	0
<i>Distribution*</i>	6	<1	0

(*sampling scheduled for again for 2014)

Summary of Organic parameters sampled during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	Feb. 16/12	<0.48	ug/L	No
Aldicarb	Feb. 16/12	<0.85	ug/L	No
Aldrin + Dieldrin	Feb. 16/12	<0.004	ug/L	No
Atrazine + N-dealkylated metabolites	Feb. 16/12	<0.9	ug/L	No
Azinphos-methyl	Feb. 16/12	<0.36	ug/L	No
Bendiocarb	Feb. 16/12	<1.7	ug/L	No
Benzene	Feb. 16/12	<0.25	ug/L	No
Benzo(a)pyrene	Feb. 16/12	<0.0095	ug/L	No
Bromoxynil	Feb. 16/12	<0.73	ug/L	No
Carbaryl	Feb. 16/12	<1.7	ug/L	No
Carbofuran	Feb. 16/12	<1.7	ug/L	No
Carbon Tetrachloride	Feb. 16/12	<0.25	ug/L	No
Chlordane (Total)	Feb. 16/12	<0.004	ug/L	No
Chlorpyrifos	Feb. 16/12	<0.36	ug/L	No
Cyanazine	Feb. 16/12	<0.36	ug/L	No

Annual Report under O. Reg. 170/03 Sec. 11

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Diazinon	Feb. 16/12	<0.36	ug/L	No
Dicamba	Feb. 16/12	<0.29	ug/L	No
1,2-Dichlorobenzene	Feb. 16/12	<0.25	ug/L	No
1,4-Dichlorobenzene	Feb. 16/12	<0.25	ug/L	No
Dichlorodiphenyltrichloroethane (DDT) + metabolites	Feb. 16/12	<0.005	ug/L	No
1,2-Dichloroethane	Feb. 16/12	<0.25	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	Feb. 16/12	<0.25	ug/L	No
Dichloromethane	Feb. 16/12	<0.25	ug/L	No
2-4 Dichlorophenol	Feb. 16/12	<0.058	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	Feb. 16/12	<0.29	ug/L	No
Diclofop-methyl	Feb. 16/12	<0.29	ug/L	No
Dimethoate	Feb. 16/12	<0.36	ug/L	No
Dinoseb	Feb. 16/12	<0.073	ug/L	No
Diquat	Feb. 16/12	<7	ug/L	No
Diuron	Feb. 16/12	<8.5	ug/L	No
Glyphosate	Feb. 16/12	<20	ug/L	No
Heptachlor + Heptachlor Epoxide	Feb. 16/12	<0.004	ug/L	No
Lindane (Total)	Feb. 16/12	<0.00047	ug/L	No
Malathion	Feb. 16/12	<0.36	ug/L	No
Methoxychlor	Feb. 16/12	<0.0013	ug/L	No
Metolachlor	Feb. 16/12	<0.24	ug/L	No
Metribuzin	Feb. 16/12	<0.24	ug/L	No
Monochlorobenzene	Feb. 16/12	<0.25	ug/L	No
Paraquat	Feb. 16/12	<1	ug/L	No

Annual Report under O. Reg. 170/03 Sec. 11

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Parathion	Feb. 16/12	<0.24	ug/L	No
Pentachlorophenol	Feb. 16/12	<0.058	ug/L	No
Phorate	Feb 16/12	<0.36	ug/L	No
Picloram	Feb 16/12	<0.073	ug/L	No
Polychlorinated Biphenyls(PCB)	Feb 16/12	<0.0039	ug/L	No
Prometryne	Feb16/12	<0.24	ug/L	No
Simazine	Feb16/12	<0.36	ug/L	No
THM (NOTE: show latest annual average)	Average of last 4 quarters	52.2	ug/L	No
THM	Feb.16/12	31.5	ug/L	No
THM	May 22/12	49.2	ug/L	No
THM	Aug. 21/12	82.1	ug/L	No
THM	Nov.14/12	46.0	ug/L	No
Temephos	Feb 16/12	<24	ug/L	No
Terbufos	Feb 16/12	<0.24	ug/L	No
Tetrachloroethylene	Feb 16/12	<0.25	ug/L	No
No 2,3,4,6-Tetrachlorophenol	Feb 16/12	<0.058	ug/L	No
Triallate	Feb 16/12	<0.24	ug/L	No
Trichloroethylene	Feb 16/12	<0.25	ug/L	No
2,4,6-Trichlorophenol	Feb 16/12	<0.058	ug/L	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	Feb 16/12	<0.073	ug/L	No
Trifluralin	Feb 16/12	<0.24	ug/L	No
Vinyl Chloride	Feb 16/12	<0.25	ug/L	No

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
TTHM	82.1	ug/L	Aug 21/12

TERMS AND DEFINITIONS:

The following are terms that you will find useful when reading the summary of analytical results.

MAC: Maximum Acceptable Concentration. This is a health-related Ontario drinking water standard established for contaminants that have known or suspected adverse health effects when above a certain concentration. The length of time the MAC can be exceeded without injury to health will depend on the nature and concentration of the parameter.

IMAC: Interim Maximum Acceptable Concentration. This is a health-related Ontario drinking water standard established for contaminants when there are insufficient toxicological data to establish a MAC with reasonable certainty, or when it is not practical to establish a MAC at the desired level.

Parameter: This is a substance in the water for which we sample and analyze.

CFU: Colony Forming Units. This is a unit of measure for bacterial colonies in water.

Membrane Filtration (MF): A method for counting bacteria in water. A measured volume of water is filtered through a sterilized membrane, which is then transferred to the surface of an appropriate agar medium and incubated. Upon incubation, retained bacteria give rise to visible colonies on the membrane surface.

mg/L: Milligrams per litre. This is a measure of the concentration of a parameter in water, sometimes called parts per million (ppm).

ug/L; Micrograms per litre. This is a measure of the concentration of a parameter in water, sometimes called parts per billion (ppb).

m³: Cubic Meter. This is a measure of the volume of water (equal to 1000 Litres).

Coliform bacteria: A group of commonly found bacteria. Their presence in a water sample may be indicative of inadequate filtration / disinfection.

Total Coliforms: Indicates possible presence of fecal contamination

E. Coli bacteria: Is a sub-group of coliforms bacteria. They reside in the digestive tracts of warm-blooded animals. Their presence is a definite indicator of fecal contamination.

Heterotrophic Plate Count (HPC): Indicates bacterial activity that may contribute to the deterioration of water quality.

Raw Water: Surface or ground water available as a source for drinking water that has not undergone treatment