



Report to: General Committee

Date Report Authored: January 21, 2013

SUBJECT: Annual Water Quality Report (January – December 2012)
PREPARED BY: Stefan Ulman, Ext 2449
Water Quality Coordinator, Waterworks

RECOMMENDATION:

- 1) THAT the report titled “Annual Water Quality Report (January-December 2012)” as required by Schedule 22 of Ontario Regulation 170/03 enclosed herein be received;
- 2) THAT the Annual 2012 Regulatory Water Quality Report (Attachment “A”), containing information for the Ministry of the Environment (MOE) on water supply and quality as required by Section 11 of Ontario Regulation 170/03, be received;
- 3) THAT Council directs staff to post the Annual 2012 Detailed Regulatory Water Quality Report on the City’s website and that it be made available and provided to residents upon request in hard copy version by February 28, 2013;
- 4) AND FURTHER THAT Staff be authorized and directed to do all things necessary to give effect to this resolution.

EXECUTIVE SUMMARY:

The subject of this report covers the following key areas:

- To meet legislated requirements of O. Reg. 170/03 Schedule 22 by informing Council annually of the quality of Markham’s Drinking Water System.
- To provide an annual report by March 31st to detail the drinking water system, sampling activity, corrective action and any major expenses undertaken in 2012.

Key Findings/Recommendations:

- The drinking water distributed to the residents continues to be of high quality.
- That only 0.07% (6 out of 8,537) of samples taken were reportable to the MOE.
- Five (5) adverse water quality incidents were for microbiological indicators (2 were results from testing after a watermain break) and one (1) adverse water quality incident was for deficient chlorine residual after a watermain break. For all these adverse situations, the City of Markham performed the required regulatory notifications and corrective actions to rectify the situation.

The following are the environmental, social and economic impacts:

- 64% of water consumption is by residents averaging 179 litres per person per day. This is a reduction of 5 litres per person per day from 2011, getting closer to York Region’s target of 150 litres.
- Proactive and preventative strategies are taken to identify and manage risks to public health.
- This report is to be made available for residents in accordance with the legislation.
- There are no economic impacts.

PURPOSE:

To inform Council, as owner of the drinking water system, on the quality of drinking water provided to the residents of Markham in 2012 through the water distribution system. By doing so, we are meeting the requirements of Schedule 22 of Ontario Regulation 170/03.

To provide Council with a summary on the more detailed & technical annual water quality report (included as Attachment "A"). This annual report has been prepared and will be made available to the public prior to February 28, 2013 via Markham's website, at the Contact Centre and at the Waterworks Department, 8100 Warden Avenue. This annual report details the drinking water system, sampling activity, corrective actions and any major monetary expenses incurred in 2012.

BACKGROUND:

In order to meet regulatory requirements and to strengthen customer confidence in the quality of the City of Markham's drinking water supply, Waterworks has prepared annual update reports on the status of drinking water quality.

- 1) Enclosed, as Attachment "A", is the 2012 Annual Water Quality Report, which is intended to be a standalone document. This detailed, technical and statistical report summarizes the 2012 water distribution system, results of lab tests, corrective actions taken and any major expenses incurred. The Regulation also requires that this report be made available to the public free of charge, and be posted on the City of Markham's website on or before February 28, 2013.
- 2) The 2012 Annual Water Quality Report to Council, contained herein, is intended to inform Council on the performance of the water distribution system over the past year and to provide specific information that meets Ontario Regulation 170/03 concerning Markham's Drinking Water Distribution System.

2012 Drinking Water System Information

The City of Markham's drinking water system is strictly a distribution system. We do not operate any treatment plants and therefore the rated capacity of our system, as requested by the MOE, is not applicable. The Region of York receives treated water from both the City of Toronto and the Region of Peel, stores and distributes it to various municipalities, including Markham, through trunk watermain from York and Toronto. The City of Markham purchases its water entirely through the Region of York as the wholesaler, and distributes this water to its residents through metered connections.

Water Supplied During 2012

The City of Markham consumed 31,529,228 m³ of water over 365 days in 2012. This amounts to an average of 2,627,435 m³/month. In Markham, 64.16% of this water was (20,228,442 m³) consumed by our 310,000 residents at a rate of 179 L/person/day (0.179 m³/person/day). This is a reduction of 5 litres per person per day since 2011, getting closer to York Region's target of 150 litres. The remaining 35.84% (11,300,786 m³) of water was consumed by our industrial, commercial and institutional clients.

2012 Drinking Water Quality Sampling Results

Ontario's Drinking Water Systems Regulation (O.Reg.170/03) requires all drinking water system owners to collect and test a minimum prescribed number of representative water quality samples for its distribution system.

During the period from January 1, 2012 to December 31, 2012, the total number of water samples collected and tested by Waterworks Operators was 8,537. These samples were tested for the presence of bacteria (*Escheria coli*, Total Coliforms, and Heterotrophic Plate Count), for chemical analysis (Trihalomethanes (THM), Lead (Pb), Nitrate (NO_3^-) & Nitrite (NO_2^-), Organic and Inorganic chemical scans) and for chlorine residuals as required. Sodium and Fluoride concentrations were not tested in 2012 as this test is required every 5 years and was last tested in 2010.

In 2012, there were a total of six (6) reports of adverse water quality incidents (out of 8,537 samples, 0.07%) which did not meet the Ontario's Drinking Water Systems Regulation (O. Reg. 170/03). Five (5) did not meet the required parameters with respect to microbiological indicators (presence of Total Coliform) and one (1) did not meet the required parameters with respect to chemical parameters (deficient chlorine residual). The six (6) adverse sampling results/incidents, are summarized below:

Adverse Water Quality – Presence of Bacteria

Total Coliforms – Five (5) samples tested positive for TC (Total Coliform). Two (2) of these occurred during our regulatory, scheduled, microbiological sampling. There were a total of 2,355 microbiological samples tested during 2012.

The other three (3) were detected during unscheduled sampling. One (1) unscheduled sample, tested positive for total coliforms when a system sample was taken after a watermain break at 20 Morgan Ave. on October 24, 2012. One (1) unscheduled sample, tested positive for total coliforms, when a sample was taken after a watermain break at 28 Willowbrook Rd., on October 26, 2012, which led to an additional (1) separate adverse water quality incident after the first re-sample failed.

The detection of coliforms in water samples is considered to be an indicator of adverse water quality. Upon being notified by York Durham Region Environmental Laboratory that a given sample did not meet the water quality regulations for bacteria, Markham Waterworks immediately notified the York Region Medical Officer of Health and the MOE. Immediate corrective action was taken that included flushing the affected parts of the water distribution system, re-sampling the water at the affected sites as well as at upstream and downstream locations until satisfactory results were obtained. Markham's past experience has been that the bacterial presence in water samples have been a result of external influences such as sample handling or insufficient preparation of the sample at site rather than being caused by the water supply itself.

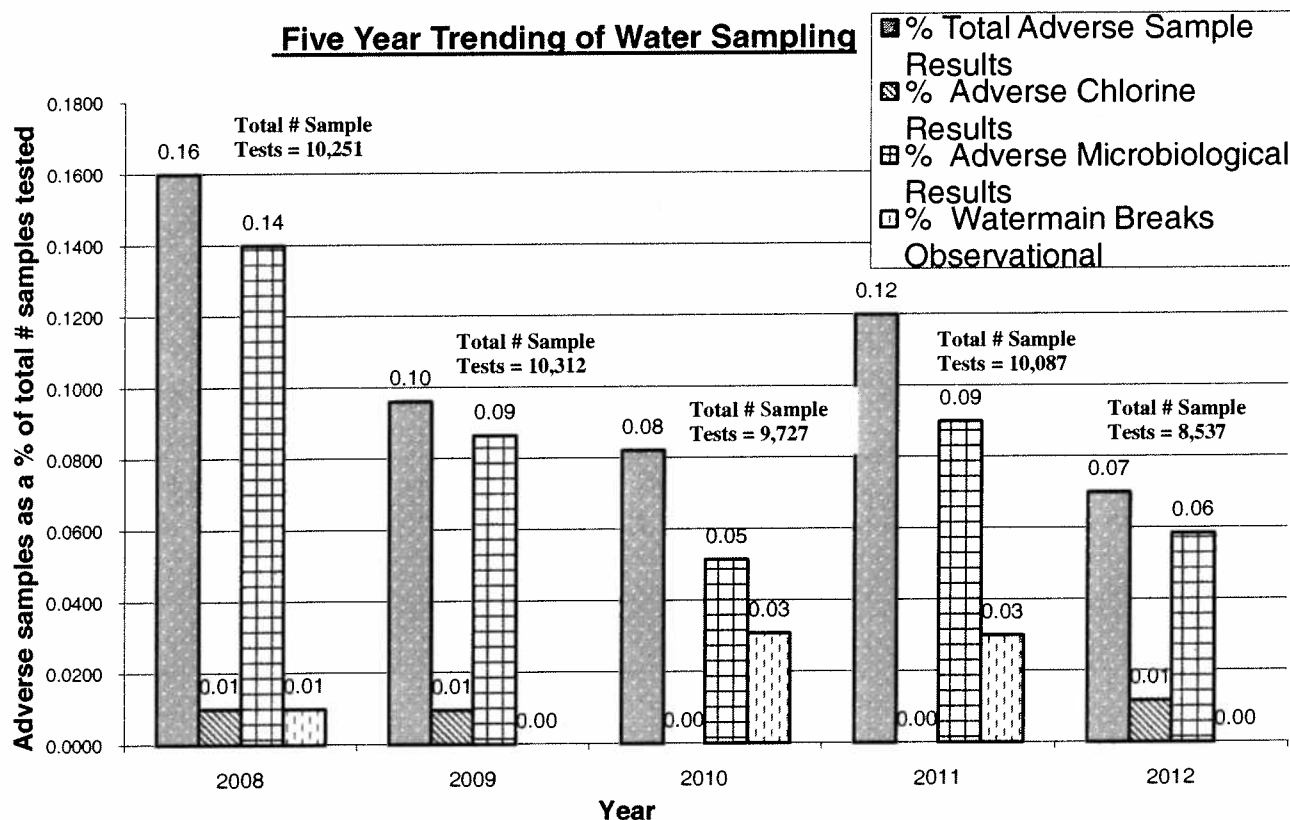
Adverse Water Quality – Chemical Indicator

Deficient Chlorine Residual - For the one (1) sample with adverse results for deficient chlorine residual, Waterworks sent notification to both the MOE and York Region Public Health Department (Ministry of Health). Corrective action taken was to

continuously flush the watermain until an acceptable chlorine residual level in the affected area was established. This ensured secondary disinfection of the drinking water.

5 Year Trending of Water Sampling:

The graph below depicts the adverse sample results of the last 5 years (total sample test numbers, % adverse and source of the adverse incident).



Conclusions:

In 2012, the drinking water distributed to the City of Markham residents continued to be of high quality. The total number of samples tested in 2012 decreased significantly compared to previous years, due to a large reduction in lead samples taken under the Community Lead Testing Program. This was as a result of the exemption granted by the MOE in 2011 for such testing and due to a planned reduction approach for microbiological sampling. This planned reduction was initiated so that the number of samples taken over regulatory requirements was closer to that of other municipalities. This resulted in a 25% reduction of weekly microbiological sampling (removing one of the four groups to be sampled per week). This reduction in microbiological sampling started on July 1st, 2012. The number of samples still let us achieve a 15% sampling buffer over requirements. The drinking water system is maintained by Waterworks through continuous improvement programs to ensure water quality and cost effectiveness in operating the water distribution system.

The Corporation of the City of Markham, as owner and operating authority of the Markham Drinking Water System, has demonstrated that the Markham Quality Management System

meets the requirements of the Drinking Water Quality Management Standard and the *Safe Drinking Water Act*, 2002.

FINANCIAL CONSIDERATIONS AND TEMPLATE: (external link)

Not Applicable

HUMAN RESOURCES CONSIDERATIONS

Not Applicable

ALIGNMENT WITH STRATEGIC PRIORITIES:

The 2012 Annual Water Quality Report on the drinking water system meets legislative requirements and is consistent with the City's corporate goals of Infrastructure Management and Quality Community.

These goals enhance several key Waterworks service delivery components:

- Proactive and preventative strategies to identify and manage risks to public health;
- Continuous Improvement of Waterworks activities and service delivery;

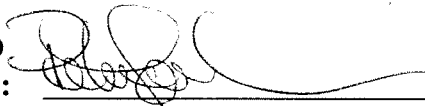
BUSINESS UNITS CONSULTED AND AFFECTED:

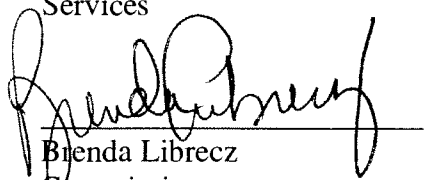
Not Applicable


The undersigned represent the Top Management of City of Markham's Drinking Water Distribution System, and by signing below the Top Management of the Operating Authority has reviewed the deficiencies, decisions and action items identified in the Management Review, and hereby communicating these results to the Owner.

RECOMMENDED

BY:


Peter Loukes, P. Eng.
Director, Environmental
Services


Brenda Librecz
Commissioner,
Community and Fire Services


Andy Taylor
CAO, City of Markham
Services

ATTACHMENTS:

Attachment "A" – 2012 Annual Water Quality Report



ANNUAL REPORT

Drinking-Water System Number:	220004162
Drinking-Water System Name:	Markham Water Distribution
Drinking-Water System Owner:	The Corporation of the City of Markham
Drinking-Water System Category:	Large Municipal Residential System
Period being reported:	January 1, 2012 to December 31, 2012

<p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <ul style="list-style-type: none">www.markham.ca8100 Warden Ave. – Waterworks DepartmentMarkham Civic Centre – 101 Town Centre Blvd. – Contact Centre	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served:</p> <div>Not applicable</div> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Number of Interested Authorities you report to:</p> <div>Not applicable</div> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes <input type="checkbox"/> No <input type="checkbox"/></p>
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Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

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
Not applicable	

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?

Yes ☐ No ☐



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

- ☒ Public access/notice via the web
- ☒ Public access/notice via Government Office
- ☒ 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

The City of Markham's distribution system is an extension of the Toronto and York Region distribution systems. Raw surface water from Lake Ontario is disinfected, treated and tested rigorously by the City of Toronto and Peel Region for microbiological, organic and inorganic parameters prior to reaching the York Region distribution system. Markham is supplied with treated water via feeder mains from Toronto and Peel Region. York Region distribution system acts as a wholesale supplier of water and provides further testing, storage and pressure boosting for the Markham system.

Markham's Distribution System provides treated water to approximately 310,000 residents and is comprised of approximately 991 kilometers of various size watermain, 10,585 watermain valves and 8,274 municipal fire hydrants. Markham is a distribution only system, without pumping and storage facilities. Markham's drinking water within the distribution system is tested for standard parameters, in compliance with Ontario Regulation 170/03. The samples are collected by licensed Waterworks operators and analyzed by the provincially approved York-Durham Regional Environmental Laboratory.

List all water treatment chemicals used over this reporting period

Not applicable; treatment chemicals are introduced at various sources by the City of Toronto, Peel Region and York Region only.

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

Cathodic Protection of Iron Watermains	= \$476,000.00
Water Meter Replacement/Upgrades	= \$400,000.00
Watermain Replacement	= \$790,000.00
Watermain Replacement Design for 2012	= \$ 30,000.00
Watermain Repair	= \$ 33,000.00



Ontario Drinking-Water Systems Regulation O. Reg. 170/03

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
June 19, 2012 (AWQI #106526)	Total Coliform	P	P/A	Flush Mains and Resample	June 19, 2012
June 26, 2012 (AWQI #106702)	Total Coliform	P	P/A	Flush Mains and Resample	June 26, 2012
October 13, 2012 (AWQI #108912)	Combined Chlorine Residual	0.16	mg/L	Flushed mains until chlorine reached acceptable levels	October 13, 2012
October 24, 2012 (AWQI #109085)	Total Coliform	10	CFU/100 mL	Flush Mains and Resample	October 24, 2012
October 26, 2012 (AWQI #109128)	Total Coliform	5	CFU/100 mL	Flush Mains and Resample	October 26, 2012
October 27, 2012 (AWQI #109141)	Total Coliform	6	CFU/100 mL	Flush Mains and Resample	October 27, 2012

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	N/A				
Treated	N/A				
Distribution	2,355	0	0-6	1,003	0-190

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		
Chlorine	5,041	0.16-1.96
Fluoride (If the DWS provides fluoridation)	0*	

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

* N/A – next Fluoride testing is scheduled for 2015

*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

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	May 25, 2012	0.006	mg/L	No
Arsenic	May 25, 2012	0.007	mg/L	No
Barium	May 25, 2012	0.0222	mg/L	No
Boron	May 25, 2012	0.023	mg/L	No
Cadmium	May 25, 2012	<0.001	mg/L	No
Chromium	May 25, 2012	0.007	mg/L	No
*Lead	Not applicable			
Mercury	May 25, 2012	<0.02	mg/L	No
Selenium	May 25, 2012	0.003	mg/L	No
Sodium	Not applicable			
Uranium	May 25, 2012	0.003	mg/L	No
Fluoride	Not applicable			
Nitrite	Nov 30, 2012	<0.003	mg/L	No
Nitrate	Nov 30, 2012	0.425	mg/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

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
Plumbing	N/A*		
Distribution	20	0.0001-0.0003	0

*The City of Markham has been exempt for Lead Testing from plumbing servicing private residences and plumbing servicing non-residential buildings. Relief was granted as sample results for seven rounds of sampling were confirmed to be well below the MOE's limit of 0.01mg/L.

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	May 25, 2012	<0.4	ug/L	No



Aldicarb	June 4, 2012	<4.5	ug/L	No
Aldrin + Dieldrin	May 25, 2012	<0.006	ug/L	No
Atrazine + N-dealkylated metabolites	May 25, 2012	<0.2	ug/L	No
Azinphos-methyl	May 25, 2012	<0.3	ug/L	No
Bendiocarb	June 4, 2012	<3.0	ug/L	No
Benzene	May 25, 2012	<0.1	ug/L	No
Benzo(a)pyrene	May 25, 2012	<0.01	ug/L	No
Bromoxynil	May 25, 2012	<0.4	ug/L	No
Carbaryl	June 4, 2012	<3.0	ug/L	No
Carbofuran	June 4, 2012	<3.0	ug/L	No
Carbon Tetrachloride	May 25, 2012	<0.2	ug/L	No
Chlordane (Total)	May 25, 2012	<0.006	ug/L	No
Chlorpyrifos	May 25, 2012	<0.2	ug/L	No
Cyanazine	May 25, 2012	<0.3	ug/L	No
Diazinon	May 25, 2012	<0.2	ug/L	No
Dicamba	May 25, 2012	<0.4	ug/L	No
1,2-Dichlorobenzene	May 25, 2012	<0.1	ug/L	No
1,4-Dichlorobenzene	May 25, 2012	<0.1	ug/L	No
Dichlorodiphenyltrichloroethane (DDT) + metabolites	May 25, 2012	<0.008	ug/L	No
1,2-Dichloroethane	May 25, 2012	<0.1	ug/L	No
1,1-Dichloroethylene (vinylidene chloride)	May 25, 2012	<0.3	ug/L	No
Dichloromethane	May 25, 2012	<0.5	ug/L	No
2,4-Dichlorophenol	May 25, 2012	<0.7	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	May 25, 2012	<0.8	ug/L	No
Diclofop-methyl	May 25, 2012	<0.4	ug/L	No
Dimethoate	May 25, 2012	<0.3	ug/L	No
Dinoseb	May 25, 2012	<0.5	ug/L	No
Diquat	May 25, 2012	<1.0	ug/L	No
Diuron	June 4, 2012	<3.0	ug/L	No
Glyphosate	May 25, 2012	<25	ug/L	No
Heptachlor + Heptachlor Epoxide	May 25, 2012	<0.008	ug/L	No
Lindane (Total)	May 25, 2012	<0.005	ug/L	No
Malathion	May 25, 2012	<0.2	ug/L	No
Methoxychlor	May 25, 2012	<0.009	ug/L	No
Metolachlor	May 25, 2012	<0.2	ug/L	No
Metribuzin	May 25, 2012	<0.3	ug/L	No
Monochlorobenzene	May 25, 2012	<0.1	ug/L	No
Paraquat	May 25, 2012	<1.0	ug/L	No
Parathion	May 25, 2012	<0.2	ug/L	No
Pentachlorophenol	May 25, 2012	<0.4	ug/L	No
Phorate	May 25, 2012	<0.2	ug/L	No
Picloram	May 25, 2012	<0.7	ug/L	No
Polychlorinated Biphenyls(PCB)	May 25, 2012	<0.02	ug/L	No



Prometryne	May 25, 2012	<0.2	ug/L	No
Simazine	May 25, 2012	<0.2	ug/L	No
THM (NOTE: show latest annual average)	Nov. 30, 2012 (Latest sample date)	12.7	ug/L	No
Temephos	May 25, 2012	<3.0	ug/L	No
Terbufos	May 25, 2012	<0.2	ug/L	No
Tetrachloroethylene	May 25, 2012	<0.3	ug/L	No
2,3,4,6-Tetrachlorophenol	May 25, 2012	<0.5	ug/L	No
Triallate	June 4, 2012	<4.0	ug/L	No
Trichloroethylene	May 25, 2012	<0.1	ug/L	No
2,4,6-Trichlorophenol	May 25, 2012	<0.5	ug/L	No
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	May 25, 2012	<0.5	ug/L	No
Trifluralin	May 25, 2012	<0.006	ug/L	No
Vinyl Chloride	May 25, 2012	<0.2	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

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