MARKHAM

Report to: General Committee | Date Report Authored: January 09, 2012

**SUBJECT:** Annual Water Quality Report (January – December 2011)
**PREPARED BY:** Helena Frantzke, Ext 2449
Water Quality Coordinator, Waterworks

**RECOMMENDATION:**

1) THAT the report titled "Annual Water Quality Report (January-December 2011)" as required by Schedule 22 of the Ontario Drinking Water System Regulation 170/03 (O. Reg. 170/03) be received;

2) THAT the 2011 Annual Water Quality Report (Attachment "A"), contains information for the Ministry of the Environment (MOE) on water supply and quality as required by Section 11 of O. Reg. 170/03, be received;

3) THAT Council directs staff to post the 2011 Annual Water Quality Report on the Town's website and that it be made available and provided to residents upon request in hard copy version by February 28, 2012;

4) AND FURTHER THAT Staff be authorized and directed to do all things necessary to give effect to this resolution.

**EXECUTIVE SUMMARY:**

As per O. Reg. 170/03 the Town of Markham is mandated to produce the following two reports:

1) An annual report summarizing water quality information. This report outlines how the Town of Markham receives its water, a description of the drinking water system and the water quality results for the period from January 1, 2011 to December 31, 2011. In addition, this report is required to be made available to the public upon request. The annual report has been posted on the Markham website and is also available at the Contact Centre (Civic Centre) and Waterworks (8100 Warden). The regulatory requirements for this report have been met and a copy has been enclosed as Attachment "A".

2) A report prepared for Council is to be submitted by March 31, 2012. This report is to inform Council on any regulatory requirements that have not been met during the period of January 1, 2011 to December 31, 2011 and for each requirement not met what corrective actions were taken. In addition a summary is to be provided of the quantities and flow rates of the water supplied during the same period. This report enclosed herein ensures that Markham has met all regulatory requirements.

O.Reg.170/03 requires all drinking water system owners to collect and test a minimum prescribed number of representative water quality samples.

During the period January 1, 2011 to December 31, 2011, the total number of water samples collected and tested by Waterworks Operators was 10,087. These samples are tested for the presence of bacteria (*Escheria coli*, Total Coliforms, and Heterotrophic Plate Count), for chemical analysis (Trihalomethanes (THM), Lead (Pb), Nitrate & Nitrite, and Organic and Inorganic chemical scans) and for chlorine residuals as required

In 2011, all sampling results met provincial standards, except for nine adverse water quality incidents (out of 10,087 samples) with respect to microbiological indicators. In addition three adverse water quality incidents were reported due to on-site observations during severe watermain break situations as precautionary measures. Therefore, in total twelve (12) adverse water quality incidents were reported to the Ministry of Environment (MOE) for 2011. For all adverse situations the Town of Markham performed the required regulatory notifications and made corrective actions to rectify the situation.

Markham consumed 30,991,947 $m^3$ of water over 365 days, purchased from the Region of York and distributed it to residential, industrial, commercial and institutional customers. Throughout 2011, the Markham drinking water system was well maintained, proactively managed and delivered high quality water to residents.

**PURPOSE:**

To inform Council, as owner of the drinking water system, on the quality of drinking water provided in 2011 to Markham residents through the water distribution system and in doing so, meet the requirements of O. Reg. 170/03 Schedule 22.

To provide Council a detailed technical annual water quality report included as Attachment "A", the report will be made available to the public prior to February 28, 2012 through the Markham website, at the Contact Centre and at Waterworks Department, (8100 Warden Avenue). This annual report details the drinking water system, sampling activity, corrective action and any major expenses undertaken in 2011.

**BACKGROUND:**

In order to meet regulatory requirements and to strengthen customer confidence in the Town's drinking water quality, Waterworks has prepared annual update reports on the status of drinking water quality in Markham as described below:

1) Enclosed as Attachment "A" is the 2011 Annual Water Quality Report which is intended to be a stand alone document. This detailed technical and statistical report summarizes the 2011 existing water distribution system, results of tests, corrective actions and any major expenses. The Regulation also requires that this report be made available to the public, free of charge and be posted on the Town of Markham's website on or before February 28, 2012.

2) The 2011 Annual Water Quality Report to Council is intended to inform Council on the performance of the water distribution system over the past year and to provide information which meets O. Reg. 170/03 concerning Markham's Drinking Water Distribution System.

The Town of Markham 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 the City of Toronto and the Region of Peel, stores and supplies it to various municipalities including Markham through trunk watermains from York and Toronto. The Town of Markham purchases its water entirely from the Region of York, and distributes this water to its residents through metered connections.

The Town of Markham consumed 30,991,947 $m^3$ of water over 365 days in 2011. This amounts to an average of 2,582,662 $m^3$/ month. In Markham 66.63% of water (20,648,986 $m^3$) is consumed by our 308,000 residents at a rate of 184 litres/person/day (0.184 $m^3$/person/day). The remaining 33.37% (10,342,961 $m^3$) of water is consumed by our industrial, commercial and institutional clients.

O. Reg.170/03 requires all drinking water system owners to collect and test a minimum prescribed number of representative water quality samples.

During the period January 1, 2011 to December 31, 2011, the total number of water samples collected and tested by Waterworks Operators was 10,087. These samples are tested for the presence of bacteria (*Escheria coli*, Total Coliforms, and Heterotrophic Plate Count), for chemical analysis (Trihalomethanes (THM), Lead (Pb), Nitrate & Nitrite, and Organic and Inorganic chemical scans) and for chlorine residuals as required.

Markham exceeds the required number of samples tested for microbiological parameters during our regular sampling process and by taking additional samples following every watermain repair, regardless of severity. These proactive procedures could lead to an increase in the number of reported adverse water quality incidents. However, they are necessary to enable faster response to potential adverse conditions. These procedures following watermain breaks also ensure that the Town maintains compliance with the requirement to report observation incidents other than adverse test results.

## OPTIONS/ DISCUSSION:

In 2011, there were 9 reports of adverse water quality incidents (out of 10,087 samples) which did not meet the O. Reg. 170/03 required standards with respect to microbiological parameters.

Further, there were 3 adverse incident reports as on-site observations during severe watermain breaks.

**Microbiology Parameters**

1) Total Coliforms - Of the 2,598 samples tested for microbiology during 2011 on the drinking water system as part of our regular scheduled sampling, only four (4) samples detected the presence of total coliforms In addition during unscheduled sampling, one (1) sample detected the presence of total coliforms which led to two (2) additional adverse water quality incidences for presence of total coliforms. The detection of these total coliforms in water samples is considered to be an indicator of adverse water quality. Immediate corrective action was taken which included flushing the affected area and re-sampling the site until satisfactory results were achieved. Markham's past experience has been that the bacterial presence in water samples was a result of external influences rather than being caused by the water supply itself.

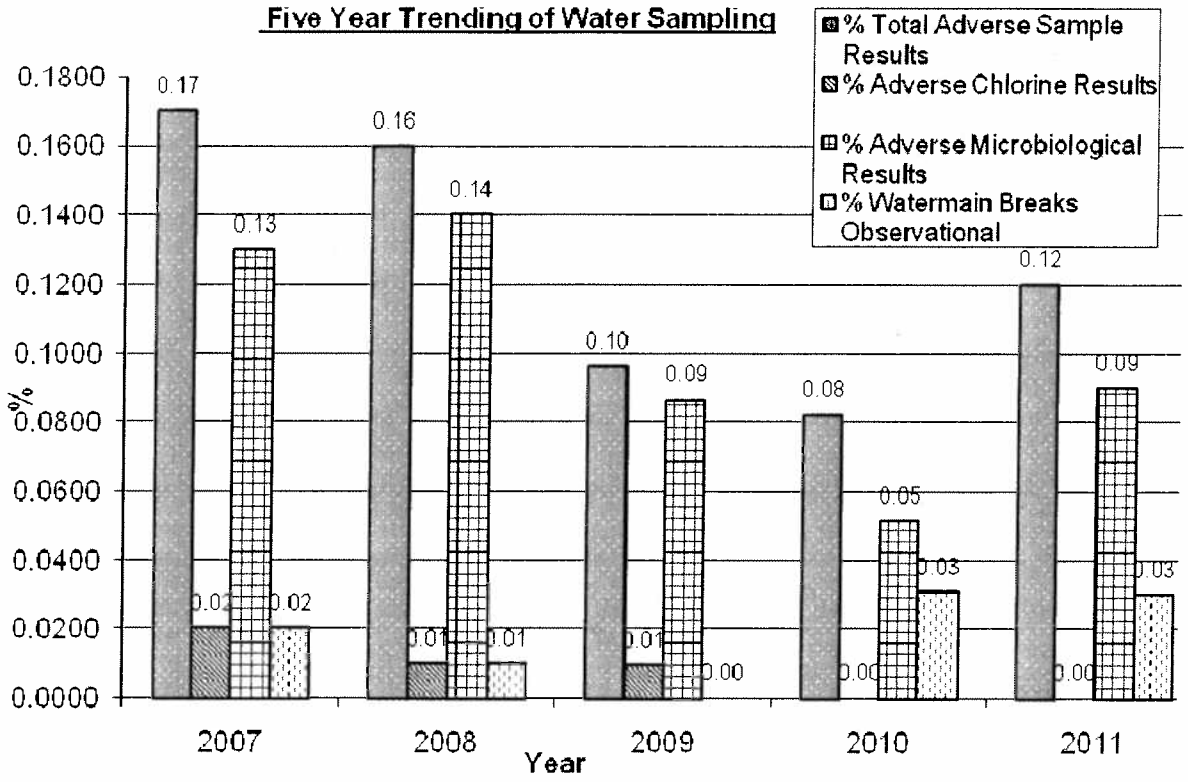
2) Heterotrophic Plate Count (HPC) - Further two (2) samples exceeded the MOE guideline for HPC. Both these exceedences occurred at the same location. HPC results give an indication of overall water quality in drinking water systems. HPC results are not an indicator of water safety and, as such, should not be used as an indicator of potential adverse human health effects. The MOE does not require HPC exceedences to be reported as an adverse water quality incident. However, Markham has identified any results of HPC $\geq$ 500 as a critical control point in our procedures and practices. As such Waterworks reported the two incidences to the MOE as a precautionary measure. Immediate corrective action was taken which included flushing the affected area and re-sampling the site until satisfactory results were achieved. During the 2011 Management Review this item has been identified as an action item to further investigate possible sources of the elevated HPC incidences. This investigation is expected to be completed by June 2012

**On-site Observations**

For the three (3) on-site observation incidents (during severe watermain break occurrences) reported as an adverse results, notification was sent by Waterworks to both the Ministry of Health (MOH) and the MOE. The watermain break was repaired, the system was then flushed until acceptable chlorine residuals were established following which another a water sample was taken and tested for microbial contamination.

As part of our due diligence, Markham proactively reports severe watermain breaks to the MOE and the MOH when water directed to the public may have adverse properties as a result of the watermain break. A severe watermain break is created by the collapse of the pipe wall resulting in entry of dirt in the watermain. Following every watermain repair, regardless of its severity, Waterworks initiates a procedure to test a water sample for microbial contamination.

## 5 Year Trending of Water Sampling:




The drinking water distributed to the Town of Markham residents in 2011 continues to be of high quality. During 2011 water distribution system operations there were very few adverse reports (0.09% of all system tests undertaken, 10,087), and all of these were immediately resolved. The drinking water system is maintained by Waterworks with continual improvements and programs in place to ensure excellent water quality.

**FINANCIAL CONSIDERATIONS AND TEMPLATE: (external link)**
Not Applicable

**HUMAN RESOURCES CONSIDERATIONS**
Not Applicable

**ALIGNMENT WITH STRATEGIC PRIORITIES:**
The 2011 Annual Water Quality Report on the drinking water system meets legislative requirements and is consistent with the Town'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

**RECOMMENDED BY:**

Shu Min Gao, P. Eng.
Acting Manager,
System Engineering

Peter Loukes, P. Eng.
Director,
Environmental Services

Brenda Librecz
Commissioner,
Community and Fire Services

Andy Taylor
CAO,
Town of Markham

**ATTACHMENTS:**

Attachment "A" – 2011 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 Town of Markham |
| **Drinking-Water System Category:** | Large Municipal Residential System |
| **Period being reported:** | January 1, 2011 to December 31, 2011 |

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

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

**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.**

- www.markham.ca
- 8100 Warden Ave. – Waterworks Department
- Markham Civic Centre – 101 Town Centre Blvd. – Contact Centre

***Complete for all other Categories.***

**Number of Designated Facilities served:**

**Did you provide a copy of your annual report to all Designated Facilities you serve?**
**Yes [ ] No [ ]**

**Number of Interested Authorities you report to:**

**Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?**
**Yes [ ] No [ ]**

**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 |
|---|---|
| | |

**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.**

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

**Describe your Drinking-Water System**

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 by both Toronto and Peel for microbiological, organic and inorganic parameters prior to reaching the York Region distribution system. York Region performs independent water testing and supplies Markham through feeder mains. Water directly from Toronto also enters Markham through feeder mains. York Region distribution system acts as a wholesale supplier of water and provides storage and pressure boosting for the Markham system.
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 the Ontario Drinking Water system regulation.
Markham's drinking water samples are taken to the provincially-approved laboratory for analysis, the York-Durham Regional Environmental Laboratory.

**List all water treatment chemicals used over this reporting period**

Not applicable

**Were any significant expenses incurred to?**

- [x ] Install required equipment
- [ x ] Repair required equipment
- [ x ] Replace required equipment

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

| | |
|---|---|
| Watermain Cement Relining (Watermain Rehabilitation) | =$1,153,464.00 |
| Cathodic Protection of Iron Watermains | =$454,440.14 |
| Water Meter Replacement/Upgrades | =$513,205.55 |
| Watermain Replacement | =$2,196,880.55 |
| Watermain Replacement Design for 2012 | =$100,000.00 |
| Watermain Repair | =$837,997.24 |
| Watermian Looping/ Disconnection | =$358,394.70 |

**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. 22, 2011 (AWQI # 100023) | On-Site Observation (No adverse water quality sample results were obtained) | | | Repair Watermain, Flush Mains and Sample | Feb. 22, 2011 |
| June 28, 2011 (AWQI # 101651 | Total Coliform | P | P/A | Flush Mains and Resample | June 28, 2011 |
| July 20, 2011 (AWQI # 102121) | HPC | 1700 | CFU/mL | Flush Mains and Resample | July 20, 2011 |
| July 26, 2011 (AWQI # 102278) | Total Coliform | P | P/A | Flush Mains and Resample | July 26, 2011 |
| Aug. 03, 2011 (AWQI # 102460) | Total Coliform | P | P/A | Flush Mains and Resample | Aug. 03, 2011 |
| Aug. 17, 2011 (AWQI # 102802) | HPC | 690 | CFU/mL | Flush Mains and Resample | Aug. 17, 2011 |
| Aug. 30, 2011 (AWQI # 103051) | Total Coliform | P | P/A | Flush Mains and Resample | Aug. 30, 2011 |
| Sep.23,2011 (AWQI # 103478) | Total Coliform | 1 | CFU/100 mL | Flush Mains and Resample | Sep. 23, 2011 |
| Sep. 24, 2011 (AWQI #103494 | Total Coliform (2 samples) | 1 and 18 | CFU/100 mL | Flush Mains and Resample | Sep. 24, 2011 |
| Sep. 25, 2011 (AWQI #103503) | Total Coliform | 1 | CFU/100 mL | Flush Mains and Resample | Sep. 25, 2011 |
| Sep. 28, 2011 (AWQI # 103561) | On-Site Observation (No adverse water quality sample results were obtained) | | | Repair Watermain, Flush Mains and Sample | Sep. 28, 2011 |
| Oct. 07, 2011 | On-Site | | | Repair | Oct. 07, 2011 |

| | | | | | |
|---|---|---|---|---|---|
| (AWQI # 103715) | Observation (No adverse water quality sample results were obtained) | | | Watermain, Flush Mains and Sample | |

**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 | | | | | |
| Treated | 2, 598 | 0 | 0 - 1 | 1381 | 0 - 1700 |
| Distribution | | | | | |

**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 #) | Unit of Measure |
|---|---|---|---|
| Turbidity | | | |
| Chlorine | 5,665 | 0.26 – 1.29 | mg/L |
| Fluoride (If the DWS provides fluoridation) | 0 | | |

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

**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, 2011 | 0.0004 | mg/L | No |
| Arsenic | May 25, 2011 | 0.0006 | mg/L | No |
| Barium | May 25, 2011 | 0.0208 | mg/L | No |

| | | | | |
|---|---|---|---|---|
| Boron | May 25, 2011 | <0.0009 | mg/L | No |
| Cadmium | May 25, 2011 | <0.0001 | mg/L | No |
| Chromium | May 25, 2011 | <0.0001 | mg/L | No |
| *Lead | Not Applicable | | | |
| Mercury | May 25, 2011 | <0.02 | ug/L | No |
| Selenium | May 25, 2011 | <0.0001 | mg/L | No |
| Sodium | Not Applicable | | | |
| Uranium | May 25, 2011 | 0.0003 | mg/L | No |
| Fluoride | Not Applicable | | | |
| Nitrite | Nov. 25, 2011 | <0.001 | mg/L | No |
| Nitrate | Nov. 25, 2011 | 0.468 | 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 #) | Unit of Measure | Number of Exceedances |
|---|---|---|---|---|
| Plumbing | 296 | <0.0001 – 0.0050 | mg/L | 0 |
| Distribution | 77 | 0.0001 – 0.0017 | mg/L | 0 |

## 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, 2011 | <0.4 | ug/L | No |
| Aldicarb | May 25, 2011 | <4.5 | ug/L | No |
| Aldrin + Dieldrin | May 25, 2011 | <0.006 | ug/L | No |
| Atrazine + N-dealkylated metobolites | May 25, 2011 | <0.2 | ug/L | No |
| Azinphos-methyl | May 25, 2011 | <0.3 | ug/L | No |
| Bendiocarb | May 25, 2011 | <3.0 | ug/L | No |
| Benzene | May 25, 2011 | <0.1 | ug/L | No |
| Benzo(a)pyrene | May 25, 2011 | <0.01 | ug/L | No |
| Bromoxynil | May 25, 2011 | <0.4 | ug/L | No |
| Carbaryl | May 25, 2011 | <3.0 | ug/L | No |
| Carbofuran | May 25, 2011 | <3.0 | ug/L | No |
| Carbon Tetrachloride | May 25, 2011 | <0.2 | ug/L | No |
| Chlordane (Total) | May 25, 2011 | <0.006 | ug/L | No |
| Chlorpyrifos | May 25, 2011 | <0.2 | ug/L | No |
| Cyanazine | May 25, 2011 | <0.3 | ug/L | No |
| Diazinon | May 25, 2011 | <0.2 | ug/L | No |
| Dicamba | May 25, 2011 | <0.4 | ug/L | No |

| | | | | |
|---|---|---|---|---|
| 1,2-Dichlorobenzene | May 25, 2011 | <0.1 | ug/L | No |
| 1,4-Dichlorobenzene | May 25, 2011 | <0.1 | ug/L | No |
| Dichlorodiphenyltrichloroethane (DDT) + metabolites | May 25, 2011 | <0.008 | ug/L | No |
| 1,2-Dichloroethane | May 25, 2011 | <0.1 | ug/L | No |
| 1,1-Dichloroethylene (vinylidene chloride) | May 25, 2011 | <0.3 | ug/L | No |
| Dichloromethane | May 25, 2011 | <0.5 | ug/L | No |
| 2-4 Dichlorophenol | May 25, 2011 | <0.7 | ug/L | No |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | May 25, 2011 | <0.8 | ug/L | No |
| Diclofop-methyl | May 25, 2011 | <0.4 | ug/L | No |
| Dimethoate | May 25, 2011 | <0.3 | ug/L | No |
| Dinoseb | May 25, 2011 | <0.5 | ug/L | No |
| Diquat | May 25, 2011 | <1.0 | ug/L | No |
| Diuron | May 25, 2011 | <3.0 | ug/L | No |
| Glyphosate | May 25, 2011 | <25 | ug/L | No |
| Heptachlor + Heptachlor Epoxide | May 25, 2011 | <0.008 | ug/L | No |
| Lindane (Total) | May 25, 2011 | <0.005 | ug/L | No |
| Malathion | May 25, 2011 | <0.2 | ug/L | No |
| Methoxychlor | May 25, 2011 | <0.009 | ug/L | No |
| Metolachlor | May 25, 2011 | <0.2 | ug/L | No |
| Metribuzin | May 25, 2011 | <0.3 | ug/L | No |
| Monochlorobenzene | May 25, 2011 | <0.1 | ug/L | No |
| Paraquat | May 25, 2011 | <1.0 | ug/L | No |
| Parathion | May 25, 2011 | <0.2 | ug/L | No |
| Pentachlorophenol | May 25, 2011 | <0.4 | ug/L | No |
| Phorate | May 25, 2011 | <0.2 | ug/L | No |
| Picloram | May 25, 2011 | <0.7 | ug/L | No |
| Polychlorinated Biphenyls(PCB) | May 25, 2011 | <0.02 | ug/L | No |
| Prometryne | May 25, 2011 | <0.2 | ug/L | No |
| Simazine | May 25, 2011 | <0.2 | ug/L | No |
| THM (NOTE: show latest annual average) | Nov. 25, 2011 (Lastest sample date) | 16.63 | ug/L | No |
| Temephos | May 25, 2011 | <3.0 | ug/L | No |
| Terbufos | May 25, 2011 | <0.2 | ug/L | No |
| Tetrachloroethylene | May 25, 2011 | <0.3 | ug/L | No |
| 2,3,4,6-Tetrachlorophenol | May 25, 2011 | <0.5 | ug/L | No |
| Triallate | May 25, 2011 | <4.0 | ug/L | No |
| Trichloroethylene | May 25, 2011 | <0.1 | ug/L | No |
| 2,4,6-Trichlorophenol | May 25, 2011 | <0.5 | ug/L | No |
| 2,4,5-Trichlorophenoxy acetic acid (2,4,5-T) | May 25, 2011 | <0.5 | ug/L | No |
| Trifluralin | May 25, 2011 | <0.006 | ug/L | No |
| Vinyl Chloride | May 25, 2011 | <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 |
|---|---|---|---|
| | | | |
| | | | |