

Annual 2005

# Customer Water Quality Report

January 1 to December 31, 2005

Under Ontario's Drinking Water Systems Regulation (170/03), waterworks owners are required to publish an annual report to consumers on water quality. The annual report to the Ministry of the Environment (MOE) is published on the Town of Markham's website ([www.markham.ca](http://www.markham.ca)) as is the Customer Water Quality report. The Customer Water Quality Report summarizes water quality aspects of the MOE annual report, highlights accomplishments of the Waterworks Department as well as 2006 initiatives that will ensure that high quality water is provided to our customers.

## Markham's Water Source and Supply

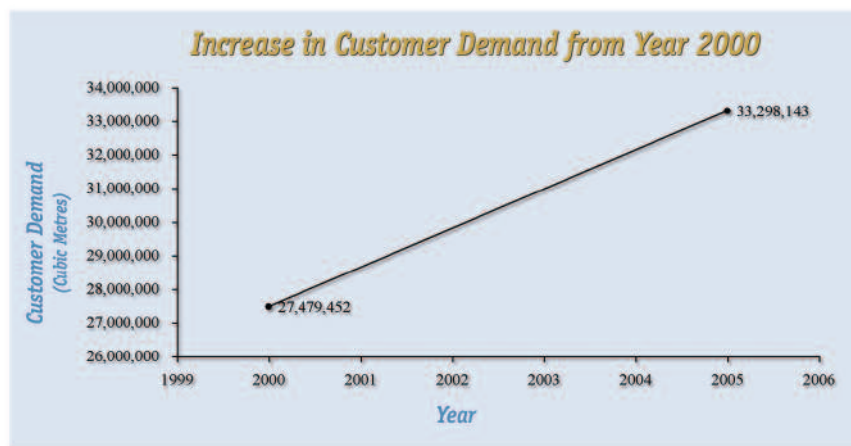


R. C. Harris Water Treatment Plant.

Markham's water supply comes from Lake Ontario. The City of Toronto's treatment facilities (left) filter, disinfect and pump processed water to reservoirs. The City of Toronto tests water quality parameters and fluoridates the water. The average hardness of the water is about 122 mg/L  $\text{CaCO}_3$  (8.5 grains / imp. gal).

The Region of York receives water from Toronto; stores, distributes, and supplies it to municipalities, including Markham through trunk watermain. The Town of Markham distributes this water to its residents.

In 2005, the Town's Waterworks Department supplied 33.3 million cubic metres of water to 268,559 residents through 754 km of local distribution watermain and 64,000 metered service connections.



### Contact & Service Information

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# Water Distribution System Regulatory Compliance

In compliance with the Ontario Drinking Water System Regulation, the Town of Markham collects and tests water samples weekly at 93 locations throughout the water distribution system weekly for presence of bacteria and daily for chlorine residual. These samples are sent to the provincially-approved York-Durham Regional Environmental Laboratory for analysis. Waterworks follows rigorous testing and compliance procedures, including reporting to the York Region Medical Officer of Health and the Ministry of the Environment (MOE) any adverse sampling results that occur, and the corrective action taken. A summary of results from 2005 follows:

|                          |   |              |
|--------------------------|---|--------------|
| <b>SAMPLING PROGRAM:</b> | Total Number of Samples collected and tested in 2005=           | 10,082       |
| <b>Breakdown:</b>        | <b>Testing for Presence of Bacteria=</b>                        | 3611 samples |
|                          | <b>Testing for Chemical Analysis:</b>                           |              |
|                          | Lead (Pb) Samples=  | 34           |
|                          | Chlorine Residual Samples at microbiological sampling stations= | 2767         |
|                          | Chlorine Residual Samples at dead end watermains=               | 3590         |
|                          | Trihalomethanes (THM) samples=                                  | 64           |
|                          | Full scan for organic & inorganic chemicals=                    | 10           |

|                              |  |    |
|------------------------------|--|----|
| <b>ADVERSE TEST RESULTS:</b> | Total Number of Adverse Water Quality Incidents (AWQI) = | 10 |
| <b>Breakdown:</b>            | <b>Adverse due to Presence of Bacteria:</b>              | 6  |
|                              | <b>Adverse due to Deficient Chlorine Residual:</b>       | 4  |

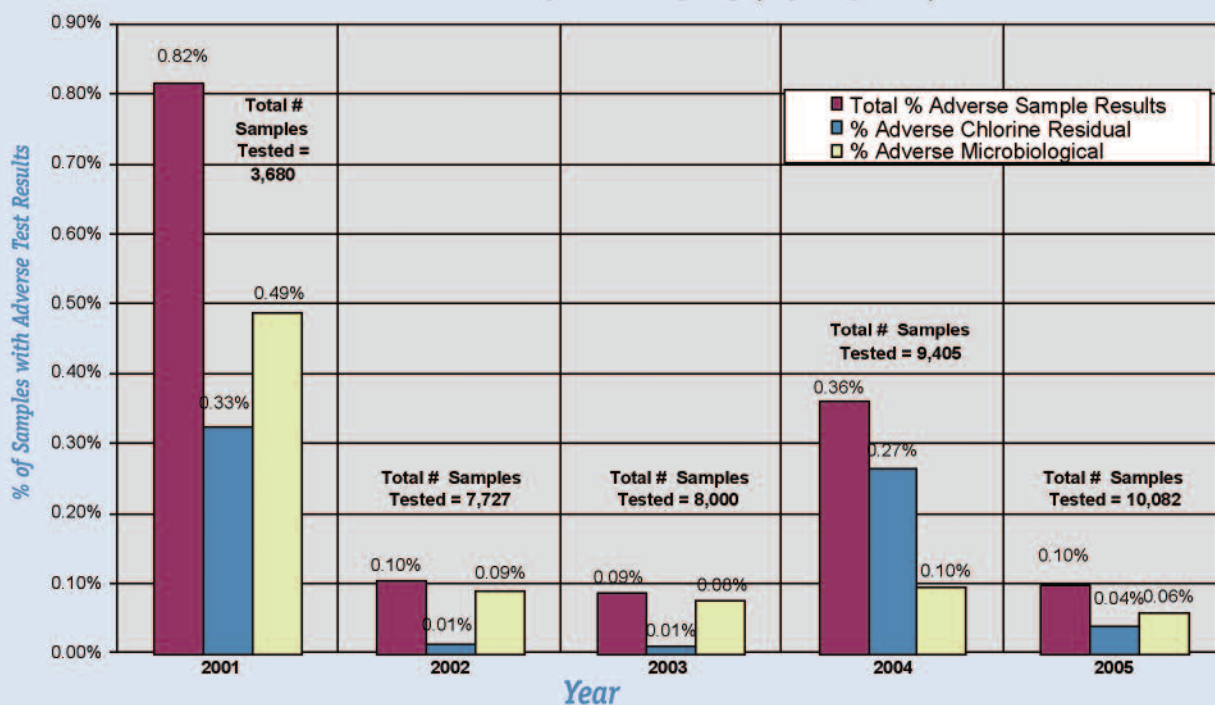
**All samples met regulatory requirements after corrective action was taken.**

No sustained water quality problems were found in the Markham water distribution system in 2005.

The adverse test results due to deficient chlorine residual have decreased from last year.

This was due to the improved dead end flushing program implemented in 2005. Chlorine residual levels dissipate over time, therefore water must be kept fresh by moving water through the watermains to ensure good quality.

**Water Distribution System Sampling (5 year period)**





## Infrastructure Renewal & Replacement

Waterworks has a renewal and replacement plan for the waterworks system infrastructure. Through the capital program, Waterworks invests \$4.5 million annually into water system upgrades such as:

### Watermain Replacement

This renewal program replaces inadequate watermains at the end of their service life. Each year, 2-3 km of watermain is replaced. A continual program of watermain replacement ensures security of water supply, reduces service interruption, ensures water quality and reduces personal and environmental risk and liabilities.

### Watermain Cement Relining

This program improves water quality, flow capacity and extends pipe life expectancy by removing internal corrosion. In 2005, 5.2 km of watermain was relined. Since 1996, 56.8 km of watermain has been relined under this program.



Watermain Replacement

### Cathodic Protection of Watermains (External Corrosion Protection)

A total of 12.0 km was completed in 2005. Since 1993, 151 km of watermain have been cathodically protected. This program extends pipe operating life, reduces watermain breaks and emergency shutdowns. The success of this program is demonstrated in the dramatic reduction in watermain breaks over the years (29 breaks in 2005, reduced from 35 breaks in 2004 and from 163 breaks in 1986).

### System Flushing Stations

Flushing stations provide automated and efficient watermain flushing to maintain safe drinking water and regulatory compliance. These are installed at dead ends to refresh water supply and improve water quality.

### Water Sampling Stations (green pedestal boxes)

Water Sampling Stations were installed throughout the water distribution system to ensure that waterworks can obtain a representative sample of water in the watermains. Previously samples were taken from faucets in public buildings such as schools. The new sampling stations allow us to take water samples any time of the day and reduce the incidence of false adverse results. Additional sampling stations are installed in new developments as needed.



System Flushing Station



Water Sampling Station

### Dead End Watermain Looping

To improve water quality, dead ends can be looped to ensure water circulation in the pipe. Dead ends that are suitable for looping are identified and looping is carried out as part of the long-term program.

## Information Management

### Customer Service and Infrastructure Work Orders

In 2005, the Waterworks Department responded to 4,543 customer service requests, an increase of 14% over 2004. These requests included calls for turning on/off water service lines, assistance for locating watermains and service lines, repair of watermain breaks, inspections and other reactive maintenance or repairs that were reported by the public.

There were also corresponding improvements in maintenance service levels between 2004 and 2005. The increase is attributed to municipal growth, increase in regulatory sampling and testing requirements as mandated by regulations and additions to Waterworks Operational staffing. Hydrants, valves, and chambers receive regular maintenance.

These initiatives are necessary to ensure proper maintenance of the water system to assure high quality of drinking water.

## Quality Management System

In response to Part II of the recommendations in the report of Justice Dennis O'Connor's *Walkerton Inquiry*, the Ministry of the Environment (MOE) will require owners of municipal water systems to obtain a licence for the operation of their waterworks. The MOE has initiated the development of a Drinking Water Quality Management Standard (DWQMS) to provide foundation and guidance to enable municipalities to develop a Quality Management System (QMS), a pre-condition to required accreditation and licensing.

The QMS will ensure that drinking water systems undergo the following processes:

- Plan** – produce an overall plan which includes the waterworks operational plan, financial plan, definition of roles and responsibilities of the owner/operating authority, and its processes
- Do** – implement the overall plans in accordance with requirements of the QMS standard
- Check** – perform periodic review of the drinking water system and its QMS implementation
- Improve** – outline requirements to revise the QMS as necessary to improve effectiveness

While anticipating the forthcoming regulation, Waterworks is preparing an appropriate course of action to satisfy upcoming DWQMS requirements from the MOE.

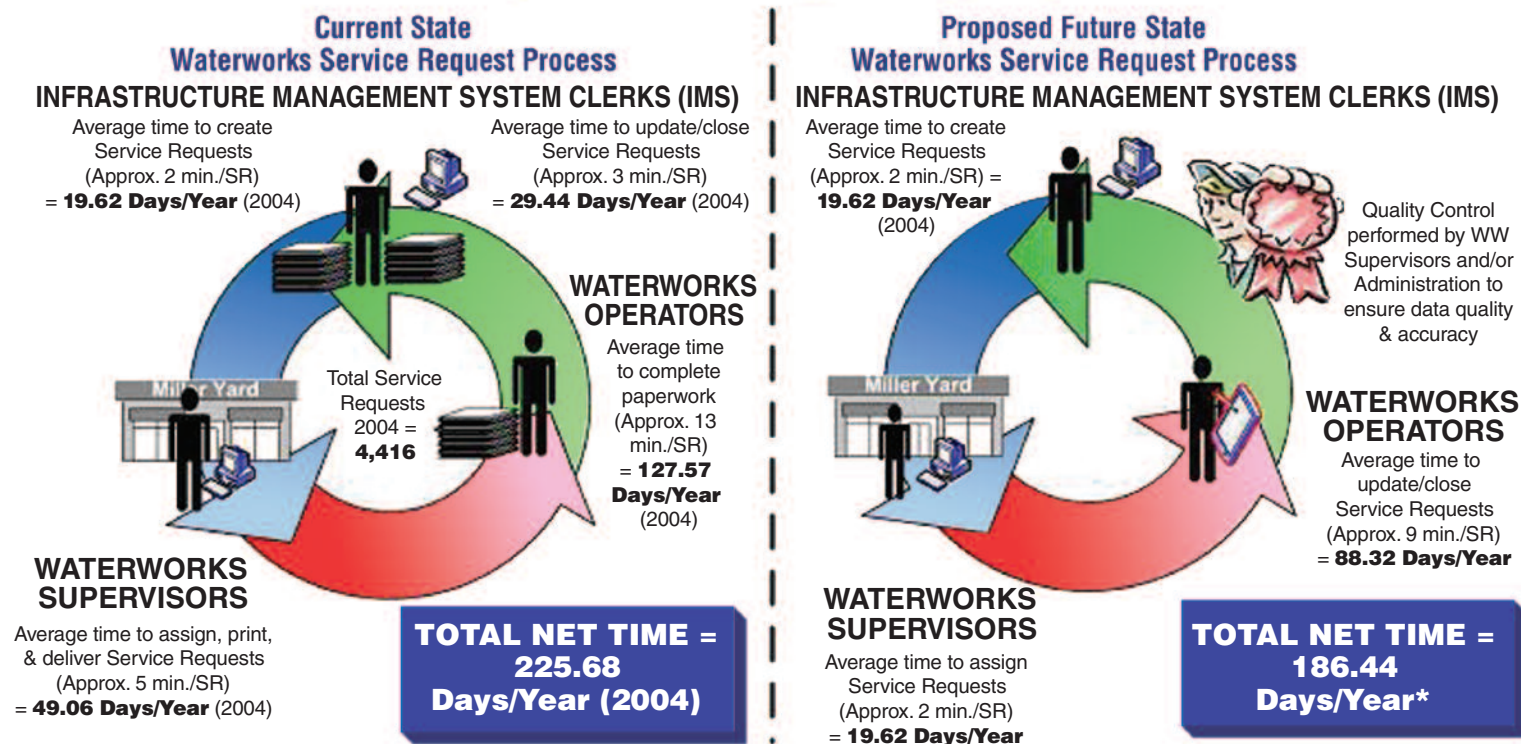
## Mobile Work Management System (MWMS)

Waterworks is in the process of developing and testing a real-time wireless field work management system that makes use of the latest mobile technology hardware, software and wide area network connectivity. MWMS roll-out is expected to be completed by 2007 and will improve service delivery and efficiency by:

- Faster response to customer needs
- Providing online real time dispatch, access to, and processing of work orders and customer service requests
  - Better use, tracking and accounting of personnel time
  - Timely access to and sharing of knowledge
  - Improved quality and timeliness of system data collection
- Reduced paperwork and enhanced electronic record keeping capabilities
  - Improved ability to locate waterworks assets (useful especially in winter when such assets may be covered with snow)



## Waterworks Service Request Process Efficiency Improvement



\*Estimate based on 2004 statistics



## Operations and Maintenance

### Quality Program

Waterworks has created a specialized work group in the Operations & Maintenance (O&M) area to carry out field aspects of water quality assurance. The O&M staff collect all of the water samples required to maintain compliance with the Provincial regulations and Town policies. This group will plan and carry out the Town's program for water quality.

The water quality work group will consist of up to seven MOE licensed water distribution operators and a supervisor. O&M's water quality group will work closely with the System Engineering Group (SEG) within Waterworks to monitor water quality throughout the system and respond to water quality issues, including customer water quality complaints.

Together they will ensure that any new watermain put into service meets the Town's stringent criteria for water potability before any water is delivered to customers.

Waterworks is continuing a program of watermain flushing to maintain chlorine residuals. This program includes the installation of automatic flushing stations that are installed on cul-de-sacs and other dead ends in the system. Three automatic stations have been installed and several others are planned. The automatic flushing stations provide cost savings by reducing the number of operator-hours required to manually flush the watermain. The automatic flushers also allow Waterworks to maintain a more consistent chlorine residual in the dead ends by providing more frequent short-duration flushes. In addition, Waterworks is eliminating dead ends in the system wherever possible by extending and connecting watermain.

### Preventative Maintenance Program

The O&M group is improving the ongoing preventative maintenance program for watermain control valves, air-release valves, and pressure reduction valves. These revamped programs will ensure that critical control devices work when required and function safely and efficiently. This program will lead to greater system reliability which will result in improved water quality and customer satisfaction. The program includes several methods to improve the Town's inventory and mapping of water assets, such as the use of bar code labelling. Waterworks has acquired a trailer-mounted power valve operator that will improve the efficiency of the valve-exercising operation. With this equipment, staff can collect detailed information about the valve performance through data collection features such as date operated, torque required, number of turns, and number of cycles. The valve operator in use is shown below.



### Future Programs

The Town is in the process of developing a program to protect the water distribution system from accidental backflow of non-potable water from private property. This program, jointly carried out by the SEG and O&M Groups within Waterworks, will develop a property-specific

inventory of cross-connection and backflow risks, and an inventory of backflow prevention devices employed at each location to protect the municipal water supply. This program will contain several components, including public education, inspection, reporting and monitoring.

These programs and policies support and maintain high water quality with further safeguards as recommended by Justice O'Connor in Part II of the *Walkerton Inquiry* report.

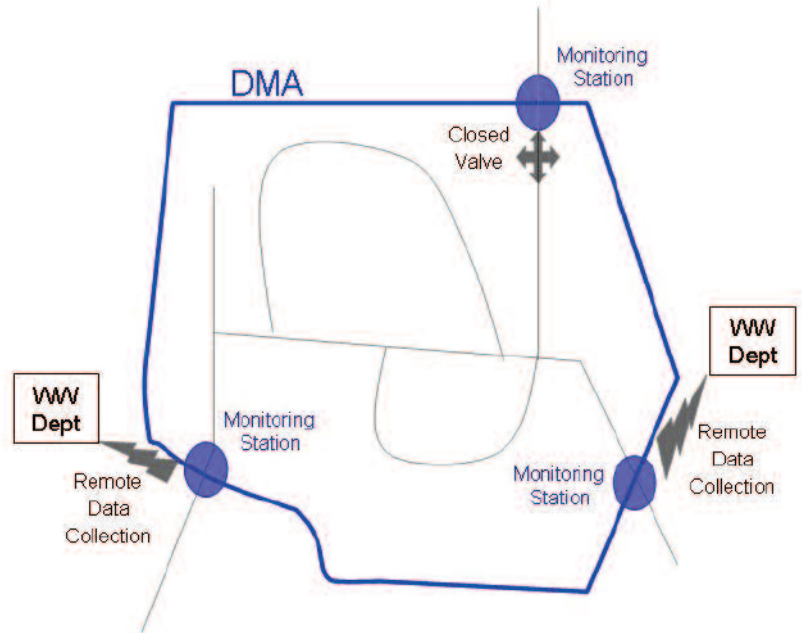
# System Engineering

The System Engineering Group within Waterworks is embarking on some major initiatives this year. These are aimed at improving efficiency of system operation and the ability to assess and correct potential water quality issues.

The System Engineering Group will work closely with all the groups within Waterworks to ensure compliance with provincial water quality regulations, enhance water quality in the system and minimize risk with the development of a cross connection program, emergency management program and system input to the Drinking Water Quality Management System currently being developed.

## Pilot Management Area Project (Sector and District)

A pilot management project is being implemented. This will involve monitoring all flow into and out of isolated areas known as the District Metering Area (DMA) of the Town's water distribution system. Flows and net water usage data will be available in real time for analysis and will be correlated with automated meter reading (AMR) data to check for system losses, such as leakage and unauthorized use. A much better understanding of system usage patterns will result. This work will involve the setting up of instrumentation for remote, real-time data collection.



MWH Soft InfoWater Program



## Water Distribution System Modeling

The System Engineering Group has acquired state-of-the-art water distribution system modeling software called INFOWATER which will be integrated with our latest mapping technology system. This software has tools (shown in the diagram on the left) which will be utilized in creating a model of Markham's water distribution system for use in system analyses. The model will include pressure, flow and water quality components. Automated features in the model will enable System Engineering to determine areas of the Town where water quality or quantity concerns can arise. These features will also provide the potential to rapidly analyze the impacts of watermain breaks on water quality and quantity to initiate specific corrective action.



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