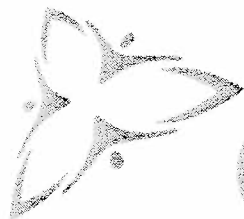




Attachment 'A'

**The Ontario Ministry of the Environment**  
**MARKHAM DISTRIBUTION SYSTEM**  
**Drinking Water System Inspection Report**  
**April 11, 2012**



# Ontario

Ministry of the Environment

## MARKHAM DISTRIBUTION SYSTEM

### Drinking Water System Inspection Report

DWS Number:	220004162
Inspection Number:	1-9XQG5
Date of Inspection:	Apr 11, 2012
Inspected By:	Loralyn Wild



## **TABLE OF CONTENTS**

- 1. Drinking Water System Owners Information**
- 2. Drinking Water System Inspection Report**

**Appendix:**

- A. Stakeholders Appendix**
- B. MOE Audit Samples**
- C. Inspection Rating Record**

**OWNER INFORMATION:**

**Company Name:** MARKHAM, THE TOWN OF  
**Street Number:** 101 **Unit Identifier:**  
**Street Name:** TOWN CENTRE Blvd N  
**City:** MARKHAM  
**Province:** ON **Postal Code:** L3R 9W3

**CONTACT INFORMATION**

**Type:** Manager **Name:** Noris M. Dela Cruz  
**Phone:** (905) 477-7000 x4800 **Fax:** (905) 475-4863  
**Email:** ndelacruz@markham.ca  
**Title:** Manager, IMS, Waterworks Department

**Type:** Main Contact/Coordinator **Name:** Helena Frantzke  
**Phone:** (905) 477-7000 x2449 **Fax:** (905) 479-7772  
**Email:** hfrantzke@markham.ca  
**Title:** Water Quality Coordinator, Waterworks Department

**Type:** Director **Name:** Peter Loukes  
**Phone:** (905) 477-7000 **Fax:** (905) 479-7772  
**Email:** ploukes@markham.ca  
**Title:** Director, Environmental Services

**Type:** Supervisor **Name:** Peter Solymos  
**Phone:** (905) 477-7000 x2830 **Fax:** (905) 475-4732  
**Email:** psolymos@markham.ca  
**Title:** Supervisor, Water Quality, Waterworks Department

**Type:** Manager **Name:** Eddy S. Y. Wu  
**Phone:** (905) 477-7000 x2445 **Fax:** (905) 479-7772  
**Email:** ewu@markham.ca  
**Title:** Manager, Operations and Maintenance, Waterworks Department

**INSPECTION DETAILS:**

<b>DWS Name:</b>	MARKHAM DISTRIBUTION SYSTEM
<b>DWS Address:</b>	101 TOWN CENTRE BLVD N MARKHAM L3R 9W3
<b>County/District:</b>	Markham
<b>MOE District/Area Office:</b>	York-Durham District
<b>Health Unit:</b>	YORK REGION HEALTH SERVICES DEPARTMENT
<b>Conservation Authority</b>	N/A
<b>MNR Office:</b>	N/A
<b>DWS Category:</b>	Large Municipal Residential
<b>DWS Number:</b>	220004162
<b>Inspection Type:</b>	Announced
<b>Inspection Number:</b>	1-9XQG5
<b>Date of Inspection:</b>	Apr 11, 2012
<b>Date of Previous Inspection:</b>	Jul 12, 2011

**DRINKING WATER SYSTEM COMPONENTS DESCRIPTION**

<b>Site (Name):</b>	Markham Operation Office	<b>Sub Type:</b>	Other
<b>Type:</b>	Other		

**Comments:**

The Markham Distribution System (DS) is operated and maintained by the Town of Markham, and receives most of its distribution water from the City of Toronto. The York Water System was inter-connected with Peel Region in 2006. The trunk transmission lines, pumping stations, and water storage facilities located within the Markham Distribution System are owned and operated by the Regional Municipality of York and the City of Toronto.

The City of Toronto operates and maintains four surface water treatment plants utilizing chemically assisted filtration, chlorination, fluoridation and chloramination processes. The Regional Municipality of York measures and monitors the distribution water flows and volumes directed to the Town of Markham through the use of nineteen (19) flow meters located along the Richmond Hill, Vaughan, Stouffville, Toronto and Markham boundaries. York Region also provides water storage and pressure boosting for the Markham system.

The Markham DS provides potable water to approximately 310,000 residents of Markham. The Markham Distribution System comprises approximately 981 km of watermains, 7,772 hydrants, 7,821 valve chambers, 9,281 valves, 188 blow-offs, and approximately 72,225 service connections.

## INSPECTION SUMMARY

### INTRODUCTION

- \* The primary focus of this inspection is to confirm compliance with Ministry of the Environment legislation and authorizing documents such as Orders and Certificates of Approval, as well as evaluating conformance with Ministry drinking water related policies and guidelines during the inspection period.

This report is based on an inspection of a "stand alone connected distribution system". This type of system receives treated water from a separately owned "donor" system. This report contains all of the elements required to assess key compliance and conformance issues associated with a "receiver" system to ensure that the system was not being operated or managed in a "deficient" condition, as defined under O. Reg. 172/03. The report does not contain items associated with the inspection of the donor system, such as source waters, intakes/wells and treatment facilities.

This drinking water system is subject to the legislative requirements of the Safe Drinking Water Act, 2002 (SDWA) and regulations made therein, including Ontario Regulation 170/03, "Drinking Water Systems" (O.Reg.170/03). This inspection has been conducted pursuant to Section 81 of the SDWA.

Your system was chosen for a focused inspection during this inspection cycle because inspection findings over the past three years were such that the number of violations were minimal or non existent, there were few or no orders issued to you that were of significance in the maintenance of water potability and there were no deficiencies as defined in O. Reg. 172/03. The undertaking of a focused inspection at your drinking water system during this year's inspection cycle does not ensure that a similar type of inspection will be conducted at any point in the future.

Drinking Water Inspector Loralyn Wild began conducting an inspection of the Town of Markham Drinking Water System on April 11, 2011. Files were reviewed and staff were interviewed at 8100 Warden Avenue on this date. The Town of Markham contact for this inspection was Helena Frantzke, Water Quality Coordinator. Audit drinking water samples were collected as part of this inspection on April 18, 2012. The period of review for this inspection is July 12, 2011, to April 11, 2012.

The Markham Distribution System has been granted approval under Drinking Water Permit #021-201: Issue #3 and Drinking Water Licence #021-101: Issue #3. The current Licence for the Markham Distribution System was issued on November 1, 2011.

For the purpose of this report, "the Ministry" refers to the Ontario Ministry of the Environment, and "the Town" refers to the Town of Markham.

### TREATMENT PROCESS MONITORING

- \* The secondary disinfectant residual was measured as required for the distribution system.

The Town of Markham tests for chlorine residuals more than the required minimum of seven times a week.

### DISTRIBUTION SYSTEM

## **DISTRIBUTION SYSTEM**

- \* Existing parts of the distribution system that were taken out of service for inspection, repair or other activities that may lead to contamination, and all new parts of the distribution system that came in contact with drinking water, were disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit.

The Town of Markham Quality Standards contain procedures for disinfecting equipment prior to use in the distribution system. Records indicate these procedures are being followed.

- \* Based on the records available the owner was able to maintain proper pressures in the distribution system.

## **OPERATIONS MANUALS**

- \* The operations and maintenance manuals contained plans, drawings and process descriptions sufficient for the safe and efficient operation of the system.

The Town of Markham has hard copy operations and maintenance manuals available at their main office at 8100 Warden Avenue. Electronic files are also available for staff to access.

- \* The operations and maintenance manuals did meet the requirements of the Permit and Licence or Approval issued under Part V of the SDWA.

## **LOGBOOKS**

- \* Records or other record keeping mechanisms confirmed that operational testing not performed by continuous monitoring equipment was being done by a certified operator, water quality analyst, or person who suffices the requirements of O. Reg. 170/03 7-5.

Logs for the Markham Distribution System consist of work orders as well as a logbook maintained at the main office for the waterworks, 8100 Warden Avenue.

## **SECURITY**

- \* The owner had provided security measures to protect components of the drinking-water system.

## **CERTIFICATION AND TRAINING**

- \* The overall responsible operator had been designated for each subsystem.

A schedule is issued that names the overall responsible operator for each week, a role that is rotated between the Town of Markham Waterworks Supervisors.

- \* Operators in charge had been designated for all subsystems which comprised the drinking-water system.

## **WATER QUALITY MONITORING**

- \* All microbiological water quality monitoring requirements for distribution samples were being met.

The Town of Markham has over 310,000 residents and is required to collect a minimum of 131 drinking water samples to be tested for microbiological parameters each month. The Town of Markham has collected more than their required number of samples for this inspection period.

## **WATER QUALITY MONITORING**

- \* **All trihalomethanes water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

Samples were collected and tested for trihalomethanes as required for this inspection period.

- \* **All water quality monitoring requirements imposed by the Permit and Licence or Approval issued under Part V of the SDWA were being met.**

There are no additional sampling requirements under the Municipal Drinking Water Licence 021-101: Issue #3 currently issued to the Markham Distribution System.

- \* **All sampling requirements for lead prescribed by schedule 15.1 of O. Reg. 170/03 were being met.**

The Town of Markham has been granted approval for regulatory relief from lead sampling as described under the Municipal Drinking Water Licence 021-101, Issue #3. The Town has collected the required number of samples for the community lead sampling program and tested the samples according to requirements under Section 15.1

- \* **Records confirmed that chlorine residual tests were being conducted at the same time and at the same location that microbiological samples were obtained.**

Sample submission records reviewed during this inspection included chlorine residual test results for each microbiological sample collected.

## **WATER QUALITY ASSESSMENT**

- \* **The audit samples collected by the inspector met the applicable Ontario Drinking Water Quality Standards and/or the aesthetic objectives or operation guidelines. The results of the audit sampling are summarized as follows:**

Three (3) samples were collected in the Markham Distribution System on April 18, 2012, by the Drinking Water Inspector and analyzed for microbiological parameters at the Ministry Laboratory. The results, which all met Ontario's Drinking Water Quality Standards, are attached to this report.

- \* **Records show that water sample results taken during the review period met the Ontario Drinking Water Quality Standards (O. Reg. 169/03), with the following exceptions:**

(1) September 25, 2011, sample result showed Total Coliform (TC) colonies = 2; sample was collected from a hydrant that was isolated from the distribution system.

(2) September 24, 2011, sample result showed TC = 18; sample was collected from a sample station that was isolated from the distribution system.

(3) September 23, 2011, sample result showed TC = 1; sample was collected from a hydrant that was isolated from the distribution system.

(4) August 30, 2011, sample result showed TC presence; sample was collected from a sample station.

(5) August 3, 2012, sample result showed TC presence; sample was collected from a sample station.

(6) July 26, 2012, sample result showed TC presence; sample was collected from a sample station.

The Ontario Drinking Water Quality Standard under O. Reg. 169/03, for microbiological parameters is zero (0) Total Coliform colonies.

## **REPORTING & CORRECTIVE ACTIONS**

- \* **Corrective actions (as per Schedule 17) had been taken to address adverse conditions, including any other steps that were directed by the Medical Officer of Health.**

For all six (6) incidents listed above with adverse sample results, the correct resampling and reporting actions were completed as required.



**REPORTING & CORRECTIVE ACTIONS**

- \* **Corrective actions as directed by the Medical Officer of Health had been taken by the owner and operating authority to address exceedances of the lead standard.**

- \* **All required notifications of adverse water quality incidents were immediately provided as per O. Reg. 170/03 16-6.**

There were ten (10) adverse water quality notifications made to the Ministry during this inspection period. In addition to the six (6) adverse test results listed above, the Town of Markham also provided precautionary notification of two (2) watermain breaks and two (2) samples with higher than normal Heterotrophic Plate Count (HPC) in microbiological test results. All notifications were provided in a timely manner.

- \* **All reporting requirements for lead sampling were complied with as per schedule 15.1-9 of O. Reg. 170/03.**
- \* **All changes to the system registration information were provided within ten (10) days of the change.**

**NON-COMPLIANCE WITH REGULATORY REQUIREMENTS AND ACTIONS REQUIRED**

This section provides a summary of all non-compliance with regulatory requirements identified during the inspection period, as well as actions required to address these issues. Further details pertaining to these items can be found in the body of the inspection report.

Not Applicable

## SUMMARY OF BEST PRACTICE ISSUES AND RECOMMENDATIONS

This section provides a summary of all best practice issues identified during the inspection period. Details pertaining to these items can be found in the body of the inspection report. Best Management Practices are recommendations and not mandatory requirements, but may lead to safe drinking water for the consumer.

In the interest of continuous improvement in the interim, it is recommended that owners and operators develop an awareness of the following practices and consider measures to implement them so that all drinking water systems continuously improve their processes.

Not Applicable

## SIGNATURES

Inspected By:

Loralyn Wild

Signature: (Provincial Officer):



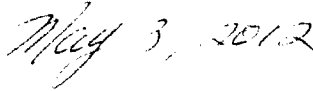
Reviewed & Approved By:

Demetra Koros

Signature: (Supervisor):



Review & Approval Date:



Note: This inspection does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they apply or may apply to this facility. It is, and remains, the responsibility of the owner and/or operating authority to ensure compliance with all applicable legislative and regulatory requirements.



## **APPENDIX A**

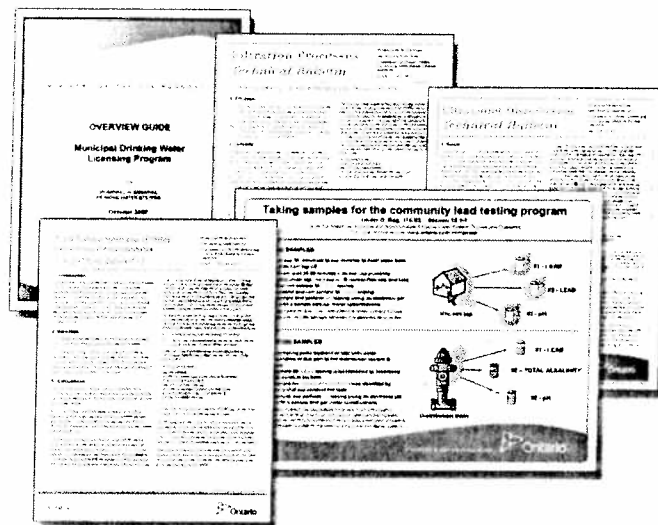
### **STAKEHOLDER APPENDIX**

# Key Reference and Guidance Material for Municipal Residential Drinking Water Systems

Many useful materials are posted on the Ministry of the Environment's Drinking Water Ontario website at [www.ontario.ca/drinkingwater](http://www.ontario.ca/drinkingwater) to help in the operation of your drinking water system.

Below is a list of key materials frequently used by owners and operators of municipal drinking water systems. To read or download these materials, go to Drinking Water Ontario and search in the **Resources** section by **Publication Number**.

Visit Drinking Water Ontario for more useful materials. Contact the Public Information Centre if you need assistance or have questions at 1-800-565-4923/416-325-4000 or [picemail.moe@ontario.ca](mailto:picemail.moe@ontario.ca).



PUBLICATION NUMBER	PUBLICATION TITLE
4448e01	Procedure for Disinfection of Drinking Water in Ontario
7152e	Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids
7467	Filtration Processes Technical Bulletin
7685	Ultraviolet Disinfection Technical Bulletin
8215	Total Trihalomethane (TTHM) Reporting Requirements Technical Bulletin (February 2011)
2601e	Overview Guide: Municipal Drinking Water Licensing Program
0000	Municipal Drinking Water Licensing Program Bulletin, Issue 1, January 2011
0000	Certification Guide for Operators and Water Quality Analysts
6560e	Taking Samples for the Community Lead Testing Program
7423e	Community Sampling and Testing for Lead: Standard and Reduced Sampling and Eligibility for Exemption
7128e	Drinking Water System Contact List
4449e01	Technical Support Document for Ontario Drinking Water Quality Standards



**APPENDIX B**

**MOE AUDIT SAMPLE**

**RESULTS**

Login: C193257

Program Code 130071401

Program: MOE OPERATIONS DIVISION  
Study: WATER, COMMUNAL  
Project: CENTRAL REG. - YORK-DURHAM DIS  
Activity: WTP MUNIC INSPECT/ADVERS NOTIF  
Organization: District Manager York-Durham

Org. Id: 4514

Mail this copy to :

WILD, LORALYN  
MOE - YORK-DURHAM DISTRICT OFFICE  
230 WESTNEY ROAD SOUTH, 5TH FLOOR  
AJAX, ONT.  
L1S 7J5

Final reports to : RAPHAEL, PAULINE  
WILD, LORALYN

SAFEDRINKINGWATERBRANCH.CALENDAR.MOE

Approved for release by : DAVE MORSE Manager, Organic Contaminants Section

Approved date : Apr. 20, 2012

Inquires to : RUSTY MOODY  
PETER DROUIN

Telephone : 416-235-5863

Telephone : 416-235-5850

LOGIN DESCRIPTION: 220004162 MARKHAM DISTRIBUTION SYSTEM LORALYN WILD 905-427-5638

The results relate only to items tested.

To provide customer service feedback on this report and/or other services provided by LaSB, please contact the LaSB HelpDesk at 416-235-6030 or the Customer Service Manager at 416-235-5831

This report contains confidential information intended only for the person(s) to whom it is addressed. Any unauthorized disclosure, copying, other distribution of this report, or taking any action on strictly prohibited. If you have received this report in error, please contact the LaSB HelpDesk at 416-235-6030 or the Customer Service Manager at .



Login: C193257

Print Date: Apr. 20, 2012 05:15 PM By REPORTADMIN

\*\*\*\* RE

Field Id Station ID  
LWMDS- 220004162  
1 Sample ID  
C193257-0001  
Sample Location Description  
130 CASTLEMORE AVE. DISTRIBUTION  
Sample Comment Description  
Sampling Date 18 APR 2012 09:50  
Time 09:50  
Zone 5  
Sampler Information

MOE\*LIMS Products Requested:

WD E3226A PA3226

UTM:  
Zone Easting Northing Collection Method Map Datum Accuracy  
17 636025 4861778 GPS NAD83 6-10M

Field Id Station ID  
LWMDS- 220004162  
2 Sample ID  
C193257-0002  
Sample Location Description  
45 WILLOWBROOK RD. DISTRIBUTION  
Sample Comment Description  
Sampling Date 18 APR 2012 10:25  
Time 10:25  
Zone 5  
Sampler Information

MOE\*LIMS Products Requested:

WD E3226A PA3226

UTM:  
Zone Easting Northing Collection Method Map Datum Accuracy  
17 640923 4859281 GPS NAD83 6-10M

Field Id Station ID  
LWMDS- 220004162  
3 Sample ID  
C193257-0003  
Sample Location Description  
43 MAJOR BUTTONS DR. DISTRIBUTION  
Sample Comment Description  
Sampling Date 18 APR 2012 10:50  
Time 10:50  
Zone 5  
Sampler Information

MOE\*LIMS Products Requested:

WD E3226A PA3226

UTM:  
Zone Easting Northing Collection Method Map Datum Accuracy  
17 628758 4854185 GPS NAD83 6-10M

Login: C193257

FINAL REPORT(manager)

Print Date: Apr. 20, 2012 05:15 PM By REPORTADMIN

\*\*\*\* R

Field ID:  
Sample ID:  
MOE-LIMS ID:  
Station ID:  
Collect Date:  
Sample Location Description:

LWMDS-1  
C193257-0001  
2012WDD16-00121  
220004162  
18 APR 2012

130 CASTLEMORE AVE. DISTRIBUTION

LWMDS-2  
C193257-0002  
2012WDD16-00122  
220004162  
18 APR 2012

45 WILLOWBROOK RD. DISTRIBUTION

LWMDS-3  
C193257-0003  
2012WDD16-00123  
220004162  
18 APR 2012

43 MAJOR BUTTONS DR. DI

Sample Comments Description:

Listid Parmname

Value

Units

Qual

Rmk1

Value

Units

Qual

Rmk1

Value

Units

Qu

3226L1 NT: Total Coliforms

See Non-Target Textual result

See Non-Target Textual result

See Non-Target Textual result

Login: C193257

CODE DESCRIPTION

- NDAT NO DATA: ABSENT NT: TOTAL COLIFORMS
- NDDN NO DATA: NOT DETECTED NT: DETERIORATION INDICATORS
- NDAE NO DATA: ABSENT NT: ESCHERICHIA COLI

NON-TARGET TEXTUAL RESULT

Sample ID: C193257-0001	Listid : 3226L1	Parmname : NT: Total Coliforms	Value:	Units: c/100mL	Qual: NDAT	Rem:
Absent						
Sample ID: C193257-0001	Listid : 3226L1	Parmname : NT: Escherichia coli	Value:	Units: c/100mL	Qual: NDAE	Rem:
Absent						
Sample ID: C193257-0001	Listid : 3226L1	Parmname : NT: Deterioration Indicators	Value:	Units: c/100mL	Qual: NDDN	Rem:
Not Detected						
Sample ID: C193257-0002	Listid : 3226L1	Parmname : NT: Total Coliforms	Value:	Units: c/100mL	Qual: NDAT	Rem:
Absent						
Sample ID: C193257-0002	Listid : 3226L1	Parmname : NT: Escherichia coli	Value:	Units: c/100mL	Qual: NDAE	Rem:
Absent						
Sample ID: C193257-0002	Listid : 3226L1	Parmname : NT: Deterioration Indicators	Value:	Units: c/100mL	Qual: NDDN	Rem:
Not Detected						
Sample ID: C193257-0003	Listid : 3226L1	Parmname : NT: Total Coliforms	Value:	Units: c/100mL	Qual: NDAT	Rem:
Absent						
Sample ID: C193257-0003	Listid : 3226L1	Parmname : NT: Escherichia coli	Value:	Units: c/100mL	Qual: NDAE	Rem:
Absent						
Sample ID: C193257-0003	Listid : 3226L1	Parmname : NT: Deterioration Indicators	Value:	Units: c/100mL	Qual: NDDN	Rem:
Not Detected						

TEXT COMMENT

Product Completion

FINAL REPORT(manager)

Print Date: Apr. 20, 2012 05:15 PM By REPORTADMIN

Login: C193257

\*\*\*\* RE

Sample ID	Matrix	Method	Product	Analytical Department	Completion Date
C193257-0001	WD	E3226A	PA3226	6510	20-APR-12
C193257-0002	WD	E3226A	PA3226	6510	20-APR-12
C193257-0003	WD	E3226A	PA3226	6510	20-APR-12

\*\*\* End of Report \*\*\*



**APPENDIX C**  
**INSPECTION RATING RECORD**

Ministry of the Environment - Inspection Summary Rating Record (Reporting Year - 2012-2013)

**DWS Name:** MARKHAM DISTRIBUTION SYSTEM  
**DWS Number:** 220004162  
**DWS Owner:** Markham, The Town Of  
**Municipal Location:** Markham

**Regulation:** O.REG 170/03  
**Category:** Large Municipal Residential System  
**Type Of Inspection:** Adhoc  
**Inspection Date:** April 11, 2012  
**Ministry Office:** York-Durham District

**Maximum Question Rating:** 232

Inspection Module	Non-Compliance Rating
Distribution System	0 / 21
Operations Manuals	0 / 28
Logbooks	0 / 14
Certification and Training	0 / 14
Water Quality Monitoring	0 / 63
Reporting & Corrective Actions	0 / 71
Treatment Process Monitoring	0 / 21
<b>TOTAL</b>	<b>0 / 232</b>

**Inspection Risk Rating** 0.00%

**FINAL INSPECTION RATING:** 100.00%

**Ministry of the Environment - Detailed Inspection Rating Record (Reporting Year - 2012-2013)**

**DWS Name:** MARKHAM DISTRIBUTION SYSTEM  
**DWS Number:** 220004162  
**DWS Owner:** Markham, The Town Of  
**Municipal Location:** Markham

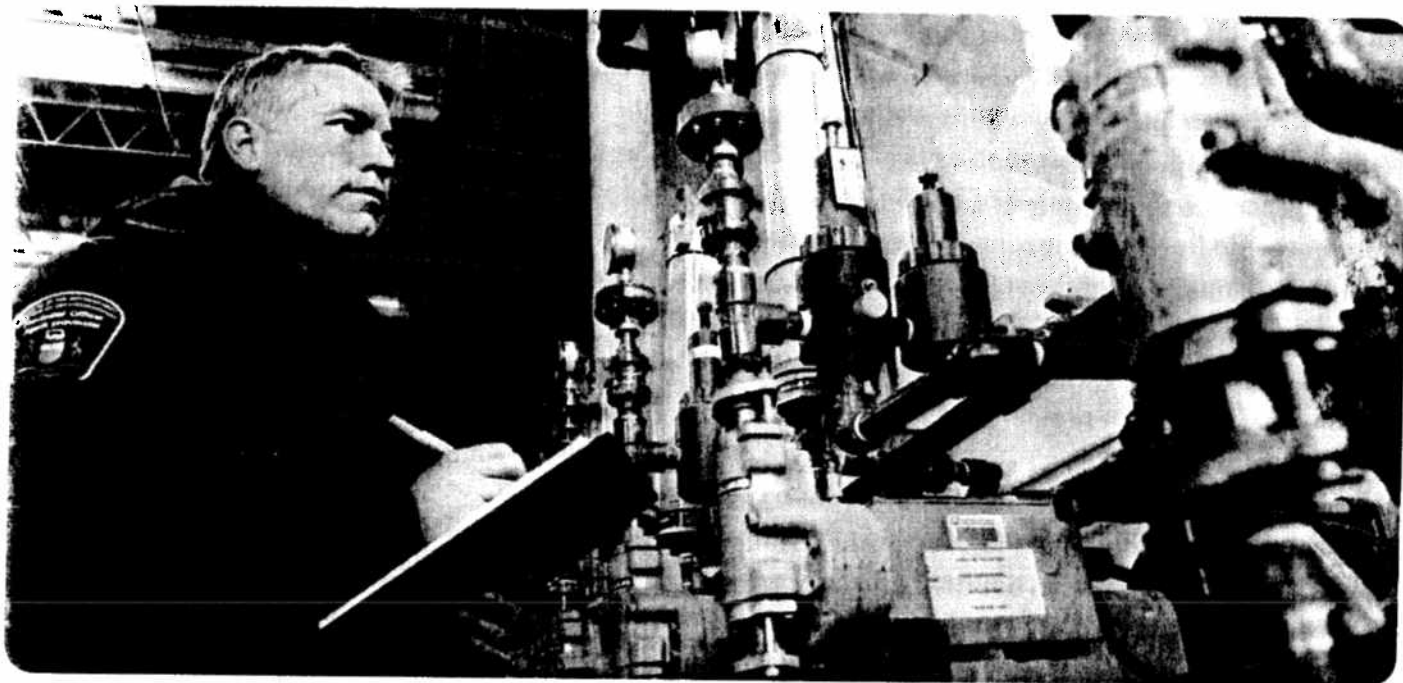
**Regulation:** O.REG 170/03  
**Category:** Large Municipal Residential System  
**Type Of Inspection:** Adhoc  
**Inspection Date:** April 11, 2012  
**Ministry Office:** York-Durham District

**Maximum Question Rating:** 232

**Inspection Risk Rating** | 0.00%

**FINAL INSPECTION RATING:** | 100.00%

# APPLICATION OF THE RISK METHODOLOGY USED FOR MEASURING MUNICIPAL RESIDENTIAL DRINKING WATER SYSTEM INSPECTION RESULTS



The Ministry of the Environment (MOE) has a rigorous and comprehensive inspection program for municipal residential drinking water systems (MRDWS). Its objective is to determine the compliance of MRDWS with requirements under the Safe Drinking Water Act and associated regulations. It is the responsibility of the municipal residential drinking water system owner to ensure their drinking water systems are in compliance with all applicable legal requirements.

This document describes the risk rating methodology, which has been applied to the findings of the Ministry's MRDWS inspection

results since fiscal year 2008-09. The primary goals of this assessment are to encourage ongoing improvement of these systems and to establish a way to measure this progress.

MOE reviews the risk rating methodology every three years.

The Ministry's Municipal Residential Drinking Water Inspection Protocol contains 15 inspection modules consisting of approximately 100 regulatory questions. Those protocol questions are also linked to definitive guidance that ministry inspectors use when conducting MRDWS inspections.

[ontario.ca/drinkingwater](http://ontario.ca/drinkingwater)



The questions address a wide range of regulatory issues, from administrative procedures to drinking water quality monitoring. The inspection protocol also contains a number of non-regulatory questions.

A team of drinking water specialists in the ministry assessed each of the inspection protocol regulatory questions to determine the risk (not complying with the regulation) to the delivery of safe drinking water. This assessment was based on established provincial risk assessment principles, with each question receiving a risk rating referred to as the Question Risk Rating. Based on the number of areas where a system is deemed to be non-compliant during the inspection, and the significance of these areas to administrative, environmental, and health consequences, a risk-based inspection rating is calculated by the ministry for each drinking water system.

It is important to be aware that an inspection rating less than 100 per cent does not mean the drinking water from the system is unsafe. It shows areas where a system's operation can improve. The ministry works with owners and operators of systems to make sure they know what they need to do to achieve full compliance.

The inspection rating reflects the inspection results of the specific drinking water system for the reporting year. Since the methodology is applied consistently over a period of years, it serves as a comparative measure both provincially and in relation to the individual system. Both the drinking water system and the public are able to track the performance over time, which encourages continuous improvement and allows systems to identify specific areas requiring attention.

The ministry's annual inspection program is an important aspect of our drinking water safety net. The ministry and its partners share a common commitment to excellence and we continue to work toward the goal of 100 per cent regulatory compliance.

## Determining Potential to Compromise the Delivery of Safe Water

The risk management approach used for MRDWS is aligned with the Government of Ontario's Risk Management Framework. Risk management is a systematic approach to identifying potential hazards, understanding the likelihood and consequences of the hazards, and taking steps to reduce their risk if necessary and as appropriate.

The Risk Management Framework provides a formula to be used in the determination of risk:

$$\text{RISK} = \text{LIKELIHOOD} \times \text{CONSEQUENCE}$$

(of the consequence)

Every regulatory question in the inspection protocol possesses a likelihood value (L) for an assigned consequence value (C) as described in **Table 1** and **Table 2**.

TABLE 1:	
Likelihood of Consequence Occurring	Likelihood Value
0% - 0.99% (Possible but Highly Unlikely)	L = 0
1 - 10% (Unlikely)	L = 1
11 - 49% (Possible)	L = 2
50 - 89% (Likely)	L = 3
90 - 100% (Almost Certain)	L = 4

TABLE 2:	
Consequence	Consequence Value
Medium Administrative Consequence	C = 1
Major Administrative Consequence	C = 2
Minor Environmental Consequence	C = 3
Minor Health Consequence	C = 4
Medium Environmental Consequence	C = 5
Major Environmental Consequence	C = 6
Medium Health Consequence	C = 7
Major Health Consequence	C = 8

The consequence values (0 through 8) are selected to align with other risk-based programs and projects currently under development or in use within the ministry as outlined in **Table 2**.

The Question Risk Rating for each regulatory inspection question is derived from an evaluation of every identified consequence and its corresponding likelihood of occurrence:

- All levels of consequence are evaluated for their potential to occur
- Greatest of all the combinations is selected.

The Question Risk Rating quantifies the risk of non-compliance of each question relative to the others. Questions with higher values are those with a potentially more significant impact on drinking water safety and a higher likelihood of occurrence. The highest possible value would be 32 (4×8) and the lowest would be 0 (0×1).

**Table 3** presents a sample question showing the risk rating determination process.

TABLE 3:							
Does the Operator In Charge ensure that the equipment and processes are monitored, inspected and evaluated?							
Risk = Likelihood × Consequence							
C=1	C=2	C=3	C=4	C=5	C=6	C=7	C=8
Medium Administrative Consequence	Major Administrative Consequence	Minor Environmental Consequence	Minor Health Consequence	Medium Environmental Consequence	Major Environmental Consequence	Medium Health Consequence	Major Health Consequence
L=4 (Almost Certain)	L=1 (Unlikely)	L=2 (Possible)	L=3 (Likely)	L=3 (Likely)	L=1 (Unlikely)	L=3 (Likely)	L=2 (Possible)
R=4	R=2	R=6	R=12	R=15	R=6	R=21	R=16

## Application of the Methodology to Inspection Results

Based on the results of a MRDWS inspection, an overall inspection risk rating is calculated. During an inspection, inspectors answer the questions related to regulatory compliance and input their “yes”, “no” or “not applicable” responses into the Ministry’s Laboratory and Waterworks Inspection System (LWIS) database. A “no” response indicates non-compliance. The maximum number of regulatory questions asked by an inspector varies by: system (i.e., distribution, stand-alone); type of inspection (i.e., focused, detailed); and source type (i.e., groundwater, surface water).

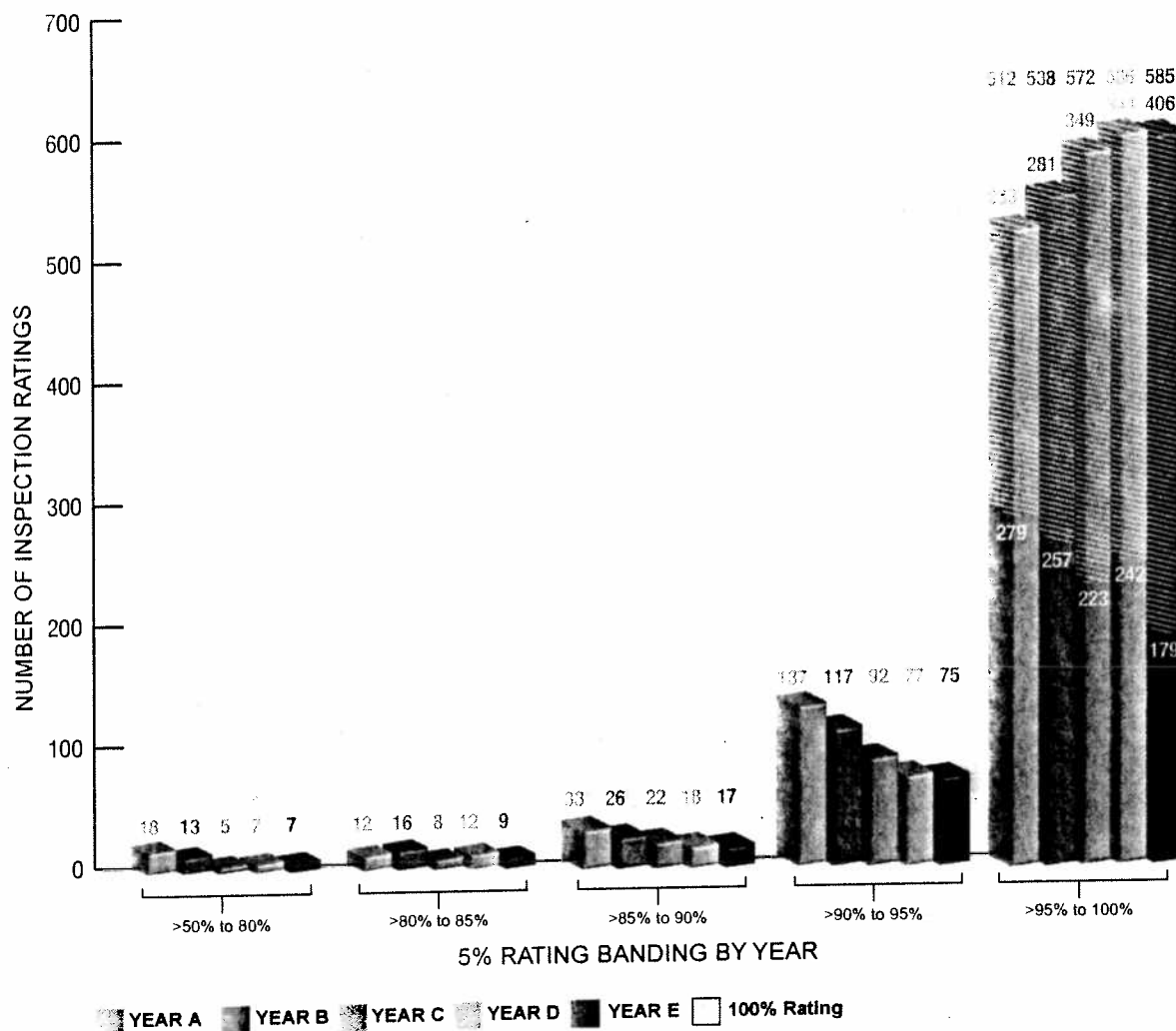
The risk ratings of all non-compliant answers are summed and divided by the sum of the risk ratings of all questions asked (maximum question rating). The resulting inspection risk rating (as a percentage) is subtracted from 100 per cent to arrive at the final inspection rating.

## Application of the Methodology for Public Reporting

The individual MRDWS Total Inspection Ratings are published with the ministry's Chief Drinking Water Inspector's Annual Report.

**Figure 1** presents the distribution of MRDWS ratings for a sample of annual inspections. Individual drinking water systems can compare against all the other inspected facilities over a period of inspection years.

**Figure 1: Year Over Year Distribution of MRDWS Ratings**



## Reporting Results to MRDWS Owners/Operators

A summary of inspection findings for each system is generated in the form of an Inspection Rating Record (IRR). The findings are grouped into the 15 possible modules of the inspection protocol,

which would provide the system owner/operator with information on the areas where they need to improve. The 15 modules are:

- |                         |                                 |  |  |
|-------------------------|---------------------------------|--|--|
| 1. Source               | 5. Treatment Process Monitoring | 9. Logbooks                            | 13. Water Quality Monitoring                       |
| 2. Permit to Take Water | 6. Process Wastewater           | 10. Contingency and Emergency Planning | 14. Reporting, Notification and Corrective Actions |
| 3. Capacity Assessment  | 7. Distribution System          | 11. Consumer Relations                 | 15. Other Inspection Findings                      |
| 4. Treatment Processes  | 8. Operations Manuals           | 12. Certification and Training         |  |

For further information, please visit [www.ontario.ca/drinkingwater](http://www.ontario.ca/drinkingwater)