

Appendix 'A': Inspection Report

Ministry of the Environment and
Climate Change

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December 22, 2017
The Corporation of the City of London
300 Dufferin Avenue
London, ON N6A 4L9

File no. SI-MI-LN-DU-540

Attention: Mr. John Simon – Division Manager – Water Operations

Re: City of London Distribution System (WW# 260004917)
Inspection conducted on November 29, 2017

Dear Mr. Simon,

The enclosed Drinking Water Inspection Report outlines non-compliance, if any, with Ministry legislation, and policies for the above noted water system. Violations noted in this report, if any, have been evaluated based on community risk. These violations will be monitored for compliance with the minimum standards for drinking water in Ontario as set forth under the *Safe Drinking Water Act* and associated regulations. Where risk is deemed to be high and/or compliance is an ongoing concern, violations will be forwarded to this Ministry's Investigation and Enforcement Branch.

In order to measure individual inspection results, the Ministry has established an inspection compliance risk framework based on the principles of the Inspection, Investigation & Enforcement (II&E) Secretariat and advice of internal/external risk experts. The Inspection Summary Rating Record (IRR) provides the Ministry, the system owner and the local Public Health Units with a summarized quantitative measure of the drinking water system's annual inspection and regulated water quality testing performance.

Section 19 of the *Safe Drinking Water Act* (Standard of Care) creates a number of obligations for individuals who exercise decision-making authority over municipal drinking water systems. Please be aware that the Ministry has encouraged such individuals, particularly municipal councillors, to take steps to be better informed about the drinking water systems over which they have decision-making authority. These steps could include asking for a copy of this inspection report and a review of its findings. Further information about Section 19 can be found in "*Taking Care of Your Drinking Water: A guide for members of municipal council*" found under "Resources" on the Drinking Water Ontario website at www.ontario.ca/drinkingwater.

Please note the attached IRR methodology memo describing how the risk rating model has improved to better reflect the health related and administrative non-compliance found in an inspection report. IRR ratings are published (for the previous inspection year) in the Ministry's Chief Drinking Water Inspector's Annual Report. If you have any questions or concerns regarding the rating, please contact John Ritchie, Drinking Water Program Supervisor (Acting), at (519) 371-4687.

If you have any questions regarding the report, please feel free to call me at (519) 873-5065.

Yours truly,

Neville Rising, P.Eng.
Provincial Officer
London District Office

cc. Middlesex London Health Unit
Upper Thames River Conservation Area
London District File
Dan Huggins, Water Quality Manager



Ministry of the Environment and Climate Change

**CITY OF LONDON DISTRIBUTION SYSTEM
Inspection Report**

Site Number:	260004917
Inspection Number:	1-F6WEL
Date of Inspection:	Nov 29, 2017
Inspected By:	Neville Rising



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Appendix A: Stakeholder References

Appendix B: Inspection Rating Record and Inspection Risk Methodology

OWNER INFORMATION:

Company Name:	LONDON, THE CORPORATION OF THE CITY OF	Unit Identifier:	
Street Number:	300		
Street Name:	DUFFERIN Ave		
City:	LONDON		
Province:	ON	Postal Code:	N6A 4L9

CONTACT INFORMATION

Type:	Owner	Name:	John Simon
Phone:	(519) 661-2500	Fax:	(519) 661-2352
Email:	jsimon@london.ca		
Title:	Division Manager - Water Operations		
Type:	Main Contact	Name:	Dan Huggins
Phone:	(519) 661-2500	Fax:	(519) 661-2352
Email:	dhuggins@london.ca		
Title:	Water Quality Manager		

INSPECTION DETAILS:

Site Name:	CITY OF LONDON DISTRIBUTION SYSTEM
Site Address:	300 Dufferin Avenue LONDON ON N6A 4L9
County/District:	London
MOECC District/Area Office:	London District
Health Unit:	MIDDLESEX-LONDON HEALTH UNIT
Conservation Authority:	
MNR Office:	
Category:	Large Municipal Residential
Site Number:	260004917
Inspection Type:	Unannounced
Inspection Number:	1-F6WEL
Date of Inspection:	Nov 29, 2017
Date of Previous Inspection:	Dec 07, 2016

COMPONENTS DESCRIPTION

Site (Name):	London Water Distribution System	Sub Type:	Other
Type:	Other		
Comments:	As of 2015, the Water Distribution System for London consisted of approximately 1,563 km of pipe ranging from 50mm to 1050mm. The type of pipe is roughly 34% polyvinyl chloride (PVC), 33% cast iron, 23% ductile iron, 8% reinforced concrete pressure pipe, and 2% steel. Water is obtained from the Elgin Area Primary Water Supply System as well as the Lake Huron Primary Water Supply System and serves approximately 381,000 people.		

Site (Name):	John Gillies (Arva) Pumping Station	Sub Type:	Booster Station
Type:	Other		

Comments:

Location: 13966 Medway Road, R.R. 1, Arva ON

UTM Coordinates: NAD 83, Zone 17, Easting 4744384.92 m and Northing 4766239.87 m

Equipment: Four (4) fixed speed horizontal centrifugal pumps rated at 58,000 m³/d, 55 m TDH; One (1) fixed speed horizontal centrifugal pump rated at 55,000 m³/d, 33 m TDH; One (1) fixed speed horizontal centrifugal pump rated at 140,000 m³/d, 37 m TDH

Fluoridation: Two (2) hydrofluorosilicic acid solution storage tanks, each 12.2 m³, two (2) day tanks, each 0.7 m³, online analyzer

Standby Power: 48 kW stationary diesel generator set

This main city pumping station conveys water to the City of London from the Lake Huron Primary Water Supply System reservoir in Arva. The pumping station is located adjacent to the Arva Reservoir. Pump discharge ball valves are used to modulate the discharge pressure. There are two parallel east and west pumping systems, with pumps 1, 2 and 3 on the west header, and pumps 4, 5 and 6 on the east header. Each discharge header has a magnetic flowmeter. A chlorine residual analyzer draws from the two headers. No chlorine is added at this location, but the distribution system is monitored on a continuous basis.

Fluoride is injected as 25% Hydrofluosilicic Acid solution into the pump suction conduit. There is a flow-paced fluoride injection system which maintains the fluoride concentration at a consistent level. Fluoride concentration is monitored: continuously by an on-line analyzer, daily by bench test and weight consumed calculation, and weekly lab samples.

Site (Name): Elgin-Middlesex Pumping Station (London Portion)
Type: Other **Sub Type:** Booster Station

Comments:
Location: 490 South Edgeware Street, St. Thomas ON

UTM Coordinates: NAD 83, Zone 17, Easting 488296.00 m and Northing 4737955.00 m

Equipment: One (1) fixed speed horizontal centrifugal pump rated at 73,000 m³/d, 77.5 m TDH; Two (2) fixed speed horizontal centrifugal pumps rated at 45,000 m³/d, 46 m TDH

Surge Protection: One (1) 167 m³ hydro-pneumatic tank, with two (2) air compressors

Standby Power: None

Notes: A standby generator exists at this facility, but it is owned by the St. Thomas Secondary Water Supply System and the Aylmer Secondary Water Supply System. It is not part of the City of London Distribution System.

There is a dual-celled reservoir at this location that is shared amongst the City of St. Thomas, the Town of Aylmer and the City of London/County of Elgin - Middlesex, each cell with 27,300 m³ capacities.

Site (Name): Springbank Pumping Station

Type: Other **Sub Type:** Booster Station

Comments:
Location: 848 Commissioners Road W, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 474731.50 m and Northing 4755576.72 m

Equipment: Two (2) fixed speed vertical turbine pumps rated at 11,768 m³/d, 35.1 m TDH; Two (2) variable speed vertical turbine pumps rated at 12,355 m³/d, 50.8 m TDH

Rechlorination: Sodium hypochlorite solution storage tank, 118.6 L, two (2) chemical metering pumps, one (1) operating on standby, rated at 3.6 L/h, with automatic switchover between pumps, online-chlorine analyzer

Standby Power: 450 kW stationary diesel generator set

The Springbank Pumping Station and Reservoir #3 are located adjacent to each other on the south side of Commissioners Road. Springbank Reservoir #1 and #2 are located to the north of the Springbank Pumping Station and Reservoir #3.

Site (Name): Westmount Pumping Station
Type: Other **Sub Type:** Booster Station

Comments:
Location: 603 Wonderland Road S, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 476275.11 m and Northing 4755700.82 m

Equipment: Four (4) variable speed vertical turbine pumps rated at 15,725 m³/d, 30 m TDH

Standby Power: 250 kW stationary diesel generator set

Site (Name): Pond Mills Pumping Station
Type: Other **Sub Type:** Booster Station

Comments:
Location: 1121 Commissioners Rd E, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 483865.44 m and Northing 4756577.00 m

Equipment: One (1) variable speed vertical turbine pump rated at 6,497 m³/d, 33.5 m TDH; Two (2) variable speed vertical turbine pumps rated at 10,454 m³/d, 33.5 m TDH

Standby Power: 200 kW stationary diesel generator set

Site (Name): Wickerson Pumping Station
Type: Other **Sub Type:** Booster Station

Comments:
Location: 2080 Wickerson Rd, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 471443.06 m and Northing 4755230.30 m

Equipment: Two (2) variable speed vertical turbine pumps rated at 11,578 m³/d, 38 m TDH; One (1) variable speed vertical turbine pump rated at 2,851 m³/d, 34 m TDH

Standby Power: 130 kW stationary diesel generator set

Site (Name): Hyde Park Pumping Station
Type: Other **Sub Type:** Booster Station
Comments:
Location: 1617 Hyde Park Rd, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 472944.70 m and Northing 4760841.25 m

Equipment: Two (2) variable speed vertical turbine pumps rated at 17,971 m³/d, 18.2 m TDH; One (1) variable speed vertical turbine pump rated at 8,208 m³/d, 14.0 m TDH

Standby Power: 230 kW stationary diesel generator set

Site (Name): Uplands Pumping Station
Type: Other **Sub Type:** Booster Station
Comments:
Location: 221 Sunningdale Rd E, London, ON

UTM Coordinates: NAD 83, Zone 17, Easting 477102.10 m and Northing 4765327.98 m

Equipment: Three (3) variable speed vertical turbine pumps rated at 9,072 m³/d, 18.4 m TDH; One (1) variable speed vertical turbine pump rated at 3,197 m³/d, 10.7 m TDH

Standby Power: 160 kW stationary diesel generator set

Site (Name): Springbank Reservoir #1
Type: Other **Sub Type:** Reservoir
Comments:
Location: 869 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474794.57 m and Northing 4755801.67 m

Description: In-ground reservoir

Dimensions: 117 m by 97 m, 11 m depth

Capacity: 81,800 m³ capacity

Notes: Rechlorination provided on-site and at Springbank Meterhouse No. 4

Site (Name): Springbank Reservoir #2
Type: Other **Sub Type:** Reservoir
Comments:
Location: 869 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474794.57 m and Northing 4755801.67 m

Description: In-ground reservoir

Dimensions: 105 m by 75.9 m at the top, 76 m by 44.2 m at the bottom, 9.23 m depth

Capacity: 45,400 m³ capacity

Notes: Reservoir has sloped sides and is equipped with a floating cover. Rechlorination provided on-site and at Springbank Meterhouse No. 4

Site (Name): Springbank Reservoir #3

Type: Other

Sub Type: Reservoir

Comments:

Location: 848 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474731.50 m and Northing 4755576.72 m

Description: In-ground reservoir

Dimensions: 117 m by 97 m, 11 m depth

Dimensions: 81,800 m³ capacity

Notes: Connected to the Springbank Pumping Station, Rechlorination provided at Springbank Pumping Station and at Springbank Meterhouse No. 4

Site (Name): Elgin-Middlesex Terminal Reservoir - London Cell

Type: Other

Sub Type: Reservoir

Comments:

Location: 490 South Edgeware St, St. Thomas ON

UTM Coordinates: NAD 83, Zone 17, Easting 488296.00 m and Northing 4737955.00 m

Description: One cell of an in-ground reservoir comprised of two (2) baffled cells in total

Dimensions : 71.7 m x 64.6 m, 5.9 m deep

Capacity: 27,300 m³ capacity

Notes: Treated water is supplied to this reservoir by the Elgin Area Primary Water Supply System. The Elgin-Middlesex Pumping Station (London Portion) draws water from this reservoir and pumps into the London Distribution System.

Site (Name): Elgin-Middlesex Pumping Station Hydro-Pneumatic Surge Tank

Type: Other

Sub Type: Other

Comments:

Location: 490 South Edgeware St, St. Thomas ON

UTM Coordinates: NAD 83, Zone 17, Easting 488296.00 m and Northing 4737955.00 m

Description: Steel pressure vessel

Dimensions: 167 m3 nominal capacity

Notes: Equipped with two (2) positive displacement air compressors rated at 7.4 m3/min at 1,380 kPa

Site (Name): Springbank Meterhouse No. 4 Rechlorination System

Type: Other

Sub Type: Secondary Treatment

Comments:

Location: 809 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474932.59 m and Northing 4755630.50 m

Equipment: Two (2) booster pumps, one (1) duty and one (1) standby, gas chlorinator rated at 24 kg/d, two (2) chlorine cylinders on electronic scales, one (1) chlorine leak detector, one (1) portable standby chlorinator connection

Notes: Chlorine gas system. Compound loop control re-chlorination system with an on-line chlorine analyzer

Site (Name): Springbank Reservoirs No.1 & 2 - Rechlorination System

Type: Other

Sub Type: Secondary Treatment

Comments:

Location: 869 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474794.57 m and Northing 4755801.67 m

Equipment: Two (2) booster pumps, one (1) for the injector and one (1) for the analyser, gas chlorinator rated at 24 kg/d, two (2) chlorine cylinders on electronic scales, one (1) chlorine leak detector, one (1) portable standby chlorinator connection

Notes: Chlorine gas system. Compound loop control re-chlorination system with an on-line chlorine analyzer

Site (Name): Springbank Pumping Station Rechlorination System

Type: Other

Sub Type: Secondary Treatment

Comments:

Location: 848 Commissioners Rd W, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474731.50 m and Northing 4755576.72 m

Equipment: Two (2) Sodium Hydroxide metering pumps, one (1) duty, one (1) standby, rated at 3.6 L/h, one (1) Sodium Hydroxide plastic storage tank having 118.6 L capacity

Notes: 12% Sodium Hydroxide system. PID control re-chlorination system with an on-line chlorine analyzer

Site (Name): Fanshawe Well Field

Type: Source **Sub Type:** GUDI w Effective Insitu

Comments:

Location: 2835 Sunningdale Rd E, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 483663.70 m and Northing 4767052.02 m

Description: Drilled groundwater emergency/standby wells

Equipment: Six (6) vertical turbine well pump, four (4) rated at 53 L/s, and two (2) rated at 79 L/s operated at 53 L/s; Each well is equipped with a line valve, a blow-off line with valve, and a flowmeter.

Chlorination: Gas chlorination system on common discharge header, 68 kg chlorine cylinder, top mounted chlorinator, manual scale, chlorine injector pump and sample line

Given the well system is considered to be an emergency backup system only, the Owner has been granted certain relief from the strict requirements of Ontario Regulation 170/03. The conditions associated with the relief have been presented within the Municipal Drinking Water Licence #006-101 – Schedule D.

Site (Name): Hyde Park Well

Type: Source

Sub Type: Ground Water

Comments:

Location: 500 Hyde Park Rd, London ON

UTM Coordinates: NAD 83, Zone 17, Easting 474166.79 m and Northing 4757479.30 m

Description: Drilled groundwater emergency/standby well

Equipment: One (1) vertical turbine well pump rated at 53 L/s; Equipped with a line valve, a blow-off line with valve, and a flowmeter.

Chlorination: Gas chlorination system, 68 kg chlorine cylinder, top mounted chlorinator, manual scale, chlorine injector pump and sample line

Standby Power: Not Provided

Notes: Used in accordance with Schedule D of the Municipal Drinking Water Licence only

Given the well system is considered to be an emergency backup system only, the Owner has been granted certain relief from the strict requirements of Ontario Regulation 170/03. The conditions associated with the relief have been presented within the Municipal Drinking Water Licence #006-101 – Schedule D.

Site (Name): Southeast Reservoir and Pumping Station

Type: Other

Sub Type: Reservoir

Comments:

Approval was granted to construct a 113 ML reservoir and pumping station to primarily service the southeast area of the City of London. It will consist of the following major components:

- an in-ground reservoir consisting of two (2) baffled cells each approximately 57 ML in volume complete with all

necessary inlet, outlet and inter cell piping and valving as per the contract drawings.

- four (4) horizontal-split case water pumps each rated at 434 L/s at 62 m Total Dynamic Head (TDH) complete with all necessary piping, valves and controls as per the contract drawings.
- two (2) pumps, each rated at 125 L/s at a TDH of 58 m and equipped with adjustable speed drives;
- a gas chlorination system consisting of two (2) nominal 70 kg gas chlorine cylinders stored within two (2) containment vessels in a separate chlorination room for the purpose of re-chlorinating water as it enters the reservoir system and/or on the pumping station discharge, on an as-needed basis, and three (3) wall mounted gas chlorinators, each rated at 45 kg/d; one (1) for re-chlorination of the common reservoir inlet pipe and one (1) for each of the two (2) pumping station discharge pipes. System complete with chlorine analyzers, scales, chlorine gas detection equipment and controls for flow pacing and/or compound loop control.
- a 1,250 kW diesel generator set complete with fuel tank, electrical, and controls.
- all additional mechanical, structural, architectural, and electrical components designed for the facility to be constructed as per the contract drawings.

Site (Name): MOE DWS Mapping
Type: DWS Mapping Point

Sub Type:

INSPECTION SUMMARY:

Introduction

- **The primary focus of this inspection is to confirm compliance with Ministry of the Environment and Climate Change (MOECC) legislation as well as evaluating conformance with ministry drinking water policies and guidelines during the inspection period.**

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.

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 the elements required to assess key compliance and conformance issues associated with a "receiver" system. This report does not contain items associated with the inspection of the donor system, such as source waters, intakes/wells and treatment facilities.

This report is based on a "focused" inspection of the system. Although the inspection involved fewer activities than those normally undertaken in a detailed inspection, it contained critical elements required to assess key compliance issues. This system was chosen for a focused inspection because the system's performance met the ministry's criteria, most importantly that there were no deficiencies as identified in O.Reg. 172/03 over the past 3 years. The undertaking of a focused inspection at this drinking water system does not ensure that a similar type of inspection will be conducted at any point in the future.

This inspection report does not suggest that all applicable legislation and regulations were evaluated. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

As part of the inspection, several documents were reviewed to support the conclusions and inferences presented within this report. Generally, these include but are not limited to:

1. Drinking Water Works Permit # 006-201, Issue #3 dated November 20, 2015
2. Drinking Water Works Permit # 006-201, Issue #4 dated September 21, 2017
3. Municipal Drinking Water Licence # 006-101, Issue #4 dated November 20, 2015
4. Municipal Drinking Water Licence # 006-101, Issue #5 dated September 21, 2017
5. Permit to Take Water # 5587-8FFRJC dated April 5, 2011
6. "Waterworks Operations and Maintenance Manual" prepared by the City of London and dated October 2012

Other documents reviewed include microbiological and chemical testing results, logsheets, etc. It should be noted that this inspection covers the period from December 1, 2016 to October 31, 2017.

The City of London water distribution system receives treated water from the Lake Huron Primary Water Supply System (WW# 210000791) and the Elgin Area Primary Water Supply System (WW# 210000871).

Treatment Processes

- **The owner had ensured that all equipment was installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit.**

At the time of the site inspection, the Fanshawe and Hyde Park well field and treatment system were physically

Treatment Processes

disconnected from the City of London drinking water system. In addition, the Southeast Reservoir and Pumping Station became operational on September 11, 2017. The aforementioned changes to the system are not referenced in the current Drinking Water Works Permit #006-201 - Issue #4, dated September 21, 2017, however, the Owner / Operating Authority did complete the appropriate Director's Notification Forms and Form 2 documents to account for the changes. It is inferred these changes will be present on the next issued Drinking Water Works Permit.

- **The owner/operating authority was in compliance with the requirement to prepare Form 1 documents as required by their Drinking Water Works Permit during the inspection period.**

Over the course of the inspection period, the Operating Authority provided a total of 21 Form 1 documents for review associated with the installation of new watermains and the replacement of existing watermains.

- **The owner/operating authority was in compliance with the requirement to prepare Form 2 documents as required by their Drinking Water Works Permit during the inspection period.**

Over the course of the inspection period, the Operating Authority provided a total of 8 Form 2 documents for review associated with minor modifications and replacements associated with the drinking water system.

- **Records confirmed that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.**

The City of London Distribution System is equipped with permanent rechlorination systems and multiple online free chlorine analyzers throughout the distribution system through which the free chlorine is continually monitored. In addition, the Operating Authority also uses portable chlorine analyzers to measure the concentration of free chlorine at various locations throughout the distribution system when collecting microbiological samples.

According to the manual grab samples collected, there were no events when the concentration of free chlorine was less than 0.05 mg/L. In addition, according to the alarm summaries associated with the online free chlorine analyzers, there were no occasions when the concentration of free chlorine was less than 0.05 mg/L with the exception of short, acceptable periods of time during which power outages, equipment calibrations, etc., occurred.

Treatment Process Monitoring

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

Ontario Regulation 170/03 – Schedule 7-2(3) and 7-2(4) stipulates that at least seven distribution samples are collected for testing each week for free chlorine residual. A sample for chlorine residual testing can be collected each day, otherwise at least four samples must be collected on one day, and at least three samples must be collected on another day in the same week, at least 48 hours apart.

The City of London uses a portable meter to collect free chlorine residual readings throughout the distribution system in conjunction with the collection of microbiological samples. Based on the sampling regime, the City of London collects at least four samples on one day in a week, and at least three samples on another day in the same week, separated by at least 48 hours.

In addition, there are several locations throughout the distribution system where online free chlorine meters are utilized for operational purposes. These online analyzers are fitted with alarms to notify the Operating Authority in the event that the free chlorine concentrations are less than the alarm setpoints. They are not considered regulatory meters.

- **Operators were examining continuous monitoring test results and they were examining the results within 72 hours of the test.**

Treatment Process Monitoring

The Operating Authority typically reviews the online data on a daily basis by way of the SCADA system.

- **All continuous monitoring equipment utilized for sampling and testing required by O. Reg.170/03, or Municipal Drinking Water Licence or Drinking Water Works Permit or order, were equipped with alarms or shut-off mechanisms that satisfy the standards described in Schedule 6.**

The City of London Distribution system is equipped with online operational chlorine analysers at each of its major components. At these locations, the concentration of free chlorine is continuously monitored and recorded. Although the Operating Authority does not rely on these online meters to meet with the regulatory requirements for free chlorine monitoring, they have been set up with alarms to aid with the operation of the system. Generally stated, the current free chlorine alarms setpoints are as follows:

1. Low Low Alarm = 0.20 mg/L
2. Low Alarm = 0.25 to 0.30 mg/L
3. High Alarm = 1.5 mg/L (Shut Down)
4. High High Alarm = 2.0 mg/L

There are two operational online fluoride analyzers located at the Arva Reservoir and the Southeast Reservoir and Pumping Station. The alarm setpoints for these meters are as follows:

1. Low Low Alarm = 0.40 mg/L
2. Low Alarm = 0.50 mg/L
3. High Alarm = 0.80 mg/L
4. High High Alarm = 1.00 mg/L (Shut Down at 0.90 mg/L)

In addition, the Operating Authority also uses a portable chlorine analyzer to measure the concentration of free chlorine at various locations throughout the distribution system.

- **All continuous analysers were calibrated, maintained, and operated, in accordance with the manufacturer's instructions or the regulation.**

The City of London utilizes several online free chlorine analyzers throughout the distribution system at major components for operational purposes. In addition, there are two online fluoride analyzers used to measure the fluoride concentrations from the Arva Reservoir and from the Southeast Reservoir and Pumping Station. As part of the City of London maintenance and calibration procedures, their portable meters are verified on a quarterly basis and these portable meters are used to assess the accuracy of the operational (non-regulatory) online meters throughout the system. In the event that the measurements from the online analyzers relative to the portable meters exceeds an acceptable range, adjustments are made to ensure their accuracy. The Operating Authority advised that records of all adjustments are maintained on logsheets.

Distribution System

- **Existing parts of the distribution system that are taken out of service for inspection, repair or other activities that may lead to contamination, and all new parts of the distribution system that come in contact with drinking water, were not disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit, or an equivalent procedure (i.e. the Watermain Disinfection Procedure).**

According to the documentation provided for review, there were occasions when the free chlorine residual was measured during new watermain installations, but the time over which the chlorination occurred was not recorded on the logsheets. In addition, the aforementioned logsheets did not identify the chlorination method employed during the installation of new watermains (i.e. continuous, slug, etc.)

Operations Manuals

Operations Manuals

- **The operations and maintenance manuals contained plans, drawings and process descriptions sufficient for the safe and efficient operation of the system.**
- **The operations and maintenance manuals did not meet the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA.**

Over the course of the inspection period, significant changes to the City of London distribution system have occurred. Generally stated, the Southeast Reservoir and Pumping Station was commissioned for service on September 11, 2017. In addition, the Fanshawe Park and Hyde Park well fields and treatment systems were physically disconnected from the City of London drinking water system on October 3 and 19, 2017, respectively. The current Operations and Maintenance Manual is dated October 2012, and does not reflect the aforementioned changes, modifications and additions to the water system at this time. Municipal Drinking Water Licence #006-101 - Issue #5, Section 16.0, dated September 21 Sept 2017 – Section 16.0 prescribes the minimum requirements for the Operations and Maintenance Manual.

Logbooks

- **Logbooks were properly maintained and contained the required information.**
- **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.**

The City of London employs Certified Operators to conduct any tests not completed by online continuous monitoring equipment.

Security

- **The owner had not provided security measures to protect components of the drinking water system.**

The component buildings associated with the City of London water distribution system remain locked at all times and are equipped with entry alarms which are connected to a dialing system to alert the Operating Authority / Owner of unathourized entry.

At the time of the site inspection, the hatches at Springbank Reservoir #3 were observed to be improperly sealed which could allow foreign material, insects, etc., to gain access to the treated water within the reservoir. Similarly, there are 17 reservoir hatches on the Southeast Reservoir Pumping Station reservoirs that did not have seals / gaskets to properly ensure foreign material, insects, etc. could not enter.

Certification and Training

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

The City of London currently has two qualified Operators that have been designated as the Overall Responsible Operators for the water systems. Each of these Operators rotate their duty as the ORO on a monthly basis. This combination of staff members provides continuity in the event of absenteeism.

- **Operators in charge had been designated for all subsystems which comprised the drinking-water system.**
- **Only certified operators made adjustments to the treatment equipment.**

Water Quality Monitoring

Water Quality Monitoring

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

Ontario Regulation 170/03 – Schedule 10-2 stipulates that distribution water samples are required to be collected for testing every week within the frequency prescribed by Ontario Regulation 170/03 – Schedule 6-1.1 (1). Testing of the samples collected from the distribution system must include E. coli, total coliforms on all samples, and 25% of the required samples must be tested for general bacteria population expressed as colony counts on a heterotrophic plate count.

According to the Operating Authority, the City of London Distribution system serves a total population of approximately 381000 people. Given this information, a minimum of 138 microbiological samples are required to be collected for testing each month. Over the course of the inspection period, the Operating Authority typically collected over 200 microbiological samples per month for testing which meets with the requirements of Ontario Regulation 170/03 – Schedule 10-2.

- **All haloacetic acid water quality monitoring requirements prescribed by legislation are being conducted within the required frequency and at the required location.**

Ontario Regulation 170/03 – Schedule 13-6.1 stipulates that haloacetic acids are required to be collected and tested every three months from the distribution water within the required frequency as prescribed by Ontario Regulation 170/03 – Schedule 6-1.1(4). According to documentation provided for review from the Owner / Operating Authority, samples were collected on the following days from the distribution system:

1. January 24, 2017 – HAA = 5.3 ug/L
2. April 11, 2017 – HAA = 5.3 ug/L
3. June 21, 2017 – HAA = 7.8 ug/L
4. June 21, 2017 – HAA = 8.0 ug/L
5. June 21, 2017 – HAA = 7.4 ug/L
6. June 21, 2017 – HAA = 17.7 ug/L
7. July 4, 2017 – HAA = 5.6 ug/L
8. September 20, 2017 – HAA = 17.0 ug/L
9. September 20, 2017 – HAA = 9.4 ug/L
10. September 20, 2017 – HAA = 10.0 ug/L
11. September 20, 2017 – HAA = 14.2 ug/L
12. October 17, 2017 – HAA = 7.4 ug/L

Based on the aforementioned tests, the Owner / Operating Authority are in compliance with the requirements for collecting haloacetic acids water quality samples as prescribed on Ontario Regulation 170/03 – Schedule 13-6.1.

- **All trihalomethane water quality monitoring requirements prescribed by legislation were conducted within the required frequency and at the required location.**

Ontario Regulation 170/03 – Schedule 13-6 stipulates that trihalomethanes are required to be collected and tested every three months from the distribution water within the required frequency as prescribed by Ontario Regulation 170/03 – Schedule 6-1.1(4). According to documentation provided for review from the Owner / Operating Authority, samples were collected from the distribution system on the following dates:

1. December 21, 2016 – THM = 13 ug/L
2. December 21, 2016 – THM = 17 ug/L

Water Quality Monitoring

3. December 21, 2016 – THM = 26 ug/L
4. December 21, 2016 – THM = 15 ug/L
5. January 10, 2017 – THM = 12 ug/L
6. March 28, 2017 – THM = 19 ug/L
7. March 28, 2017 – THM = 27 ug/L
8. March 28, 2017 – THM = 12 ug/L
9. March 28, 2017 – THM = 23 ug/L
10. April 11, 2017 – THM = 16 ug/L
11. June 21, 2017 – THM = 33 ug/L
12. June 21, 2017 – THM = 33 ug/L
13. June 21, 2017 – THM = 25 ug/L
14. June 21, 2017 – THM = 45 ug/L
15. July 4, 2017 – THM = 24 ug/L
16. September 20, 2017 – THM = 44 ug/L
17. September 20, 2017 – THM = 48 ug/L
18. September 20, 2017 – THM = 33 ug/L
19. September 20, 2017 – THM = 56 ug/L
20. October 17, 2017 – THM = 30 ug/L

Based on the aforementioned tests, the Owner / Operating Authority are in compliance with the requirements for collecting trihalomethane water quality samples as prescribed by Ontario Regulation 170/03 – Schedule 13-6.

- **All water quality monitoring requirements imposed by the Municipal Drinking Water Licence and/or Drinking Water Works Permit were not being met.**

Schedule D – Section 1 of Municipal Drinking Water Licence ("MDWL") #006-101 (Issue #4 dated 20 Nov 2015) stipulates that 10 distribution samples for Ontario Regulation 170/03 - Schedule 15.1 testing are to be collected for testing in each sampling period. Prior to, and including the inspection period, the City of London system collected the following samples:

1. December 15, 2015 – April 15, 2016
 - a. 10 distribution samples for pH and Alkalinity testing
2. June 15, 2016 – October 15, 2016
 - a. 10 distribution samples for Lead, pH and Alkalinity testing
 - a. 2 distribution samples for Alkalinity testing
3. December 15, 2016 – April 15, 2017
 - a. 10 distribution samples for Lead, pH and Alkalinity testing – collected on April 19, 2017
4. June 15, 2017 – October 15, 2017
 - a. 12 distribution samples for pH and Alkalinity testing

The appropriate number of samples were collected as prescribed by the MDWL, however the samples collected in Period #3 above did not fall between December 15, 2016 – April 15, 2017 as prescribed by Ontario Regulation 170/03 – Schedule 15.1-5. It should be noted that MDWL # #006-101 (Issue #4) was recently revoked and replaced with Issue #5 which eliminated this requirement.

Water Quality Monitoring

Schedule C - Section 5 of the recent Municipal Drinking Water Licence (Issue #5 dated 21 Sept 2017) stipulates that a study is required to assess the effectiveness of the corrosion control plan implemented by the City of London. Generally stated, the study involves the collection and analysis of lead, alkalinity, pH, etc samples from the distribution system and residential and non-residential sampling locations. Section 5.3 stipulates that a Corrosion Control Evaluation Report be prepared and submitted to the Director by March 31, annually. In addition, Section 5.4 of stipulates that the sampling data outlined in Section 5.1.3 be submitted to the Director by January 31, annually. Given this requirement is new to the Municipal Drinking Water Licence issued on September 21, 2017, the reporting has not yet been required to date, but the Owner is reminded of the aforementioned milestone dates for submission of the required elements.

In addition, Schedule D – Section 2.0 of Municipal Drinking Water Licence #006-101 (Issue #5 dated 21 Sept 2017) stipulates certain relief conditions associated with the operation of the Fanshawe and Hyde Park Emergency Well System. Generally stated, the conditions are variable, depending on whether the well system is put into service. Over the course of the inspection period, the well system was not in service, and as such, the following tests were required:

1. E. Coli – each well annually
2. Total Coliform – each well annually
3. Turbidity – each well annually

The aforementioned testing was completed on June 21, 2017. It should be noted that in October 2017, the Fanshawe and Hyde Park well systems were physically disconnected from the City of London distribution system, and as such, this testing is no longer possible.

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

Water Quality Assessment

- **Records did not show that all water sample results taken during the inspection review period did not exceed the values of tables 1, 2 and 3 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03).**

Over the course of the inspection period, there were a total of 16 adverse water quality incidents ("AWQI"). Each of these AWQIs were related to microbiological contamination based on testing performed by the laboratory.

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.**

Over the course of the inspection period, there were a total of 16 adverse water quality incidents ("AWQI"). Each of these AWQIs were related to microbiological contamination based on testing performed by the laboratory. During these events, the appropriate corrective actions were completed and the Spills Action Centre and the Medical Officer of Health (i.e. Health Unit) were contacted.

- **All required notifications of adverse water quality incidents were immediately provided as per O. Reg. 170/03 16-6.**
- **All changes to the system registration information were not provided within ten (10) days of the change.**

Reporting & Corrective Actions

At the time of the site inspection, the Owner / Operating Authority did advise that the majority of phone numbers on the DWIS profile were not representative of the current phone numbers associated with each referenced individual on the profile. The Owner / Operating Authority further indicated that the City of London recently re-assigned all of their telephone numbers which was not reflected on the DWIS profile. In addition, the Owner / Operating Authority advised that one of the representatives listed on the profile had retired, and the population noted on the profile was out of date.

Other Inspection Findings

- **The following issues were also noted during the inspection:**

A. Over the course of the inspection period, the Hyde Park and Fanshawe wells and treatment systems were physically disconnected from the City of London water distribution system and are planned for decommissioning. Permit to Take Water # 5587-8FFRJC dated April 5, 2011 authorizes the City of London with permitted takings from the aforementioned wells until March 31, 2021.

B. On October 3 and 19, 2017, the Fanshawe Park and Hyde Park well field and treatment system were physically disconnected from the City of London drinking water system, respectively. Similarly, the Southeast Reservoir and Pumping Station became operational on September 11, 2017. According to discussions with the Owner / Operating Authority, a reassessment of the works and determination of the type and classification of the drinking water system has not yet been completed.

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.

- 1 Existing parts of the distribution system that are taken out of service for inspection, repair or other activities that may lead to contamination, and all new parts of the distribution system that come in contact with drinking water, were not disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit, or an equivalent procedure (i.e. the Watermain Disinfection Procedure).**

According to the documentation provided for review, there were occasions when the free chlorine residual was measured during new watermain installations, but the time over which the chlorination occurred was not recorded on the logsheets. In addition, the aforementioned logsheets did not identify the chlorination method employed during the installation of new watermains (i.e. continuous, slug, etc.)

Action(s) Required:

From herein, the Owner / Operating Authority shall ensure that when existing parts of the distribution system that are taken out of service for inspection, repair or other activities that may lead to contamination, and all new parts of the distribution system that come in contact with drinking water, they are disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit, or an equivalent procedure (i.e. the Watermain Disinfection Procedure). Compliance with this requirement will be assessed during the next inspection of the water system. In addition, it is recommended that the free chlorine concentration of the flushed water from any watermain repair / modification is measured following dechlorination and recorded, in addition, to the method of dechlorination.

- 2 The operations and maintenance manuals did not meet the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA.**

Over the course of the inspection period, significant changes to the City of London distribution system have occurred. Generally stated, the Southeast Reservoir and Pumping Station was commissioned for service on September 11, 2017. In addition, the Fanshawe Park and Hyde Park well fields and treatment systems were physically disconnected from the City of London drinking water system on October 3 and 19, 2017, respectively. The current Operations and Maintenance Manual is dated October 2012, and does not reflect the aforementioned changes, modifications and additions to the water system at this time. Municipal Drinking Water Licence #006-101 - Issue #5, Section 16.0, dated September 21 Sept 2017 – Section 16.0 prescribes the minimum requirements for the Operations and Maintenance Manual.

Action(s) Required:

The Owner / Operating Authority shall provide an up to date Operations and Maintenance Manual to account for the recent changes to the drinking water system to Neville Rising of the Ministry of the Environment and Climate Change by March 31, 2018. The manual must include, at a minimum, the elements prescribed by Section 16.0 of the current Municipal Drinking Water Licence. In addition, the Owner / Operating Authority is reminded that all alterations to the drinking water system must be incorporated into the Operations and Maintenance Manual prior to those alterations coming into operation as prescribed by Section 16.3 of Municipal Drinking Water Licence #006-101 - Issue #5.

- 3 All water quality monitoring requirements imposed by the Municipal Drinking Water Licence and/or Drinking Water Works Permit were not being met.**

Schedule D – Section 1 of Municipal Drinking Water Licence ("MDWL") #006-101 (Issue #4 dated 20 Nov 2015) stipulates that 10 distribution samples for Ontario Regulation 170/03 - Schedule 15.1 testing are to be collected for testing in each sampling period. Prior to, and including the inspection period, the City of London system collected the following samples:

1. December 15, 2015 – April 15, 2016
 - a. 10 distribution samples for pH and Alkalinity testing
2. June 15, 2016 – October 15, 2016
 - a. 10 distribution samples for Lead, pH and Alkalinity testing
 - a. 2 distribution samples for Alkalinity testing
3. December 15, 2016 – April 15, 2017
 - a. 10 distribution samples for Lead, pH and Alkalinity testing – collected on April 19, 2017
4. June 15, 2017 – October 15, 2017
 - a. 12 distribution samples for pH and Alkalinity testing

The appropriate number of samples were collected as prescribed by the MDWL, however the samples collected in Period #3 above did not fall between December 15, 2016 – April 15, 2017 as prescribed by Ontario Regulation 170/03 – Schedule 15.1-5. It should be noted that MDWL # #006-101 (Issue #4) was recently revoked and replaced with Issue #5 which eliminated this requirement.

Action(s) Required:

None. Municipal Drinking Water Licence #006-101 dated November 20, 2015 was revoked and replaced by Municipal Drinking Water Licence #006-101 dated September 21, 2017 which no longer requires this specific testing. In lieu of the previously required lead testing, Municipal Drinking Water Licence #006-101 – Issue #5, Schedule C, Section 5.0 prescribes certain requirements for lead testing associated with the City of London Corrosion Control Plan. The Section 5.0 requirements have certain milestone dates for reporting and providing data to the Ministry of the Environment and Climate Change that the Owner / Operating Authority is reminded about.

4 All changes to the system registration information were not provided within ten (10) days of the change.

At the time of the site inspection, the Owner / Operating Authority did advise that the majority of phone numbers on the DWIS profile were not representative of the current phone numbers associated with each referenced individual on the profile. The Owner / Operating Authority further indicated that the City of London recently re-assigned all of their telephone numbers which was not reflected on the DWIS profile. In addition, the Owner / Operating Authority advised that one of the representatives listed on the profile had retired, and the population noted on the profile was out of date.

Action(s) Required:

None. Upon being notified of the out dated information presented on the DWIS profile, the Owner / Operating Authority immediately made modifications to the profile, and forwarded them to the MOEEC registration staff to be updated. The Owner / Operating Authority is reminded that all changes to the profile information for the water system must be made within 10 days of any changes as prescribed by Ontario Regulation 170/03 – Section 10.1(3).

SUMMARY OF RECOMMENDATIONS AND BEST PRACTICE ISSUES

This section provides a summary of all recommendations and best practice issues identified during the inspection period. Details pertaining to these items can be found in the body of the inspection report. In the interest of continuous improvement in the interim, it is recommended that owners and operators develop an awareness of the following issues and consider measures to address them.

1. The owner had not provided security measures to protect components of the drinking water system.

The component buildings associated with the City of London water distribution system remain locked at all times and are equipped with entry alarms which are connected to a dialing system to alert the Operating Authority / Owner of unauthorized entry.

At the time of the site inspection, the hatches at Springbank Reservoir #3 were observed to be improperly sealed which could allow foreign material, insects, etc., to gain access to the treated water within the reservoir. Similarly, there are 17 reservoir hatches on the Southeast Reservoir Pumping Station reservoirs that did not have seals / gaskets to properly ensure foreign material, insects, etc. could not enter.

Recommendation:

It is recommended that the Owner / Operating Authority retrofit the hatches associated with the reservoirs to ensure proper seals are installed to mitigate the entry of foreign material, insects, etc. It is further recommended that the Owner / Operating Authority conduct periodic checks of the hatch seals to ensure they are functioning properly, and log this information into their logbooks.

2. The following issues were also noted during the inspection:

A. Over the course of the inspection period, the Hyde Park and Fanshawe wells and treatment systems were physically disconnected from the City of London water distribution system and are planned for decommissioning. Permit to Take Water # 5587-8FFRJJC dated April 5, 2011 authorizes the City of London with permitted takings from the aforementioned wells until March 31, 2021.

B. On October 3 and 19, 2017, the Fanshawe Park and Hyde Park well field and treatment system were physically disconnected from the City of London drinking water system, respectively. Similarly, the Southeast Reservoir and Pumping Station became operational on September 11, 2017. According to discussions with the Owner / Operating Authority, a reassessment of the works and determination of the type and classification of the drinking water system has not yet been completed.

Recommendation:

A. It is recommended that the Owner / Operating Authority contact the MOECC Technical Support Department to advise of the physical disconnection of the Hyde Park and Fanshawe wells and their planned decommissioning to allow for the appropriate amendments to the Permit to Take Water to be made.

B. The Owner / Operating Authority shall forthwith apply for redetermination of the type and classification of the drinking water system as prescribed by Ontario Regulation 128/04 – Section 3(3). The Owner / Operating Authority shall notify Neville Rising of the Ministry of the Environment and Climate Change in writing following completion of the prepared application.

SIGNATURES

Inspected By:

Neville Rising

Signature: (Provincial Officer)



Reviewed & Approved By:

John Ritchie

Signature: (Supervisor)



Review & Approval Date: December 22, 2017

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.



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report Appendix A**

Stakeholder References

Key Reference and Guidance Material for Municipal Residential Drinking Water Systems

Many useful materials are available to help you operate your drinking water system. Below is a list of key materials owners and operators of municipal residential drinking water systems frequently use.

To access these materials online click on their titles in the table below or use your web browser to search for their titles. 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.

For more information on Ontario's drinking water visit www.ontario.ca/drinkingwater and email drinking.water@ontario.ca to subscribe to drinking water news.



PUBLICATION TITLE	PUBLICATION NUMBER
Taking Care of Your Drinking Water: A Guide for Members of Municipal Councils	7889e01
FORMS: Drinking Water System Profile Information, Laboratory Services Notification, Adverse Test Result Notification Form	7419e, 5387e, 4444e
Procedure for Disinfection of Drinking Water in Ontario	4448e01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids	7152e
Total Trihalomethane (TTHM) Reporting Requirements Technical Bulletin (February 2011)	8215e
Filtration Processes Technical Bulletin	7467
Ultraviolet Disinfection Technical Bulletin	7685
Guide for Applying for Drinking Water Works Permit Amendments, Licence Amendments, Licence Renewals and New System Applications	7014e01
Certification Guide for Operators and Water Quality Analysts	
Guide to Drinking Water Operator Training Requirements	9802e
Taking Samples for the Community Lead Testing Program	6560e01
Community Sampling and Testing for Lead: Standard and Reduced Sampling and Eligibility for Exemption	7423e
Guide: Requesting Regulatory Relief from Lead Sampling Requirements	6610
Drinking Water System Contact List	7128e
Technical Support Document for Ontario Drinking Water Quality Standards	4449e01

ontario.ca/drinkingwater

Principaux guides et documents de référence sur les réseaux résidentiels municipaux d'eau potable

De nombreux documents utiles peuvent vous aider à exploiter votre réseau d'eau potable. Vous trouverez ci-après une liste de documents que les propriétaires et exploitants de réseaux résidentiels municipaux d'eau potable utilisent fréquemment.

Pour accéder à ces documents en ligne, cliquez sur leur titre dans le tableau ci-dessous ou faites une recherche à l'aide de votre navigateur Web. Communiquez avec le Centre d'information au public au 1 800 565-4923 ou au 416 325-4000, ou encore à picemail.moe@ontario.ca si vous avez des questions ou besoin d'aide.



Pour plus de renseignements sur l'eau potable en Ontario, consultez le site www.ontario.ca/eaupotable ou envoyez un courriel à drinking.water@ontario.ca pour suivre l'information sur l'eau potable.

TITRE DE LA PUBLICATION	NUMÉRO DE PUBLICATION
Prendre soin de votre eau potable – Un guide destiné aux membres des conseils municipaux	7889f01
Renseignements sur le profil du réseau d'eau potable, Avis de demande de services de laboratoire, Formulaire de communication de résultats d'analyse insatisfaisants et du règlement des problèmes	7419f, 5387f, 4444f
Marche à suivre pour désinfecter l'eau potable en Ontario	4448f01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids (en anglais seulement)	7152e
Total Trihalomethane (TTHM) Reporting Requirements: Technical Bulletin (février 2011) (en anglais seulement)	8215e
Filtration Processes Technical Bulletin (en anglais seulement)	7467
Ultraviolet Disinfection Technical Bulletin (en anglais seulement)	7685
Guide de présentation d'une demande de modification du permis d'aménagement de station de production d'eau potable, de modification du permis de réseau municipal d'eau potable, de renouvellement du permis de réseau municipal d'eau potable et de permis pour un nouveau réseau	7014f01
Guide sur l'accréditation des exploitants de réseaux d'eau potable et des analystes de la qualité de l'eau de réseaux d'eau potable	
Guide sur les exigences relatives à la formation des exploitants de réseaux d'eau potable	9802f
Prélèvement d'échantillons dans le cadre du programme d'analyse de la teneur en plomb de l'eau dans les collectivités	6560f01
Échantillonnage et analyse du plomb dans les collectivités : échantillonnage normalisé ou réduit et admissibilité à l'exemption	7423f
Guide: Requesting Regulatory Relief from Lead Sampling Requirements (en anglais seulement)	6610
Liste des personnes-ressources du réseau d'eau potable	7128f
Document d'aide technique pour les normes, directives et objectifs associés à la qualité de l'eau potable en Ontario	4449f01

ontario.ca/eaupotable



Ministry of the Environment and Climate Change
Drinking Water System Inspection Report Appendix B

Inspection Rating Record and Inspection Risk Methodology

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 up to 14 inspection modules and consists of approximately 120 regulatory questions. Those protocol questions are also linked to definitive guidance that ministry inspectors use when conducting MRDWS inspections.

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).

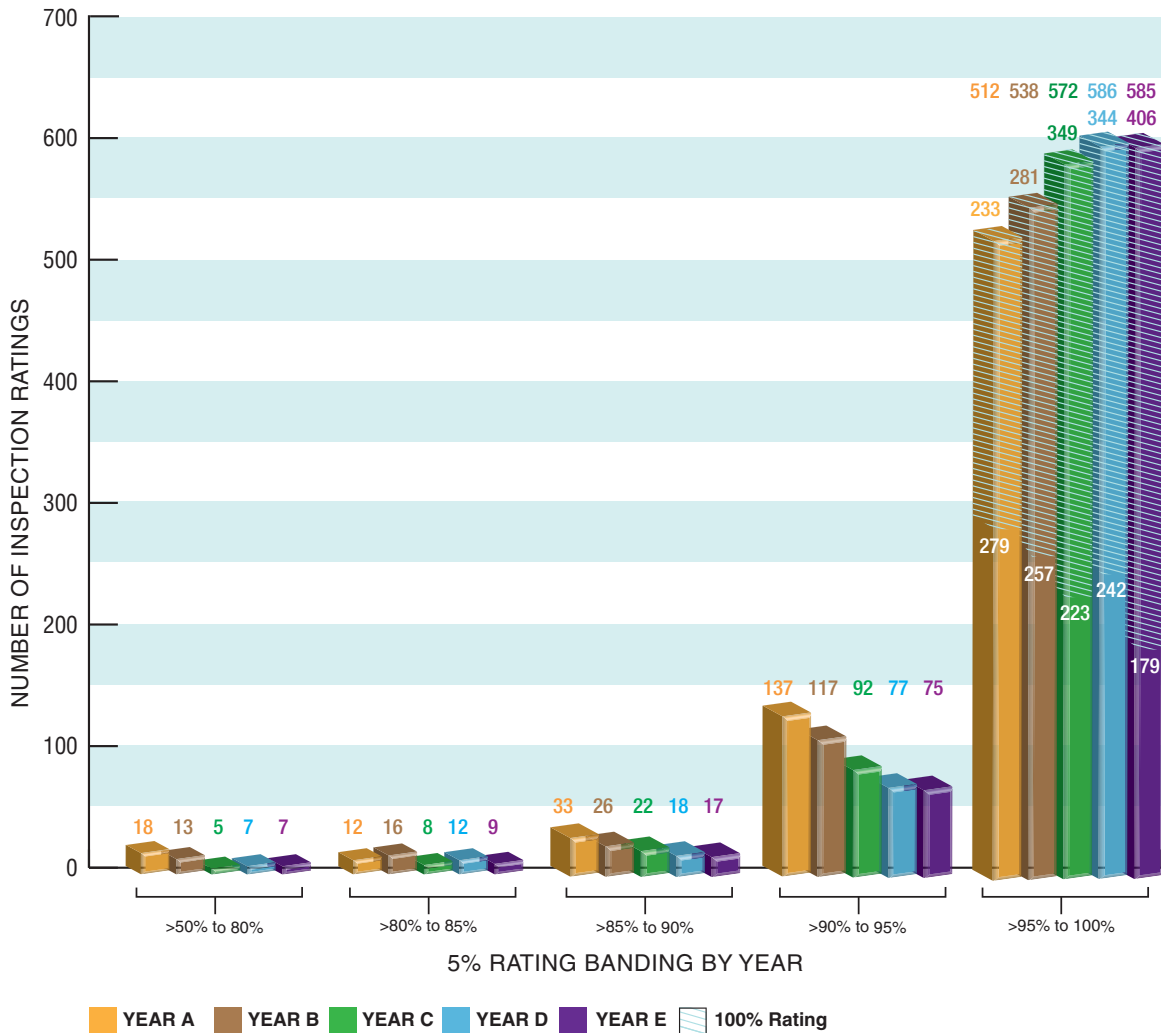
The risk ratings of all non-compliant answers are summed and divided by the sum of the risk ratings of all questions asked (maximum question rating). The resulting inspection risk rating (as a percentage) is subtracted from 100 per cent to arrive at the final inspection rating.

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 14 possible modules of the inspection protocol,

which would provide the system owner/operator with information on the areas where they need to improve. The 14 modules are:

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

For further information, please visit www.ontario.ca/drinkingwater

Ministry of the Environment - Inspection Summary Rating Record (Reporting Year - 2017-2018)

DWS Name:	CITY OF LONDON DISTRIBUTION SYSTEM
DWS Number:	260004917
DWS Owner:	London, The Corporation Of The City Of
Municipal Location:	London

Regulation: O.REG 170/03
Category: Large Municipal Residential System
Type Of Inspection: Adhoc
Inspection Date: November 29, 2017
Ministry Office: London District

Maximum Question Rating: 320

Inspection Module	Non-Compliance Rating
Treatment Processes	0 / 43
Distribution System	21 / 21
Operations Manuals	14 / 28
Logbooks	0 / 18
Certification and Training	0 / 28
Water Quality Monitoring	12 / 63
Reporting & Corrective Actions	4 / 49
Treatment Process Monitoring	0 / 70
TOTAL	51 / 320

Inspection Risk Rating	15.94%
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FINAL INSPECTION RATING:	84.06%
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Ministry of the Environment - Detailed Inspection Rating Record (Reporting Year - 2017-2018)

DWS Name: CITY OF LONDON DISTRIBUTION SYSTEM
DWS Number: 260004917
DWS Owner: London, The Corporation Of The City Of
Municipal Location: London

Regulation: O.REG 170/03
Category: Large Municipal Residential System
Type Of Inspection: Adhoc
Inspection Date: November 29, 2017
Ministry Office: London District

Non-compliant Question(s)	Question Rating
Distribution System	
Are existing parts of the distribution system that are taken out of service for inspection, repair or other activities that may lead to contamination, and all new parts of the distribution system that come in contact with drinking water, disinfected in accordance with Schedule B, Condition 2.3 of the Drinking Water Works Permit, or an equivalent procedure (i.e. the Watermain Disinfection Procedure)?	21
Operations Manuals	
Do the operations and maintenance manuals meet the requirements of the DWWP and MDWL issued under Part V of the SDWA?	14
Reporting & Corrective Actions	
Have all changes to the system registration information been provided to the Ministry within ten (10) days of the change?	4
Water Quality Monitoring	
Are all water quality monitoring requirements imposed by the Municipal Drinking Water Licence and Drinking Water Works Permit being met?	12
TOTAL QUESTION RATING	51

Maximum Question Rating: 320

Inspection Risk Rating	15.94%
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FINAL INSPECTION RATING:	84.06%
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