

2017 Summary Report

Lemieux Island Water Purification Plant & Distribution System

1.0 General overview

The City of Ottawa provides treatment, storage, and distribution of high quality drinking water to approximately 892,000 residents and industrial water users. The central water supply includes the Britannia and Lemieux Island Water Purification Plants which utilize the Ottawa River for their source water. Treated drinking water from both plants is distributed through a large network of water mains, pumping stations, reservoirs, and elevated tanks including a direct water supply to Russell Township. Outside of the central supply, the City operates (5) well systems that provide drinking water to rural communities located in Carp, Richmond (Kings Park subdivision), Munster, Greely (Shadow Ridge subdivision), and Vars.

This report deals specifically with the production and distribution of drinking water from the Lemieux Island Water Purification Plant (WPP). The report must review regulatory requirements, standards and drinking water license requirements as a means of demonstrating compliance with drinking water regulations and the provision of safe drinking water during 2017.

The report has been prepared in fulfillment of Schedule 22 of O.Reg.170/03, which requires that a Summary Report be prepared for each water supply system and given to the members of municipal council by March 31st of the following year. The report covers the period from January 1st, 2017 to December 31st, 2017.

2.0 Drinking water regulations

The Safe Drinking Water Act (2002) was created in response to the events in Walkerton, as a means of ensuring the provision of safe drinking water throughout the province. Under the authority of the Safe Drinking Water Act, several key regulations have been established over the last number of years:

- O.Reg.170/03 – Drinking Water Systems Regulation
- O.Reg.169/03 – Ontario Drinking Water Quality Standards
- O.Reg.248/03 – Drinking Water Testing Services
- O.Reg.128/04 – Certification of Drinking Water Systems Operators
- O.Reg.188/07 – Licensing of Municipal Drinking Water systems
- O.Reg.170/03 (Appendix) – Procedure for Disinfection of Drinking Water in Ontario
- O.Reg.170/03 (Sch.15.1) – Community Lead Testing Program
- O.Reg.284/07 – Source Water Protection Regulation

These regulations cover all aspects of municipal water supply, including treatment requirements, quality standards, test frequency, operations and maintenance, operator qualifications, laboratory testing, inspections, reports, and public notification.

3.0 System approval and accreditation

In addition to the regulations noted above, the Ministry of Environment and Climate Change (MOECC) requires all owners of municipal drinking water systems to obtain a Municipal Drinking Water License (MDWL) for each drinking water system. These licenses are comprised of five elements, as listed below:

- **Permit To Take Water**
- **Drinking Water Works Permit**
- **Operational Plan**
- **Accredited Operating Authority**
- **Financial Plan**

Ottawa's municipal water systems operate under a comprehensive quality management system which is required in Ontario through the *Safe Drinking Water Act, 2002*. The Drinking Water Quality Management System (DWQMS) was established in 2007 to ensure proper oversight and management of the drinking water supply. It is composed of 21 Elements that cover all aspects of drinking water supply including: plant operations, infrastructure, maintenance, risk assessment, water quality testing, staff training, documentation, and continual improvement.

The City of Ottawa is the Operating Authority for the Lemieux Island Water Purification Plant and was awarded its third party accreditation on October 3rd, 2011. Since that time, the City has maintained its accreditation through annual external audits of the Quality Management System and re-accreditation audits on a triennial basis. Re-accreditation was awarded by NSF International Strategic Registrations on October 4, 2014 and October 2, 2017. Collectively, these elements help to ensure the provision of safe drinking water to the public.

4.0 Annual inspection

The Ministry of Environment and Climate Change (MOECC) carried out its annual inspection of the Lemieux Island Water Purification Plant on January 17th, 2018. The inspection focused on regulatory compliance, plant operations, data records, operator certification, record keeping, and management practices for the period January 1st to December 31st, 2017.

An inspection report was received on March 8th, 2018. There were (0) Provincial Orders, (0) Items of Non-Compliance, and (0) Best Practice Recommendations cited by the Inspector. A final inspection rating of 100% was given for the Lemieux Island Water Purification Plant. The % rating is a risk-based score determined from 100 regulatory questions covering 15 inspection categories.

5.0 Compliance with drinking water regulations

During 2017, the Lemieux Island Water Purification Plant and Distribution System were compliant with drinking water regulatory requirements, with any exceptions noted below in section 6.0. The table in Appendix I demonstrates compliance by listing all key regulatory requirements for drinking water in comparison to the operational results achieved during 2017. The table illustrates both the comprehensive nature of provincial requirements and the diligence of drinking water staff in complying with drinking water regulations.

6.0 Items of non-compliance

There was (1) incident of non-compliance observed during 2017 for the Lemieux Island Water Purification Plant and (1) incident of non-compliance observed in the central water distribution system, as noted below:

Lemieux Island WPP Filter #9 turbidity analyzer failure: on January 11th, 2017 a plant technician noticed that Filter #9 turbidity analyzer was in “alarm” and reading 0.0 NTU. Upon further investigation, the event lasted for a period of 5 hours with the computer trend incorrectly showing 0.03 NTU during this period. Regulations require that each filter must operate with a continuous turbidity analyzer at all times. The technician repaired the analyzer and the measurement signal was restored to normal. The analyzer was programmed to send a 0.2 NTU signal in the event of an alarm condition in order to alert operators in the future. A sample of filter effluent was taken and measured 0.03 NTU using a bench-scale turbidity meter, confirming that normal water quality was maintained during the analyzer outage.

Distribution system incorrect valve operation for watermain break: on January 6th, 2017 as a result of a suspected watermain break, a section of watermain near Cordova and Withrow was isolated and depressurized for 9 days. Field crews then opened the valve to restore the water supply before the watermain break had been repaired. In this instance, it was possible that improperly disinfected water was released into the distribution system. Accordingly, City staff reported the incident to the MOECC as an Adverse Water Quality Incident (AWQI), and conducted a risk assessment in collaboration with Ottawa Public Health. Operating staff took a number of bacteriological samples within the affected area and test results were clear. The specific portion of watermain was later isolated to conduct the repair. Subsequent to the repair, the main was flushed and a bacteriological sample taken as per MOECC procedures.

7.0 Summary of annual water production

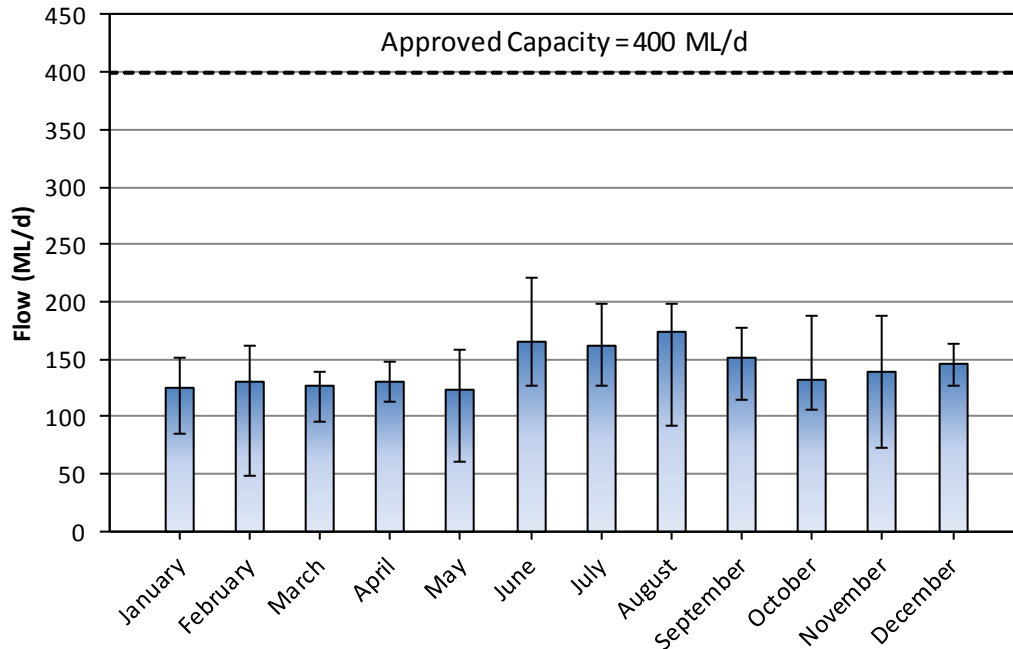
The Lemieux Island Water Purification Plant treated and distributed an average of 142.1 Million Liters per day (ML/d), which represents 36 % of the approved plant capacity. The daily flow rates ranged from a minimum of 49.5 (ML/d) to a maximum of 220.4 (ML/d). The table and graph below summarize the 2017 water production by month. The 2017 maximum daily flow rate of 220.4 (ML/d) was within the approved capacity of the treatment system, which is 400.0 (ML/d).

Lemieux Island WPP daily water production flow rates by month during 2017

	Average Daily Flow Rate	Minimum Daily Flow Rate	Maximum Daily Flow Rate
Month	(ML/d)	(ML/d)	(ML/d)
January	125.1	85.4	151.3
February	130.5	49.5	162.6
March	126.6	96.0	139.6
April	129.8	112.8	147.4
May	123.8	61.4	158.7
June	165.0	126.1	220.4
July	161.3	127.3	197.9
August	174.1	92.8	197.8
September	151.0	115.3	178.2
October	131.6	105.7	187.8
November	138.9	73.7	187.2
December	146.5	126.6	164.1
Year End	142.1	49.5	220.4
	(Average)	(Min. Day)	(Max. Day)

2017 Lemieux Island Water Production by month

(minimum, average & maximum daily flow rate)



The combined average water production rate for the Britannia and Lemieux Island plants together was 269.2 (ML/d). This rate of withdrawal to supply Ottawa's central water system represents less than 1% of the Ottawa River flow (approximately 0.25 %).

8.0 Water quality report

The Ontario Drinking Water System Regulation O.Reg.170/03 defines requirements for water quality sampling and testing based on categories of test parameters: microbiological, operational, inorganic, and organic. In order to fully characterize drinking water quality, the City of Ottawa conducts additional testing for hundreds of trace organic, pharmaceutical, and radiological substances. The table attached in Appendix II summarizes the test results for Lemieux Island treated water, which represents water as it enters into the distribution system. It is important to note that in addition to treated water, water quality testing is conducted in the raw (untreated) water, at each stage of the treatment process, and at 60 routine sample sites located throughout the distribution system (e.g. pump stations, reservoirs, schools, fire halls, etc.).

For comparison against the water quality results, the Ontario Drinking Water Standards (O.Reg.169/03) are presented in the right column of the table to indicate the maximum acceptable concentration (MAC) for various substances in drinking water. These standards are based on the Health Canada Guidelines for Canadian Drinking Water Quality. The MAC concentration limits are set at levels that are deemed to be protective of public health for daily water consumption over a lifetime.

During 2017, there were no test results that exceeded MAC levels for health-based parameters. The results demonstrate that drinking water supplied from the Lemieux Island Water Purification Plant and Distribution System was of high quality and met Ontario Drinking Water Standards (O.Reg.169/03) and the Health Canada Guidelines for Canadian Drinking Water Quality.

9.0 Summary

The operation of the Lemieux Island Water Purification Plant and Distribution System complied with Ontario requirements of drinking water regulations, permits, and licenses except where noted above in Section 6.0. The quality of treated and distributed drinking water remained high during 2017 and met all federal and provincial standards for safe drinking water.

Appendix I

Lemieux Island Water Purification Plant & Distribution System

Regulatory requirements and compliance with Safe Drinking Water Act (2002)

Drinking water system: Lemieux Island W.P.P. and Central Distribution System
Source Water: Ottawa River
Waterworks No.: 220003207
Date of report: March 31, 2018

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance	Lead Person
Water Treatment						
T1	Raw (river) water taking	PTTW #4062-7QMKQM	Raw water flow must be <450 ML/d	Avg. intake flow = 155.8 ML/d Max. daily flow = 234.7 ML/d	yes	Y. Zawada
T2	Raw (river) water taking	PTTW #4062-7QMKQM	Daily raw water taking flow rates for previous year must be submitted to MOECC by March 31	Daily water taking data submitted to MOECC Water Taking and Reporting System by March 31	yes	Y. Zawada
T3	Treated water production	MDWL #008-102 Sch.(C) 1.0	Treated water flow must be <400 ML/d	Average daily flowrate = 144.2 ML/d Max. daily flowrate = 219.1 ML/d	yes	Y. Zawada
T4	Treatment barriers	O.Reg.170/03 Sch.1.4	Treatment must include chemically assisted filtration	Chemically assisted filtration treatment was provided at all times during the year	yes	Y. Zawada
T5	Treatment barriers	O.Reg.170/03 Sch.1.2	Treatment barriers must be operated: (i) whenever water is being supplied, (ii) in accordance with the <i>Procedure for Disinfection</i> , & (iii) to achieve the design capability	During 2017, all treatment barriers were fully operational whenever the treatment plant was in production	yes	Y. Zawada

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance ²	Lead Person
T6	Pathogen removal	MDWL #008-102 Sch.(E) 1.0	Treatment must be designed and operated to achieve: 3-log (99.9%) reduction of Crypto 4-log (99.99%) reduction of Giardia 5-log (99.999%) reduction of Virus	Pathogen inactivation+removal targets were met at all times during the year; Log-Crypto = 6.5-log log-Giardia = 9.3-log log-Virus = 54.0-log <i>(using minimum CT values)</i>	yes	Y. Zawada
T7	Filter turbidity monitoring	O.Reg.170/03 Sch.7.3	Each filter must operate with a dedicated continuous analyzer to monitor filter effluent turbidity	Each of the (18) filters were monitored by a continuous turbidity analyzer, with exception of 5-hour failure in Filter #9 (see NOTE 1)	no ¹	Y. Zawada
T8	Filter turbidity performance	O.Reg.170/03 <i>Procedure for Disinfection</i>	Filter effluent turbidity measurements must be <0.3 NTU in 95% of monthly readings	>99% of the monthly filter effluent turbidity readings were <0.3 NTU	yes	Y. Zawada
T9	Secondary disinfection	O.Reg.170/03 Sch.1.5	Secondary disinfection equipment must be capable of providing 1.0 mg/L combined chlorine (chloramine) throughout the distribution system	Secondary disinfection levels in treated water ranged from 1.54 mg/L to 2.35 mg/L.	yes	P.Wilson
T10	Continuous analyzers	O.Reg.170/03 Sch.6.5, Sch.7.2	Must provide minimum testing frequency , alarm settings, operator response, data review within 72 hours, chlorine at CT outlet, calibration	In 2017, (18) filter effluent turbidity, (2) total chlorine analyzers, and (2) primary disinfection chlorine analyzers	yes	Y. Zawada
T11	Chemicals and materials	MDWL #008-102 Section 14.0	Chemicals and materials in contact with drinking water must meet standards NSF/60, NSF/61, & NSF 372	NSF certification achieved for all (7) treatment chemicals	yes	Y. Zawada
T12	Waste & residual management	MDWL #008-102 Sch.(C) 1.5	Total suspended solids <25 mg/L (annual average); Total chlorine <0.02 mg/L (maximum); pH between 6.0 and 9.5 pH units	During 2017 the average concentration of total suspended solids was 12.2 mg/L; Total chlorine <0.02 mg/L; Daily pH values 6.17 – 8.76 (range)	yes	Y. Zawada

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance ?	Lead Person
T13	Calibration of flow measuring devices	MDWL #008-102 Sch.(C) 2.0	Annual calibration for raw water and treated water flow meters	During 2017 both raw and treated water flow meters were calibrated	yes	Y. Zawada
Water Quality						
W1	Microbiological sampling & testing	O.Reg.170/03 Sch.10.2, 10.3, & 10.4	Raw water – weekly TC/EC (n=52) Treated water – weekly TC/EC (n=52) Treated water – weekly HPC (n=52) Distrib. – 186/month TC/EC (n=2232) Distrib. – 46/month HPC (n=558)	Raw water – TC/EC (n=365) Treated water – TC/EC (n=1450) Treated water – HPC (n=200) Distrib. – TC/EC (n=5103) Distrib. – HPC (n=2930)	yes	P.Wilson
W2	Chemical sampling & testing	O.Reg.170/03 Sch.13.2, Sch.13.3	Inorganics (9 trace metals) – 1/year Organics (56 chemicals) – 1/year	Inorganics – in 2017, 12 samples were analyzed for trace metals Organics – In 2017, 4 samples were analyzed for trace organics	yes	P.Wilson
W3	Trihalomethanes, haloacetic acids, nitrate, nitrite, & sodium	O.Reg.170/03 Sch.13.6, 13.6.1, 13.7, & 13.8	trihalomethanes – 4/year (dist.) haloacetic acids – 4/year (dist.) nitrate/nitrite – 4/year sodium – 1 sample every 5 years	trihalomethanes – in 2017, 44 samples haloacetic acids – in 2017, 44 samples nitrate/nitrite – in 2017, 12 samples sodium – in 2017, 12 samples taken	yes	P.Wilson
W4	Chlorine residual testing in distribution system	O.Reg.170/03 Sch.7.2.3	At least 7 samples per week, either daily or 4/3 at least 48 hours apart with multiple locations	Met through operation of (3) continuous chlorine analyzers in distribution system: Barrhaven Res., Ottawa South PS, Leitrim PS	yes	P.Wilson
W5	Chlorine readings for bacteriological samples	O.Reg.170/03 Sch.6.3	Chlorine residual must be measured and recorded for every bacteriological sample	1,450 treated and 5,103 distribution bacteriological samples were taken during the year; all samples had a chlorine residual measured and recorded.	yes	P.Wilson
W6	Fluoride testing	O.Reg.170/03 Sch.7.4	Fluoride concentration measured at least once per day (n=365 tests per year)	Fluoride measured 2x per day (n=724 samples taken) plus continuous analyzer	yes	P.Wilson

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance ²	Lead Person
W7	Increased frequency of testing for chemicals	O.Reg.170/03 Sch.13.5	Increase test frequency to quarterly if test result exceeds half the Ontario Drinking Water Quality Standard	Test frequency is at least quarterly for parameters that exceeded half the MAC concentration: chloramine (2.35 mg/L) and fluoride (0.75 mg/L)	yes	P.Wilson
W8	Lead testing in consumer tap water	O.Reg.170/03 Sch.15.1	Twice per year, conduct 30-minute stagnation sampling in 50 homes with lead service pipes, 5 buildings, and 10 distribution locations; (n=240) 90 th percentile lead concentrations for Litre-1 and Litre-2 must be <10 ppb	In 2017, the required number of samples were taken (262 samples taken). 90 th percentile concentrations were <10 ppb: 7.0 ppb (summer) and 5.8 ppb (winter)	yes	P.Wilson
W9	Duty to report adverse water quality test results	O.Reg.170/03 Sch.16.3, 16.4, 16.6, 16.7, 16.8, 16.9	Report immediately to MOH, MOECC, written report within 24 hours, corrective actions taken, resolution notice within 7 days	During 2017 there were no (0) adverse water quality report for the Lemieux Island WPP and (4) adverse reports for the distribution system. All adverse samples were reported, investigated and resolved according to O. Reg. 170/03.	yes	P.Wilson/ C.Hall
W10	Corrective actions for adverse water quality	O.Reg.170/03 Sch.17.2 – 17.13	Specific corrective actions are required for each type of Adverse Water Quality event : improper disinfection, filter turbidity, chlorine residual, E.coli, total coliforms, <i>Aeromonas</i> , chemical MAC, pesticide, sodium	For all (4) adverse water quality reports, the required corrective actions were taken	yes	P.Wilson/ C. Hall
W11	Retention of records	O.Reg.170/03 Section 13	2 years – operational checks & microbiological testing 6 years – chemical testing, lead testing, corrective actions, annual & summary reports 15 years – sodium, fluoride, Engineer Reports	All records retained as per the regulation: 2 years required– 5 years retained 6 years required– 8 years retained 15 years required– 15 years retained	yes	P.Wilson

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance ²	Lead Person
W12	Notification of laboratory testing	O.Reg.170/03 Sch.6.9	Must provide written notification to the MOECC for the identity of the Laboratory performing regulatory testing of water samples	Written notifications were provided to MOECC in 2008 with an update in 2016 & 2017 for regulatory testing at the ROPEC, Caduceon & SGS Lakefield (& subcontracted) Laboratories	yes	P.Wilson
W13	Laboratory testing of drinking water samples	O.Reg.248/03 Section 1	Analysis of parameters with a health-based drinking water quality standard must be performed by a licensed and accredited laboratory	ROPEC, Caduceon & SGS Lakefield (& subcontracted) Laboratories are all licensed and accredited labs	yes	P.Wilson
W14	Research - laboratory testing of water samples	O.Reg.248/03 Section 5	Provide written notification to MOECC for research samples being analyzed in non-licensed laboratories	(3) research notification forms updated, signed, and available for MOECC inspection: pharmaceuticals & PFOS/PFOA, Crypto/Giardia, & radiological testing	yes	I.Douglas
Water Distribution						
D1	Repair and disinfection of watermains	DWWP #008-202; Sch.B 2.3	All watermains or related fixtures that come in contact with drinking water must be disinfected as per the MOECC Watermain Disinfection Procedure and/or AWWA Standard C651 before being put into service	During 2017, all new water mains and watermain repairs were disinfected as per requirements of AWWA Standard C651 and the MOECC Watermain Disinfection Procedure with one exception (see NOTE 2)	no ²	C.Hall
Operator Certification						
O1	Overall Responsible Operator (ORO)	O.Reg.128/04	Overall Responsible Operator must be certified to level of the system: Level-4 (Treatment) & Level-3 (Distribution); can be one level lower for up to 150 days per year	During 2017, Overall Responsible Operators held Class-3/4 license (treatment) and Class-2/3 license (distribution) as required by regulation O.Reg.128/04	yes	Y. Zawada / C.Hall

No.	Description	Legislation	Regulatory Requirement	Results Achieved	Regulatory Compliance ?	Lead Person
O2	Treatment & distribution operators	O.Reg.170/03 Sch.1.2; O.Reg.128/04 Sch.22	All adjustments to water treatment and distribution system must be carried out by certified operators	The treatment plant and distribution system was operated and/or supervised by certified operators at all times during the reporting period	yes	Y. Zawada / C.Hall
O3	Water quality testing	O.Reg.170/03 Sch.7.5	All drinking water tests must be performed by a Certified Operator or Water Quality Analyst	Field testing performed by Process Operators, Remote Facility Operators, & Water Distribution Operators (all certified by MOECC)	yes	P.Wilson
Reports & Record-keeping						
R1	Summary reports	O.Reg.170/03 Sch.22.2	Prepare and transmit Summary Report for each water system to municipal council by March 31 st of the next calendar year	Summary Report was prepared and transmitted by March 31 st , 2018	yes	T.Rose
R2	Annual reports	O.Reg.170/03 Section 11	Prepare Annual Report for each water system and make available to public by February 28 th of the next calendar year	Annual Report was prepared and posted on www.ottawa.ca website on February 14 th , 2018	yes	T.Rose
R3	Alterations to the system	DWWP #008-202 ; Sch.B 4.0	Any alteration of the treatment system must be documented in Forms 2/3 – Record of Minor Modification, retained on-site for 10 years	During 2017, there were no minor modification project carried out for this facility.	yes	Y.Zawada
R4	Alterations to the system	DWWP #008-202 ; Sch.B 4.0	Any alteration of the water mains must be documented in Form 1 – Record of Water Mains Authorized as a Future Alteration, retained on-site for 10 years	All water main alterations carried out during 2016 were recorded in Form 1 documents, stored on City Intranet Site	yes	C.Hall

NOTE 1: *Lemieux Island WPP Filter #9 turbidity analyzer failure:* on January 11th, 2017, a plant technician noticed that Filter #9 turbidity analyzer was in “alarm” and reading 0.0 NTU. Upon further investigation, the event lasted for a period of 5 hours with the computer trend incorrectly showing 0.03 NTU during this period. Regulations require that each filter must operate with a continuous turbidity analyzer at all times. The technician repaired the analyzer and the measurement signal was restored to normal. The analyzer was programmed to send a 0.2 NTU signal in the event of an alarm condition in order to alert operators in the future. A sample of filter effluent was taken and measured 0.03 NTU using a bench-scale turbidity meter, confirming that normal water quality was maintained during the analyzer outage.

NOTE 2: *Distribution system incorrect valve operation for watermain break:* on January 6th, 2017, as a result of a suspected watermain break, a section of watermain near Cordova and Withrow was isolated and depressurized for 9 days. Field crews then opened the valve to restore the water supply before the watermain break had been repaired. In this instance, it was possible that improperly disinfected water was released into the distribution system. Accordingly, City staff reported the incident to the MOECC as an Adverse Water Quality Incident (AWQI), and conducted a risk assessment in collaboration with Ottawa Public Health. Operating staff took a number of bacteriological samples within the affected area and test results were clear. The specific portion of watermain was later isolated to conduct the repair. Subsequent to the repair, the main was flushed and a bacteriological sample taken as per MOECC procedures.

Regulations, Licenses, & Permits:

MDWL – Municipal Drinking Water License

DWWP – Drinking Water Works Permit

PTTW – Permit To Take Water

O.Reg.170/03 – Drinking Water Systems Regulation

O.Reg.169/03 – Ontario Drinking Water Quality Standards

O.Reg.248/03 – Drinking Water Testing Services

O.Reg.128/04 – Certification of Drinking Water Systems Operators

O.Reg.188/07 – Licensing of Municipal Drinking Water systems

O.Reg.170/03 (Appendix) – Procedure for Disinfection of Drinking Water in Ontario

O.Reg.170/03 (Sch.15.1) – Community Lead Testing Program

AWWA – American Water Works Association

Glossary:

NOTE: water quality testing refers to treated water samples unless otherwise stated

ML/d = mega-Litres per day = million Litres per day

WPP = Water Purification Plant

TC = Total Coliform bacteria, units of (cfu/100mL)

EC = E.coli bacteria, units of (cfu/100mL)

HPC = Heterotrophic Plate Count bacteria, units of (cfu/mL)

PS = Pump Station

MAC = maximum acceptable concentration for Ontario Drinking Water Standards

MOH – Medical Officer of Health

MOECC – Ministry of Environment and Climate Change



City of Ottawa

Lemieux Water Purification Plant - 2017 Drinking Water Quality

physical, microbiological, chemical, & radiological test results

Physical

Test Parameter	units	Treated water results	Drinking water standard*
Colour	TCU	2.5	5.0 (A)
Turbidity	NTU	0.053	5.0 (A)
Temperature	°C	0.2 - 24.5	<15.0 (A)
Conductivity	m-mhos/cm	160	
UV254 absorbance	abs/cm	0.05	
Total Dissolved Solids	mg/L	103	500 (A)

Microbiological

Test Parameter	units	Treated water results	Drinking water standard*
Total Coliforms	cfu/100mL	0 of 1445 tests >0	0
E.coli	cfu/100mL	0 of 1445 tests >0	0
Heterotrophic Plate Count (HPC)	cfu/mL	range: <10 - 100	500 (O)

Chemical - general

Test Parameter	units	Treated water results	Drinking water standard*
pH	log ₁₀	9.39	² 7.0 - 10.5 (O)
Alkalinity	mg/L CaCO ₃	35.3	30 - 500 (O)
Bromate	mg/L	<0.003	0.01
Bromide	mg/L	0.009	
Calcium	mg/L	9.4	
Chlorate	mg/L	0.10	1.0
Chloride	mg/L	7.0	250 (A)
Chlorine (total, as chloramine)	mg/L	1.80	3.0
Chlorite	mg/L	<0.01	1.0
Cyanide	mg/L	<0.002	0.2
Fluoride	mg/L	0.69	1.5
Iodide	mg/L	0.0006	
Magnesium	mg/L	2.4	
Potassium	mg/L	0.66	
Silicon	mg/L	2.62	
Sodium	mg/L	19.4	⁶ 20, 200 (A)
Sulphate	mg/L	28.6	500 (A)
Total Hardness**	mg/L CaCO ₃	33.3	80 - 100 (A)
Calcium Hardness**	mg/L CaCO ₃	23.6	
Magnesium Hardness**	mg/L CaCO ₃	9.7	
Ammonia	mg/L N	<0.01	
Total Kjeldahl Nitrogen	mg/L N	0.35	
Organic Nitrogen**	mg/L N	0.33	³ 0.15 (O)
Nitrate	mg/L N	0.18	10
Nitrite	mg/L N	<0.02	1
Phosphate	mg/L P	<0.002	
Dissolved Organic Carbon	mg/L	3.3	5 (A)
Langelier's Index**	log ₁₀	-1.5	
C-T Disinfection**	mg/L-min	182.3	
Log Giardia Disinfection**	log ₁₀	9.1-log	min 0.5-log
Log Virus Disinfection**	log ₁₀	>10-log	min 3.0-log

Chemical - inorganic metals

Test Parameter	units	Treated water results	Drinking water standard*
Aluminum	mg/L	0.0828	0.1 (O)
Antimony	mg/L	0.0002	0.006
Arsenic	mg/L	0.0002	² 0.010/ ³ 0.025
Barium	mg/L	0.0143	1
Beryllium	mg/L	<	
Bismuth	mg/L	<	
Boron	mg/L	0.0059	5
Cadmium	mg/L	<	0.005
Chromium	mg/L	0.0002	0.05
Chromium VI	mg/L	0.0001	
Cobalt	mg/L	<	
Copper	mg/L	0.0013	1 (A)
Iron	mg/L	0.0029	0.3 (A)
Lead	mg/L	<	0.01
Manganese	mg/L	0.0022	0.05 (A)
Mercury	mg/L	<	0.001
Molybdenum	mg/L	<	
Nickel	mg/L	0.0004	
Selenium	mg/L	<	0.05
Silver	mg/L	0.0001	
Strontium	mg/L	0.0457	
Thallium	mg/L	<	
Tin	mg/L	<	
Titanium	mg/L	<	
Tungsten	mg/L	<	
Uranium	mg/L	<	0.02
Vanadium	mg/L	0.0002	
Zinc	mg/L	0.0016	5 (A)
Zirconium	mg/L	0.0002	

Chemical - organics

Test Parameter	units	Treated water results	Drinking water standard*
1,1,1-Trichloroethane	µg/L	<	
1,1,1,2-Tetrachloroethane	µg/L	<	
1,1,2,2-Tetrachloroethane	µg/L	<	
1,1,2-Trichloroethane	µg/L	<	
1,1-Dichloroethane	µg/L	<	
1,1-Dichloroethylene	µg/L	<	14.0
1,1-Dichloropropene	µg/L	<	
1,2,3-Trichlorobenzene	µg/L	<	
1,2,3-Trichloropropane	µg/L	<	
1,2,4-Trichlorobenzene	µg/L	<	
1,2,4-Trimethylbenzene	µg/L	<	
1,2-Dibromo-3-chloropropane / DBCP	µg/L	<	
1,2-Dichlorobenzene	µg/L	<	200, 3.0 (A)
1,2-Dichloroethane	µg/L	<	5.0
1,2-Dichloroethylene - cis	µg/L	<	
1,2-Dichloroethylene - trans	µg/L	<	
1,2-Dichloropropane	µg/L	<	
1,3,5-Trimethylbenzene	µg/L	<	
1,3-Dichlorobenzene	µg/L	<	
1,3-Dichloropropane	µg/L	<	
1,3-Dichloropropene - cis	µg/L	<	
1,3-Dichloropropene - trans	µg/L	<	
1,4-Dichlorobenzene	µg/L	<	5.0, 1.0 (A)
2,2-Dichloropropane	µg/L	<	

Chemical - organics

Test Parameter	units	Treated water results	Drinking water standard*
2,3,4,6-Tetrachlorophenol	µg/L	<	100, 1.0 (A)
2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T)	µg/L	<	
2,4,6-Trichlorophenol	µg/L	<	5.0, 2.0 (A)
2,4-DDT	µg/L	<	
2,4-Dichlorophenol	µg/L	<	900, 0.3 (A)
2,4-Dichlorophenoxyacetic Acid (2,4-D)	µg/L	<	100
2-Chlorotoluene	µg/L	<	
2-Hexanone	µg/L	<	
4-Chlorotoluene	µg/L	<	
Acetone	µg/L	<	
Alachlor	µg/L	<	5.0
Aldicarb	µg/L	<	
Aldrin	µg/L	<	
Aldrin + Dieldrin	µg/L	<	
Atrazine	µg/L	<	
Atrazine + N-dealkylated metabolites	µg/L	<	5.0
Atrazine-desethyl	µg/L	<	
Azinphos-methyl	µg/L	<	20
Bendiocarb	µg/L	<	
Benzene	µg/L	<	² 5.0 / ³ 1.0
Benzo(a)pyrene	µg/L	<	0.01
Bromobenzene	µg/L	<	
Bromoxynil	µg/L	<	5.0
Carbaryl	µg/L	<	90
Carbofuran	µg/L	<	90
Carbon Tetrachloride	µg/L	<	2.0
Chlorobenzene	µg/L	<	80.0, 30.0 (A)
Chloroethane	µg/L	<	
Chlorpyrifos	µg/L	<	90
Cyanazine	µg/L	<	
DDD - para, para	µg/L	<	
DDE - para, para	µg/L	<	
DDT - ortho, para	µg/L	<	
DDT + metabolites	µg/L	<	
Diazinon	µg/L	<	20
Dicamba	µg/L	<	120
Dichlorodifluoromethane / Freon 12	µg/L	<	
Dichloromethane	µg/L	<	50
Diclofop - methyl	µg/L	<	9
Dieldrin	µg/L	<	
Dimethoate	µg/L	<	20
Dinoseb	µg/L	<	
Diquat	µg/L	<	70
Diuron	µg/L	<	150
Ethylbenzene	µg/L	<	140, 1.6(A)
Ethylene dibromide / EDB	µg/L	<	
Glyphosate	µg/L	<	280
Heptachlor	µg/L	<	
Heptachlor + Heptachlor Epoxide	µg/L	<	
Heptachlor Epoxide	µg/L	<	
Hexachlorocyclohexane (Lindane)	µg/L	<	
Hexane	µg/L	<	
Isopropylbenzene	µg/L	<	
Malathion	µg/L	<	190
MCPA	µg/L	<	100
Methoxychlor	µg/L	<	
Methyl ethyl ketone	µg/L	<	

Chemical - organics

Test Parameter	units	Treated water results	Drinking water standard*
Methyl isobutyl ketone (MIBK)	µg/L	<	
Methyl tert-butyl ether / MTBE	µg/L	<	15 (A)
Metolachlor	µg/L	<	50
Metribuzin	µg/L	<	80
Microcystin	µg/L	<	1.5
N - Nitrosodimethylamine (NDMA)	µg/L	0.002	³ 0.009 / ² 0.040
n-Butylbenzene	µg/L	<	
Nitrilotriacetic Acid	µg/L	<	400
n-Propylbenzene	µg/L	<	
Paraquat	µg/L	<	7
Parathion	µg/L	<	
Pentachlorophenol	µg/L	<	60, 30(A)
Phorate	µg/L	<	2
Picloram	µg/L	<	190
p-Isopropyltoluene	µg/L	<	
Polychlorinated Biphenyls (PCBs)	µg/L	<	3
Prometryne	µg/L	<	1
sec-Butylbenzene	µg/L	<	
Simazine	µg/L	<	10
Styrene	µg/L	<	
Temephos	µg/L	<	
Terbufos	µg/L	<	1
tert-Butylbenzene	µg/L	<	
Tetrachloroethylene	µg/L	<	10
Toluene	µg/L	<	60, 24 (A)
Total Chlordane	µg/L	<	
Triallate	µg/L	<	³ 230
Trichloroethylene / TCE	µg/L	<	5
Trifluralin	µg/L	<	45
Vinyl Chloride	µg/L	<	² 2.0/ ³ 1.0
Xylene-meta	µg/L	<	
Xylene-ortho	µg/L	<	
Xylenes - total	µg/L	<	90, 20(A)
2,3,7,8,-Tetra-Dibenzo-p-Dioxin	µg/L	<	
1,2,3,7,8,-Penta-Dibenzo-p-Dioxin	µg/L	<	
1,2,3,4,7,8,-Hexa-Dibenzo-p-Dioxin	µg/L	<	
1,2,3,6,7,8,-Hexa-Dibenzo-p-Dioxin	µg/L	<	
1,2,3,7,8,9-Hexa-Dibenzo-p-Dioxin	µg/L	<	
1,2,3,4,6,7,8,-Hepta-Dibenzo-p-Dioxin	µg/L	<	
2,3,7,8-Tetra-Dibenzofuran	µg/L	<	
1,2,3,7,8,-Penta-Dibenzofuran	µg/L	<	
2,3,4,7,8,-Penta-Dibenzofuran	µg/L	<	
1,2,3,4,7,8,-Hexa-Dibenzofuran	µg/L	<	
1,2,3,6,7,8,-Hexa-Dibenzofuran	µg/L	<	
2,3,4,6,7,8,-Hexa-Dibenzofuran	µg/L	<	
1,2,3,7,8,9,-Hexa-Dibenzofuran	µg/L	<	
1,2,3,4,6,7,8-Hepta-Dibenzofuran	µg/L	<	
1,2,3,4,7,8,9,-Hepta-Dibenzofuran	µg/L	<	
Total Tetrachlorodibenzo-p-Dioxins	µg/L	<	
Total Pentachlorodibenzo-p-Dioxins	µg/L	<	
Total Hexachlorodibenzo-p-Dioxins	µg/L	<	
Total Heptachlorodibenzo-p-Dioxins	µg/L	<	
Total Octachlorodibenzo-p-Dioxins	µg/L	<	
Total Tetrachlorodibenzofurans	µg/L	<	
Total Pentachlorodibenzofurans	µg/L	<	
Total Hexachlorodibenzofurans	µg/L	<	

Chemical - organics

Test Parameter	units	Treated water results	Drinking water standard*
Total Heptachlorodibenzofurans	µg/L	<	
Total Octachlorodibenzofuran	µg/L	<	
2,3,7,8-TCDD Toxicity Equivalents	µg/L	<	³ 0.000015

Chemical - disinfection by-products

Test Parameter	units	Treated water results	Drinking water standard*
Chloroform	µg/L	36.8	
Bromodichloromethane	µg/L	4.3	
Dibromochloromethane	µg/L	0.3	
Bromoform	µg/L	<	
Total Trihalomethanes (TTHMs)	µg/L	41.4	
Monochloroacetic Acid	µg/L	3.4	
Monobromoacetic Acid	µg/L	<	
Dichloroacetic Acid	µg/L	14.8	
Dibromoacetic Acid	µg/L	<	
Trichloroacetic Acid	µg/L	16.2	
Bromochloroacetic Acid	µg/L	1.6	
Bromodichloroacetic Acid	µg/L	1.9	
Chlorodibromoacetic Acid	µg/L	<	
Tribromoacetic Acid	µg/L	<	
Total Haloacetic Acids (HAA5)	µg/L	34.7	
Total Haloacetic Acids (HAA9)	µg/L	38.0	
Total Trihalomethanes (TTHMs) 1 in distribution	µg/L	39.1	100
Total Haloacetic Acids (HAA5) 1 in distribution	µg/L	34.4	80

Chemical - pharmaceuticals & personal care products⁷

Test Parameter	units	Treated water results	Drinking water standard*
1,7-Dimethylxanthine	µg/L	<	
10-Hydroxy-Amitriptyline	µg/L	<	
17α-Dihydroequilin	µg/L	<	
17α-Estradiol	µg/L	<	
17α-Ethinylestradiol	µg/L	<	
17β-Estradiol	µg/L	<	
Acetaminophen	µg/L	<	
Albuterol	µg/L	0.0021	
Amitriptyline	µg/L	<	
Amlodipine	µg/L	<	
Amphetamine	µg/L	<	
Androstenedion	µg/L	<	
Androsterone	µg/L	<	
Atenolol	µg/L	0.0067	
Atorvastatin	µg/L	<	
Azithromycin	µg/L	<	
Benzafibrate	µg/L	<	
Benzoylcegonine	µg/L	<	
Betamethasone	µg/L	<	
Bis-phenyl A ⁴	µg/L	0.0005	
Caffeine	µg/L	0.0023	
Carbamezepine	µg/L	0.0005	
Clotrimazole	µg/L	<	
Cotinine	µg/L	0.0018	
Deet	µg/L	0.0040	
Diphenhydramine	µg/L	<	
Enrofloxacin	µg/L	<	
Erythromycin	µg/L	<	

Chemical - pharmaceuticals & personal care products⁷

Test Parameter	units	Treated water results	Drinking water standard*
Fluoxetine	µg/L	<	
Indomethacin	µg/L	<	
Ketoprofen	µg/L	<	
Metformin	µg/L	0.0180	
Miconazole	µg/L	<	
Norfloxacin	µg/L	<	
Ofloxacin	µg/L	<	
Oxolinic Acid	µg/L	<	
Pentoxifylline	µg/L	<	
Roxithromycin	µg/L	<	
Sulfachloropyridazine	µg/L	<	
Sulfadiazine	µg/L	<	
Sulfadimethoxine	µg/L	<	
Sulfamerazine	µg/L	<	
Sulfamethazine	µg/L	<	
Sulfamethizole	µg/L	<	
Sulfamethoxazole	µg/L	<	
Sulfathiazole	µg/L	<	
Trimethoprim	µg/L	<	

Chemical - additional test parameters****

Test Parameter	units	Treated water results	Drinking water standard*
Dissolved Inorganic Carbon	mg/L	7.1	
Total Organic Carbon	mg/L	3.3	
Phosphorus (total)	mg/L	<	
1,2-dibromoethane	µg/L	<	
2,2-dichloropropanoic acid	µg/L	0.38	
2,3,4,5-tetrachlorophenol	µg/L	<	
2,3,4-trichlorophenol	µg/L	<	
2,4,5-trichlorophenol	µg/L	<	
2,4-DB	µg/L	<	
Ametryne	µg/L	<	
Aminomethylphosphonic acid	µg/L	<	
Atratone	µg/L	<	
Barban	µg/L	<	
Bromochloroacetaldehyde	µg/L	<	
Bromochloroacetonitrile	µg/L	<	
Butachlor	µg/L	<	
Butylate	µg/L	<	
Chloral Hydrate	µg/L	0.73	
Chloroacetonitrile	µg/L	<	
Chlorobromuron	µg/L	<	
Chlorotoluron	µg/L	<	
Chlorpropham	µg/L	<	
De-ethylated simazine	µg/L	<	
Diallate	µg/L	<	
Dibromoacetaldehyde	µg/L	<	
Dibromoacetonitrile	µg/L	<	
Dichloroacetonitrile	µg/L	<	
Dichlorvos	µg/L	<	
Difenoxuron	µg/L	<	
Diisopropylether	µg/L	<	
Eptam	µg/L	<	
Ethion	µg/L	<	
Fluometuron	µg/L	<	
Glufosinate	µg/L	<	

Chemical - additional test parameters****

Test Parameter	units	Treated water results	Drinking water standard*
Hexachlorocyclopentadiene	µg/L	<	
Iodoacetic acid	µg/L	<	
Linuron	µg/L	<	
Methylparathion	µg/L	<	
Metobromuron	µg/L	<	
Metoxuron	µg/L	<	
Mevinphos	µg/L	<	
Monolinuron	µg/L	<	
Monuron	µg/L	<	
Neburon	µg/L	<	
Perchlorate	µg/L	<	
Prometone	µg/L	<	
Propazine	µg/L	<	
Propham	µg/L	<	
Propoxur	µg/L	<	
Reldan	µg/L	<	
Ronnel	µg/L	<	
Siduron	µg/L	<	
Silvex	µg/L	<	
Terbutryne	µg/L	<	
Trichloroacetone nitrile	µg/L	<	
Trichloroethene	µg/L	<	

Radiological

Test Parameter	units	Treated water results	Drinking water standard*
Gross-Alpha Radioactivity	Bq/L	<0.04	⁵ 0.5
Gross-Beta Radioactivity	Bq/L	<0.1	⁵ 1.0
Tritium	Bq/L	<6.9	7000

Glossary and notes:

reported values represent average concentrations measured in treated water

< indicates less than detection limit

mg/L = milligram per Litre = part per million (ppm)

µg/L = microgram per Litre = part per billion (ppb)

cfu = colony forming units

*Ontario Drinking Water Standards O.Reg.169/03 and/or Health Canada Guidelines for Canadian Drinking Water Quality

*Drinking water standards are health-based MAC (Maximum Acceptable Concentration) values, unless otherwise noted

(A) indicates aesthetic objective, not health related but may affect taste, odour, or appearance

(O) indicates an operational guideline, to ensure efficient treatment and distribution system operation

¹The reported THM and HAA result is an annual average concentration measured in the distribution system.

² Health Canada Drinking Water Guideline only

³ Ontario Drinking Water Quality Standard only

⁴Bisphenyl A (BPA) result from 2013 testing for a Health Canada study

⁵Radioactivity screening values = 0.5 Bq/L for gross alpha and 1.0 Bq/L for gross beta as per Health Canada

⁶Sodium health advisory level of 20 mg/L for people on sodium-restricted diets only

⁷Pharmaceutical reported values taken from Britannia treated water test results

**calculated parameter based on individual analytes

***the lead values reported do not include the Ontario Ministry of Environment Community Lead Testing Program results

****tests performed by Ontario Drinking Water Surveillance Program (DWSP)