



2020 Annual Performance & Summary Report Melrose Drinking Water System

Date: January 7, 2021

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Introduction

The Municipality of Middlesex Centre has prepared a report summarizing system operation and water quality for every municipal drinking water system annually. The reports detail the latest water quality testing results, water quantity statistics and any adverse conditions that may have occurred for the previous year. They are available for review by the end of February on the Municipality of Middlesex Centre website at www.middlesexcentre.on.ca/services/residents/water or by contacting the Public Works & Engineering Department.

All efforts have been made to ensure the information presented in this report is accurate. If you have any questions or comments concerning the report, please contact the Municipality of Middlesex Centre.

Table 1 – Plant Information

Drinking Water System	Melrose Well Supply System
Drinking Water System Number	260002915
Drinking Water System Owner & Contact Information	Municipality of Middlesex Centre Small Municipal Residential System 10227 Ilderton Road, RR #2 Ilderton, Ontario N0M 2A0
Reporting Period	January 1, 2020 to December 31, 2020

Section A – System Description

The Melrose Drinking Water System is owned by the Municipality of Middlesex Centre and operated by the Municipality of Middlesex Centre. The Melrose Drinking Water System is a ground water supply system serving the settlement area of Melrose that presently services 64 lots with an estimated population of 200 residents. The Melrose Drinking Water System consists of two deep-drilled groundwater production wells operating under Permit to Take Water # P-300-8072386149 that pump raw water through a sodium hypochlorite pre-disinfection system into an aerator for iron oxidization to a reservoir. From the reservoir, the water is transferred to three multimedia pressure filters for iron removal. After the water is filtered it can be chlorinated a second time, analyzed for free chlorine residual and stored in a triple-chambered underground clear well. From the clear well the water is pumped into the distribution system and can be disinfected for a third time with sodium hypochlorite. The treated water is analyzed for both turbidity and free chlorine residual using online analyzers with the values being recorded SCADA. The system operates under Municipal Drinking Water License Number 052-103 and Drinking Water Works Permit Number 052-203. The system is maintained by licensed water system operators, who

operate treatment and monitoring equipment and collect samples as specified by the Regulation. Alarms automatically notify operators in the event of failure of critical operational requirements. The water treatment chemicals used on site is a 12% sodium hypochlorite solution.

Section B – Significant Modifications & Replacements

Modifications & Replacements	
Rebuild of a multistage vertical turbine water distribution pump	\$ 7,076.20

Section C – Microbiological Testing

(I) E. coli & Total Coliform

Bacteriological tests for E. coli and total coliforms are collected from the raw water at the facility and treated water from the distribution system. Raw water is collected once per month on each well, and the distribution water is collected on a bi-weekly schedule. Extra samples are taken after major repairs or maintenance work. Any E. coli or total coliform results above 0 in the treated distribution water must be reported to the Ministry of the Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2020 sampling program are shown on the table below. There were no adverse test results from 26 distribution water samples in this reporting period.

Table 2 – E. Coli & Total Coliform Samples

	Number of Samples	Range of E. coli Results Min – Max	Range of Total Coliform Results Min – Max
Raw	24	0 – 0	0 – 0
Distribution	26	0 - 0	0 - 0

(II) Heterotrophic Plate Count (HPC)

HPC analyses are required from the distribution water on a bi-weekly basis. HPC should be less than 500 colonies per 1 mL. Results over 500 colonies per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water. The 2020 results are shown in the table below.

Table 3 – Heterotrophic Plate Count (HPC) Samples

Parameters	Number of Samples	Range of HPC Results Min-Max
Distribution	26	<10 - <20

Section D – Chemical Testing

The Safe Drinking Water Act requires periodic testing of the water for chemical parameters. The sampling frequency varies for different types and sizes of water systems. If the concentration of a parameter is above half of the Maximum Allowable Concentration (MAC) under the Ontario Drinking Water Quality Standards, an increased testing frequency of once every three months is required by the Regulation. Where concerns regarding a parameter exist, the MECP can also require additional sampling be undertaken.

Nitrate and nitrate samples are required every 3 months in normal operation.

Table 4 – Quarterly Nitrate & Nitrite

Parameter & Sample Date	Result (mg/l)	MAC (mg/l)	Exceedance
Nitrate			
1st Quarter	0.008	10.0	No
2nd Quarter	0.008	10.0	No
3rd Quarter	<0.006	10.0	No
4th Quarter	<0.006	10.0	No
Nitrite			
1st Quarter	<0.003	1.0	No
2nd Quarter	<0.003	1.0	No
3rd Quarter	<0.003	1.0	No
4th Quarter	<0.003	1.0	No

Trihalomethanes (THM) and total Haloacetic Acids (HAA) are by-products of the disinfection process. As described in Schedule 13.6 (4) a small municipal system which obtains test results from the previous 12 consecutive calendar quarters and no single test result is above 0.050 mg/l may cease sampling and testing for eight consecutive calendar quarters. Middlesex Centre is required to begin sampling for THM for eight more consecutive months as outlined in Schedule 13.6(4). Samples for Haloacetic Acid (HAA) were collected every 3 months from the distribution system.

Table 5 – Quarterly Trihalomethane & Haloacetic Acid

Parameter & Sample Date	Result (mg/l)	Annual Rolling Average (mg/l)	MAC (mg/l)	Exceedance
Trihalomethane				
1st Quarter	0.014	0.014	100	No
2nd Quarter	0.015	0.014	100	No
3rd Quarter	0.010	0.013	100	No
4th Quarter	0.014	0.013	100	No
Haloacetic Acid (HAA)				
1st Quarter	<0.0053	0.0053	80	No
2nd Quarter	<0.0053	0.0053	80	No
3rd Quarter	<0.0053	0.0053	80	No
4th Quarter	<0.0053	0.0053	80	No

The following Table summarizes the most recent test results for Sodium and Fluoride. Samples collect and test at least one (1) water sample every 60 months (5 years) and report upon the results.

Table 6 – Sodium & Fluoride

Parameter	Sample Date	Result Value (mg/L)	MAC (mg/L)
Sodium	January 2, 2017	24.4	20
Sodium	January 9, 2017	25.4*	20
Fluoride	January 2, 2017	1.02	1.5

**Sodium levels between 20 – 200 mg/L must be reported every 5 years. Natural levels of fluoride between 1.5 – 2.4 mg/L must be reported every 5 years. Sodium samples are scheduled to be collected in 2021.*

The following Table summarizes the most recent results for the Lead Testing Program. Lead samples are twice per year, in the winter sample period and the summer sample period as outlined below. Alkalinity and pH are monitored twice per year in the distribution system to ensure water quality is consistent and does not facilitate leaching of lead into the water.

Table 7 – Lead Sampling

Parameter	Result Value	MAC	Exceedance
Winter Sample (Dec. 15 – April 15)			
Lead (ug/l)	0.17	10	No
Distribution Alkalinity (mg/l)	224	*30 - 500	No
Distribution pH	8.06	-	No
Summer Sample (June 15 – Oct. 15)			
Lead (ug/l)	0.33	10	No
Distribution Alkalinity	229	*30 – 500	No
Distribution pH	7.69	-	No

**Distribution alkalinity is an aesthetic objective / Operational Guideline with a range between 30 mg/l to 500 mg/l*

The following Table summarizes the most recent test results for Schedules 23 and 24. Testing is required every 5 years for secure groundwater wells.

Table 8 – Schedule 23 & 24

Parameter	Sample Date	Treated Water Value (ug/l)	Exceedance
Antimony	01/02/2017	0.02	No
Arsenic	01/02/2017	0.3	No
Barium	01/02/2017	148	No
Boron	01/02/2017	145	No
Cadmium	01/02/2017	0.006	No
Chromium	01/02/2017	0.57	No
Mercury	01/02/2017	ND	No
Selenium	01/02/2017	ND	No
Uranium	01/02/2017	0.087	No
Alachlor	01/02/2017	ND	No
Atrazine + N-dealkylated metabolites	01/02/2017	ND	No
Atrazine	01/02/2017	ND	No
Densethyl atrazine	01/02/2017	ND	No
Azinphos-methyl	01/02/2017	ND	No
Benzene	01/02/2017	ND	No
Benzo(a)pyrene	01/02/2017	ND	No
Bromoxynil	01/02/2017	ND	No

Parameter	Sample Date	Treated Water Value (ug/l)	Exceedance
Carbaryl	01/02/2017	ND	No
Carbofuran	01/02/2017	ND	No
Carbon Tetrachloride	01/02/2017	ND	No
Chlorpyrifos	01/02/2017	ND	No
Diazinon	01/02/2017	ND	No
Dicamba	01/02/2017	ND	No
1,2-Dichlorobenzene	01/02/2017	ND	No
1,4-Dichlorobenzene	01/02/2017	ND	No
1,2-Dichloroethane	01/02/2017	ND	No
1,1-Dichloroethylene (vinylidene chloride)	01/02/2017	ND	No
Dichloromethane	01/02/2017	ND	No
2-4 Dichlorophenol	01/02/2017	ND	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	01/02/2017	ND	No
Diclofop-methyl	01/02/2017	ND	No
Dimethoate	01/02/2017	ND	No
Diquat	01/02/2017	ND	No
Diuron	01/02/2017	ND	No
Glyphosate	01/02/2017	ND	No
Malathion	01/02/2017	ND	No
2-methyl-4chlorophenoxyacetic acid (MCPA)	01/02/2017	ND	No
Metolachlor	01/02/2017	ND	No
Metribuzin	01/02/2017	ND	No
Monochlorobenzene	01/02/2017	ND	No
Paraquat	01/02/2017	ND	No
Pentachlorophenol	01/02/2017	ND	No
Phorate	01/02/2017	ND	No
Picloram	01/02/2017	ND	No
Polychlorinated Biphenyls(PCB)	01/02/2017	ND	No
Prometryne	01/02/2017	ND	No
Simazine	01/02/2017	ND	No
Terbufos	01/02/2017	ND	No
Tetrachloroethylene	01/02/2017	ND	No
2,3,4,6-Tetrachlorophenol	01/02/2017	ND	No
Triallate	01/02/2017	ND	No
Trichloroethylene	01/02/2017	ND	No

Parameter	Sample Date	Treated Water Value (ug/l)	Exceedance
2,4,6-Trichlorophenol	01/02/2017	ND	No
Trifluralin	01/02/2017	ND	No
Vinyl Chloride	01/02/2017	ND	No

ND = Non-Detect

Section E – Operational Monitoring

(I) Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations throughout the distribution system. As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A free chlorine level lower than 0.05 mg/L must be reported and corrective action taken. There were no reportable incidents in 2020. A summary of the chlorine residual readings is provided in the table below.

Table 9 – Chlorine Residuals

Parameter	Number of Tests or Monitoring Frequency	Range of Results (Min – Max)
Chlorine residual in distribution (mg/l)	104	0.87 – 1.39
Chlorine residual after treatment (mg/L)	Continuous	0.94 – 1.46

(II) Turbidity

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. The turbidity of untreated water from the wells is checked monthly. Turbidity is measured in nephelometric turbidity units (NTU). Under Regulation 170/03 turbidity in groundwater is not reportable however, turbidity should be < 1 NTU at the treatment plant and < 5 NTU in the distribution system. A summary of the monitoring results for 2020 is provided in the table below.

Table 10 – Turbidity

Parameter	Number of Tests or Monitoring Frequency	Range of Results (Min – Max)
Turbidity after treatment (NTU)	Continuous	0.03 – 3.16

Section F – Water Quantity

Continuous monitoring of flowrates from supply wells into the treatment system and from the facility into the distribution system is required by Regulation 170/03. The Municipal Drinking Water License and Permit to Take Water issued by the MECPC regulate the amount of water that can be utilized over a given time period. A summary of the 2020 flows are provided below.

Table 11 – Rated Capacity

Flow Summary	Quantity
Permit to Take Water Limit	277 m ³ /d
Municipal Drinking Water License Limit	277 m ³ /d

Table 12 – Monthly Raw Water Flows (m³/day)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Rated Flow	m ³	277	277	277	277	277	277	277	277	277	277	277	277	
Raw Average	m ³ /d	42.4	33.8	32.6	38.7	48.8	69.6	82.6	56.0	44.5	36.0	34.9	37.4	46.4
Raw Max	m ³ /d	75.6	46.5	55.7	76.8	88.1	120.9	157.5	93.0	79.2	63.0	52.8	78.9	

Graph 1 – Monthly Flows (m³/day)

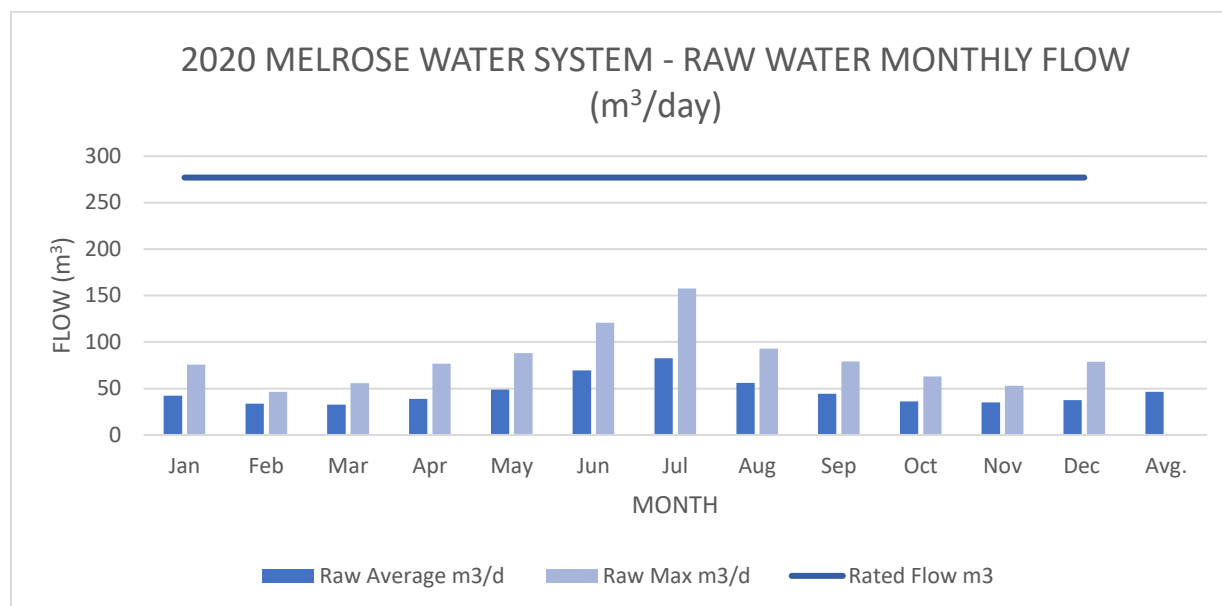


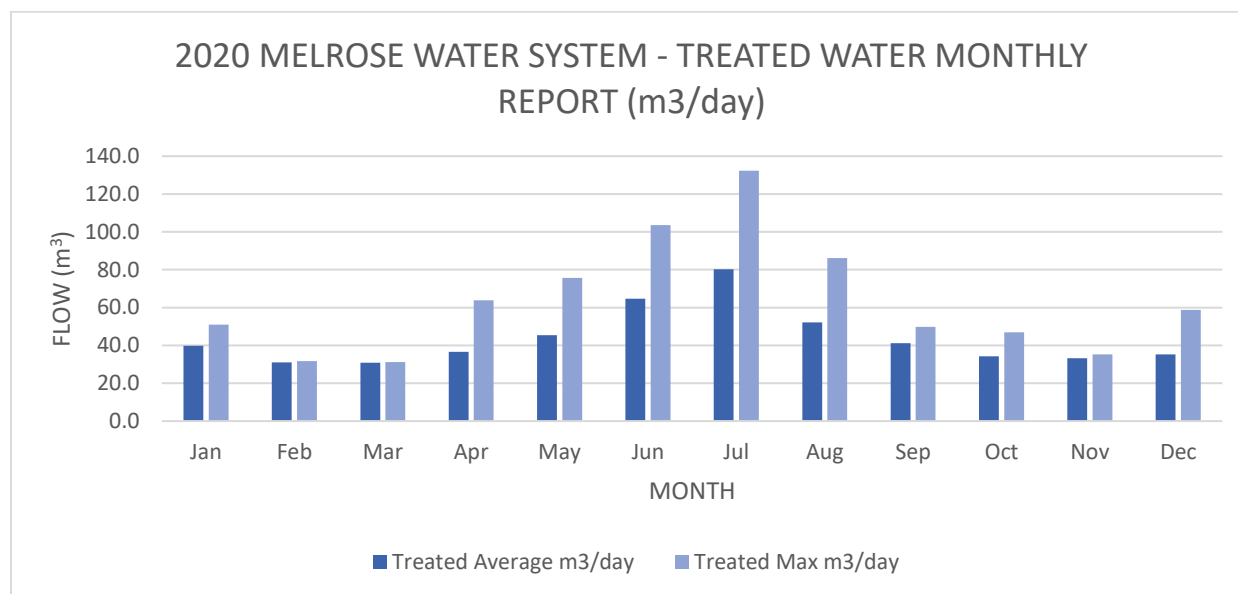
Table 13 – Treated Water Monthly Flow Summary

2020 Average Daily Treated Water Flow	43.7 m ³ /day
2020 Maximum Daily Treated Water Flow	132.31 m ³ /day
2020 Average Monthly Treated Water Flow	1,333 m ³
2020 Total Amount of Treated Water Supplied	15,996 m ³

Table 14 – Treated Water Flow

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg (m ³ /d)	39.7	31.0	30.8	36.6	45.4	64.6	80.2	52.2	41.2	34.3	33.3	35.3
Max (m ³ /d)	51.0	31.7	31.3	63.8	75.6	103.6	132.3	86.2	49.8	47.0	35.2	58.8

Graph 2 – Monthly Treated Flows (m³/day)



(I) Rated capacity assessment

The table below illustrates the water supplied to the distribution system and the capacity of the system.

System Capability Assessment Comparison of Treated Water Rates: Melrose Well Supply System				
Month	Total Flow (m ³)	Monthly Raw Average Flow (m ³ /day)	Max Raw Flow (m ³ /day)	Max Flow / Rated Capacity (%)
January	1,232	39.7	51.0	18%
February	869	31.0	31.7	11%
March	954	30.8	31.3	11%
April	1,099	36.6	63.8	23%
May	1,406	45.4	75.6	27%
June	1,939	64.6	103.6	37%
July	2,487	80.2	132.3	48%
August	1,618	52.2	86.2	31%
September	1,236	41.2	49.8	18%
October	1063	34.3	47.0	17%
November	998	33.3	35.2	13%
December	1095	35.3	58.8	21%
Average Flow	1333	43.7	68.8	23%
Maximum Flow	2,487	80.2	132.3	
Rated Capacity	277 (m³/day)			

Section G – Non-Compliance Findings & Adverse Results

Non-compliance issues are typically identified by either the Operating Authority or the MECP Drinking Water Inspectors. All non-compliance issues are investigated, corrective actions taken and documented using the Municipalities Drinking Water Quality Management System (DWQMS) procedures. There were no non-compliance or adverse results in 2020.

(I) Non-Compliance Findings

The MECP conducted an announced routine inspection of the Melrose Drinking Water System on July 15, 2020. The MECP inspector identified one (1) non-compliance with the regulatory requirements.

1. The owner/operating authority was not in compliance with the requirement to prepare Form 2 documents as required by their Drinking Water Works Permit during the inspection period. At the time of the inspection, it was noted that there were two liquid sodium hypochlorite containers within two separate secondary containment units in the northwest and southern parts of the treatment plant that were approximately 60 litres in volumetric capacity. Schedule A, Section 1 of Drinking Water Works Permit #052-203 - Issue #2 dated 30 June 2016 currently lists two - 100 litre chemical storage tank for sodium hypochlorite. A Form 2 document and / or a Director's Notification form for the modification in size of the two sodium hypochlorite tanks were not available. There were no action items issued. Upon completion of the Site visit on July 15, 2020, the Owner / Operating Authority immediately prepared a Director's Notification Form and a Form 2 as required by Schedule B – Section 2.4 and Section 4.5 respectively of Drinking Water Works Permit #052-203 - Issue #2 dated 30 June 2016 to account for the discrepancy associated with the chemical storage on site. These forms were both dated July 15, 2020.

(III) SUMMARY OR REPORTING TEST RESULTS AND OTHER PROBLEMS (SCHEDULE 16)

There were no adverse results in 2020.