

Annual Report

For the 2016 Operating Year

Lakeshore Drinking Water System

2016 Operation and Maintenance

Annual Report

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1.0 INTRODUCTION AND BACKGROUND

The purpose of the 2016 Annual Report is to document the operation and maintenance data for the Lakeshore Drinking Water System for review by the Ministry of the Environment in accordance with O. Reg. 170/03. This report covers January 1, 2016 to December 31, 2016. A copy of this report will be submitted to the owner to be displayed to the residents.

2.0 DESCRIPTION OF WATER SYSTEM

The Lakeshore Drinking Water System (DWS # **220000425**) is comprised of four different well systems: Point Clark, Blairs Grove, Huronville, and Murdock Glen. All of these sites are located within the Municipality of Huron-Kinloss along Lake Huron. The system was designed to serve an originally estimated population of 3,200 people and 2,300 connections. Blairs Grove, Huronville, and Murdock Glen each have one well and one well pump. Point Clark has two wells and two well pumps. All sites are equipped with an on-line chlorine analyzer and are monitored through a SCADA system (Supervisory Control and Data Acquisition) based out of the Ripley Municipal office. As a redundancy, each site is also equipped with an auto-dialer that is independent of the SCADA system, to call out alarms in the event of communications/SCADA failure.

The system is characterized as a “secure groundwater system” and categorized as a Class 3 Distribution and Supply, Large Municipal Residential drinking water system as per O.Reg 170/03. The system consists of four sub-systems and its equipment has a daily maximum capacity to deliver 11,636 cubic metres of potable water to the Huron-Kinloss Lakeshore community, extending from Point Clark in the south, to Huronville in the north, and the subsystem supplying the Courtney/Amberley Beach subdivision in the Township of Ashfield-Colborne-Wawanosh. The Lakeshore Distribution System currently (January 2016) has 2,134 water connections along the Huron-Kinloss Lakeshore and 139 water connections in the Courtney/Amberley Beach Subdivision. In total, the Lakeshore Distribution System could supply a total seasonal population of approximately 5,548 (based on 2.6 people per connection average). The Lakeshore area has a large seasonal population and therefore, the demands are significantly higher during the cottage season.

The four subsystems are described as follows:

Blairs Grove: Well #2 (BG-W2) is a 200 mm diameter, 73.2 m deep flowing/artesian bedrock well, equipped with a submersible pump with well pump discharge piping into the chlorine contact reservoir (7.0 x 5.6 x 2.0 m = 82.3 m³). BG-W2 is located at 28 Cathcart Street. Blairs Grove Monitoring Well #3 (BG-W3) is an overflowing artesian bedrock well, currently not equipped with a well pump, and is covered by a metal-clad, removable, locked, insulated wooden housing unit. The Blairs Grove high-lift pump (BG-HLP1) high-lift discharge manifold has a continuous residual chlorine analyzer. Blairs Grove Well #2 was drilled in 1982, with new well pump and piping installed in 2006.

Huronville South: Well #2 (HS-W2) is a 200 mm diameter, 93.3 m deep bedrock well, that is equipped with a submersible pump, with a well pump discharge piping discharging into the chlorine contact reservoir (65 m³). HS-W2 is located within a municipal park at 39 Penetangore Row South. Huronville South Well #2 was drilled in 1994, with new well pump and piping installed in 2006 with a soft-start module.

Murdoch Glen: Well #2 (MG-W2) is a 200 mm diameter, 80.5 m deep bedrock well equipped with a submersible pump with well pump discharge piping going to the contact water main (19,498 L), and into the single cell concrete ground level storage reservoir (10 x 10 x 4.7 m = 400 m³). MG-W2 is located at 815 Parkplace. The water level in the reservoir is monitored by an ultrasonic level transducer. The reservoir is configured so that when the level drops to the well pump start level, the SCADA system triggers the well pump to maintain an adequate quantity of treated water in the reservoir. Murdoch Glen Well # 2 was drilled in 1992, with new well pump and piping installed in 2006.

Point Clark Development: Well #1 (PCD-W1) was abandoned in September 2014. Point Clark Development Wells #2 (PCD-W2) and #3 (PCD-W3) are located at 603 Tuscarora Rd. PCD-W2 is a 200 mm diameter, 75.6 m deep bedrock well, equipped with a submersible pump. PCD-W3 is a 250 mm diameter, 82.3 m deep bedrock well, equipped with a submersible pump. Both wells have a common well discharge manifold and a flow meter discharging to the chlorine contact reservoir (65 m³). Point Clark Well #2 was drilled in 1994, with new well pump and piping installed in 2006. Point Clark Well #3 was drilled in 2015 to replace Point Clark Well #1.

All the Lakeshore wells are secure deep bedrock wells, not under the influence of surface water. The wells penetrate limestone aquifers. Due to the depth and structure of the aquifers, the water temperature is relatively constant (<10°C), turbidity is low, and the water is relatively hard. The raw water is also relatively high in sodium, fluoride, and iron, but the lead content of the raw water is well below the half-MAC (Maximum Allowable Concentration). Those who are supplied water from the Lakeshore Drinking Water System are made aware of the various concentrations in their drinking water by numerous means of communication with the Township of Huron-Kinloss.

The Lakeshore Drinking Water System is equipped with a Supervisory Control and Data Acquisition system (SCADA) allowing for remote control, monitoring and record keeping of the system. This provides the operator with the current operating status of the supply and treatment equipment throughout the system at any given time via remote access by computer or iPhone.

A 130 kW diesel generator, located at the Murdoch Glen pumphouse, includes a 1,135 L capacity fuel storage tank and is used for emergency power supply. A standpipe is situated in the Point Clark area at 3405 Concession 2, and is constructed of bolted steel. The 31 m (102 ft) high and 9.45m (31 ft) wide standpipe has an effective storage of approximately 1,500 m³ to supply the entire Lakeshore System in emergency situations.

Each well house in the Lakeshore Drinking Water System ensures that raw water is disinfected and undergoes iron sequestering. Sodium hypochlorite (12%), the chemical used in the disinfection process, disinfects the raw water, and serves primarily as a measure to prevent microbiological growth within the raw water pipeline, reservoir, and distribution system. The Lakeshore Drinking Water System has two different methods to achieve a minimum of 2-log (99%) removal or inactivation of viruses as outlined in the MOECC *Procedure for Disinfection of Drinking Water in Ontario*. Three well houses have a chlorine contact chamber (baffled basement reservoir), while the Murdoch Glen well house has a chlorine contact watermain.

Each well house also provides iron sequestering by means of treating the chlorinated water with sodium silicate. Sequestering does not remove iron, but instead it prevents the dissolved iron from precipitating which can stain plumbing fixtures and appear as discoloration in the water. It can leave a slight metallic taste in the water.

The Township of Huron-Kinloss has an agreement with the Municipality of Kincardine, where Kincardine is the Operating Authority for a small area of Huron-Kinloss known as the Huronville Subdivision Distribution System (Plan M28). This subdivision receives all their water from the Municipality of Kincardine Water System. The Township of Huron-Kinloss installed an interconnecting valve between the Lakeshore Well Supply to the Huronville Subdivision Distribution System and/or the Town of Kincardine. This valve is to be used for emergency purposes only.

3.0 SUMMARY OF WATER QUALITY MONITORING

3.1 Water Treatment Equipment Operation and Monitoring

3.1.1 Treated Water (Point of Entry) Chlorine Residual

In 2016, a total of 1,462 samples were collected and analyzed for Free Chlorine Residual at the Point of Entry (POE) for treated water using a HACH pocket chlorine colorimeter. One sample was missed on October 6, 2016, and one sample was missed on November 6, 2016. **Table 1** shows the monthly average of free chlorine residual values.

3.1.2 Distribution Chlorine Residual

In 2016, a Total of 366 samples were collected in the Lakeshore Distribution System. Refer to **Table 1**.

Table 1 – Average Treated and Distribution Free Chlorine (Grab) Residuals for Lakeshore Drinking Water System ^a

Month	Blairs Grove	Huronville South	Murdock Glen	Point Clark	Distribution
Jan	1.16	1.45	1.65	1.43	1.17
Feb	1.26	1.53	1.73	1.53	1.24
Mar	1.20	1.57	1.71	1.44	1.25
Apr	1.25	1.54	1.61	1.52	1.29
May	1.40	1.66	1.68	1.57	1.41
Jun	1.52	1.69	1.76	1.57	1.38
Jul	1.53	1.58	1.62	1.53	1.46
Aug	1.33	1.51	1.56	1.50	1.33
Sep	1.26	1.64	1.47	1.50	1.30
Oct	1.16	1.51	1.35	1.43	1.19
Nov	1.48	1.69	1.44	1.68	1.42
Dec	1.60	1.67	1.53	1.69	1.44
Annual Min	0.95	1.06	1.28	0.92	0.74
Annual Max	2.17	2.20	2.20	2.20	1.93
Annual Avg	1.35	1.59	1.59	1.53	1.32
# Samples	365	366	366	365	366

^a – Results collected from January 1, 2016 – December 31, 2016

3.1.3 Turbidity

Drinking water turbidity was measured by a portable turbidity analyzer. The raw and treated water grab samples were collected monthly and analyzed for turbidity. **Table 2** provides a summary of raw and treated turbidity results. The maximum turbidity measured in the raw water was 0.93 NTU and the maximum turbidity measured in the treated water was 1.70 NTU.

Table 2 – Raw and Treated Water Turbidities for Lakeshore Drinking Water System ^a

Month	BG Raw	BG Treated	HS Raw	HS Treated	MG Raw	MG Treated	PC W2 Raw	PC W3 Raw	PC Treated
Jan	0.83	0.62	0.10	0.08	0.17	0.24	0.13	0.26	0.15
Feb	0.70	0.50	0.09	0.11	0.17	0.19	0.09	0.26	0.21
Mar	0.85	0.80	0.08	0.10	0.17	0.23	0.12	0.26	0.15
Apr	0.39	0.89	0.10	0.16	0.19	0.26	0.12	0.19	0.21
May	0.82	0.88	0.07	0.07	0.14	0.18	0.18	0.23	0.17
Jun	0.93	0.28	0.09	0.14	0.18	0.16	0.20	0.15	
Jul	0.46	0.34	0.20	0.16	0.17	0.14	0.19	0.14	0.14
Aug	0.71	0.28	0.10	0.13	0.12	0.13	0.17	0.20	0.18
Sep	0.68	0.82	0.14	0.16	0.18	0.24	0.17	0.14	
Oct	0.65	1.17	0.21	0.15	0.20	0.21	0.20	0.18	0.20
Nov	0.66	0.94	0.22	0.20	0.22	0.25	0.12	0.11	0.12
Dec	0.63	0.22	0.15	0.19	0.19	0.24	0.11	0.13	
Annual Min	0.37	0.22	0.07	0.06	0.09	0.09	0.06	0.11	0.12
Annual Max	0.93	1.70	0.28	0.22	0.22	0.26	0.24	0.37	0.27
Annual Avg	0.68	0.73	0.14	0.14	0.17	0.20	0.16	0.20	0.17
# Samples	18	18	19	18	18	18	20	18	11

^a – Results collected from January 1, 2016 – December 31, 2016

3.2 Microbiological Sampling as per Schedule 10, O. Reg. 170/03

3.2.1 Raw Water Samples

Raw water samples are taken every week. In 2016, a total of 254 samples were collected and analyzed for E.Coli and Total Coliform. The E.Coli results obtained were 0 cfu/100 mL. The Total Coliform results were 0 cfu/100 mL. **Table 3** provides a summary of bacteriological results performed on the raw water.

Table 3 – Microbiological Results for Raw Water at Lakeshore Drinking Water System ^a

Month	E. Coli			Total Coliform		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	20	20	0	20	20	0
Feb	21	21	0	21	21	0
Mar	24	24	0	24	24	0
Apr	21	21	0	21	21	0
May	24	24	0	24	24	0
Jun	19	19	0	19	19	0
Jul	21	21	0	21	21	0
Aug	24	24	0	24	24	0
Sep	20	20	0	20	20	0
Oct	21	21	0	21	21	0
Nov	19	19	0	19	19	0
Dec	20	20	0	20	20	0
Total	254	254	0	254	254	0

^a – Results collected from January 1, 2016 – December 31, 2016

3.2.2 Treated Water (Point of Entry) Samples

One (1) treated water sample from each point of entry is taken every week and analyzed for E.Coli, Total Coliform, and for Heterotrophic Plate Count (HPC). In 2016, a total of 207 treated water samples were collected and analyzed for the above parameters. All samples were found to be safe. Each E.Coli and Total Coliform result from the treated water was 0 cfu/100 mL. The range of HPC results were 0 – 32 cfu/100 mL. **Table 4** provides a summary of all bacteriological results performed on treated water.

3.2.3 Distribution Samples

Seven (7) distribution samples are collected every week and tested for E.Coli, Total Coliform, and for Heterotrophic Plate Count (HPC). In 2016, a total of 382 distribution samples were collected and analyzed for the above parameters and all sampled were found to be safe. Each E.Coli and Total Coliform result from the treated water was 0 cfu/100 mL. The range of HPC results were 0 – 7 cfu/100 mL. **Table 5** provides a summary of all bacteriological samples taken in the distribution system.

Table 4 – Microbiological Results for Treated Water (Point of Entry) at Lakeshore Drinking Water System ^a

Month	E.Coli			Total Coliform			HPC		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1
Jan	16	16	0	16	16	0	16	13	3
Feb	16	16	0	16	16	0	16	13	3
Mar	20	20	0	20	20	0	20	12	8
Apr	16	16	0	16	16	0	16	11	5
May	20	20	0	20	20	0	20	8	12
Jun	16	16	0	16	16	0	16	9	7
Jul	16	16	0	16	16	0	16	9	7
Aug	20	20	0	20	20	0	20	11	9
Sep	16	16	0	16	16	0	16	4	12
Oct	16	16	0	16	16	0	16	12	4
Nov	19	19	0	19	19	0	19	14	5
Dec	16	16	0	16	16	0	16	13	3
Total	207	207	0	207	207	0	207	129	78

^a – Results collected from January 1, 2016 – December 31, 2016

Table 5 – Microbiological Results for Lakeshore Drinking Water Distribution System ^a

Month	E.Coli			Total Coliform			HPC		
	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples ≥1	# Samples	# Samples "0"	# Samples 1 - 7
Jan	21	21	0	21	21	0	12	14	6
Feb	28	28	0	28	28	0	17	12	5
Mar	34	34	0	34	34	0	20	12	8
Apr	28	28	0	28	28	0	15	13	2
May	35	35	0	35	35	0	20	9	11
Jun	28	28	0	28	28	0	16	6	8
Jul	28	28	0	28	28	0	16	9	7
Aug	36	36	0	36	36	0	21	13	8
Sep	34	34	0	34	33	1	16	3	13
Oct	28	28	0	28	28	0	17	9	8
Nov	35	35	0	35	35	0	20	15	5
Dec	28	28	0	28	28	0	16	12	4
Total	363	363	0	363	363	1	212	127	85

^a – Results collected from January 1, 2016 – December 31, 2016

3.3 Chemical Sampling & Testing as per Schedule 13, O. Reg.170/03

3.3.1 Inorganics

Treated water samples are collected every 36 months and tested for inorganics. The most recent samples for the Lakeshore Drinking Water System were collected on June 10, 2015 and submitted to the laboratory for analysis of inorganics as listed in Schedule 23. All parameters were found to be within compliance. Inorganics will be sampled and analyzed again on or before June 10, 2018. Results from the June 10, 2015 samples can be found in **Table 6**.

Table 6 – Schedule 23 Results for Lakeshore Drinking Water System ^a

Parameter	Blairs Grove Result (µg/L)	Huronville South Result (µg/L)	Murdock Glen Result (µg/L)	Point Clark Result (µg/L)	Maximum Allowable Concentration (µg/L)
Antimony	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	6
Arsenic	3.9	0.4	1.6	5.5	25
Barium	24.1	24.3	26.6	25.3	1000
Boron	68.2	151	138	71.1	5000
Cadmium	0.003 <MDL	0.003 <MDL	0.012	0.003 <MDL	5
Chromium	0.03 <MDL	0.03 <MDL	0.08	0.03 <MDL	50
Mercury	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	1
Selenium	0.04 <MDL	0.04 <MDL	0.04 <MDL	0.04 <MDL	10
Uranium	0.419	0.305	1.47	0.431	20

^a – Samples collected on June 10, 2015.

3.3.2 Lead

Schedule 15.1 of Ontario Regulation 170/03 requires that samples be taken during two seasons: once between December 15 and April 15 and once between June 15 and October 15. The Lakeshore Drinking Water System is currently under a reduced sampling program for lead where lead, pH and alkalinity are sampled in each season every 3 years. In the interim, pH and alkalinity are tested during each sampling season. Two pH and alkalinity samples were taken on March 28, 2016 and one pH and alkalinity samples on September 28, 2016. These parameters are required to be sampled and analyzed again between the months of December 2016 and April 2017 and again between June and October 2017. Lead samples are required next in the 2017 sampling season. 2016 results can be found in Table 7.

Table 7 – Lead Sampling Program Results for Lakeshore Drinking Water System ^a

Sampling Season	pH	Alkalinity (mg/L)
Dec-Apr	7.39	184
	7.64	172
Jun-Oct	7.61	182
	7.92	175

^a – Samples collected on March 28, 2016 and September 28, 2016 respectively.

3.3.3 Organics

Treated water samples are collected every 36 months and tested for schedule 24 organic parameters. The most recent samples were collected on June 10, 2015. All parameters were found to be within compliance. Organics will be sampled and analyzed again on or before June 10, 2018. June 10, 2015 sample results can be found in **Table 8**.

Table 8 – Schedule 24 Results for Lakeshore Drinking Water System ^a

Parameter	Blairs Grove (µg/L)	Huronville South (µg/L)	Murdock Glen (µg/L)	Point Clark (µg/L)	Maximum Allowable Concentration (µg/L)
Benzene	0.32 <MDL	0.32 <MDL	0.32 <MDL	0.32 <MDL	5
Carbon Tetrachloride	0.16 <MDL	0.16 <MDL	0.16 <MDL	0.16 <MDL	5
1,2-Dichlorobenzene	0.41 <MDL	0.41 <MDL	0.41 <MDL	0.41 <MDL	200
1,4-Dichlorobenzene	0.36 <MDL	0.36 <MDL	0.36 <MDL	0.36 <MDL	5
1,1-Dichloroethylene	0.33 <MDL	0.33 <MDL	0.33 <MDL	0.33 <MDL	14
1,2-Dichloroethane	0.35 <MDL	0.35 <MDL	0.35 <MDL	0.35 <MDL	5
Dichloromethane	0.35 <MDL	0.35 <MDL	0.35 <MDL	0.35 <MDL	50
Monochlorobenzene	0.3 <MDL	0.3 <MDL	0.3 <MDL	0.3 <MDL	80
Tetrachloroethylene	0.35 <MDL	0.35 <MDL	0.35 <MDL	0.35 <MDL	30
Trichloroethylene	0.44 <MDL	0.44 <MDL	0.44 <MDL	0.44 <MDL	50
Vinyl Chloride	0.17 <MDL	0.17 <MDL	0.17 <MDL	0.17 <MDL	2
Diquat	1 <MDL	1 <MDL	1 <MDL	1 <MDL	70
Paraquat	1 <MDL	1 <MDL	1 <MDL	1 <MDL	10
Glyphosate	1 <MDL	1 <MDL	1 <MDL	1 <MDL	280
Polychlorinated Biphenyls	0.04 <MDL	0.04 <MDL	0.04 <MDL	0.04 <MDL	3
Benzo(a)pyrene	0.004 <MDL	0.004 <MDL	0.004 <MDL	0.004 <MDL	0.01
2,4-dichlorophenol	0.15 <MDL	0.15 <MDL	0.15 <MDL	0.15 <MDL	900
2,4,6-trichlorophenol	0.25 <MDL	0.25 <MDL	0.25 <MDL	0.25 <MDL	5
2,3,4,5-tetrachlorophenol	0.20 <MDL	0.20 <MDL	0.20 <MDL	0.20 <MDL	100
Pentachlorophenol	0.15 <MDL	0.15 <MDL	0.15 <MDL	0.15 <MDL	60
Alachlor	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	5
Aldicarb	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	9
Aldrin+Dieldrin	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.7
Aldrin	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Dieldrin	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Atrazine+N-dealkylated metabolites	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	5
Atrazine	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
De-ethylated atrazine	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Azinphos-methyl	0.05 <MDL	0.05 <MDL	0.05 <MDL	0.05 <MDL	20
Bendiocarb	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	40
Carbaryl	0.05 <MDL	0.05 <MDL	0.05 <MDL	0.05 <MDL	90
Carbofuran	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	90
Chlordane	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	7

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Parameter	Blairs Grove (µg/L)	Huronville South (µg/L)	Murdock Glen (µg/L)	Point Clark (µg/L)	Maximum Allowable Concentration (µg/L)
a-chlordane	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
g-chlordane	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Oxychlordane	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Chlorpyrifos	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	90
Cyanazine	0.03 <MDL	0.03 <MDL	0.03 <MDL	0.03 <MDL	10
Diazinon	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	20
(DDT)+Metabolites	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	30
op-DDT	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
pp-DDD	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
pp-DDE	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
pp-DDT	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Dimethoate	0.03 <MDL	0.03 <MDL	0.03 <MDL	0.03 <MDL	20
Diuron	0.03 <MDL	0.03 <MDL	0.03 <MDL	0.03 <MDL	150
Heptachlor-Heptachlor Epoxide	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	3
Heptachlor	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Heptachlor epoxide	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	-
Lindane	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	4
Malathion	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	190
Methoxychlor	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	900
Metolachlor	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	50
Metribuzin	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	80
Parathion	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	50
Phorate	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	2
Prometryne	0.03 <MDL	0.03 <MDL	0.03 <MDL	0.03 <MDL	1
Simazine	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	10
Temephos	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	280
Terbufos	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	1
Triallate	0.01 <MDL	0.01 <MDL	0.01 <MDL	0.01 <MDL	230
Trifluralin	0.02 <MDL	0.02 <MDL	0.02 <MDL	0.02 <MDL	45
2,4-dichlorophenoxyacetic acid	0.19 <MDL	0.19 <MDL	0.19 <MDL	0.19 <MDL	100
2,4,5-trichlorophenoxyacetic acid	0.22 <MDL	0.22 <MDL	0.22 <MDL	0.22 <MDL	280
Bromoxynil	0.33 <MDL	0.33 <MDL	0.33 <MDL	0.33 <MDL	5
Dicamba	0.20 <MDL	0.20 <MDL	0.20 <MDL	0.20 <MDL	120
Diclofop-methyl	0.40 <MDL	0.40 <MDL	0.40 <MDL	0.40 <MDL	9
Dinoseb	0.36 <MDL	0.36 <MDL	0.36 <MDL	0.36 <MDL	10
Picloram	1 <MDL	1 <MDL	1 <MDL	1 <MDL	190

^a – Samples collected on June 10, 2015.

3.3.4 Trihalomethanes

Distribution samples are taken every three months from representative points in the distribution system and tested for Trihalomethanes (THMs). In 2016, samples were collected during the months of February, May, August, and November. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and it is expressed as a running annual average. In 2016, the average THM was found to be 10.04 µg/L, which is within compliance. Refer to **Table 9** for the summary of trihalomethane results. In 2017, samples will be collected in February, May, August, and November.

3.3.5 Nitrate & Nitrite

Four treated water samples are taken every three months and tested for nitrate and nitrite. In 2016, samples were collected during the months of February, May, August, and December. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 1 mg/L for nitrites and 10 mg/L for nitrates. The results were found to be within compliance. Refer to **Table 9**. In 2017, samples will be collected in February, May, August, and December.

Table 9 – Nitrate, Nitrite and THM Results at Lakeshore Drinking Water System ^a

BLAIRS GROVE

Month	Nitrate		Nitrite		THMs	
	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)
Feb	1	<0.006	1	<0.003	1	12.0
May	1	<0.006	1	<0.003	1	7.7
Aug	1	<0.006	1	<0.003	1	4.0
Nov	1	<0.006	1	<0.003	1	20.0
Total	4		4		4	
Average		<0.006		<0.003		10.9
Maximum		<0.006		<0.003		20.0

HURONVILLE SOUTH

Month	Nitrate		Nitrite		THMs	
	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)
Feb	1	<0.006	1	<0.003	1	6.9
May	1	<0.006	1	<0.003	1	5.0
Aug	1	<0.006	1	<0.003	1	7.8
Nov	1	<0.006	1	<0.003	1	8.2
Total	4		4		4	
Average		<0.006		<0.003		7.0
Maximum		<0.006		<0.003		8.2

MURDOCK GLEN

Month	Nitrate		Nitrite		THMs	
	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)
Feb	1	<0.006	1	<0.003	1	13.0
May	1	<0.006	1	<0.003	1	14.0
Aug	1	<0.006	1	<0.003	1	11.0
Nov	1	<0.006	1	<0.003	1	19.0
Total	4		4		4	
Average		<0.006		<0.003		14.3
Maximum		<0.006		<0.003		19.0

POINT CLARK

Month	Nitrate		Nitrite		THMs	
	# Samples	Result (mg/L)	# Samples	Result (mg/L)	# Samples	Result (µg/L)
Feb	1	<0.006	1	<0.003	1	6.6
May	1	<0.006	1	<0.003	1	5.5
Aug	1	<0.006	1	<0.003	1	10.0
Nov	1	<0.006	1	<0.003	1	10.0
Total	4		4		4	
Average		<0.006		<0.003		8.0
Maximum		<0.006		<0.003		10.0

^a – Results collected from January 1, 2016 – December 31, 2016

3.3.6 Sodium

One water sample is collected from each point of entry every 60 months and tested for Sodium. The Ontario Drinking Water Standards (ODWQS) have set a Maximum Acceptable concentration (MAC) of 200 mg/L for Sodium and requires the Medical Office of Health be notified if the concentration exceeds 20 mg/L. These samples were collected on June 21, 2016. Refer to **Table 10**. The next water sample for Sodium will be collected and analyzed on or before June 21, 2021.

3.3.7 Fluoride

One water sample is collected from each point of entry at least once in every 60 months and tested for Fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a MAC of 1.5 mg/L. On May 12, 2015, samples were collected for this analysis. All four samples exceeded the Maximum Allowable Concentration (MAC). This is due to naturally occurring fluoride in the aquifers. The next water samples for Fluoride will be collected and analyzed on or before May 12, 2020. Refer to **Table 10**.

Table 10 – Sodium and Fluoride Results at Lakeshore Drinking Water System

Location	Sodium (mg/L)	Fluoride (mg/L)
Blairs Grove	101	1.71
Huronville South	52.7	2.19
Murdock Glen	68.4	2.12
Point Clark	19.8	2.04
MAC	20	1.50

3.3.8 Non-Regulatory Testing – Aesthetic Objectives and Operational Guidelines

Samples were collected on November 21, 2016 and tested for parameters listed in the *MOECC Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, June 2006, PIBS 4449e01*. Refer to **Table 11** for Aesthetic Objective/Operational Guideline results.

Table 11 – Aesthetic Objectives and Operational Guidelines

Parameter	AO/OG	Blairs Grove Treated Water	Huronville South Treated Water	Murdock Glen Treated Water	Point Clark Treated Water
pH	6.5 – 8.5	7.89	8.10	8.17	8.07
Alkalinity (mg/L as CaCO ₃)	30 – 500	174	156	171	190
Conductivity (µS/cm)	---	1,720	694	771	709
Colour (TCU)	5	3<MDL	3<MDL	3<MDL	7
Total Dissolved Solids (mg/L)	500	1,350	494	511	534
Organic Nitrogen (mg/L)	0.15	0.05<MDL	0.05<MDL	0.05<MDL	0.05<MDL
Total Kjeldahl Nitrogen (mg/L)	---	0.05<MDL	0.07	0.05<MDL	0.05<MDL
Ammonia + Ammonium (mg/L)	---	0.04<MDL	0.04	0.07	0.05
Hydrogen Sulphide (mg/L)	0.05	<0.006	<0.006	<0.006	<0.006
Sulphide (mg/L)	0.05	0.006<MDL	0.006<MDL	0.006<MDL	0.006<MDL
Chloride (mg/L)	250	150	18	37	13
Sulphate (mg/L)	500	620	170	170	170
Hardness (mg/L as CaCO ₃)	80 – 100	765	237	246	308
Aluminum (µg/L)	100	25.5	1.0	2.8	3.3
Copper (µg/L)	1000	0.08	0.12	5.80	0.22
Iron (µg/L)	300	581	150	102	311
Manganese (µg/L)	50	3.70	2.02	3.07	4.11
Zinc (µg/L)	5000	2	4	20	4
Dissolved Organic Carbon (mg/L)	5	1<MDL	1<MDL	1<MDL	1<MDL
Methane (L/m ³)	3	0.02<MDL	0.02<MDL	0.02<MDL	0.02<MDL
Ethylbenzene (µg/L)	2.4	0.33<MDL	0.33<MDL	0.33<MDL	0.33<MDL
Toluene (µg/L)	24	0.36<MDL	0.36<MDL	0.36<MDL	0.36<MDL
Xylene (µg/L)	300	0.43<MDL	0.43<MDL	0.43<MDL	0.43<MDL
m/p-xylene (µg/L)	---	0.43<MDL	0.43<MDL	0.43<MDL	0.43<MDL
o-xylene (µg/L)	---	0.17<MDL	0.17<MDL	0.17<MDL	0.17<MDL

AO/OG – Aesthetic Objective / Operational Guideline

MDL – Laboratory Method Detection Limit

4.0 WATER AND CHEMICAL USAGE

4.1 Chemical Usage

From January 1, 2016 to December 31, 2016, 1,762.68 kg of sodium hypochlorite (NaOCl) was used to treat the water that was provided to the distribution system with an average dosage of 3.56 mg/L. During the same time period, 4,133.21 kgs of sodium silicate (Na₂SiO₃) was used for iron sequestering. Refer to **Table 12** for sodium hypochlorite usage and **Table 13** for sodium silicate usage.

Table 12 – Sodium Hypochlorite Usage at Lakeshore Drinking Water System^a

Month	BLAIRS GROVE		HURONVILLE SOUTH		MURDOCK GLEN		POINT CLARK	
	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)
Jan	1.38	4.74	23.46	3.00	7.04	4.01	40.71	2.62
Feb	0.97	3.77	22.77	3.03	5.38	3.93	39.47	2.57
Mar	1.52	4.66	25.39	3.20	5.52	4.36	44.30	2.57
Apr	1.24	3.22	30.08	3.12	4.97	3.50	45.54	2.71
May	3.31	4.63	62.79	3.14	24.98	3.45	74.38	2.77
Jun	31.19	2.87	101.15	3.10	9.25	1.66	81.97	2.84
Jul	39.33	4.68	131.65	2.98	24.70	3.19	127.37	2.76
Aug	21.25	4.58	111.23	3.21	23.05	3.36	125.17	3.07
Sep	7.18	5.47	71.07	3.27	12.56	3.55	71.62	3.04
Oct	4.00	5.89	38.64	3.55	9.25	3.93	54.37	3.14
Nov	22.49	4.97	32.84	3.57	5.80	4.34	36.85	3.26
Dec	20.98	2.96	27.32	3.38	4.97	4.11	44.99	3.20
Total	154.84		678.39		142.71		786.74	
Average		4.37		3.21		3.77		2.88

^a – Results collected from January 1, 2016 – December 31, 2016

Table 13 - Sodium Silicate Usage at Lakeshore Drinking Water System^a

Month	BLAIRS GROVE		HURONVILLE SOUTH		MURDOCK GLEN		POINT CLARK	
	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)	Usage (kg)	Average Dosage (mg/L)
Jan	11.15	44.51	37.64	4.76	32.06	18.81	217.46	14.01
Feb	5.58	30.70	37.64	5.00	25.09	19.68	230.01	15.05
Mar	15.33	45.67	41.82	5.52	25.09	18.84	262.07	15.15
Apr	6.97	21.30	51.58	5.18	26.49	18.84	249.53	15.27
May	34.85	29.17	135.22	6.35	122.67	16.21	418.20	15.31
Jun	327.59	90.17	230.01	7.08	89.22	20.30	423.78	15.19
Jul	412.62	40.72	301.10	7.18	132.43	17.36	602.21	13.46
Aug	228.62	40.22	218.86	6.31	119.88	17.17	620.33	15.28
Sep	82.25	42.69	144.98	6.88	62.73	16.79	363.83	14.68
Oct	39.03	34.54	72.49	6.61	47.40	19.10	281.59	16.22
Nov	207.71	39.01	46.00	5.03	27.88	21.42	189.58	16.49
Dec	217.46	23.93	36.24	4.51	23.70	17.53	274.62	20.30
Total	1,583.59		1,353.58		734.64		4,133.21	
Average		40.22		5.87		18.50		15.53

4.2 Annual Volumes

A summary of the water supplied to the distribution system in 2016 is provided in **Table 14**. This Table provides a breakdown of the monthly volumes provided to the distribution system.

Flow meters were calibrated on July 28, 2016 by Coulter Water Meter Service and were found to be acceptable. The water meters will be calibrated again by July 2017.

Table 14 – Treated Water Volume for Lakeshore Drinking Water System ^a

BLAIRS GROVE

Month	Avg Daily Volume (m ³)	Max Daily Volume (m ³)	Total Monthly Volume (m ³)
Jan	7.51	22.12	232.67
Feb	7.27	20.70	210.75
Mar	8.81	36.74	273.13
Apr	9.18	86.32	275.34
May	26.09	549.25	808.69
Jun	276.21	1,661.26	8,286.38
Jul	337.21	1,982.40	10,453.42
Aug	173.14	834.62	5,367.20
Sep	62.26	532.67	1,867.76
Oct	41.39	248.56	952.00
Nov	194.63	734.77	5,838.80
Dec	178.80	678.28	5,542.78
Total			40,108.92
Average	110.21		
Maximum		1,982.40	

HURONVILLE SOUTH

Month	Avg Daily Volume (m ³)	Max Daily Volume (m ³)	Total Monthly Volume (m ³)
Jan	249.36	288.14	7,730.10
Feb	250.35	284.23	7,260.03
Mar	248.36	304.64	7,699.14
Apr	325.68	547.04	9,770.46
May	645.39	1,244.12	20,007.13
Jun	1,104.52	1,549.90	33,135.49
Jul	1,414.83	1,739.59	43,859.64
Aug	1,096.47	1,694.46	33,990.53
Sep	712.32	1,356.01	21,369.68
Oct	355.94	526.63	11,034.05
Nov	302.58	502.39	9,077.49
Dec	255.18	348.37	7,910.71
Total			212,844.45
Average	580.08		
Maximum		1,739.59	

MURDOCK GLEN

Month	Avg Daily Volume (m ³)	Max Daily Volume (m ³)	Total Monthly Volume (m ³)
Jan	57.98	124.20	1,797.36
Feb	49.43	116.90	1,433.44
Mar	46.88	214.47	1,453.13
Apr	51.61	135.49	1,548.43
May	227.17	1,595.14	7,042.28
Jun	142.51	319.34	4,275.44
Jul	234.62	432.63	7,273.12
Aug	213.58	809.12	6,621.12
Sep	123.12	452.31	3,693.72
Oct	81.40	340.99	2,523.43
Nov	52.24	160.90	1,567.12
Dec	45.61	70.14	1,413.95
Total			40,642.54
Average	110.51		
Maximum		1,595.14	

POINT CLARK

Month	Avg Daily Volume (m ³)	Max Daily Volume (m ³)	Total Monthly Volume (m ³)
Jan	482.77	634.78	14,965.95
Feb	509.16	642.06	14,765.55
Mar	525.15	657.75	16,279.69
Apr	540.92	742.74	16,227.46
May	841.45	1,455.38	26,084.97
Jun	925.21	1,552.61	27,756.38
Jul	1,380.77	1,761.83	42,803.86
Aug	1,240.28	1,715.15	38,448.63
Sep	740.78	1,425.18	22,223.31
Oct	555.75	752.35	17,228.24
Nov	358.85	657.69	10,765.60
Dec	502.39	793.27	15,573.98
Total			263,123.62
Average	716.96		
Maximum		1,761.83	

^a – Results collected from January 1, 2016 – December 31, 2016

Annual Lakeshore Total Flow, Actual (m³): 556,719.53

Annual Lakeshore Total Capacity, PTTW (m³): 4,247,234.90

Annual Lakeshore Capacity, Actual %: 13.11%

5.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE

The following summarizes water system improvements and routine and preventative maintenance for the Lakeshore Drinking Water System Supply:

Point Clark:

Routine and preventative maintenance performed as per Jobs Plus schedule.

Semi-annual flushing in April - May, and again October – November.

June 13, 2016 – Well # 3 controllers were replaced, and Well # 2 motor was replaced.

June 17, 2016 - The Standpipe in Point Clark was inspected.

July – September, 2016 – Watermain upgrade project on Potawatomi Path, Ojibwa Trail, Oki Court, Menomini Road, and Kickapoo Road.

July 22, 2016 – Well # 2 motor was replaced again after a power surge, and lightning arresters have been installed for both wells.

November 21, 2016 – Replaced the flow meter with a new mag meter.

Blairs Grove:

Routine and preventative maintenance performed as per Jobs Plus schedule.

Semi-annual flushing in April - May, and again October – November.

July 12, 2016 – Replaced flow meter with a new mag meter.

Murdock Glen:

Routine and preventative maintenance performed as per Jobs Plus schedule.

Semi-annual flushing in April - May, and again in October – November.

May 16, 2016 - Diesel generator annual service.

September 15, 2016 – Overhead crane/hoist inspection.

October 19, 2016 - Back-flow preventer inspection.

Huronville South:

Routine and preventative maintenance performed as per Jobs Plus schedule.

Semi-annual flushing in April - May, and again October – November.

August 3, 2016 – Eramosa Engineering on-site to correct controller problems related to well pump functionality.

October 19, 2016 - Back-flow preventer removed.

6.0 MINISTRY OF THE ENVIRONMENT INSPECTIONS AND REGULATORY ISSUES

The Ministry of the Environment and Climate Change did not conduct an inspection on Lakeshore Drinking Water System Supply in 2016. The last MOECC Drinking Water Inspection was conducted on October 8, 2015, and a report was issued December 17, 2015. The Operating Authority achieved a rating of 88.07% on the 2015 Lakeshore Inspection Report – an improvement from the 2014-2015 Lakeshore Inspection Report (85.63%). The most recent MOECC inspection occurred on January 11, 2017. The operating authority achieved a rating of 99.40%, a discernable increase from the previous two years.

DWQMS Audit was conducted on November 24, 2016.

Flow meter calibrations were conducted on June 29, 2016.

Blairs Grove:

One adverse water quality event occurred at the Blairs Grove well house during 2016.

AWQI # 129676 - June 5, 2016, chlorine residuals below the minimum required were observed for 9 minutes during pumphouse startup. The low-chlorine water was flushed from the system.

Distribution System:

Two adverse water quality incidents occurred in the distribution system during 2016.

AWQI # 131318 – September 27, 2016, in response to a Class 2 watermain break on Tanglewood Road. A Precautionary Boil Water Notice was issued and samples were collected.

AWQI # 131376 – September 30, 2016, one of the samples collected in response to the watermain break on Tanglewood Road yielded a 1 Total Coliform hit. Resamples were collected (2 sets) and came back all clear.

7.0 EMERGENT ISSUES

It should be noted that there will be some upcoming changes to Ontario Regulation 170/03 and Ontario Regulation 169/03 that strengthen standards and clarify testing requirements as follows:

- Strengthen standards for Arsenic, Carbon Tetrachloride, Benzene, and Vinyl Chloride;
- Adopt new standards for Chlorate, Chlorite, 1-Methyl-4-Chlorophenoxyacetic acid (MCPA) and Haloacetic Acids (HAAs); (NOTE: Chlorate and Chlorite testing is only required for Municipal Drinking Water Systems using Chlorine Dioxide treatment equipment.)
- Clarify/optimize testing, sampling and reporting requirements for Trihalomethanes (THMs) and HAAs; and
- Remove 13 pesticides from testing requirements.

The aforementioned amendments will be phased in over the next four years to allow system owners and/or operators the opportunity to collect baseline information and complete required system upgrades. Currently, the new sampling, testing, reporting and re-sampling requirements, and the removal of 13 pesticides came into effect January 1, 2016. Refer to **Table 15** for the new Regulatory Requirements. Subsequent phase-in dates are:

- January 1, 2017: Testing requirements for HAAs and updates to standards for Carbon Tetrachloride, Benzene, Vinyl Chloride, Chlorate, Chlorite, and MCPA come into effect / require reporting
- January 1, 2018: Updates to standards for Arsenic come into effect / require reporting
- January 1, 2020: New standards for HAAs and HAAs testing optimization rule for smaller systems will come into effect / require reporting.

Table 15 – Regulatory Requirements

Parameter	Current Requirement		Amended Requirement	
	MAC	½ MAC	MAC	½ MAC
Arsenic	25 µg/L	12.5 µg/L	10 µg/L	5 µg/L
Benzene	5 µg/L	2.5 µg/L	1 µg/L	0.5 µg/L
Carbon Tetrachloride	5 µg/L	2.5 µg/L	2 µg/L	1 µg/L
Vinyl Chloride	2 µg/L	1 µg/L	1 µg/L	0.5 µg/L

ARSENIC REVIEW

Historic Arsenic values were reviewed from 2003 to 2015 and are shown in **Table 16**.

Table 16 – Historic Arsenic Values

Date	Blairs Grove	Huronville South	Murdock Glen	Point Clark
Feb 2003	3	<2	<2	2
Jun 2003	<2	<2	<2	3
Jun 2006	1.2	0.5	1.2	7.3
Jan 2008	1.1	0.8	1.7	5.2
Jun 2009	3.3	1.6	2.7	6.7
Nov 2010	1.5	0.7	1.8	5.6
Dec 2010	3.7	0.9	2.1	5.6
Aug 2011	3.7	0.9	1.8	5.5
Nov 2011	3.7	1.0	1.9	5.7
Aug 2012	3.3	0.6	1.7	5.2
Nov 2012	1.5	0.8	2.0	5.8
Sep 2013	1.9	0.7	2.0	5.5
Nov 2013	1.4	0.6	1.7	5.1
Sep 2014	3.6	0.6	1.9	5.9
Dec 2014	0.5	0.5	1.7	6.0
Jun 2015	3.9	0.4	1.6	5.5

EMERGENT ISSUES SUMMARY:

A review of the sample results between 2003 and 2015 indicates that Arsenic may be in exceedance of the amended ½ MAC requirements at the Point Clark facility (highlighted in yellow). This would require quarterly sampling to be conducted (see note below).

Historic values of the other parameters (Benzene, Carbon Tetrachloride, and Vinyl Chloride), are all below the amended standards prescribed.

NOTE:

O. Reg. 170/03, Schedule 13: Increased frequency under ss. 13-2 and 13-4

13-5. (1) If a test result obtained under section 13-2 or 13-4 for a parameter **exceeds half of the standard prescribed** for the parameter in Schedule 2 to the Ontario Drinking Water Quality Standards, the frequency of sampling and testing for that parameter under that section shall be **increased** so that at least one water sample is taken and tested **every three months**.