

Gravenhurst Water Summary Report 2017



Drinking Water Works Permit: 143-209
Municipal Drinking Water Licence: 143-109

Ministry of Environment and Climate Change Waterworks #: 220002100

INTRODUCTION

The Beach Road Water Treatment Plant (WTP) or Gravenhurst WTP is owned and operated by the District Municipality of Muskoka. The WTP serving the community of Gravenhurst was constructed in 1983, replacing an old system that consisted of a well house at Nelson Street and a pump house supplying chlorinated water to the town from Gull Lake. The Gravenhurst WTP has a rated capacity of 9,996 cubic metres per day (m³/day) and the water system currently serves a population of approximately 7,400 people

The plant operates under licence 143-09 and permit 143-09, issued in October 2010 and re-issued in October 2015 under the Municipal Drinking Water Licencing Program. The plant also presently operates under Ministry of Environment and Climate Change (MOECC) permit to take water #2320-8G2MLQ (expires February 28, 2021), which permits the operation of up to 10,000 m³/day. The raw water intake structure is located near Brydon's Bay on Lake Muskoka approximately 11.5 metres deep and 1,000 metres from shore.

The plant process is a direct filtration plant, with supplementary pH adjustment. The facility includes an intake crib, intake pipe, fixed screen, and a low lift pumping station. The treatment plant consists of flash mixing, four variable speed flocculators, and four dual media filters. Also located at the treatment plant are 2 backwash holding tanks, two contact chambers, two clear wells, 4 high lift pumps, 2 backwash pumps, chemical storage, preparation, and feed equipment.

The treatment plant system features chemical treatment consisting of hydrated lime / carbon dioxide (corrosion control), polyaluminum chloride (coagulation), polymer (filter aid), sodium hydroxide (pH control) and disinfection in a chlorine contact chamber followed by final pH adjustment. The addition of hydrofluorosilic acid (fluoridation) to prevent tooth decay completes the treatment process.

The distribution system includes two elevated storage tanks supplying the urban area of Gravenhurst and one underground reservoir supplying Fenbrook Institutions owned by Correctional Services Canada.

Legislation Requirements

Safe Drinking Water Act

In the Part Two Report in the Walkerton Inquiry, Commissioner Dennis O'Connor recommended that the Ontario Government enact a Safe Drinking Water Act to deal with matters related to treatment and distribution of drinking water. The Safe Drinking Water Act (SDWA) received royal assent in December, 2002.

The purpose of the Act is to gather in one place all legislation and regulations relating to the treatment and distribution of drinking water. The Act serves to protect human health through the control and regulation of drinking water systems and drinking water testing.

The foundation provisions of the Safe Drinking Water Act include:

- Purpose of the Act
- Definitions
- Minister's Powers and Duties
- Inspections
- Compliance and Enforcement
- Appeals and Offences

Ontario Regulations

The Ontario Government has enacted several supporting regulations under the SDWA (2002). These regulations combine previous requirements under the Ontario Water Resources Act and the new requirements under the SDWA. Key components of the regulations include:

- System Categories
- Groundwater Under Direct Influence Of Surface Water (GUDI)
- Exemptions
- Approval of Systems
- Treatment
- Testing and Operational Checks (General Rules)
- Operational Checks
- Microbiological Testing
- Chemical Testing
- Adverse Conditions
- Corrective Actions
- Engineer's and Summary Reports

Municipal Drinking Water Licences / Certificates of Approval

The Municipal Drinking Water Licensing Program has replaced the Certificate of Approval program for municipal residential drinking water systems. The Ontario Government has implemented the Municipal Drinking Water Licensing Program (MDWLP) as recommended by Justice O'Connor in the Part II Report of the Walkerton Inquiry. Justice O'Connor recommended a new approvals framework for municipal drinking water systems, which would require owners to obtain a license to operate their systems as well as incorporate the concept of quality management into their operations.

A municipal drinking water license is an approval that is issued by the MOECC to owners under the Safe Drinking Water Act, 2002 for the operation of municipal residential drinking water systems. The District of Muskoka operated under various Certificates of Approval until October 2010 when the operating licenses were issued, these have since been renewed on 5 year intervals.

Previous Certificates of Approval were required for the establishment, replacement or alteration of all municipal drinking water systems. The Ministry of Environment and Climate Change (MOECC) issued Certificates of Approval to ensure that all undertakings comply with the legislation (i.e. Acts and Regulations) and the Ministry's Environmental Guidelines and Procedures developed to provide consistency of approach to various aspects of environmental protection throughout the province.

Municipal Drinking Water Licenses and Permits similar to previous Certificates of Approval provide specific details about the drinking water system including:

- Drinking Water System Description
- Definitions and Information
- General Information – Compliance, Other Legal Requirements, Adverse Effects, Inspections
- Performance – Rated Capacity, Management of Residue
- Monitoring and Recording – Flow Measuring Devices, Sampling
- Operations and Maintenance

Comparison to Rated Capacity and Flow Rate

The Muskoka Beach Road water treatment plant has a rated capacity of 9,996 m³/day. In 2017, the total monthly average flow for the year was 3,057 m³/day. The maximum daily flow for the year was 4,372 m³/day, however, the 3-year average for maximum daily flow is 4,387 m³/day, which represents 44% of the plant design capacity.

Monthly flows are shown in the attached table.

The Permit to Take Water (PTTW #2320-8G2MLQ) permits 10,000 m³/day; therefore there were no exceedances of this permit.

Summary of Analytical Results

A total of 1,088 microbiological regulatory tests were performed in 2017 and compliance with Provincial standards was achieved throughout. There were 868 free chlorine residual tests performed in the distribution system, and all results were within guidelines. Staff continue to routinely sample all areas of the system to ensure adequate free chlorine residuals are available throughout the distribution system.

A summary of other analytical results is also shown in this report.

Summary of Treatment Chemicals

The following chemicals are used for the treatment of drinking water at the Muskoka Beach Road Water Treatment Plant:

- Sodium Hypochlorite: Disinfection
- Polyaluminum Chloride (Stern PAC): Primary Coagulant
- Polymer: Filter Aid
- Sodium Hydroxide: Final pH adjustment
- Hydrated Lime: Alkalinity and pH adjustment
- Carbon Dioxide: pH adjustment
- Sodium Permanganate: Taste and Odour Control, manganese precipitant
- Hydrofluosilicic Acid: Fluoride to prevent tooth decay

A chart summarizing the chemical use and average dosages is included in this report.

Documentation of System Repairs and Upgrades

No significant capital expenses were incurred to conduct system repairs or upgrades in 2017.

External Audits

MOECC Inspection

A MOECC inspection was completed on December 16, 2016 and was attached in the 2016 Annual Report. The overall rating was 100%. An MOECC inspection took place in January 2018 and the report is still in draft stage, a finalized copy will be provided in next year's Annual Report for 2018.

DWQMS Audit

In 2017 all drinking water systems had an external recertification audit performed. There were four (4) minor non-conformances reported, all have subsequently been addressed and as a result all drinking water systems have been recertified. Overall, all drinking water systems are performing satisfactorily.

2017 Gravenhurst Water Distribution Summary

New Services

One new 19 mm water service was installed, another 49 customers connected to existing serviced properties in 2017.

Watermain Failures

Two watermain breaks occurred in 2017, with an average repair cost of approximately \$7000.

Service Leaks

Three service leaks were repaired in 2017 on the District side of services, at an average cost of approximately \$1675.

Frozen Services

There were no frozen services observed on municipal side in 2017.

Replacement Watermains

195 m of 200 mm unlined ductile iron pipe was replaced with 250 mm PVC on District Road 169 (H-238 to Readman St.) in 2017.

New Watermains

No new watermains were installed in 2017.

Watermain Rehabilitation

Phillip Street's 150 mm cast was relined (from Fourth St. to H-306).

Valve Failure

Valve # 328 was replaced on Phillip Street at a cost of \$1003.70.

Valve maintenance

All 149 critical valves, and 167 non-critical valves where operated.

Fire Hydrants

There are 468 hydrants maintained by the District in the Town of Gravenhurst, they were inspected, operated, and/or flushed at least once during 2017. One fire hydrant was replaced and two others were repaired in 2017.

Meter Replacement/Installations

244 Water meters were replaced as part of the aged meter change out program in 2017. The average age of meters in Gravenhurst is 10 years.

Air-vacuum Release Valves

All sixteen (16) Air-Vacuum release valves, were removed, cleaned, and tested for the yearly maintenance inspection.

Locates

750 Locates were performed by District staff in 2017.

**Part III Form 2
Section 11. ANNUAL REPORT.**

Drinking-Water System Number:	220002100
Drinking-Water System Name:	Muskoka Beach Water Treatment Plant
Drinking-Water System Owner:	District Municipality of Muskoka
Drinking-Water System Category:	Large Municipal Residential
Period being reported:	January 01 to December 31, 2017

<p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [] No [X]</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No []</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <div style="border: 1px solid black; padding: 5px;"> District municipality of Muskoka 70 Pine Street Bracebridge, Ontario P1H 1N3 (705) 645-6764 www.muskoka.on.ca </div>	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served: <div style="border: 1px solid black; padding: 2px; display: inline-block;">N.A.</div> </p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [] No [] </p> <p>Number of Interested Authorities you report to: <div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div></p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [] No [] </p>
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List Drinking-Water Systems, if any, which receive all of their drinking water from your system:

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?
 Yes [] No []

Indicate how you notified system users that your annual report is available, and is free of charge.

- [X] Public access/notice via the web
- [X] Public access/notice via Government Office
- [X] Public access/notice via a newspaper

- Public access/notice via Public Request**
 Public access/notice via a Public Library
 Public access/notice via other method

Describe your Drinking-Water System

The water treatment plant in Gravenhurst was originally constructed in 1983. Significant improvements to process monitoring, control, and chemical feed systems were completed in 2004. The treatment process consists of chemically assisted coagulation-flocculation and direct filtration using dual media filters with a combination of sand and anthracite coal. Disinfection in a chlorine contact chamber followed by final pH adjustment and fluoridation completes the treatment process. The water system currently serves a population of approximately 7400 people. The rated water production of the plant is 9,996 cubic meters per day. Our raw water source is Lake Muskoka. Our intake is located approximately 11.5 meters deep, about 1000 meters from shore.

List all water treatment chemicals used over this reporting period

Sodium Hypochlorite, Sodium hydroxide, Polyaluminum Chloride, Carbon Dioxide, Hydrated Lime, Sodium Permanganate, Fluoride, Cationic Polymer

Were any significant expenses incurred to?

- Install required equipment
 Repair required equipment
 Replace required equipment

Describe
Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
Aug 21 2017 AWQI # 135844	Total Coliform	4	cfu/100 ml	Resample from 3 locations ALL Clear	Aug 25 2017

Microbiological testing done under section 8-2 during this reporting period

	Number of Samples	Range of E.Coli Or Fecal Results (#-#)	Range of Total Coliform Results (#-#)	Number of HPC Samples Or Background Colony Counts	Range of HPC Results (#-#) Or Background Colony Counts
Raw	52	0 - 9	0 - 32	0	N/A

Treated	52	0 - 0	0 - 0	52	0 – 300
Distribution	311	0 - 0	0 - 4	191	0 – 29

Operational testing done under Schedule 7, 8 or 9 during the period covered by this Annual Report.

	Number of Grab Samples	Range of Results (min # - max #)	Geometric Mean
Turbidity	8760	0.01 – 0.09	0.06
Chlorine	8760	1.38 – 2.47	2.27
Chlorine Residual Distribution System	8760	0.35 – 1.87	1.62
Fluoride (If the DWS provides fluoridation)	8760	0.51 – 0.78	0.60

NOTE:
For continuous monitors use 8760 as the number of samples.

NOTE: Record the unit of measure if it is **not** milligrams per litre.

Summary of additional testing and sampling carried out in accordance with the requirement of an approval or order.
Summary of Inorganic parameters tested during this reporting period or most recent sample results.

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	May 9/17	0.06	µg/L	No
Arsenic	May 9/17	0.2	µg/L	No
Barium	May 9/17	11.9	µg/L	No
Boron	May 9/17	12.0	µg/L	No
Cadmium	May 9/17	0.005	µg/L	No
Chromium	May 9/17	0.60	µg/L	No
Lead*	May 9/17	0.00	µg/L	No
Mercury	May 9/17	0.01<MDL	µg/L	No
Selenium	May 9/17	0.04	µg/L	No
Sodium	May 9/17	16.2	mg/L	No
Uranium	May 9/17	0.006	µg/L	No
Fluoride	May 9/17	0.67	mg/L	No
Nitrite	Feb 7/17	0.003<MDL	mg/L	No
Nitrate	Feb 7/17	0.18	mg/L	No
Nitrite	May 9/17	0.003<MDL	mg/L	No
Nitrate	May 9/17	0.184	mg/L	No
Nitrite	Aug 15/16	0.003<MDL	mg/L	No
Nitrate	Aug 15/16	0.219	mg/L	No
Nitrite	Nov 20/16	0.003<MDL	mg/L	No
Nitrate	Nov 20/16	0.167	mg/L	No

*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems.

Summary of Lead Testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and small non-municipal non-residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) -(max#)	Geometric Mean Average	Unit of Measure	Number of Exceedances
Plumbing	0	N.A.	N.A.	N.A.	N.A.
Distribution	6	0.01 – 0.22		µg/L	0

Summary of Organic parameters sampled during this reporting period or most recent

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	May 9/17	0.02<MDL	µg/L	No
Atrazine + N-dealkylated metabolites	May 9/17	0.01<MDL	µg/L	No
Azinphos-methyl	May 9/17	0.05<MDL	µg/L	No
Benzene	May 9/17	0.32<MDL	µg/L	No
Benzo(a)pyrene	May 9/17	0.004<MDL	µg/L	No
Bromoxynil	May 9/17	0.33<MDL	µg/L	No
Carbaryl	May 9/17	0.05<MDL	µg/L	No
Carbofuran	May 9/17	0.01<MDL	µg/L	No
Carbon Tetrachloride	May 9/17	0.16<MDL	µg/L	No
Chlorpyrifos	May 9/17	0.02<MDL	µg/L	No
Diazinon	May 9/17	0.02<MDL	µg/L	No
Dicamba	May 9/17	0.20<MDL	µg/L	No
1,2-Dichlorobenzene	May 9/17	0.41<MDL	µg/L	No
1,4-Dichlorobenzene	May 9/17	0.36<MDL	µg/L	No
1,2-Dichloroethane	May 9/17	0.35<MDL	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	May 9/17	0.33<MDL	µg/L	No
Dichloromethane	May 9/17	0.35<MDL	µg/L	No
2-4 Dichlorophenol	May 9/17	0.15<MDL	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	May 9/17	0.19<MDL	µg/L	No
Diclofop-methyl	May 9/17	0.40<MDL	µg/L	No
Dimethoate	May 9/17	0.03<MDL	µg/L	No
Diquat	May 9/17	1<MDL	µg/L	No
Diuron	May 9/17	0.03<MDL	µg/L	No
Glyphosate	May 9/17	1<MDL	µg/L	No
Malathion	May 9/17	0.02<MDL	µg/L	No
MCPA	May 9/17	0.00012<MDL	µg/L	No
Metolachlor	May 9/17	0.01<MDL	µg/L	No
Metribuzin	May 9/17	0.02<MDL	µg/L	No

District of Muskoka - Beach Road WTP - Gravenhurst

1.0 Water Flow Summary - 2017

Month	Total Monthly (m ³)	Average Day Flow (m ³ /d)	Maximum Day Flow (m ³ /d)	Minimum Day Flow (m ³ /d)	Comments
January	83,862	2,705	3,260	2,299	
February	76,913	2,747	3,121	2,265	
March	85,184	2,748	3,317	2,381	
April	84,932	2,831	3,601	2,343	
May	97,690	3,151	3,776	2,608	
June	98,112	3,270	4,372	2,735	
July	105,309	3,397	3,922	2,797	
August	107,629	3,472	4,159	2,850	
September	97,331	3,244	3,819	2,724	
October	95,516	3,081	3,509	2,372	
November	89,598	2,987	3,517	2,423	
December	94,585	3,051	3,449	2,551	

Total 1,116,663

Average Day 3,056.8

Maximum Day 4,372.0

Minimum Day 2,265.2

District of Muskoka - Beach Road WTP - Gravenhurst

2.0 Raw Water Monthly Analysis Summary - 2017

Month	Alkalinity	Hardness	pH	Turbidity	True Colour	Temperature	TDS	Langliers Saturation Index	Total Coliform	E-coli	Total Number of Samples
<i>Parameter</i>	<i>mg/l</i>	<i>mg/l</i>	<i>pH</i>	<i>ntu</i>	<i>tcu</i>	<i>Celcius</i>	<i>mg/l</i>		<i>CFU/100ml</i>	<i>CFU/100ml</i>	
January	8.2	12	7.03	0.39	14	2.5			3	0	5
February	8.1	11	6.19	4.67	11	2.4			3	0	4
March	8.1	12	6.91	0.34	9	2.8			3	1	4
April	8.3	14	6.79	0.40	21	4.2			7	0	4
May	7.8	14	6.90	0.53	32	8.0			13	1	5
June	7.4	13	6.73	0.41	21	11.2			6	0	4
July	7.1	14	6.59	0.37	25	11.1			1	1	4
August	6.9	14	6.54	0.37	16	12.5			27	0	4
September	7.0	12	6.50	0.40	17	12.8			7	0	4
October	7.8	12	6.79	0.39	20	13.9			10	2	5
November	7.8	12	6.94	0.42	21	8.7			15	2	4
December	7.9	11	6.24	0.41	19	4.6			5	0	4
Average	7.7	13	6.68	0.76	19	7.9	0.0	0.0	8	1	4

District of Muskoka - Beach Road WTP - Gravenhurst

3.0 Raw Water Quarterly Sampling Summary - 2017

<i>Parameter</i>	<i>I.D.</i>					1	2	3	4		
<i>Table B Volatile Organics</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Date 4 Q</i>	<i>Average</i>	<i>Max</i>
Benzene	µg/L	5	-	0.5	0.4						
Carbon Tetrachloride	µg/L	5	-	0.5	0.4						
1,2 Dichlorobenzene	µg/L	200	3	20	1						
1,4 Dichlorobenzene	µg/L	5	1	0.5	0.4						
1,2 Dichloroethane	µg/L	5	-	0.5	0.4						
1,1 Dichloroethylene	µg/L	14	-	1.4	0.5						
Dichloromethane	µg/L	50	-	5	3						
Ethylbenzene	µg/L	-	2.4	1.2	1						
Monochlorobenzene	µg/L	80	30	8	5						
Tetrachloroethylene	µg/L	30	-	3	1						
Toluene	µg/L	-	24	2.4	1						
Trichloroethylene	µg/L	50	-	5	1						
Trihalomethanes Total	µg/L	100	-	10	8						
Vinyl Chloride	µg/L	2	-	0.2	0.1						
Xylenes (Total)	µg/L	-	300	150	5						
<i>Table C Inorganics</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Date 4 Q</i>	<i>Average</i>	<i>Max</i>
Arsenic	µg/L	25	-	2.5	1						
Barium	µg/L	1000	-	100	3						
Boron	µg/L	5000	-	500	10						
Cadmium	µg/L	5	-	1	5						
Chromium	µg/L	50	-	5	20						
Copper	µg/L	-	1000	500	5						
Iron	µg/L	-	300	150	20						
Lead	µg/L	10	-	2	2						
Manganese	µg/L	-	50	25	2						
Mercury	µg/L	1	-	0.1	0.1						
Nitrite	mg/L	1.0	-	0.1	0.06						
Nitrate	mg/L	10	-	1	0.06						
Selenium	µg/L	10	-	5	5						
Uranium	µg/L	100	-	10	20						
<i>Table D Pesticides</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Date 4 Q</i>	<i>Average</i>	<i>Max</i>
Alachlor	µg/L	5	-	0.5	0.2						
Aldicarb	µg/L	9	-	9	5						
Aldrin + Dieldrin	µg/L	0.7	-	0.07	0.05						
Atrazine	µg/L	-	-	-	0.5						
Azinphos-methyl	µg/L	20	-	2	1						
Bendiocarb	µg/L	40	-	7.5	1						
Bromoxynil	µg/L	5	-	0.5	0.2						
Carbaryl	µg/L	90	-	9	1						
Carbofuran	µg/L	90	-	12.5	5						
Chlordane (Total)	µg/L	7	-	0.7	0.2						
Chorpyrifos	µg/L	90	-	9	5						
MAC - Maximum Acceptable Concentration						IMAC -Interim Acceptable Concentration					
OG - Operational Guideline						AO - Aesthetic Objective					
ODWS LR - Ontario Drinking Water Standards Reporting Limits						LRL MDL - Lakefield Research Limited Method Detection Limit.					

1.10 Raw Water Quarterly Sampling Summary (continued)
District of Muskoka - Water Treatment Plant

<i>Parameter</i>	<i>I.D #</i>					1	2	3	4		
<i>C of A Requirement</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
Alkalinity	mg/L	-	30-500	-	1						
Aluminum	µg/L	-	100	50	10						
Ammonia+Ammonium (N)	mg/L	-	-	-	0.1						
Arsenic	µg/L	25	-	2.5	1						
Calcium	mg/L	-	-	-	0.05						
Chloride	mg/L	-	250	-	0.2						
Conductivity	uS/cm	-	-	-	0.1						
Copper	µg/L	-	1000	500	5						
Disolved Organic Carbon	mg/L	-	5	-	1						
Fluoride	mg/L	1.5		0.15	0.1						
Hardness	mg/L	-	80-100	-	0.5						
Iron	µg/L	-	300	150	20						
Lead	µg/L	10	-	2	2						
Manganese	µg/L	-	50	25	2						
Nitrate (N)	mg/L	10	-	1	0.05						
Nitrite (N)	mg/L	1	-	0.1	0.06						
Phenols	mg/L	-	-	-	0.002						
Sodium	mg/L	-	200	2	0.05						
Sulphate	mg/L	-	500	-	0.5						
Total Organic Carbon	mg/l				1	4	5	3	3		
THM (Total)	µg/L	100	-	10	8						
Total Kjeldahl Nitrogen (N)	mg/L	-	-	-	0.5						
Zinc	µg/L	-	5000	2500	10						
MAC - Maximum Acceptable Concentration						IMAC -Interim Acceptable Concentration					
OG - Operational Guideline						AO - Aesthetic Objective					
ODWS LR - Ontario Drinking Water Standards Reporting Limits						LRL MDL - Lakefield Research Limited Method Detection Limit.					

District of Muskoka - Beach Road WTP - Gravenhurst

4.0 Treated Water Monthly Analysis Summary - 2017

Month	Alkalinity	Hardness	pH	Turbidity Average	High	Low	TRUE Colour	Iron	Manganese	Chlorine Free	High	Low	TDS	Langliers Saturation Index	Total Coliforms	E-coli	Total Number of Samples	HPC	Total Number of Samples
<i>Parameter</i>	<i>mg/l</i>	<i>mg/l</i>	<i>pH</i>	<i>ntu</i>	<i>ntu</i>	<i>ntu</i>	<i>tcu</i>	<i>mg/l</i>	<i>mg/l</i>	<i>mg/l</i>	<i>mg/l</i>	<i>mg/l</i>	<i>mg/l</i>		<i>CFU/100ml</i>	<i>CFU/100ml</i>			<i>CFU/1ml</i>
January	54.0	41	7.57	0.08	0.11	0.07	0			1.91	1.96	1.82			0	0	5	0	5
February	56.4	41	7.65	0.08	0.10	0.06	0			1.96	2.10	1.84			0	0	4	0	4
March	54.5	41	7.67	0.07	0.09	0.06	0			1.95	2.46	1.79			0	0	4	0	4
April	60.9	45	7.68	0.09	0.14	0.06	0			1.83	2.00	1.70			0	0	4	1	4
May	58.2	45	7.81	0.09	0.11	0.08	0			1.83	1.96	1.65			0	0	5	0	5
June	59.9	45	7.75	0.08	0.11	0.06	0			1.93	2.20	1.70			0	0	4	0	4
July	57.5	45	7.59	0.08	0.10	0.07	0			2.03	2.12	1.87			0	0	5	0	5
August	50.4	44	7.69	0.08	0.09	0.07	0			2.03	2.19	1.94			0	0	4	75	4
September	53.3	45	7.64	0.08	0.10	0.05	0			2.00	2.15	1.76			0	0	4	0	4
October	57.3	44	7.62	0.08	0.10	0.06	0			1.95	2.25	1.80			0	0	5	0	5
November	58.1	43	7.58	0.08	0.09	0.07	0			1.88	2.25	1.66			0	0	4	0	4
December	59.6	42	7.57	0.08	0.09	0.08	0			1.85	2.14	1.60			0	0	4	0	4
Average	56.7	43	7.65	0.08	0.10	0.07	0.0	0.0	0.0	1.93	2.15	1.76	0.0	0.0	0	0	4	6	4

District of Muskoka - Beach Road WTP - Gravenhurst

5.0 Treated Water Quarterly Sampling Summary - 2017

<i>Parameter</i>	<i>I.D.</i>					1	2	3	4		
Table B Volatile Organics											
	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
Benzene	µg/L	5	-	0.5	0.4		0.32				
Carbon Tetrachloride	µg/L	5	-	0.5	0.4		0.16				
1,2 Dichlorobenzene	µg/L	200	3	20	1		0.41				
1,4 Dichlorobenzene	µg/L	5	1	0.5	0.4		0.36				
1,2 Dichloroethane	µg/L	5	-	0.5	0.4		0.35				
1,1 Dichloroethylene	µg/L	14	-	1.4	0.5		0.33				
Dichloromethane	µg/L	50	-	5	3		0.35				
Ethylbenzene	µg/L	-	2.4	1.2	1						
Monochlorobenzene	µg/L	80	30	8	5		0.3				
Tetrachloroethylene	µg/L	30	-	3	1		0.35				
Toluene	µg/L	-	24	2.4	1						
Trichloroethylene	µg/L	50	-	5	1		0.44				
Trihalomethanes Total	µg/L	100	-	10	8	35	42	38	41		
Vinyl Chloride	µg/L	2	-	0.2	0.1		0.17				
Xylenes (Total)	µg/L	-	300	150	5						
Table C Inorganics											
	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
Arsenic	µg/L	25	-	2.5	1		0.2				
Barium	µg/L	1000	-	100	3		11.9				
Boron	µg/L	5000	-	500	10		12				
Cadmium	µg/L	5	-	1	5		0.005				
Chromium	µg/L	50	-	5	20		0.6				
Copper	µg/L	-	1000	500	5						
Iron	µg/L	-	300	150	20						
Lead	µg/L	10	-	2	2						
Manganese	µg/L	-	50	25	2						
Mercury	µg/L	1	-	0.1	0.1		0.01				
Nitrite	mg/L	1.0	-	0.1	0.06	0.003	0.003	0.003	0.003		
Nitrate	mg/L	10	-	1	0.06	0.18	0.184	0.219	0.167		
Selenium	µg/L	10	-	5	5		0.05				
Uranium	µg/L	100	-	10	20		0.006				
Table D Pesticides											
	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
Alachlor	µg/L	5	-	0.5	0.2		0.02				
Aldicarb	µg/L	9	-	9	5						
Aldrin + Dieldrin	µg/L	0.7	-	0.07	0.05						
Atrazine	µg/L	-	-	-	0.5		0.01				
Azinphos-methyl	µg/L	20	-	2	1		0.05				
Bendiocarb	µg/L	40	-	7.5	1						
Bromoxynil	µg/L	5	-	0.5	0.2		0.33				
Carbaryl	µg/L	90	-	9	1		0.05				
Carbofuran	µg/L	90	-	12.5	5		0.01				
Chlordane (Total)	µg/L	7	-	0.7	0.2						
Chorpyrifos	µg/L	90	-	9	5		0.02				
MAC - Maximum Acceptable Concentration						IMAC - Interim Acceptable Concentration					
OG - Operational Guideline						AO - Aesthetic Objective					
ODWS LR - Ontario Drinking Water Standards Reporting Limits						LRL MDL - Lakefield Research Limited Method Detection Limit.					

5.1 Treated Water Quarterly Sampling Summary (continued)
District of Muskoka - Beach Road WTP - Gravenhurst

<i>Table D Pesticides (Cont'd)</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
Cyanazine	µg/L	10	-	1	0.5						
Diazinon	µg/L	20	-	2	1		0.02				
Dicamba	µg/L	120	-	12	5		0.2				
2,4 Dichlorophenol	µg/L	900	0.3	90	0.15		0.15				
DDT+metabolites	µg/L	30	-	3	0.5						
2,4-D	µg/L	100	-	10	5		0.19				
Diclofop-Methyl	µg/L	9	-	0.9	0.2		0.4				
Dimethoate	µg/L	20	-	2.5	1		0.03				
Dinoseb	µg/L	10	-	1	0.5						
Diquat	µg/L	70	-	7	60		1				
Diuron	µg/L	10	-	15	0.5		0.03				
Glyphosate	µg/L	280	-	28	10		1				
Heptachlor+Heptachlor Epoxide	µg/L	3	-	0.3	0.3						
Lindane	µg/L	4	-	0.4	0.2						
Malathion	µg/L	190	-	19	5		0.02				
Methoxychlor	µg/L	900	-	90	5						
Metolachor	µg/L	50	-	5	1		0.01				
Metribuzin	µg/L	80	-	8	5		0.02				
Paraquat	µg/L	60	-	1	9		1				
Parathion	µg/L	10	-	5	1						
Pentachlorophenol	µg/L	60	30	6	1						
Phorate	µg/L	2	-	0.5	0.2		0.01				
Picloram	µg/L	190	-	19	5		1				
PCB	µg/L	3	-	0.3	0.1		0.04				
Prometryne	µg/L	1	-	0.25	0.2		0.03				
Simazine	µg/L	10	-	1	0.5		0.01				
Temephos	µg/L	280	-	28	15						
Terbufos	µg/L	1	-	1	0.5		0.01				
2,3,4,6 - Tetrachlorophenol	µg/L	100	1	10	0.5						
Triallate	µg/L	230	-	23	5		0.01				
2,4,6,- Trichlorophenol	µg/L	5	2	0.5	0.3						
2,4,5,- T	µg/L	280	20	28	5						
Trifluralin	µg/L	45	-	4.5	1		0.02				

<i>Additional Parameters</i>	<i>Units</i>	<i>MAC/IMAC</i>	<i>AO/OG</i>	<i>ODWS RDL</i>	<i>LRL MDL</i>	<i>Feb.7/17</i>	<i>May 9/17</i>	<i>Aug 16/17</i>	<i>Nov 20/17</i>	<i>Average</i>	<i>Max</i>
HAA5						23.9	42.3	45.3	45.6		
TOC						2	2	2	2		
MAC - Maximum Acceptable Concentration						IMAC -Interim Acceptable Concentration					
OG - Operational Guideline						AO - Aesthetic Objective					
ODWS LR - Ontario Drinking Water Standards Reporting Limits						LRL MDL - Lakefield Research Limited Method Detection Limit.					

District of Muskoka - Beach Road WTP - Gravenhurst

9.0 Chemical Usage Summary - 2017

Month	Powdered Activated Carbon			CO2			Hydrated Lime			Coagulant		
	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total kg	Estimated Monthly Cost+ Rental	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	0.0	0.0	\$0	45.8	4,059.9	\$3,002	19.3	1,707.8	\$1,178	8.5	2,266	\$1,371
February	0.0	0.0	\$0	47.8	3,927.0	\$2,918	19.1	1,567.0	\$1,081	8.6	2,129	\$1,288
March	0.0	0.0	\$0	44.3	4,037.1	\$2,987	19.1	1,743.7	\$1,203	8.7	2,387	\$1,444
April	0.0	0.0	\$0	51.2	4,678.5	\$3,391	23.7	2,179.2	\$1,504	9.0	2,476	\$1,498
May	0.0	0.0	\$0	47.3	5,024.1	\$3,609	29.4	3,118.4	\$2,152	14.5	1,521	\$920
June	0.0	0.0	\$0	48.7	5,187.6	\$3,712	29.9	3,185.6	\$2,198	9.2	2,942	\$1,780
July	0.0	0.0	\$0	44.1	5,080.8	\$3,645	27.9	3,215.6	\$2,219	8.5	2,940	\$1,779
August	0.0	0.0	\$0	38.0	4,517.1	\$3,290	28.6	3,398.1	\$2,345	9.1	3,252	\$1,968
September	0.0	0.0	\$0	39.4	4,239.2	\$3,115	28.9	3,109.8	\$2,146	9.1	2,951	\$1,785
October	0.0	0.0	\$0	46.7	4,795.1	\$3,465	29.7	3,046.5	\$2,102	14.9	4,556	\$2,756
November	0.0	0.0	\$0	50.8	4,857.7	\$3,504	29.3	2,806.0	\$1,936	17.5	5,018	\$3,036
December	0.0	0.0	\$0	52.2	5,353.2	\$3,816	28.9	2,963.5	\$2,045	19.7	6,063	\$3,668
Average Monthly	0.0	0.0	\$0	46.4	4646.4	\$3,371	26	2670.1	\$1,842	11.4	3209	\$1,941
Unit Cost		\$1.49	per kg	660/Month +	\$0.63	per kg		\$690.00	per MT		\$605.00	per MT
Total Yearly		0	\$0		55,757	\$40,455		32,041	\$22,108		38,502	\$23,294

Month	Sodium Hydroxide			Fluoride			Chlorine			Soda Ash		
	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	14.5	1,310	\$3,498	0.36	154.8	\$305	3.71	334.4	\$919	0.00	0.0	\$0
February	15.5	1,302	\$3,477	0.33	129.4	\$255	3.33	279.1	\$768	0.00	0.0	\$0
March	13.7	1,254	\$3,347	0.31	132.0	\$260	3.28	309.6	\$851	0.00	0.0	\$0
April	14.7	1,455	\$3,886	0.40	170.1	\$335	2.68	257.3	\$708	0.00	0.0	\$0
May	15.0	1,645	\$4,391	0.42	206.2	\$406	2.91	318.1	\$875	0.00	0.0	\$0
June	16.3	1,780	\$4,752	0.41	203.0	\$400	2.08	226.8	\$624	0.00	0.0	\$0
July	16.7	1,972	\$5,266	0.38	205.0	\$404	2.96	349.0	\$960	0.00	0.0	\$0
August	13.6	1,658	\$4,427	0.44	237.9	\$469	3.21	393.4	\$1,082	0.00	0.0	\$0
September	12.8	1,408	\$3,761	0.43	212.1	\$418	4.24	467.3	\$1,285	0.00	0.0	\$0
October	15.9	1,684	\$4,495	0.47	225.9	\$445	3.10	331.2	\$911	0.00	0.0	\$0
November	17.6	1,742	\$4,650	0.50	226.3	\$446	2.61	257.5	\$708	0.00	0.0	\$0
December	20.4	1,865	\$4,979	0.52	246.8	\$486	2.71	291.1	\$801	0.00	0.0	\$0
Average Monthly	15.6	1590	\$4,244	0.41	196	\$386	2.94	321	\$884	0	0	\$0
Unit Cost		\$2.67	per kg		\$1.97	per kg		\$2.75	per kg dry			per kg dry
Total Yearly		19,075	\$50,929		2,349	\$4,628		3,815	\$10,491		0	\$0

Month	Potassium Permanganate			Polymer		
	Average Dosage mg/L	Total Kg	Estimated Monthly Cost	Average Dosage mg/L	Total Kg	Estimated Monthly Cost
January	0.0	0	\$0	4.2	108	\$268
February	0.0	0	\$0	4.3	100	\$248
March	0.0	0	\$0	4.3	112	\$277
April	0.0	0	\$0	4.6	114	\$283
May	0.0	0	\$0	5.3	136	\$338
June	0.0	0	\$0	5.5	138	\$343
July	0.0	0	\$0	5.8	151	\$374
August	0.0	0	\$0	6.1	158	\$391
September	0.0	0	\$0	5.8	144	\$358
October	0.0	0	\$0	5.1	132	\$327
November	0.0	0	\$0	4.9	122	\$301
December	0.0	0	\$0	5.1	130	\$324
Average Monthly	0.0	0	\$0	5.1	129	\$319
Unit Cost			per kg		\$2.48	per kg
Total Yearly		0	\$0		1,545	\$3,833

Overall total yearly cost of chemicals = \$155,738