# DESBARATS
# DRINKING WATER SYSTEM
# WATERWORKS # 210001870

# ANNUAL & SUMMARY
# REPORTS 2015

## Introduction

This Annual and Summary Report has been prepared in accordance with both Schedule 22 and section 11 of Ontario Regulation 170/03. In this manner, the requirements by regulation for each report have been consolidated into a single document. This Report is intended to brief the ownership and consumers of the Desbarats Drinking Water System on the system's performance over the past calendar year January 1 to December 31, 2015.

This report encompasses all elements as required by O. Reg. 170/03. Each section explains what is required for the category Small Municipal Residential DWS (as it pertains to the Desbarats DWS) and how limits were met or if shortfalls were revealed. The last section contains a list of tables and definition of terms identified in this report.


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# System Description

The Desbarats water treatment plant is rated as a Class 2 Water Treatment subsystem, and for the purposes of O. Reg. 170/03 it is categorized as a Small Municipal Residential system.

The treatment plant includes two (2) low lift centrifugal pumps, each pump rated at 4.24 L/s that deliver surface water from Lake Huron. The treatment system includes an Ecodyne Monoplant complete with mechanical flocculation, sedimentation and dual media filtration compartments. The filter portion of the package plant involves a dual media of sand and anthracite and provides for filtering to waste after backwashing. Waste from the clarifier is drained at timed intervals to backwash settling tanks from which supernatant travels by gravity to a diffuser in Lake Huron, located downstream from the intake site.

Post chlorination using sodium hypochlorite is injected after filtration before the clearwell to achieve primary and secondary chlorination. There are three (3) cells to the clearwell (reservoir) with a total storage capacity of 142 cubic meters. There is standby power for continued pumping capacity and plant operations. The system also involves six (6) pre-charged pressure tanks for distribution pressure control.

There are approximately 276 residents using the system with 110 service connections (93 private residences) and a secondary school with a population of about 600 students. Water is provided to the distribution system through a submarine transmission main.

## Chemicals

Chemicals utilized at the Desbarats Treatment plant during 2015 include:

- Sodium Hypochlorite for primary and secondary disinfection
- Aluminum Sulphate for coagulation
- Polymer (LT20) as a coagulant aid
- Soda Ash for pH and alkalinity adjustment

## 2015 Expenditures

During the year of 2015, expenses were incurred to maintain treatment and distribution functions:

- Highlift header replacement.
- Purchase of a spare highlift pump.
- Repair of valve boxes in distribution.

# Water Quality

## Microbiological Sampling and Testing

Sampling is conducted weekly for the DWS at the frequencies and locations identified by Schedule 11 of O.Reg 170/03 for Small Municipal Residential Systems.

Table 1: Microbiological sampling requirements

| Location | Sample Analysis | # samples | Frequency |
|---|---|---|---|
| **Raw** | EC / TC | 1 sample | monthly |
| **Treated** | N/A | - | - |
| **Distribution** | EC / TC/ HPC-100% | 1 sample | bi-weekly |

Desbarats' raw samples are collected from a sample tap from the raw water header. Treated samples are collected from a sample tap from the treated discharge header prior to distribution. Distribution samples are rotated weekly at the following locations representing areas throughout the hamlet: Township Office, Baptist Church, Arena, and Central Algoma Secondary School. Other locations may be sampled as required.

Table 1a: Microbiological Sample Results

| Type | # samples | EC (range) | TC (range) | # samples | HPC (range) |
|---|---|---|---|---|---|
| **Raw** | 12 | 0 - 4 | 6 - 1730 | - | - |
| **Treated** | - | - | - | - | - |
| **Distribution** | 50 | 0 | 0 | 50 | 0 - 2 |

Distribution samples are collected more frequent (weekly) than required by regulation.

## Operational Checks and Testing

Operational testing is completed as per Schedules 6 & 7 of O.Reg. 170/03 for Small Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers (collecting 5 minute readings) are utilized for measurement of filter turbidity and chlorine residuals.

Table 2: Monthly Filter Turbidity Results

| Month | Avg turbidity (NTU) | Range (NTU) | Monthly Filter Efficiency |
|---|---|---|---|
| **January** | 0.07 | 0.04 - 0.17 | 100 |
| **February** | 0.07 | 0.04 - 0.27 | 100 |
| **March** | 0.07 | 0.04 - 0.27 | 100 |
| **April** | 0.07 | 0.04 - 0.37 | 99.96 |
| **May** | 0.07 | 0.03 - 0.19 | 100 |
| **June** | 0.05 | 0.03 - 0.11 | 100 |
| **July** | 0.04 | 0.03 - 0.10 | 100 |
| **August** | 0.05 | 0.03 - 0.69 | 99.48 |
| **September** | 0.04 | 0.03 - 0.07 | 100 |
| **October** | 0.04 | 0.04 - 0.09 | 100 |
| **November** | 0.05 | 0.04 - 0.91 | 99.78 |
| **December** | 0.07 | 0.04 - 0.37 | 99.98 |

Filter Efficiency is monitored by tracking the turbidity readings above and below 0.30 NTU during filter run time. Desbarats maintained filter compliance each month above 95%, the required limit for dual media filtration to achieve necessary filtration credits for primary disinfection.

Table 3: Chlorine Residuals

| Month | Average Chlorine Residual (mg/L) | Chlorine Residual Range (mg/L) |
|---|---|---|
| January | 1.44 | 1.03 - 1.69 |
| February | 1.44 | 0.90 - 1.78 |
| March | 1.32 | 1.11 - 1.53 |
| April | 1.44 | 0.89 - 1.74 |
| May | 1.37 | 0.98 - 1.78 |
| June | 1.36 | 1.01 - 1.75 |
| July | 1.47 | 1.14 - 1.99 |
| August | 1.63 | 1.22 - 2.01 |
| September | 1.57 | 1.13 - 2.05 |
| October | 1.40 | 1.20 - 1.60 |
| November | 1.36 | 1.07 - 1.62 |
| December | 1.30 | 1.07 - 1.56 |

Chlorine residuals are continuously monitored and data is recorded on 5 minute intervals.

## Chemical Sampling and Testing

Schedule 13 of O.Reg 170/03 outlines chemical sampling regiments for Small Municipal Residential systems. Schedules 23 (inorganics) and 24 (organics) are collected every 60 months as well as sodium and fluoride. This system requires quarterly sampling for Nitrites/Nitrates and THM's. Schedule 15.1 outlines the requirements for semi-annual lead testing (2 periods per year). Desbarats' lead sampling follows the reduced sampling requirements every third year.

Table 4: Schedule 23 - Inorganics

| Parameter | Sample Date | Result (ug/L) | Units | ODWS |
|---|---|---|---|---|
| Antimony | 9-Jan-13 | <0.6 | ug/L | 6 |
| Arsenic | 9-Jan-13 | <1.0 | ug/L | 25 |
| Barium | 9-Jan-13 | <10.0 | ug/L | 1000 |
| Boron | 9-Jan-13 | <50.0 | ug/L | 5000 |
| Cadmium | 9-Jan-13 | <0.1 | ug/L | 5 |
| Chromium | 9-Jan-13 | <1.0 | ug/L | 50 |
| Fluoride | 9-Jan-13 | <0.03 | mg/L | 1.5 |
| Mercury | 9-Jan-13 | <0.1 | ug/L | 1 |
| Selenium | 9-Jan-13 | <1.0 | ug/L | 10 |
| Sodium | 9-Jan-13 | 4.47 | mg/L | 20 |
| Uranium | 9-Jan-13 | <2.0 | ug/L | 20 |

All results for inorganic parameters are within the maximum acceptable concentrations (MAC) of the Ontario Drinking Water Quality Standards as defined in O.Reg 169/03.

Table 5: Nitrite/ Nitrate Results

| Date | ODWS | 13-Jan-15 | 7-Apr-15 | 15-Jul-15 | 14-Oct-15 |
|---|---|---|---|---|---|
| Unit | mg/L | mg/L | mg/L | mg/L | mg/L |
| Nitrite | 1.0 | <0.010 | <0.010 | <0.010 | <0.010 |
| Nitrate | 10 | 0.362 | 0.362 | 0.270 | 0.279 |

All quarterly results for Nitrites and Nitrates are well below ODWS.

Table 6: Schedule 24 - Organics

| Parameter | Date | Result | Unit | ODWS |
|---|---|---|---|---|
| Alachlor | 9-Jan-13 | <0.1 | ug/L | 5 |
| Aldicarb | 9-Jan-13 | <1.0 | ug/L | 9 |
| Aldrin + Dieldrin | 9-Jan-13 | <0.04 | ug/L | 0.7 |
| Atrazine + N-dealkylated metobolites | 9-Jan-13 | <0.2 | ug/L | 5 |
| Azinphos-methyl | 9-Jan-13 | <0.1 | ug/L | 20 |
| Bendiocarb | 9-Jan-13 | <0.2 | ug/L | 40 |
| Benzene | 9-Jan-13 | <0.5 | ug/L | 5 |
| Benzo(a)pyrene | 9-Jan-13 | <0.01 | ug/L | 0.01 |
| Bromoxynil | 9-Jan-13 | <0.2 | ug/L | 5 |
| Carbaryl | 9-Jan-13 | <0.2 | ug/L | 90 |
| Carbofuran | 9-Jan-13 | <0.2 | ug/L | 90 |
| Carbon Tetrachloride | 9-Jan-13 | <0.5 | ug/L | 5 |
| Chlordane (Total) | 9-Jan-13 | <0.3 | ug/L | 7 |
| Chlorpyrifos | 9-Jan-13 | <0.1 | ug/L | 90 |
| Cyanazine | 9-Jan-13 | <0.1 | ug/L | 10 |
| Diazinon | 9-Jan-13 | <0.1 | ug/L | 20 |
| Dicamba | 9-Jan-13 | <0.2 | ug/L | 120 |
| 1,2-Dichlorobenzene | 9-Jan-13 | <0.5 | ug/L | 200 |
| 1,4-Dichlorobenzene | 9-Jan-13 | <0.5 | ug/L | 5 |
| Dichlorodiphenyltrichloroethane (DDT) + metabolites | 9-Jan-13 | <0.4 | ug/L | 30 |
| 1,2-Dichloroethane | 9-Jan-13 | <0.5 | ug/L | 5 |
| 1,1-Dichloroethylene (vinylidene chloride) | 9-Jan-13 | <0.5 | ug/L | 14 |
| Dichloromethane | 9-Jan-13 | <0.5 | ug/L | 50 |
| 2-4 Dichlorophenol | 9-Jan-13 | <0.3 | ug/L | 900 |
| 2,4-Dichlorophenoxy acetic acid | 9-Jan-13 | <0.2 | ug/L | 100 |
| Diclofop-methyl | 9-Jan-13 | <0.2 | ug/L | 9 |
| Dimethoate | 9-Jan-13 | <0.1 | ug/L | 20 |
| Dinoseb | 9-Jan-13 | <0.2 | ug/L | 10 |

| Parameter | Date | Result | Unit | ODWS |
|---|---|---|---|---|
| Diquat | 9-Jan-13 | <1.0 | ug/L | 70 |
| Diuron | 9-Jan-13 | <1.0 | ug/L | 150 |
| Glyphosate | 9-Jan-13 | <5.0 | ug/L | 280 |
| Heptachlor + Heptachlor Epoxide | 9-Jan-13 | <0.2 | ug/L | 3 |
| Lindane (Total) | 9-Jan-13 | <0.1 | ug/L | 4 |
| Malathion | 9-Jan-13 | <0.1 | ug/L | 190 |
| Methoxychlor | 9-Jan-13 | <0.1 | ug/L | 900 |
| Metolachlor | 9-Jan-13 | <0.1 | ug/L | 50 |
| Metribuzin | 9-Jan-13 | <0.1 | ug/L | 80 |
| Monochlorobenzene | 9-Jan-13 | <0.5 | ug/L | 80 |
| Paraquat | 9-Jan-13 | <1.0 | ug/L | 10 |
| Parathion | 9-Jan-13 | <0.1 | ug/L | 50 |
| Pentachlorophenol | 9-Jan-13 | <0.5 | ug/L | 60 |
| Phorate | 9-Jan-13 | <0.1 | ug/L | 2 |
| Picloram | 9-Jan-13 | <0.2 | ug/L | 190 |
| Polychlorinated Byphenols (PCB) | 9-Jan-13 | <0.035 | ug/L | 3 |
| Prometryne | 9-Jan-13 | <0.1 | ug/L | 1 |
| Simazine | 9-Jan-13 | <1.0 | ug/L | 10 |
| THM (RAA) | 2015 | 9.7 | ug/L | 100 |
| Temephos | 9-Jan-13 | <0.1 | ug/L | 280 |
| Terbufos | 9-Jan-13 | <0.2 | ug/L | 1 |
| Tetrachloroethylene | 9-Jan-13 | <0.5 | ug/L | 30 |
| 2,3,4,6-Tetrachlorophenol | 9-Jan-13 | <0.5 | ug/L | 100 |
| Triallate | 9-Jan-13 | <0.1 | ug/L | 230 |
| Trichloroethylene | 9-Jan-13 | <0.5 | ug/L | 5 |
| 2,4,6-Trichlorophenol | 9-Jan-13 | <0.5 | ug/L | 5 |
| 2,4,5-Trichlorophenoxy acetic acid | 9-Jan-13 | <0.2 | ug/L | 280 |
| Trifluralin | 9-Jan-13 | <0.1 | ug/L | 45 |
| Vinyl Chloride | 9-Jan-13 | <0.5 | ug/L | 2 |

**All results for the required organic sampling of schedule 24 are below the MAC.**

Lead Sampling: The maximum acceptable concentration for lead in drinking water is 10 ug/L. This applies to water at the point of consumption since lead is only present as a result of corrosion of lead solder, lead containing brass fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings.

Table 7: Community Lead Sampling Results

| Location Type | Number of Samples | Range of Lead Results (min#) – (max #) | Number of Exceedances |
|---|---|---|---|
| Plumbing | - | - | - |
| Distribution | - | - | - |

Lead samples are collected during the two prescribed periods each year (Dec 15 – Mar15 and June 15- Oct 15). Sample results revealed zero exceedances during year 2014. **Sampling relief extends to 2017.**

Table 8: TSS – C of A requirement for plant process waste water

| Month | Result Value | Unit |
|---|---|---|
| **January** | 10 | mg/L |
| **February** | 2 | mg/L |
| **March** | 14 | mg/L |
| **April** | 11 | mg/L |
| **May** | 16 | mg/L |
| **June** | 20 | mg/L |
| **July** | 11 | mg/L |
| **August** | 7 | mg/L |
| **September** | 2 | mg/L |
| **October** | 14 | mg/L |
| **November** | 47 | mg/L |
| **December** | 9 | mg/L |

The 2015 annual average suspended solids is 13.6 mg/L for plant service water (BW, instrumentation flows) released back to the environment, and is under the C of A limit of 25 mg/L.

# Compliance

## Adverse Water Quality Incidents

During 2015, the Desbarats DWS reported one incidents of adverse water quality.

Table 9: Adverse Water Quality Incidents

| Date | Incident Reported |
|---|---|
| **Feb 26/15** | Loss of water pressure due to replacement of high lift header. |
| | |

This AWQI was due to a scheduled replacement of the high lift header. In order to conduct this rebuild it was required to cease feeding treated water from the plant into the distribution resulting in a possible low or no water pressure to the distribution for a period of approximately 7 hours. Once the high lift pump header rebuild was competed, water pressure was restored with a BWA in place. After collecting two consecutive sample sets for microbiological testing resulting non-detect, the BWA was rescinded.

## Annual Drinking Water System Inspection

The annual DWS inspection took place on Dec 17, 2015 by MOECC Drinking Water inspector Stephanie Robbins. Zero non-conformances and no additional recommendations and best practice were identified.

The DWS received a final inspection rating of 100%.

## Flows

The Permit to Take Water authorizes the municipality to draw water from Lake Huron at a rate not to exceed 547.2 m3/d. The maximum daily volume taken was 154 m3, 28.1 % of the permit limit.

Municipal Drinking Water Licence: 275-201 specifies a maximum intake capacity of 366 $m^3$/d. The max flow rate reported was 126$m^3$/d, 34.4% of the rated capacity.

The Desbarats WTP treated and distributed a total of 24,964 m3 during the year of 2015. The average day treated flow demand was 68.4 m3/d, and maximum day flow was 126 m3/d on Nov 3, 2015.

Chart 1: Five Year Flow Comparison

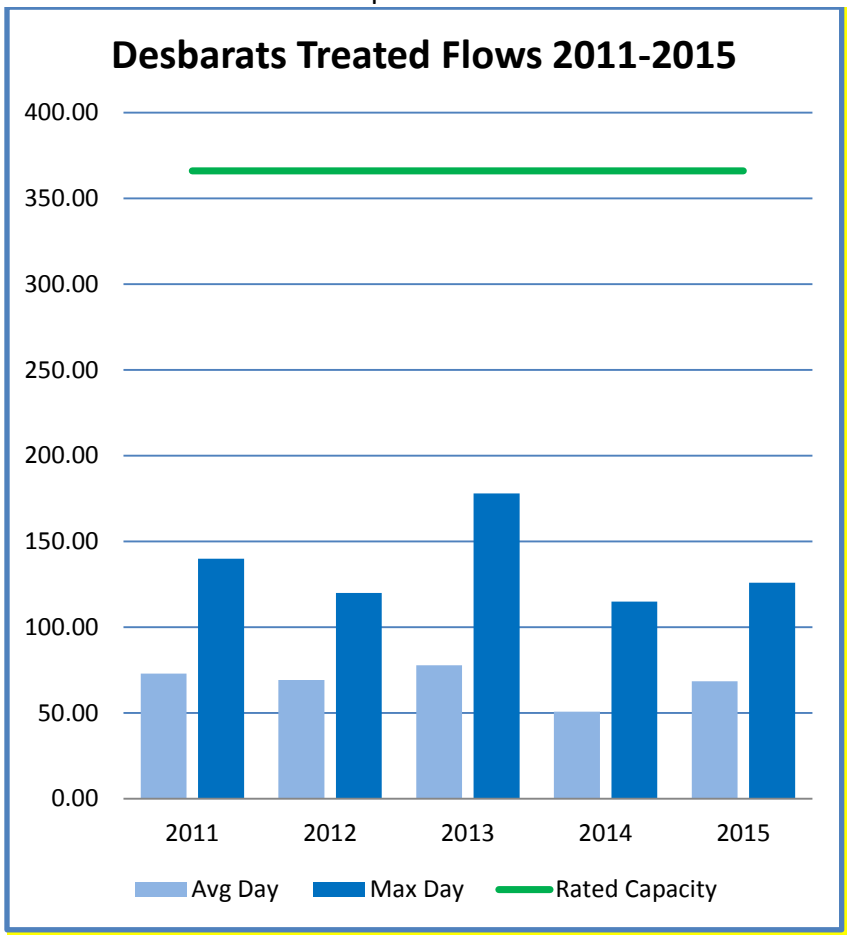
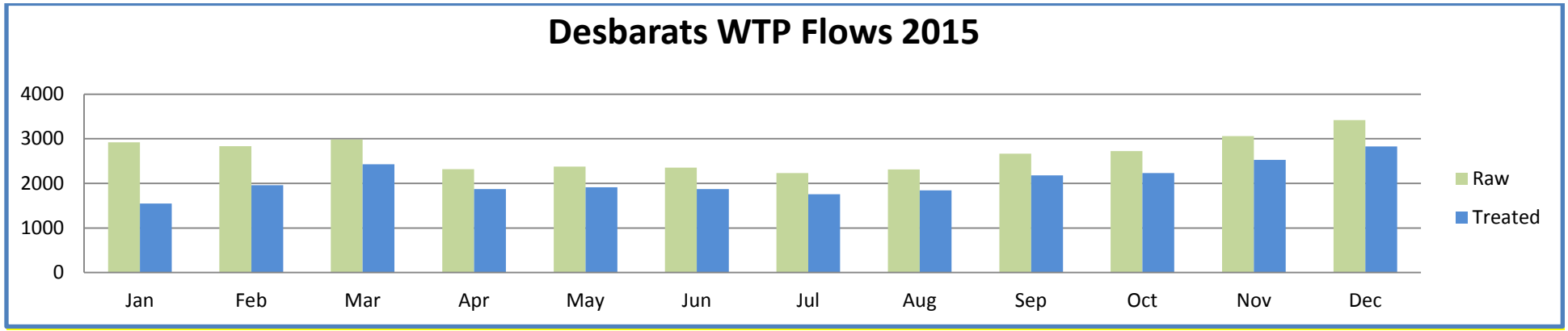


**Table 10: Raw and Treated water Flows 2015**

| 2015 | Raw Water Flows | | | | | Treated Water Flows | | | |
|---|---|---|---|---|---|---|---|---|---|
| Month | Raw Water (m3) | Minimum Day ($m^3/d$) | Maximum Day ($m^3/d$) | Average Day ($m^3/d$) | % Max. Flow Day of PTTW | Treated Water (m3) | Minimum Day ($m^3/d$) | Maximum Day ($m^3/d$) | Average Day ($m^3/d$) |
| January | 2,922 | 75 | 116 | 94.3 | 21.2 | 1,548 | 36 | 64 | 49.9 |
| February | 2,832 | 53 | 132 | 101.1 | 24.1 | 1,957 | 37 | 105 | 69.9 |
| March | 2,984 | 70 | 120 | 96.3 | 21.9 | 2,431 | 60 | 96 | 78.4 |
| April | 2,319 | 54 | 98 | 77.3 | 17.9 | 1,870 | 48 | 75 | 62.3 |
| May | 2,376 | 49 | 111 | 76.6 | 20.3 | 1,915 | 45 | 87 | 61.8 |
| June | 2,352 | 49 | 118 | 78.4 | 21.6 | 1,872 | 44 | 97 | 62.4 |
| July | 2,230 | 48 | 98 | 71.9 | 17.9 | 1,758 | 39 | 78 | 56.7 |
| August | 2,311 | 55 | 103 | 74.5 | 18.8 | 1,842 | 48 | 77 | 59.4 |
| September | 2,664 | 69 | 134 | 88.8 | 24.5 | 2,181 | 51 | 105 | 72.7 |
| October | 2,721 | 59 | 138 | 87.8 | 25.2 | 2,232 | 54 | 116 | 72.0 |
| November | 3,059 | 72 | 154 | 102.0 | 28.1 | 2,529 | 53 | 126 | 84.3 |
| December | 3,419 | 78 | 143 | 110.3 | 26.1 | 2,829 | 71 | 117 | 91.3 |

Chart 2: Desbarats WTP Flows 2015



# Report Endorsement

## Report Availability

Section 11 of O. Reg. 170/03 defines that this Annual Report must be given, without charge, to every person who requests a copy. Effective steps must also be taken to advise users of water from the system that copies of the report are available, without charge, and of how a copy may be obtained. This Annual Report shall be made available for inspection by the public on the Town Office.

Township of Johnson
1 Johnson Drive
Desbarats, ON
P0R 1E0

In accordance with Schedule 22 of O. Reg. 170/03, this Annual Report must be given to the members of the municipal council. Section 19 (Standard of care, municipal drinking-water system) of Ontario's Safe Drinking Water Act also places certain responsibilities upon those municipal officials who oversee an accredited operating authority or exercise decision-making authority over a system

## Report Endorsement

This Summary report for The Desbarats Drinking Water System encompassing the period of January 1st to December 31st, 2015 has been prepared in accordance to Schedule 22 of O. Reg 170/03. The report has been reviewed and accepted by the Township of Johnson council.

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Date

# Tables, Definition of Terms

**Appendix A: List of Tables/ Charts**


| | |
|---|---|
| **Table 1:** | Microbiological sampling requirements |
| **Table 1a:** | Microbiological Sample Results |
| **Table 2:** | Monthly Filter Turbidity Results |
| **Table 3:** | Treated Chlorine Residuals |
| **Table 4:** | Schedule 23 - Inorganics |
| **Table 5:** | Nitrite/ Nitrate Results |
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**Appendix B: Definition of Terms**

| Acronym | Definition |
|---|---|
| **AWQI** | Adverse water quality incident |
| **BWA** | Boil Water Advisory |
| **DM** | Dual Media |
| **DWS** | Drinking water system |
| **EC** | E. Coli |
| **HPC** | Heterotrophic plate count |
| **$m^3$** | Cubic metres |
| **$m^3/d$** | Cubic metres per day |
| **mg/L** | Milligram per litre (part per million) |
| **ML** | Megalitre (1000 m3) |
| **NTU** | Nephelometric turbidity unit |
| **O. Reg. 170/03** | Ontario Regulation 170/03 |
| **PTTW** | Permit to take water |
| **SCADA** | Supervisory control and data acquisition |
| **TC** | Total coliforms |
| **THM** | Trihalomethane |
| **TSS** | Total Suspended Solids |
| **ug/L** | Microgram per litre (part per billion) |
| **WD** | Water distribution |
| **WT** | Water treatment |
| **WTP** | Water treatment plant |