



2019 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT Innerkip Water System

1. GENERAL INFORMATION

Oxford County prepares 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 Oxford County website at www.oxfordcounty.ca/drinkingwater or by contacting the Public Works 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 County of Oxford at the address and phone number listed below or by email at publicworks@oxfordcounty.ca.

Drinking Water System:	Innerkip Water System
Drinking Water System Number:	260046995
Drinking Water System Owner & Contact Information:	Oxford County Public Works Department Water Services P.O. Box 1614 21 Reeve Street Woodstock, ON N4S 7Y3 Telephone: 519-539-9800 Toll Free: 866-537-7778 Email: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2019 – December 31, 2019

1.1. System Description

The Innerkip Water System is a Large Municipal Water system as defined by Regulation 170/03 and serves a population of approximately 1,290. The system consists of 2 well sources which are secure groundwater wells. The water is filtered to remove iron and manganese. Sodium hypochlorite is added as an oxidant and for disinfection. In 2019, approximately 6,150 L of sodium hypochlorite was used in the water treatment process. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses filters, high lift pumps, monitoring equipment and a 700 m³ storage standpipe. There is a retention lagoon for backwash water from the filters which discharges to a tributary of the Thames River. A standby generator is available to run the facility in the event of a power failure. 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.

1.2. Major Expenses

The Innerkip Water System is one of 14 water systems that have revenues and expenses pooled for economy of scale purposes. The systems are combined into the Township Water financial system and in 2019 had forecasted operating and maintenance expenditures of approximately \$2,600,000. In addition to regular operational and maintenance expenditures Capital Improvement projects included:

- \$290,000 for replacement of distribution water mains in the Township systems

- \$35,000 for Township groundwater models
- \$75,000 for Township well rehabs

Capital Improvement projects for all systems included:

- \$65,000 to develop Countywide SCADA Master Plan for all water systems
- \$120,000 Asset Management valuation for all treatment, pumping and storage facilities
- \$76,000 Manganese Treatment study
- \$34,000 Updated Water Modelling software
- \$34,000 TSSA Genset Repairs

2. MICROBIOLOGICAL TESTING

2.1. *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are taken weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work. Any *E. coli* or total coliform results above 0 in treated water must be reported to the Ministry of Environment and Climate Change (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2019 sampling program are shown on the table below. There were no adverse test results from 175 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	105	0	0
Treated	57	0	0
Distribution	118	0	0

2.2. Heterotrophic Plate Count (HPC)

HPC analyses are required from the treated and distribution water. The tests are required weekly for treated water and for 25% of the required distribution system bacteriological samples. 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. 2019 results are shown in the table below.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	53	0 - 7
Distribution	36	0 - 41

3. CHEMICAL TESTING

The Safe Drinking Water Act requires periodic testing of the water for approximately 60 different chemical parameters. The latest results for all parameters are provided in Appendix A. The sampling frequency varies for different types and sizes of water systems and chemical parameters. 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.

Information on the health effects and allowable limits of components in drinking water may be found on the MECP web page through the link provided in Appendix A. Additional information on common chemical parameters specific to the Innerkip system is provided below.

3.1. Hardness

This is an aesthetic parameter that may affect the appearance of the water but is not related to health. Well water commonly has high levels of hardness and other minerals from being in contact with underground rock formations. Many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. This information is included here to help set the water softener at the level recommended by the manufacturer. The average hardness in the Innerkip system is 908 mg/L (equivalent to 64 grains).

3.2. Additional Testing Required by MECP

Testing of the lagoon backwash discharge is required for the Innerkip Water System. A summary of the monitoring results for 2019 is below.

<i>Legal instrument: Municipal Drinking Water License issued December 1, 2018</i>					
<i>Parameter</i>	<i>Result Range (Min–Max) mg/L</i>	<i>Average mg/L</i>	<i>Number of Samples</i>	<i>Limit</i>	<i>MDL (mg/L)</i>
Suspended Solids from lagoon backwash discharge	(<2.00 - 36.0)	13.0	52	25 mg/L Annual Average	2.0

4. OPERATIONAL MONITORING

4.1. 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. 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 2019. A summary of the chlorine residual readings is provided in the table below.

4.2. 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 well is checked weekly. 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 2019 is provided in the table below.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual in distribution (mg/L)	Continuous	(0.24 – 2.12) 1.15
Chlorine residual after treatment (mg/L)	Continuous	(0.64 – 2.75) 1.40
Turbidity after treatment (NTU)	Continuous	(0.05 – 3.99) 0.07

5. 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 MECP regulate the amount of water that can be utilized over a given time period. A summary of the 2019 flows are provided in the Table below and presented graphically in Appendix B.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	1,728 m ³ /d
Municipal Drinking Water License Limit	1,728 m ³ /d
2019 Average Daily Flow	259 m ³ /d
2019 Maximum Daily Flow	525 m ³ /d
2019 Average Monthly Flow	7,883 m ³
2018 Total Amount of Water Supplied	94,599 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

This section documents any known incidents of non-compliance or adverse results and the associated correction actions taken to resolve the issue. Non-compliance issues are typically identified by either the Operating Authority or the MECP Drinking Water Inspectors. The issues and associated required actions are documented by the Inspectors in the system's Annual Inspection Report. All non-compliance issues are investigated, corrective actions taken and documented using the County's Drinking Water Quality Management System (DWQMS) procedures.

6.1. Non-Compliance Findings

The annual MECP inspection took place in June 2019. There was one non-compliance findings and the 2019 Inspection Report rating was 96%.

- A chlorine residual was not recorded after disinfection of new filter media, thus disinfection was not verified. Procedures were reviewed and a new form for maintenance was developed so all information will be properly documented in future maintenance activities.

6.2. Adverse Results

There were no adverse or reportable occurrences in 2019.

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

The following tables summarize the laboratory results of the chemical testing Oxford County is required to complete. Different types of parameters are required to be tested for at different frequencies as noted below. Explanations on the health impacts of these parameters can be found at the MECP web site <http://www.ontla.on.ca/library/repository/mon/14000/263450.pdf> document # 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/L. The Maximum Acceptable Concentration (MAC) is the highest amount of a parameter that is acceptable in Municipal drinking water and can be found in the MECP Drinking Water Standards. The Method Detection Limit (MDL) is the lowest amount to which the laboratory can confidently measure. A result of "ND" stands for "Not Detected" and means that the concentration of the chemical is lower than the laboratory's equipment is capable of measuring.

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

<i>Parameter</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	ND	ND	1.0	0.003
Nitrate	0.051 – 0.056	0.053	10.0	0.006

Trihalomethane (THM) and total Haloacetic Acids (HAA) are by-products of the disinfection process. The samples are required every 3 months from the distribution system.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Trihalomethane (THM)	2019	16.0	100	0.37
Haloacetic Acids (HAA)	2019	16.1	80	5.3

The following Table summarizes the most recent test results for Sodium and Fluoride. Testing and reporting any adverse results is required every 5 years.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	Aug 22/16	15.8	20.0*	0.01
Fluoride	Dec. 4/14	0.76	1.5**	0.06

*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.

The following Table summarizes the most recent results for the Lead Testing Program. Lead samples are taken every 3 years. Levels of 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.

<i>Parameter</i>	<i>Result Range (Min -- Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity	218 - 236	4	30 – 500mg/L
Distribution pH	7.1 – 7.4	4	6.5 – 8.5
Distribution Lead 2018	0.02 – 0.21	4	10 ug/L MAC

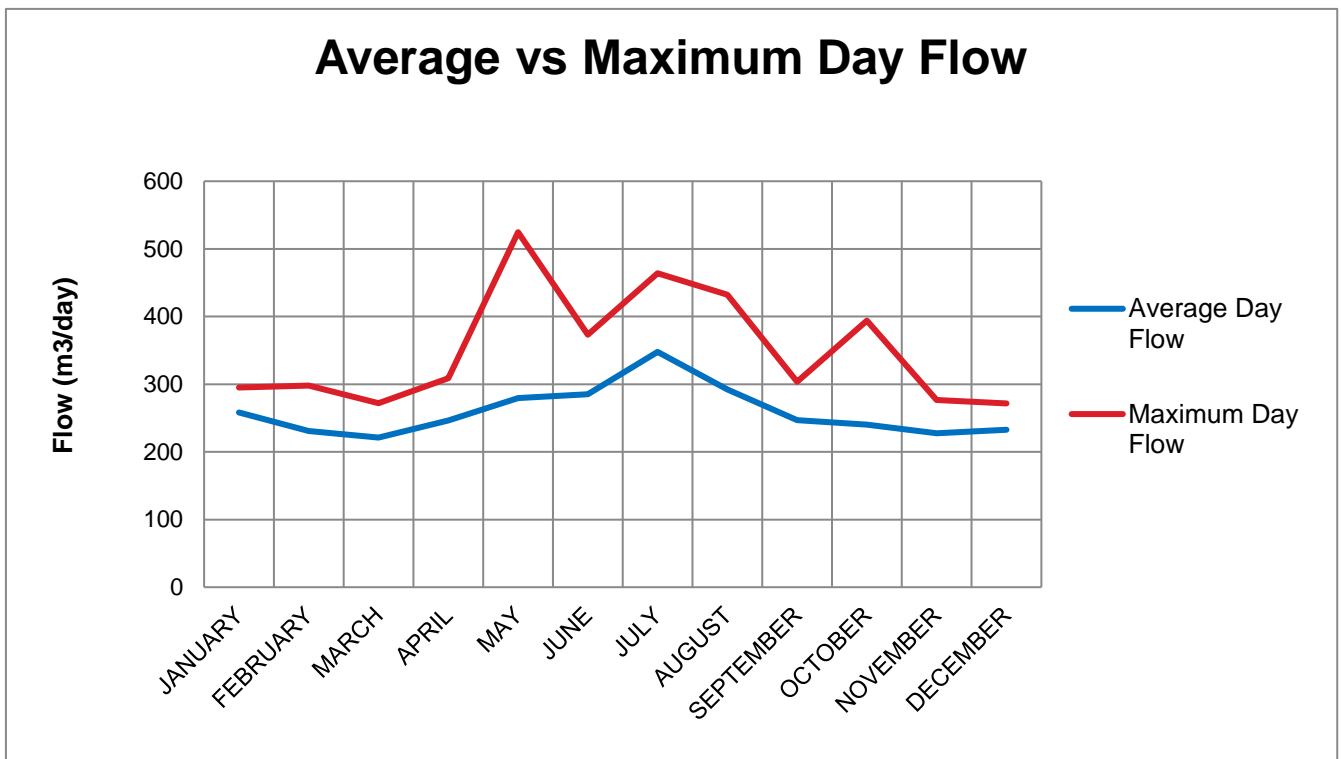
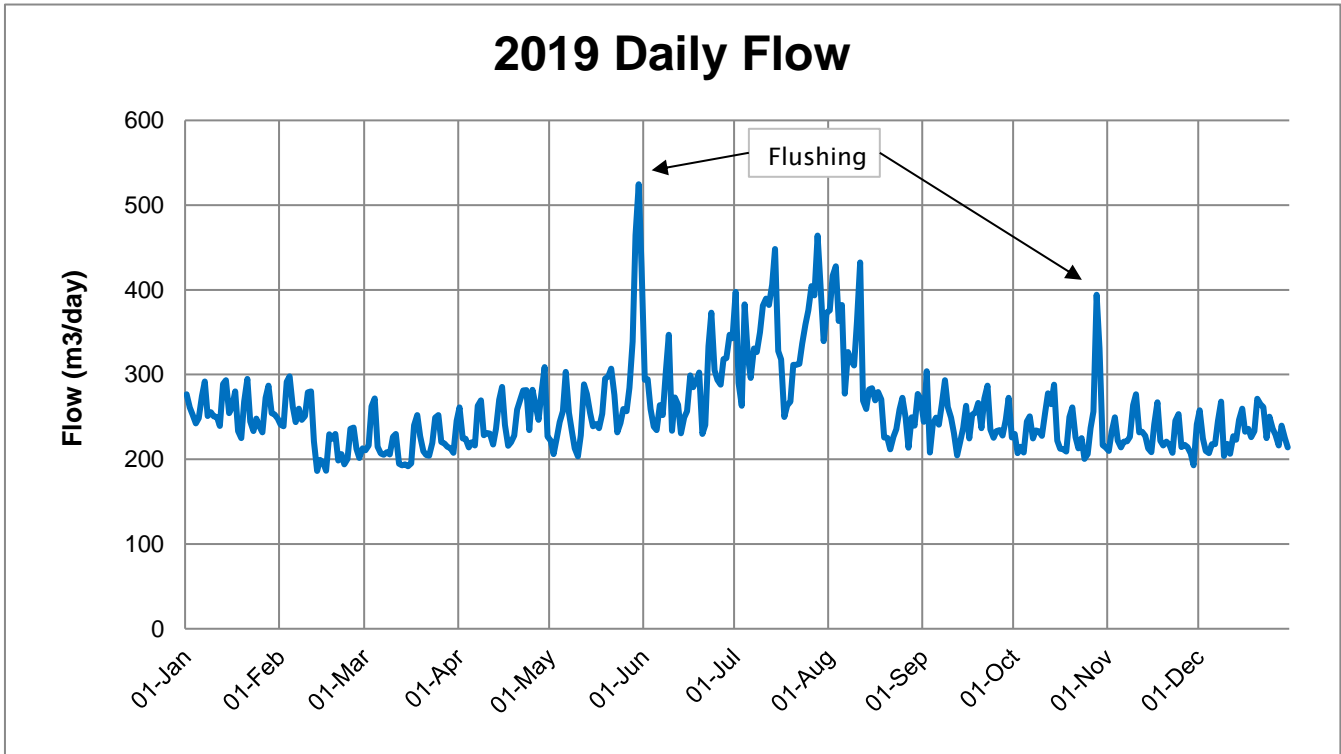
The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	Feb. 28/17	0.10	6	0.02
Arsenic	"	0.3	10	0.2
Barium	"	78.5	1000	0.01
Boron	"	96	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	0.59	50	0.03
Mercury	"	ND	1	0.01
Selenium	"	ND	5	1
Uranium	"	0.531	20	0.001

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 3 years for secure groundwater wells.

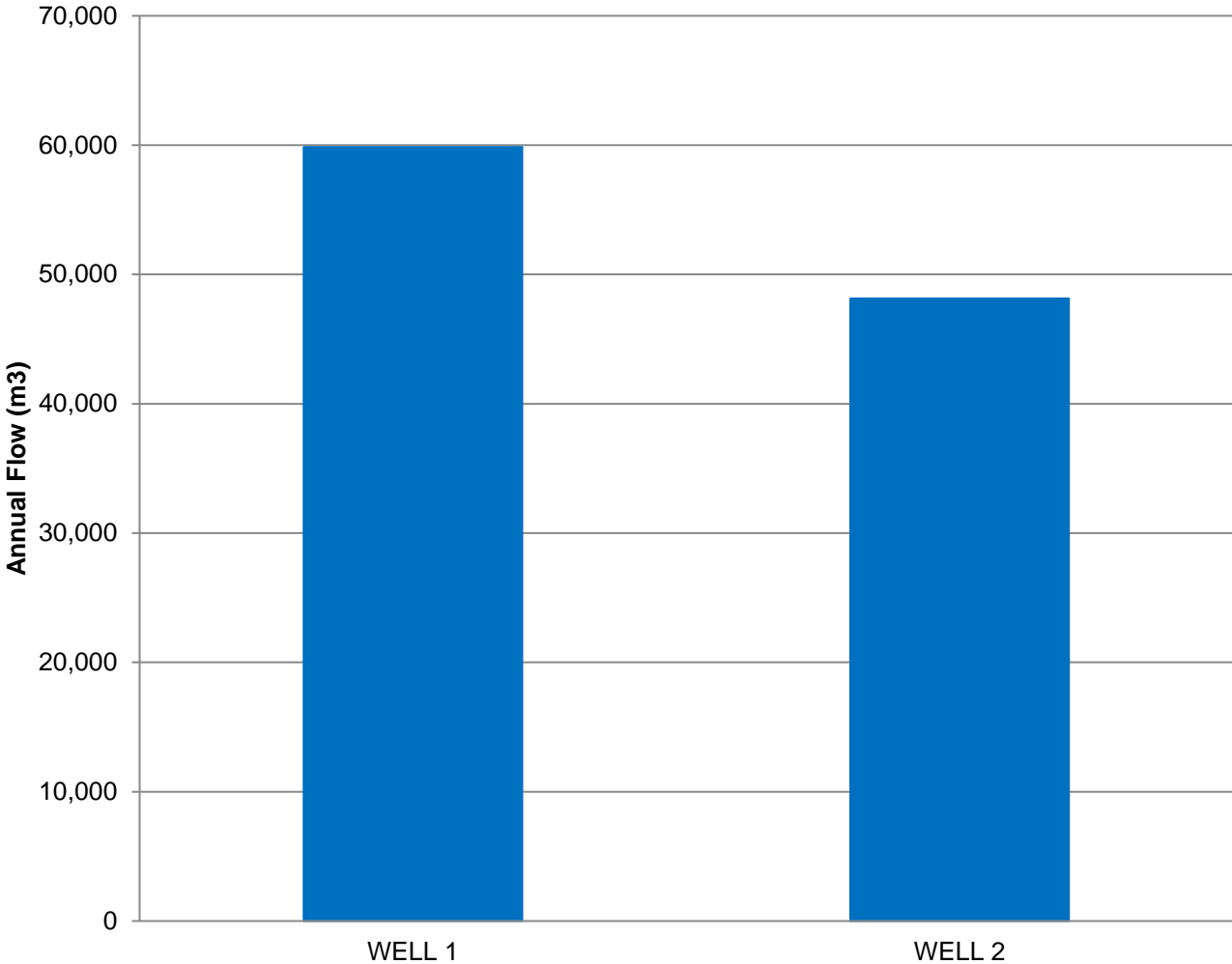
Parameter	Sample Date	Result Value (ug/L)	MAC (ug/L)	MDL (ug/L)
Alachlor	Feb 28/17	ND	5	0.11
Atrazine + N-dealkylatedmetabolites	"	ND	5	0.12
Azinphos-methyl	"	ND	20	0.21
Benzene	"	ND	1	0.37
Benzo(a)pyrene	"	ND	0.01	0.004
Bromoxynil	"	ND	5	0.33
Carbaryl	"	ND	90	0.16
Carbofuran	"	ND	90	0.37
Carbon Tetrachloride	"	ND	2	0.41
Chlorpyrifos	"	ND	90	0.18
Diazinon	"	ND	20	0.081
Dicamba	"	ND	120	0.20
1,2-Dichlorobenzene	"	ND	200	0.50
1,4-Dichlorobenzene	"	ND	5	0.21
1,2-Dichloroethane	"	ND	5	0.43
1,1-Dichloroethylene(vinylidene chloride)	"	ND	14	0.41
Dichloromethane	"	ND	50	0.34
2-4 Dichlorophenol	"	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	"	ND	100	0.19
Diclofop-methyl	"	ND	9	0.40
Dimethoate	"	ND	20	0.12
Diquat	"	ND	70	1
Diuron	"	ND	150	0.87
Glyphosate	"	ND	280	6
Malathion	"	ND	190	0.091
Metolachlor	"	ND	50	0.092
2-methyl-4chlorophenoxyacetic acid (MCPA)	"	ND	100	0.12
Metribuzin	"	ND	80	0.12
Monochlorobenzene	"	ND	80	0.58
Paraquat	"	ND	10	1
Pentachlorophenol	"	ND	60	0.15
Phorate	"	ND	2	0.11
Picloram	"	ND	190	0.25
Polychlorinated Biphenyls(PCB)	"	ND	3	0.04
Prometryne	"	ND	1	0.23
Simazine	"	ND	10	0.15
Terbufos	"	ND	1	0.12
Tetrachloroethylene	"	ND	10	0.45
2,3,4,6-Tetrachlorophenol	"	ND	100	0.14
Triallate	"	ND	230	0.10
Trichloroethylene	"	ND	5	0.38
2,4,6-Trichlorophenol	"	ND	5	0.25
Trifluralin	"	ND	45	0.12
Vinyl Chloride	"	ND	1	0.17

APPENDIX B: 2019 WATER QUANTITY SUMMARY



Innerkip Water System Capacity 1,296 m³/d

2019 Total Production by Well



Innerkip Water System Capacity 1,296 m³/d