



# 2023 Annual Drinking Water System Summary Report

## Drumbo-Princeton Drinking Water System

### 1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing system operation and water quality for every municipal drinking water system annually. The reports detail information required for Annual Reports and Summary Reports under Ontario Regulation (O. Reg.) 170/03 of the *Safe Drinking Water Act* including 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 County website at [www.oxfordcounty.ca/drinkingwater](http://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 at the address and phone number listed below or by email at [water@oxfordcounty.ca](mailto:water@oxfordcounty.ca).

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<b>Drinking Water System:</b>	Drumbo-Princeton Drinking Water System
<b>Drinking Water System Number:</b>	220007515
<b>Reporting Period:</b>	January 1, 2023 – December 31, 2023

#### **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:** [water@oxfordcounty.ca](mailto:water@oxfordcounty.ca)

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## 1.1 System Description

The Drumbo-Princeton Drinking Water System (DWS) is a large municipal residential water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,619. The system consists of three wells that are secure groundwater, connected to a central treatment facility all located in Drumbo. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron which improves water quality. In 2023, approximately 2,705 L of sodium hypochlorite and 1,885 L (2666 kg) of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada or the American National Standards Institute.

The Water Treatment Facility houses high lift pumps, monitoring equipment, and a 516 m<sup>3</sup> reservoir. A standby generator is available to run the facility in the event of a power failure. The two communities are linked by a transmission main. In Princeton, there is a pressure control facility with chlorine residual monitoring, re-chlorination equipment, and a 271 m<sup>3</sup> storage standpipe. The system is maintained by licensed water system operators, who operate treatment and monitoring equipment and collect samples as specified by the Regulation. Alarms automatically notify operators in the event of failure of critical operational requirements. The Drumbo-Princeton DWS does not supply drinking water to any other drinking water systems.

## 1.2 Major Expenses

Planning for major drinking water system expenses is included within Oxford County's Water Services Master Plan and managed according to our Asset Management and Capital Replacement Program.

The Drumbo-Princeton Drinking 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 2023 had an operating and maintenance expenditures of approximately \$4,100,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Township's systems totaled \$4,100,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- \$413,000 repair and maintenance on wells, water pump stations, and water treatment facilities;
- \$70,000 for facilities improvements; and
- \$50,000 distribution replacements.

Capital Improvement projects for all systems included:

- \$390,000 to develop Countywide SCADA Master Plan for all water systems;
- \$70,000 to develop Countywide Water Servicing Master Plan for all water systems; and
- \$38,000 to develop the County Development Charges Technical Study.

## 2. MICROBIOLOGICAL TESTING

### 2.1 E.coli and Total Coliform

Bacteriological tests for *E.coli* and *total coliforms* are required 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 the MAC of 0 colonies per 100 mL in treated water samples must be reported to the Ministry of Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the annual sampling program are shown on the table below. There were two adverse test results from 225 treated water samples taken in 2023. The corrective actions for which are summarized in section 6.2.

Source	Number of Samples	Range of <i>E. coli</i> Min - Max MAC = 0 (colonies / 100 mL)	Range of Total Coliform Min - Max MAC = 0 (colonies / 100 mL)
Raw	156	0	0 - 2
Treated	53	0	0
Distribution	172	0	0 - 19

### 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. Annual results are shown in the following table.

Source	Number of Samples	Range of HPC Min - Max (colonies / mL)
Treated	52	0 - 7
Distribution	42	0 - 2

### 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 MAC under the Ontario Drinking Water Quality Standards, an increased testing frequency of once every three months is required by O. Reg. 170/03. 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 Drumbo-Princeton Drinking Water System is provided below.

#### 3.1 Hardness, Iron, and Manganese

These are aesthetic parameters that may affect the appearance of the water but are 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, improve the efficiency of soaps and reduce iron levels. This information is included here to help set the water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum every 3 years from raw water. The Hardness for the Drumbo-Princeton Drinking Water System was tested in 2022 and ranged from 303 - 365 mg/L (18 - 21 grains/gallon).

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Drumbo-Princeton, sodium silicate is added to keep the iron in suspension at Wells 1 and 2A. Manganese is commonly found in conjunction with iron and also causes discoloured water. Manganese levels in this system are above a new proposed aesthetic objective of 0.02 mg/L.

- The average iron level in 2023 was 0.33 mg/L; and
- The average manganese level in 2023 was 0.035 mg/L.

#### 3.2 Additional Testing Required by MECP

Under the Regulation, additional quarterly sampling is required when a parameter listed in Schedule 23 or 24 exceeds half of the MAC. Based on the latest test results no additional testing is required under O. Reg. 170/03.

No additional testing requirements are listed in the Municipal Drinking Water Licence.

### 4. OPERATIONAL MONITORING

## 4.1 Chlorine Residual

Free chlorine levels in the treated water are continuously monitored at the discharge point of the Water Treatment Facility and in the distribution system. As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A free chlorine level lower than 0.05 mg/L must be reported and corrective action taken. A summary of the chlorine residual readings is provided in the table below. There were no reportable incidents in 2023.

The maximum free chlorine residual in the distribution system may exceed that of the residual collected post treatment due to re-chlorination of the distribution water in Princeton.

## 4.2 Turbidity

Turbidity of treated water is continuously monitored at the treatment facility as a change in turbidity can indicate an operational problem. As a minimum, turbidity for each well is required to be tested monthly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater from a secure well or a well with effective in-situ filtration is not reportable however turbidity should be < 1 NTU at the treatment plant and < 5 NTU in the distribution system. A summary of the annual monitoring results is provided in the following table.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.85 - 2.82) 1.42
Chlorine residual in distribution (mg/L)	Continuous	(0.87 – 2.06) 1.32
Well 1 turbidity before treatment (NTU)	52	(0.18 – 1.49) 0.56
Well 2A turbidity before treatment (NTU)	52	(0.11 – 8.16) 0.50
Well 3 turbidity before treatment (NTU)	52	(0.09 – 0.93) 0.39
Turbidity after treatment (NTU)	Continuous	(0.17 - 4.00) 0.29

## 5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells into the treatment system and from the Water Treatment Facility into the distribution system is required by O. Reg. 170/03. The Permit to Take Water (PTTW) and Municipal Drinking Water License (MDWL) issued by the MECP regulate the amount of water that can be utilized over a given time period. Terms used to evaluate capacity and current values for the Drumbo-Princeton DWS are provided in the following table.

<i>Capacity Term</i>	<i>Description</i>	<i>Capacity (m<sup>3</sup>/day)</i>
<b>Supply Capacity</b>	The limiting capacity of either the PTTW or MDWL.	1,329
<b>Dynamic Supply Capacity</b>	Accounts for any current constraints on the water supply (such as offline wells, reduced well capacity, water quality considerations).	1,329

<i>Capacity Term</i>	<i>Description</i>	<i>Capacity (m<sup>3</sup>/day)</i>
<b>Firm Capacity</b>	Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m <sup>3</sup> /day to maintain system integrity if appropriate.	609
<b>Dynamic Firm Capacity</b>	Considers the removal of the largest production well and other current system constraints. Trucked in water may be considered for some systems.	709

This system consists of three supply wells. Well 3 is removed for Firm Capacity calculations. Trucked in water of 100 m<sup>3</sup>/day is considered under the Dynamic Firm Capacity only.

A summary comparing flows in 2023 to current capacities is provided in the table below and presented graphically in Appendix ‘B’.

<i>Flow Summary</i>	<i>Supply Capacity (m<sup>3</sup>/day)</i>	<i>Dynamic Supply Capacity (m<sup>3</sup>/day)</i>	<i>Max Daily Flow (m<sup>3</sup>/day)</i>	<i>Average Daily Flow (m<sup>3</sup>/day)</i>	<i>Average Monthly Flow (m<sup>3</sup>/month)</i>	<i>Total Yearly Flow (m<sup>3</sup>/year)</i>
Drumbo-Princeton Water Treatment Facility	1,329	1,329	590	283	8,617	103,408

## 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

At the time this report was drafted, the results of the 2023 annual inspection by the MECP had not been finalized.

### 6.2 Adverse Results

Any adverse bacteriological or chemical results or observations of operational conditions that may indicate adverse water quality are reported as required and corrective actions are taken. There were four adverse or reportable occurrences in 2023, two of which resulted in a precautionary Boil Water Advisory.

- A bacteriological sample result taken from the distribution system on July 4, 2023 was found to have total coliforms of 19 CFU/100 mL. The result was reported to

the MECP and MOH. Resamples were collected at the site and from an upstream and downstream location.

- The bacteriological re-sample taken from the same location as the above incident was found to have total coliforms of 1 CFU/100 mL. The result was reported to the MECP and MOH. Resamples were collected again at the site and from an upstream and downstream location. All re-samples were determined to be acceptable by ODWS.
- Damage to a watermain on August 9, 2023 by a third party contractor resulted in low water pressure in the Princeton distribution system and potential impact to secondary disinfection. The incident was reported the MECP and MOH. A precautionary boil water advisory was enacted for residents of Princeton. The repair area was flushed and distribution free chlorine residuals were immediately collected and confirmed to be within acceptable levels. Additionally, two sets of bacteriological water samples were collected to confirm that there was no contamination to the drinking water system. All results were found to be acceptable and the advisory was lifted by Public Health.
- An instrumentation failure on August 20, 2023 resulted in sustained low pressure at the Drumbo Water Treatment facility. Pressure in Princeton was not impacted. Oxford County staff reported the incident to MECP and MOH. A precautionary boil water advisory was issued for Drumbo residents. Distribution free chlorine residuals were collected and found to be within acceptable levels. Additionally, two sets of bacteriological water samples were collected to confirm that there was no contamination to the drinking water system. All results were found to be acceptable and the advisory was lifted by Public Health.

## APPENDIX 'A': SUMMARY OF CHEMICAL RESULTS

### UNDERSTANDING CHEMICAL TEST RESULTS

The following tables summarize the laboratory results of the chemical testing the 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 in the MECP document PSIB 4449e01 titled “Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines” available at [https://cvc.ca/wp-content/uploads/2011/03/std01\\_079707.pdf](https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf).

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (µg/L). 1 mg/L is equal to 1000 µg/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. In the event that some samples results are ND, and other results are above the MDL, the value of the MDL will be used in place of the ND where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

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

<i>Parameter</i>	<i>Number of Tests</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	4	ND – 0.004	0.003	1.0	0.003
Nitrate	4	0.708 – 0.876	0.765	10.0	0.006

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

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2023	13.0	100	0.37
Haloacetic Acids (HAA)	2023	ND	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 five 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	August 16, 2021	11.4	20*	0.01
Fluoride	August 16, 2021	0.16	1.5**	0.06

\*Sodium levels between 20 – 200 mg/L must be reported every five years.

\*\*Natural levels of fluoride between 1.5 – 2.4 mg/L must be reported every five years.



The following table summarizes the most recent results for the Lead Testing Program. Lead samples are taken every three 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 2023	243 – 258 mg/L	4	30 – 500 mg/L
Distribution pH 2023	7.19 – 7.66	4	6.5 – 8.5
Distribution Lead 2021	0.01 – 0.25 µg/L	4	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23 parameters. Testing is required every three years for secure groundwater wells in large systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	1.1	10	0.2
Barium	May 30, 2022	167	1000	0.02
Boron	May 30, 2022	32	5000	2
Cadmium	May 30, 2022	0.010	5	0.003
Chromium	May 30, 2022	0.21	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.804	20	0.002

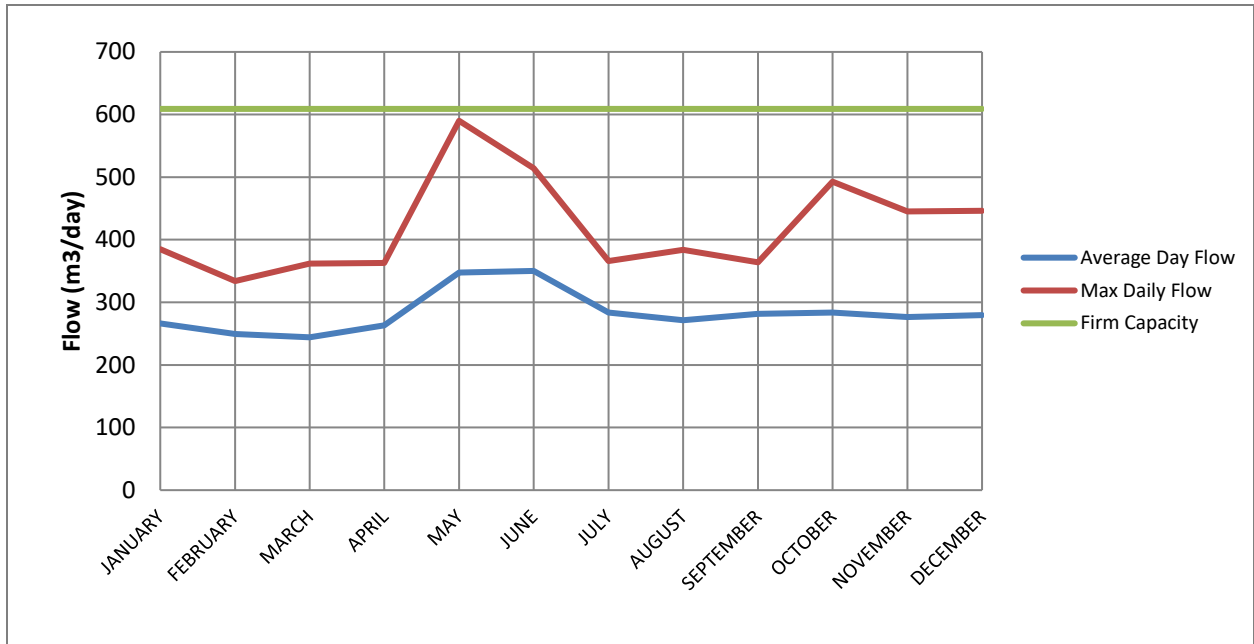
The following table summarizes the most recent test results for Schedule 24 parameters. Testing is required every three years for secure groundwater wells in large systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	June 7, 2021	ND	5	0.01
Azinphos-methyl	June 7, 2021	ND	20	0.05
Benzene	June 7, 2021	ND	1	0.32
Benzo(a)pyrene	June 7, 2021	ND	0.01	0.004
Bromoxynil	June 7, 2021	ND	5	0.33
Carbaryl	June 7, 2021	ND	90	0.05
Carbofuran	June 7, 2021	ND	90	0.01
Carbon Tetrachloride	June 7, 2021	ND	2	0.17
Chlorpyrifos	June 7, 2021	ND	90	0.02
Diazinon	June 7, 2021	ND	20	0.02
Dicamba	June 7, 2021	ND	120	0.20
1,2-Dichlorobenzene	June 7, 2021	ND	200	0.41
1,4-Dichlorobenzene	June 7, 2021	ND	5	0.36
1,2-Dichloroethane	June 7, 2021	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	June 7, 2021	ND	14	0.33
Dichloromethane	June 7, 2021	ND	50	0.35
2-4 Dichlorophenol	June 7, 2021	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19

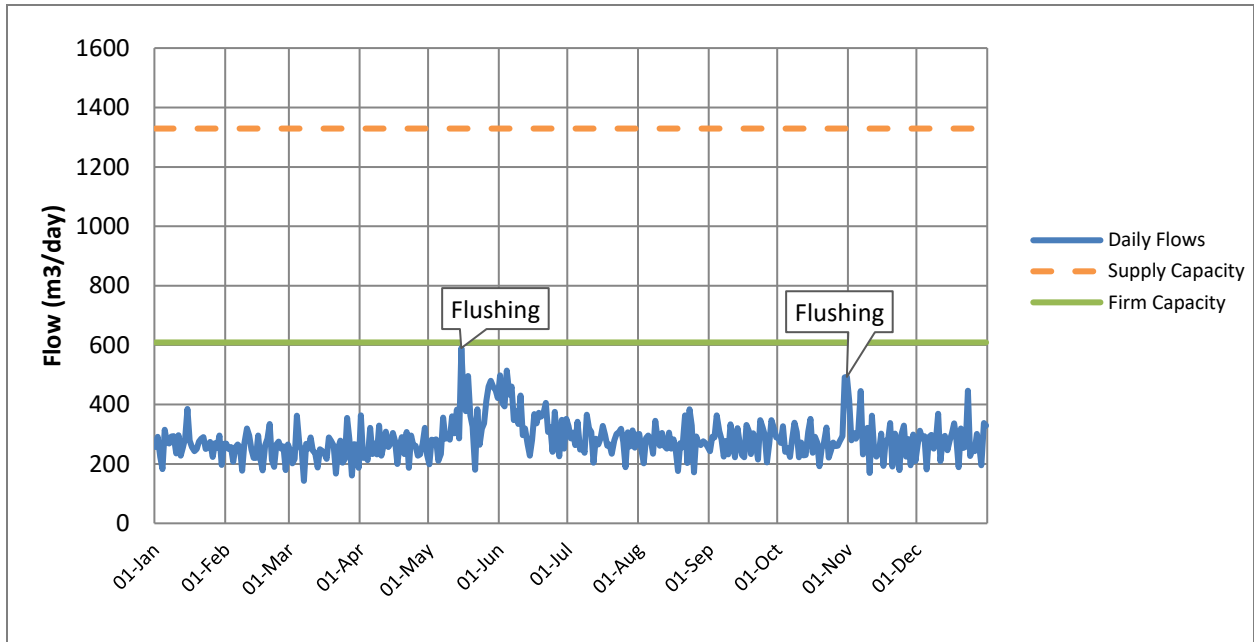
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Diclofop-methyl	June 7, 2021	ND	9	0.40
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 7, 2021	ND	100	0.12
Metolachlor	June 7, 2021	ND	50	0.01
Metribuzin	June 7, 2021	ND	80	0.02
Monochlorobenzene	June 7, 2021	ND	80	0.30
Paraquat	June 7, 2021	ND	10	1
Pentachlorophenol	June 7, 2021	ND	60	0.15
Phorate	June 7, 2021	ND	2	0.01
Picloram	June 7, 2021	ND	190	1
Polychlorinated Biphenyls(PCB)	June 7, 2021	ND	3	0.04
Prometryne	June 7, 2021	ND	1	0.03
Simazine	June 7, 2021	ND	10	0.01
Terbufos	June 7, 2021	ND	1	0.01
Tetrachloroethylene	June 7, 2021	ND	10	0.35
2,3,4,6-Tetrachlorophenol	June 7, 2021	ND	100	0.20
Triallate	June 7, 2021	ND	230	0.01
Trichloroethylene	June 7, 2021	ND	5	0.44
2,4,6-Trichlorophenol	June 7, 2021	ND	5	0.25
Trifluralin	June 7, 2021	ND	45	0.02
Vinyl Chloride	June 7, 2021	ND	1	0.17

# APPENDIX 'B': WATER QUANTITY SUMMARY

## 2023 Average vs Maximum Daily Flow Rates



## 2023 Daily Flow



In 2023, the Drumbo-Princeton Supply Capacity and Dynamic Supply Capacity were the same.

# 2023 Total Production by Well

