SAULT STE. MARIE DRINKING WATER SYSTEM WATERWORKS # 260006685

ANNUAL & SUMMARY REPORTS 2022

Introduction

This Annual and Summary Report has been prepared in accordance with both section 11 and Schedule 22 of Ontario Regulation 170/03. The regulation requirements for each report have been consolidated into a single document. This Report is intended to brief the owner and consumers of the Sault Ste. Marie (SSM) Drinking Water System (DWS) on the performance of the system over the past calendar year from January 1 to December 31, 2022.

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

System Description

PUC Services Inc. operates, maintains, and manages the Sault Ste. Marie drinking water system on behalf of the City's Public Utilities Commission. The PUC Services Inc. business office is located at 500 Second Line East. Regular business hours are 09:00 to 16:30, Monday to Friday. The telephone number is (705) 759-6500.

PUC's certified operators monitor and control all aspects of water production and quality, using a computerized control system.

Water for Sault Ste. Marie is obtained from two principal sources: surface water from Lake Superior and ground water from six deep wells. Raw water from the intake at Gros Cap is pumped to the water treatment plant, where it passes through a process of filtration and disinfection. Water from the deep wells is also disinfected prior to being pumped to the distribution system. pH stabilization and blended phosphate for corrosion control and lead mitigation are added.

On a typical day, our customers use approximately 30,000,000 litres of water. Three water storage reservoirs are used that hold up to 52,000,000 litres of water (or 1-2 days-average consumption).

Chemicals

Chemicals utilized in the Sault Ste. Marie Drinking Water Treatment facilities during 2022 include:

- SSM WTP:
  - Aluminum sulfate for coagulation
  - Chlorine gas for disinfection
  - Blended phosphates for corrosion control
  - Soda ash for pH stabilization
- Goulais Pump Station:
  - Chlorine gas for disinfection
  - Blended phosphates for corrosion control
- Steelton Pump Station:
  - Chlorine gas for disinfection
  - Blended phosphates for corrosion control
- Shannon Pump Station:
  - Chlorine gas for disinfection
  - Blended phosphates for corrosion control
  - Carbon dioxide gas for pH stabilization
- Lorna Pump Station:
  - Chlorine gas for disinfection
  - Blended phosphates for corrosion control
  - Carbon dioxide gas for pH stabilization

2022 Expenditures

In 2022, expenses were incurred to maintain and replace various treatment and distribution assets, including:

Gros Cap Pump Station:

- Roof repairs, dehumidifier

SSM Water Treatment Plant (WTP):

- Filter 1 Inlet, drain, and backwash valves, raw water control valve, soda ash pump repairs, filter spray wash nozzles, backwash control valve and check valve, treated water chlorine analyzer

Goulais Pump Station:

- Turbidity analyzer, chlorine analyzer

Shannon Pump Station:

- Chlorine cylinder heads, chlorine analyzer, turbidity analyzer

Lorna Pump Station:

- Roof replacement

Zone 2 Booster:

- Uninterruptible Power Supply (UPS) for Programmable Logic Controller (PLC) cabinet, dehumidifier, roof replacement

Distribution System:

- 62 water main breaks were repaired in 2022

Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- Eastside Phase 3
- 2022 CIPP lining
- Mulberry Street
- Angelina Avenue
- Dufferin Street
- Cedar Street
- Bloor Street West
- Noah Drive

Form 2 – Record of Minor Modification or Replacements

- Replacement of pump #2 backwash control valve and check valve
- Replacement of chlorine analyzers (WTP, Goulais Well, Shannon Well)
- Replacement of chlorine vacuum regulators (2)
- Replacement of turbidity analyzers (Goulais Well, Shannon Well)
- Replacement of 100mm gate valve (D06-75) Brown Street

Form 3 – Record of addition, modification or replacement of equipment discharging a contaminant of concern to the atmosphere

- n/a

Water Quality

Microbiological Sampling and Testing

Sampling is conducted weekly for the DWS at the frequencies and locations identified by Schedule 10 of O. Reg. 170/03 for Large Municipal Residential Systems.

Table 1: Microbiological sampling requirements

Location	Sample Analysis	# samples	Frequency
Raw	EC, TC	each source	Weekly
Treated	EC, TC, HPC	each source	Weekly
Distribution	EC, TC, HPC (25%)	83 samples	monthly

The raw and treated samples in Sault Ste. Marie are collected from each of the wells in production (Goulais 1 & 2, Steelton, and Shannon) and the WTP surface water source. Lorna Wells are not used for regular production but are sampled and available in the event of increased water demand. Distribution samples are collected from 14 locations throughout the system. In total, 1,758 microbiological samples were collected in the DWS in 2022.

Table 1a: Microbiological Sample Results

Site	Type	# samples	EC (range)	TC (range)	# HPC	HPC (range)
WTP	Raw	52	0 - 2	0 - 120	-	-
	Treated	52	0	0	52	0 - 30
Goulais #1	Raw	52	0	0	-	-
	Treated	52	0	0	52	0 - 10
Goulais #2	Raw	52	0	0	-	-
	Treated	52	0	0	52	0 - 10
Steelton	Raw	52	0	0	-	-
	Treated	52	0	0	52	0 - 10
Shannon	Raw	52	0	0	-	-
	Treated	52	0	0	52	0 - 10
Lorna #1 *	Raw	3	0	0	-	-
	Treated	-	-	-	-	-
Lorna #2 *	Raw	8	0	0	-	-
	Treated	-	-	-	-	-
Various Locations	Distribution	1,227	0	0	402	0 - 100

Lorna wells were flushed and sampled to be available for production if required, but not operated to the system in 2022.

Operational Checks and Testing

Operational testing is completed per Schedule 7 of O. Reg. 170/03 for Large Municipal Residential Systems. These checks and testing are completed on site at the water treatment facility by licensed operators. Continuous monitoring analyzers are utilized for the measurement of filter turbidity and chlorine residuals. Data summaries for turbidity and chlorine residuals are summarized in Tables 2 and 3.

Table 2: Monthly Filter Turbidity Results (SSM WTP)

Month	Filter #1		Filter #2		Filter #3		Filter #4		Monthly Compliance
	Average NTU	Range NTU	Average NTU	Range NTU	Average NTU	Range NTU	Average NTU	Range NTU	%
Jan	0.03	0.02 - 0.10	0.03	0.02 - 0.10	0.03	0.02 - 0.08	0.03	0.03 - 0.10	100
Feb	0.03	0.02 - 0.09	0.03	0.02 - 0.09	0.02	0.01 - 0.08	0.04	0.02 - 0.12	100
Mar	0.02	0.02 - 0.08	0.03	0.02 - 0.12	0.02	0.02 - 0.06	0.03	0.02 - 0.09	100
Apr	0.03	0.02 - 0.11	0.03	0.02 - 0.12	0.03	0.02 - 0.08	0.03	0.02 - 0.10	100
May	0.03	0.02 - 0.16	0.03	0.02 - 0.17	0.02	0.02 - 0.11	0.03	0.02 - 0.15	100
Jun	0.03	0.02 - 0.14	0.04	0.02 - 0.13	0.04	0.02 - 0.10	0.03	0.02 - 0.11	100
Jul	0.03	0.02 - 0.10	0.05	0.02 - 0.11	0.04	0.02 - 0.10	0.04	0.02 - 0.11	100
Aug	0.02	0.01 - 0.05	0.03	0.02 - 0.06	0.02	0.02 - 0.05	0.03	0.02 - 0.06	100
Sep	0.02	0.02 - 0.06	0.03	0.02 - 0.08	0.02	0.02 - 0.19	0.03	0.02 - 0.41	100
Oct	0.02	0.02 - 0.09	0.03	0.02 - 0.10	0.02	0.01 - 0.07	0.02	0.02 - 0.82	100
Nov	0.02	0.01 - 0.08	0.02	0.02 - 0.08	0.02	0.02 - 0.06	0.02	0.02 - 0.07	100
Dec	0.03	0.03 - 0.10	0.03	0.02 - 0.10	0.02	0.02 - 0.09	0.03	0.02 - 0.13	100

Filter turbidity is monitored on SCADA in real time. Filter efficiency is calculated by tracking the readings in five-minute intervals above and below 0.30 NTU during filter run time. ***Sault Ste. Marie 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 (Production Sites)

Production Site	WTP		Goulais Well		Steelton Well		Shannon Well	
Month	Average (mg/L)	Range (mg/L)	Average (mg/L)	Range (mg/L)	Average (mg/L)	Range (mg/L)	Average (mg/L)	Range (mg/L)
Jan	1.23	0.88 - 1.31	1.08	0.37 - 1.27	1.03	0.82 - 1.33	0.85	0.27 - 1.37
Feb	1.22	0.73 - 1.47	1.05	0.81 - 1.22	1.05	0.82 - 1.15	0.85	0.42 - 0.99
Mar	1.25	1.03 - 1.47	1.09	0.86 - 1.41	1.04	0.79 - 1.21	0.82	0.57 - 1.00
Apr	1.22	0.85 - 1.32	1.06	0.79 - 1.39	0.98	0.83 - 1.17	0.85	0.53 - 1.13
May	1.19	0.73 - 1.49	1.09	0.84 - 1.44	0.96	0.65 - 1.33	0.88	0.41 - 1.30
Jun	1.20	0.74 - 1.36	1.10	0.50 - 1.55	1.00	0.71 - 1.10	0.8	0.47 - 0.91
Jul	1.21	0.80 - 1.39	1.13	0.86 - 1.30	1.05	0.84 - 1.20	0.81	0.59 - 0.93
Aug	1.23	0.80 - 1.66	1.17	0.88 - 1.28	1.04	0.79 - 1.11	0.82	0.58 - 2.19
Sep	1.22	0.50 - 1.62	1.17	0.87 - 1.30	1.02	0.77 - 1.14	0.88	0.52 - 1.15
Oct	1.20	0.97 - 1.32	1.14	0.66 - 1.24	1.05	0.83 - 1.16	0.80	0.57 - 0.86
Nov	1.23	0.93 - 1.36	1.12	0.27 - 1.25	1.06	0.92 - 1.20	0.80	0.62 - 1.03
Dec	1.22	0.77 - 2.52	1.15	0.50 - 1.31	1.05	0.90 - 1.27	0.80	0.53 - 0.91

Chlorine residuals are continuously monitored and tracked in real time in SCADA. Minimum residuals were always maintained consistent with primary disinfection requirements.

Chemical Sampling and Testing

Schedule 13 of O. Reg. 170/03 outlines chemical sampling requirements for Large Municipal Residential systems. Sample collection for Schedule 23 (inorganics) and 24 (organics) is required annually, and quarterly sampling is required for Nitrites/Nitrates, THM's and HAA's. Sodium and fluoride are required to be sampled every 60 months. Lorna Wells were not sampled as they were not operated for the production of water to the distribution system in 2022.

Table 4: Schedule 23 - Inorganics (µg/L)

Parameter	WTP	Goulais #1	Goulais #2	Steelton	Shannon	MAC
Antimony	<0.5	<0.5	<0.5	<0.5	<0.5	**6**
Arsenic	<1	<1	<1	<1	4	**25**
Barium	9	37	36	40	62	**1,000**
Boron	<0.2	5	4	4	180	**5,000**
Cadmium	<0.1	<0.1	<0.1	<0.1	<0.1	**5**
Chromium	1	3	3	2	1	**50**
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	**1**
Selenium	<0.2	0.6	0.5	<0.2	2.7	**10**
Uranium	<1	1	1	2	9	**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: Fluoride and Sodium Results (mg/L)

Parameter	WTP	Goulais #1	Goulais #2	Steelton	Shannon	MAC
Fluoride	<0.05	<0.05	0.035	<0.05	0.208	**1.5**
*Sodium	3.2	10.2	10.1	10.9	34.4	**20**

***Sodium has an aesthetic objective (AO) of 200 mg/L but has a limit of 20 mg/L for medical reasons and if exceeded requires notifications every 60 months as required per O. Reg 170.**

Table 6: Nitrate/Nitrite Results (mg/L)

Q	Nitrite Nitrate	WTP	Goulais #1	Goulais #2	Steelton	Shannon	MAC (mg/L)
Q1	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.41	1.05	1.06	0.97	<0.05	**10**
Q2	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.34	0.93	0.87	0.95	<0.05	**10**
Q3	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.26	0.82	0.78	0.79	<0.05	**10**
Q4	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.3	0.98	0.97	0.87	<0.05	**10**

All quarterly results are well below ODWS MAC.

Table 7: Disinfection Byproducts THM/HAA Results (µg/L)

THM	Q1	Q2	Q3	Q4	MAC
Q Average	4.1	9.75	11.1	7.55	**100**
RAA	Running Annual Average (µg/L)			8.13	**100**
HAA	Q1	Q2	Q3	Q4	MAC
Q Average	8.3	10.3	19.3	27.3	**80**
RAA	Running Annual Average (µg/L)			16.3	**80**

All quarterly results for THMs and HAAs are well below ODWS MAC.

Table 8: Schedule 24 Organics – WTP

Parameter	Date	Result	Unit	MAC
Alachlor	Mar 9-22	<0.32	µg/L	5
Atrazine + N-dealkylated metabolites	Mar 9-22	<0.5	µg/L	5
Azinphos-methyl	Mar 9-22	<0.24	µg/L	20
Benzene	Mar 9-22	<0.1	µg/L	5
Benzo(a)pyrene	Mar 9-22	<0.009	µg/L	0.01
Bromoxynil	Mar 9-22	<0.101	µg/L	5
Carbaryl	Mar 9-22	<2	µg/L	90
Carbofuran	Mar 9-22	<3	µg/L	90
Carbon Tetrachloride	Mar 9-22	<0.2	µg/L	5
Chlorpyrifos	Mar 9-22	<0.24	µg/L	90
Diazinon	Mar 9-22	<0.24	µg/L	20
Dicamba	Mar 9-22	<0.0881	µg/L	120
1,2-Dichlorobenzene	Mar 9-22	<0.3	µg/L	200
1,4-Dichlorobenzene	Mar 9-22	<0.3	µg/L	5
1,2-Dichloroethane	Mar 9-22	<0.3	µg/L	5
1,1-Dichloroethylene (Vinylidene chloride)	Mar 9-22	<0.3	µg/L	14
Dichloromethane	Mar 9-22	<1	µg/L	50
2-4 Dichlorophenol	Mar 9-22	<0.2	µg/L	900
2,4-Dichlorophenoxy acetic acid	Mar 9-22	<0.378	µg/L	100
Diclofop-methyl	Mar 9-22	<0.126	µg/L	9
Dimethoate	Mar 9-22	<0.24	µg/L	20
Diquat	Mar 9-22	<0.6	µg/L	70
Diuron	Mar 9-22	<9	µg/L	150
Glyphosate	Mar 9-22	<20	µg/L	280
Malathion	Mar 9-22	<0.24	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	Mar 9-22	<6.3	µg/L	100
Metolachlor	Mar 9-22	<0.16	µg/L	50
Metribuzin	Mar 9-22	<0.16	µg/L	80
Monochlorobenzene	Mar 9-22	<0.5	µg/L	80
Paraquat	Mar 9-22	<0.3	µg/L	10
Pentachlorophenol	Mar 9-22	<0.3	µg/L	60
Phorate	Mar 9-22	<0.16	µg/L	2
Picloram	Mar 9-22	<0.0881	µg/L	190
Polychlorinated Byphenols (PCB)	Mar 9-22	<0.06	µg/L	3
Prometryne	Mar 9-22	<0.08	µg/L	1
Simazine	Mar 9-22	<0.24	µg/L	10
Terbufos	Mar 9-22	<0.16	µg/L	1
Tetrachloroethylene	Mar 9-22	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	Mar 9-22	<0.3	µg/L	100
Triallate	Mar 9-22	<0.16	µg/L	230
Trichloroethylene	Mar 9-22	<0.2	µg/L	5
2,4,6-Trichlorophenol	Mar 9-22	<0.2	µg/L	5
Trifluralin	Mar 9-22	<0.16	µg/L	45
Vinyl Chloride	Mar 9-22	<0.1	µg/L	2

All results are below the ODWS MAC and half MAC as per O. Reg. 169/03.

Table 9: Schedule 24 Organics – Goulais Wells sampled – June 27, 2022

Parameter	Goulais 1	Goulais 2	Unit	MAC
Alachlor	<0.231	<0.235	µg/L	5
Atrazine + N-dealkylated metabolites	<0.5	<0.5	µg/L	5
Azinphos-methyl	<0.173	<0.176	µg/L	20
Benzene	<0.1	<0.1	µg/L	5
Benzo(a)pyrene	<0.009	<0.009	µg/L	0.01
Bromoxynil	<0.104	<0.101	µg/L	5
Carbaryl	<3	<3	µg/L	90
Carbofuran	<4	<5	µg/L	90
Carbon Tetrachloride	<0.2	<0.2	µg/L	5
Chlorpyrifos	<0.173	<0.176	µg/L	90
Diazinon	<0.173	<0.176	µg/L	20
Dicamba	<1.3	<0.0888	µg/L	120
1,2-Dichlorobenzene	<0.2	<0.2	µg/L	200
1,4-Dichlorobenzene	<0.3	<0.3	µg/L	5
1,2-Dichloroethane	<0.2	<0.2	µg/L	5
1,1-Dichloroethylene (Vinylidene chloride)	<0.3	<0.3	µg/L	14
Dichloromethane	<4	<4	ug/L	50
2-4 Dichlorophenol	<0.2	<0.2	µg/L	900
2,4-Dichlorophenoxy acetic acid	<1.3	<0.38	µg/L	100
Diclofop-methyl	<0.13	<0.127	µg/L	9
Dimethoate	<0.173	<0.176	µg/L	20
Diquat	<0.2	<0.02	µg/L	70
Diuron	<10	<10	µg/L	150
Glyphosate	<20	<20	µg/L	280
Malathion	<0.173	<0.176	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	<6.51	<6.34	µg/L	100
Metolachlor	<0.115	<0.118	µg/L	50
Metribuzin	<0.115	<0.118	µg/L	80
Monochlorobenzene	<0.5	<0.5	µg/L	80
Paraquat	<0.2	<0.2	µg/L	10
Pentachlorophenol	<0.3	<0.3	µg/L	60
Phorate	<0.115	<0.118	µg/L	2
Picloram	<0.0912	<0.0888	µg/L	190
Polychlorinated Byphenols (PCB)	<0.06	<0.06	µg/L	3
Prometryne	<0.0577	<0.0588	µg/L	1
Simazine	<0.173	<0.176	µg/L	10
Terbufos	<0.115	<0.118	µg/L	1
Tetrachloroethylene	<0.3	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	<0.3	<0.3	µg/L	100
Triallate	<0.115	<0.118	µg/L	230
Trichloroethylene	<0.2	<0.2	µg/L	5
2,4,6-Trichlorophenol	<0.2	<0.2	µg/L	5
Trifluralin	<0.115	<0.118	µg/L	45
Vinyl Chloride	<0.1	<0.1	µg/L	2

All results are below the ODWS MAC and half MAC as per O. Reg. 169/03.

Table 10: Schedule 24 Organics – Shannon & Steelton Wells Aug 24, 2022

Parameter	Steelton	Shannon	Unit	MAC
Alachlor	<0.228	<0.221	µg/L	5
Atrazine + N-dealkylated metabolites	<0.5	<0.5	µg/L	5
Azinphos-methyl	<0.171	<0.166	µg/L	20
Benzene	<0.1	<0.1	µg/L	5
Benzo(a)pyrene	<0.009	<0.01	µg/L	0.01
Bromoxynil	<0.112	<0.146	µg/L	5
Carbaryl	<3	<3	µg/L	90
Carbofuran	<4	<4	µg/L	90
Carbon Tetrachloride	<0.2	<0.2	µg/L	5
Chlorpyrifos	<0.171	<0.166	µg/L	90
Diazinon	<0.171	<0.166	µg/L	20
Dicamba	<0.0977	<0.128	µg/L	120
1,2-Dichlorobenzene	<0.2	<0.2	µg/L	200
1,4-Dichlorobenzene	<0.3	<0.3	µg/L	5
1,2-Dichloroethane	<0.2	<0.2	µg/L	5
1,1-Dichloroethylene (Vinylidene chloride)	<0.3	<0.3	µg/L	14
Dichloromethane	<1	<1	µg/L	50
2-4 Dichlorophenol	<0.2	<0.2	µg/L	900
2,4-Dichlorophenoxy acetic acid	<0.419	<0.548	µg/L	100
Diclofop-methyl	<0.14	<0.183	µg/L	9
Dimethoate	<0.171	<0.166	µg/L	20
Diquat	<0.2	<0.2	µg/L	70
Diuron	<10	<10	µg/L	150
Glyphosate	<20	<20	µg/L	280
Malathion	<0.171	<0.166	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	<6.98	<9.14	µg/L	100
Metolachlor	<0.114	<0.11	µg/L	50
Metribuzin	<0.114	<0.11	µg/L	80
Monochlorobenzene	<0.5	<0.5	µg/L	80
Paraquat	<0.2	<0.2	µg/L	10
Pentachlorophenol	<0.3	<0.3	µg/L	60
Phorate	<0.114	<0.11	µg/L	2
Picloram	<0.0977	<0.128	µg/L	190
Polychlorinated Byphenols (PCB)	<0.06	<0.1	µg/L	3
Prometryne	<0.057	<0.0552	µg/L	1
Simazine	<0.171	<0.166	µg/L	10
Terbufos	<0.114	<0.11	µg/L	1
Tetrachloroethylene	<0.3	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	<0.3	<0.3	µg/L	100
Triallate	<0.114	<0.11	µg/L	230
Trichloroethylene	<0.2	<0.2	µg/L	5
2,4,6-Trichlorophenol	<0.2	<0.2	µg/L	5
Trifluralin	<0.114	<0.11	µg/L	45
Vinyl Chloride	<0.1	<0.1	µg/L	2

All results are below the ODWS MAC and half MAC as per O. Reg. 169/03.

Lead Sampling:

The Ontario Drinking Water Standard for lead is 10 µg/L. This applies to water at the point of consumption since lead is only present because of corrosion of lead solder, brass containing lead fittings or lead pipes which are found close to or in domestic plumbing and the service connection to buildings.

In July 2017, the required number of Lead samples was reduced to 22 Residential/Non-Residential plumbing and 8 distribution points as per Municipal Drinking Water License #216-101, Schedule C, 5.0, Table 1.

Table 11: Community Lead Sampling Results

Location Type	Number of Sample Locations	Range of Lead Results (min#) – (max #)	Number of Location Exceedances
Plumbing – Residential and Non-Residential	23	0 - 27.4	3
Distribution	9	0 - 2.4	0

In 2022, 3 of 23 plumbing locations or 13% of the tested homes exceeded the ODWS. Tests were done in homes with record of lead or suspected lead pipe – this is a small subset of homes in Sault Ste. Marie.

As part of PUC's lead service line replacement program, one additional address was sampled with zero exceedances. A total of 11 service lines were replaced in 2022 – on the municipal side, private side, or both.

Providing clean, safe, and reliable drinking water is a responsibility that PUC takes very seriously. Unfortunately, the challenge of reducing the occurrence of lead in drinking water is something communities across North America are faced with. In Sault Ste. Marie, PUC employs a robust community water sampling program that monitors lead levels in drinking water.

For the program to function efficiently, PUC partnered with the SSM Innovation Centre and Algoma Public Health to develop a system that would focus lead testing on homes with suspected lead service pipes, and that may have occupants that would be especially sensitive to lead exposure (ex. infants or expecting mothers). While it is beyond PUC's authority to replace lead services on a homeowner's property, if a home is found to have a lead service, PUC offers programs to consumers that will protect them from lead exposure.

The preferred option provided to homeowners is an interest-free loan to help them replace their lead service lines. When an owner replaces their lead service line, PUC will replace the public portion of the service at no charge to the owner. PUC will also offer service pipe lining when pandemic restrictions are eased as an affordable alternative to replacement. Another option PUC provides consumers is to issue tap-mounted water filters (certified for lead reduction) at no charge to the homeowner until the service can be replaced or that changes to water treatment processes can be shown to satisfactorily reduce lead concentrations.

In accordance with drinking water regulations, PUC implemented a Corrosion Control Plan (as part of the Water Quality Improvement Project) designed to reduce lead uptake in the drinking water. PUC continues to evaluate the long-term changes to the distribution system and water quality after implementing corrosion control plan.

Compliance

Adverse Water Quality Incidents

During 2022, the Sault Ste. Marie DWS reported one incident of adverse water quality.

Table 12: Adverse Water Quality Incidents

Date	Incident Reported
17-Aug-22	Shannon well treated Bromate exceedance (18 µg/L)
06-Sep-22	Shannon well treated Bromate exceedance (19,20 µg/L)
30-Sep-22	Shannon well treated Bromate exceedance (18, 23, 24 µg/L)
17-Nov-22	Shannon well treated Bromate exceedance (12 µg/L)

During August, PUC collected samples for the provincial Drinking Water Surveillance Program, which revealed an exceedance of bromate at Shannon well. In consultation with MECP and Algoma Public Health, continued assessment and sampling led to the additional exceedances noted above.

After investigation, it was concluded that the exceedance was caused by the piping at the sampling point. Additional sampling in the distribution system confirmed the absence of bromate in the treated and distributed water from the source supply, demonstrating that the water met the expected quality standards. A sampling plan is in place to monitor any future changes and to address the piping issue at the sampling point originally used.

Annual Drinking Water System Inspection

The annual DWS inspection took place on January 12, 2022. There were zero non-compliances, zero recommendations and best practices identified.

Ministry of Environment, Conservation, and Parks - Risk Assessment Process

Maximum Question Rating: 818

Table 13: MECP Risk Assessment Rating

Inspection Module	Non-Compliance Rating
Source	0 / 38
Capacity Assessment	0 / 42
Treatment Processes	0 / 267
Effluent Quality and Quantity	0 / 20
Distribution System	0 / 8
Operations Manuals	0 / 42
Logbooks	0 / 30
Certification and Training	0 / 142
Water Quality Monitoring	0 / 177
Reporting and Corrective Actions	0 / 152
TOTAL	**0/818**

Inspection Risk Rating 0.0%

The DWS received a final inspection rating of 100%

Flows

Municipal Drinking Water Works Permit: 216-201 specifies maximum rated flows for the raw water supplies listed in Table 14.

Table 14: Permit to Take Water

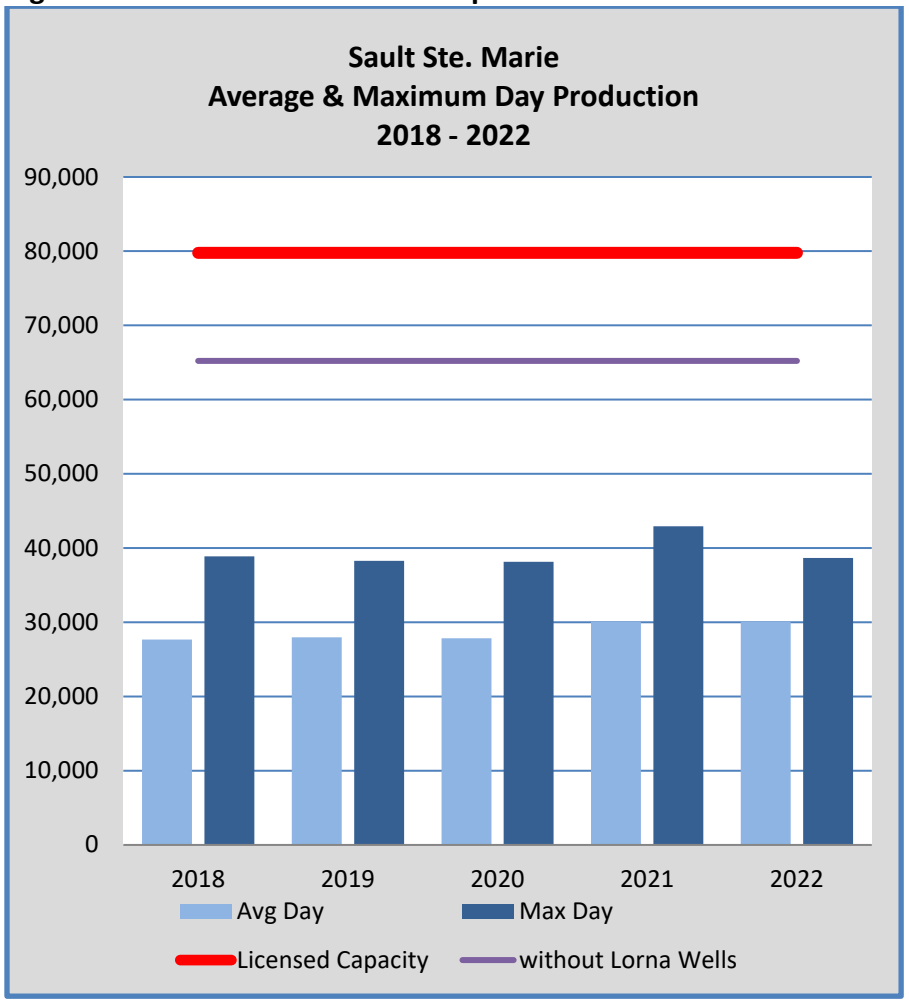
Facility	Permit to Take Water
Gros Cap Pump Station	75,000 m^3/d
Goulais Wells	10,013 m^3/d
Steelton Well	8,208 m^3/d
Shannon Well	7,000 m^3/d
Lorna Wells	14,558.4 m^3/d

$1m^3$ = 1,000 L

Water Treatment capacity is less than the available raw water supply. The Water Treatment Plant is currently rated at 40,000 m^3/d based on regulatory requirements for primary disinfection. The maximum capacity for the Sault Ste. Marie DWS is 79,779 m^3/d. Lorna Wells remains available for emergency demand if needed.

The Sault Ste. Marie WTP and production Wells treated a total of 11,016,180 m^3 of water in 2022.
The average daily treated flow was 30,096 m^3, and the maximum daily flow was 38,662 m^3 on July 18th, 2022.

Figure 1: Five Year Production Comparison



Capacity available production without Lorna Wells – 65,221 m^3/d

Table 15: WTP Raw and Treated Water Production 2022

2022	Raw Water Production				Treated Water Production				
Month	Raw Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	Treated Water (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max. Flow Day of rated Capacity
January	447,824	12,717	16,774	14,446	432,486	10,697	17,144	13,951	42.9
February	450,281	12,817	20,200	16,081	439,965	11,539	20,067	15,713	50.2
March	506,956	13,973	19,834	16,353	494,123	11,460	19,038	15,939	47.6
April	463,350	12,374	17,301	15,445	451,921	9,119	18,708	15,064	46.8
May	504,073	12,460	22,211	16,260	489,649	10,326	21,368	15,795	53.4
June	461,867	12,873	17,369	15,396	451,912	10,775	20,958	15,064	52.4
July	458,010	12,193	21,778	14,775	441,546	10,101	21,685	14,243	54.2
August	459,155	11,964	17,818	14,811	447,801	10,266	17,094	14,445	42.7
September	414,994	11,845	16,503	13,833	395,272	8,980	17,160	13,176	42.9
October	408,966	10,817	14,880	13,192	390,241	8,054	15,633	12,588	39.1
November	409,977	11,486	16,441	13,666	398,953	10,084	17,038	13,298	42.6
December	422,230	11,463	15,417	13,620	410,811	9,706	16,136	13,252	40.3

Figure 2: Sault Ste. Marie WTP Production 2022

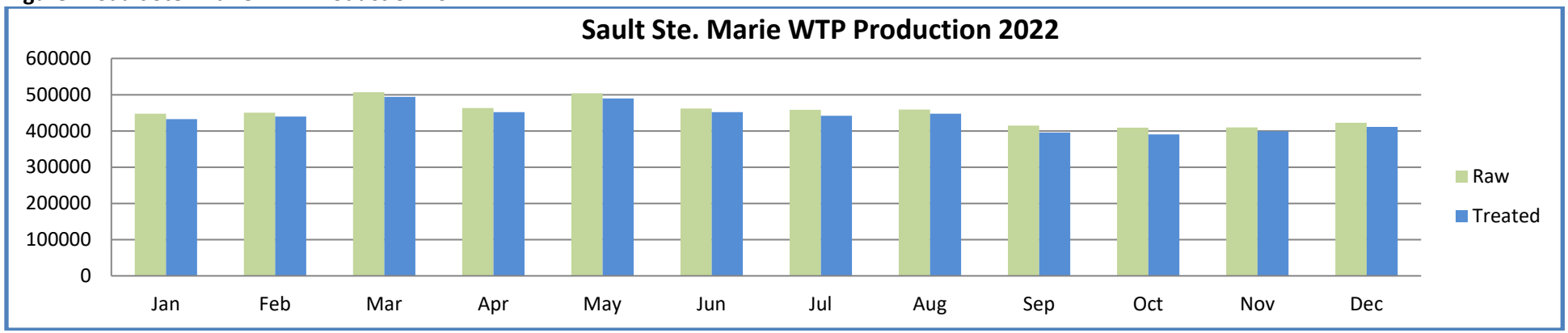


Table 16: Goulais Wells Production 2022

2022	Goulais Well #1 Production					Goulais Well #2 Production				
Month	Total Volume (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max Flow Day of PTTW	Total Volume (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max Flow Day Of PTTW
January	139,433	916	5,214	4,497	78.9	7,860	0	2,416	254	70.9
February	97,371	0	6,008	3,477	90.9	28,435	0	3,044	1,016	89.3
March	147,660	2,446	5,228	4,763	79.1	5,917	0	2,426	191	71.2
April	144,302	3,415	5,015	4,810	75.9	1,941	0	1,291	65	37.9
May	148,999	2,509	5,043	4,806	75.9	5,925	0	1,992	191	58.5
June	146,499	3,680	5,141	4,883	77.8	1,072	0	484	36	14.2
July	150,206	2,277	5,259	4,845	79.6	14,616	0	3,033	471	89.0
August	149,316	2,769	5,786	4,817	87.6	1,630	0	997	53	29.3
September	142,835	1,795	5,952	4,761	90.1	5,084	0	1,894	169	55.6
October	114,353	0	5,003	3,689	75.7	25,104	0	3,040	810	89.2
November	127,510	0	5,710	4,250	86.4	11,110	0	3,034	370	89.1
December	144,141	1,613	5,566	4,650	84.3	8,484	0	2,187	274	64.2

Figure 3: Goulais Wells Production 2022

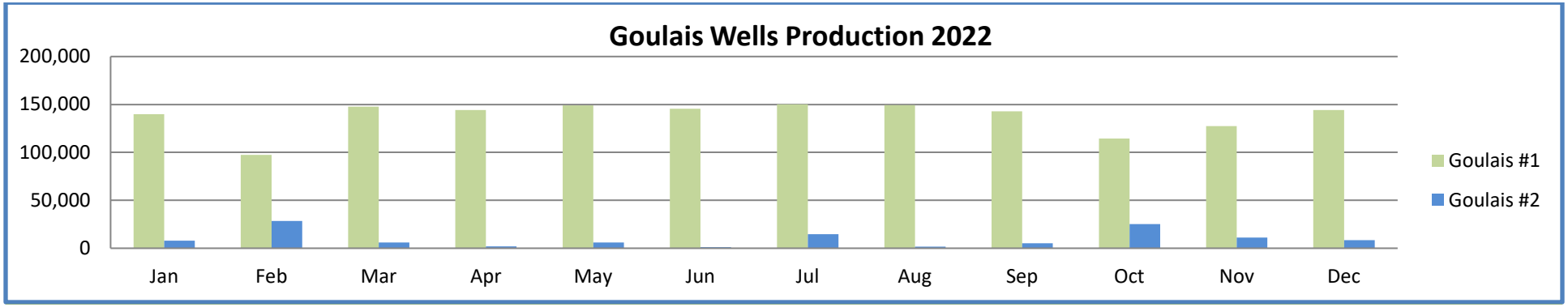
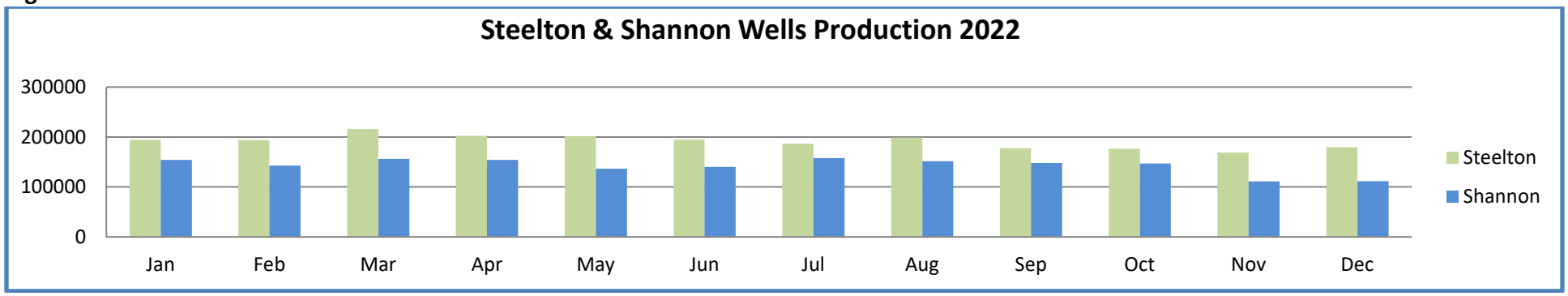


Table 17: Steelton & Shannon Wells Production 2022

2022	Steelton Well Production					Shannon Well Production				
Month	Total Volume (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max Flow Day of PTTW	Total Volume (m^3)	Minimum Day (m^3/d)	Maximum Day (m^3/d)	Average Day (m^3/d)	% Max Flow Day of PTTW
January	194,470	4,761	7,000	6,273	85.3	154,247	4,580	5,000	4,976	71.4
February	193,441	5,997	7,799	6,909	95.0	142,935	4,694	6,000	5,105	85.7
March	216,069	6,418	7,001	6,970	85.3	156,255	3,649	6,000	5,040	85.7
April	202,321	5,997	7,899	6,744	96.2	154,301	5,000	6,000	5,143	85.7
May	201,378	4,998	7,541	6,496	91.9	136,550	0	5,576	4,405	79.7
June	194,620	5,201	7,996	6,487	97.4	140,165	0	5,684	4,672	81.2
July	186,336	0	7,115	6,011	86.7	157,746	4,217	6,000	5,089	85.7
August	199,066	4,997	7,082	6,421	86.3	151,768	3,994	5,489	4,896	78.4
September	177,513	3,515	7,763	5,917	94.6	147,730	4,000	5,624	4,924	80.3
October	176,662	4,988	6,998	5,699	85.3	147,025	3,500	5,000	4,743	71.4
November	168,802	4,635	6,837	5,627	83.3	111,080	3,461	5,000	3,703	71.4
December	179,838	4,291	7,400	5,801	90.2	111,378	3,500	5,828	3,593	83.3

Figure 4: Steelton & Shannon Wells Production 2022



Report Availability

Annual Report

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 at the PUC Services Office.

PUC Services Inc.
500 Second Line East
Sault Ste. Marie, ON
P6A 6P2

Summary Report

This Summary report for The Sault Ste. Marie Drinking Water System for the period of January 1st to December 31st, 2022 has been prepared in accordance with Schedule 22 of O. Reg. 170/03.

In accordance with Schedule 22 of O. Reg. 170/03, this Summary Report has been provided to the Public Utilities Commission of the City of Sault Ste. Marie.

Tables, Definition of Terms

Appendix A: List of Tables/ Charts

Appendix B: Definition of Terms

Acronym	Definition
AWQI	Adverse water quality incident
CT Value	Product of disinfectant concentration and contact time (mg-min/L)
DM	Dual Media
DWS	Drinking water system
EC	E. Coli
HAA	Haloacetic acids
HPC	Heterotrophic plate count
MAC	Maximum Acceptable Concentration
MECP	Ministry of the Environment, Conservation and Parks
m^3	Cubic metres (1,000 L)
m^3/d	Cubic metres per day
mg/L	Milligram per litre (part per million)
ML	Megalitre (1,000 m^3)
NTU	Nephelometric turbidity unit
ODWS	Ontario Drinking Water Standards
O. Reg. 170/03	Ontario Regulation 170/03
PLC	Programmable logic controller
PTTW	Permit to take water
SCADA	Supervisory control and data acquisition
SSM	Sault Ste. Marie
TC	Total coliforms
THM	Trihalomethane
µg/L	Microgram per litre (part per billion)
WD	Water distribution
WT	Water treatment
WTP	Water treatment plant