SAULT STE. MARIE DRINKING WATER SYSTEM WATERWORKS # 260006685

ANNUAL & SUMMARY REPORTS 2021

Introduction

This Annual and Summary Report has been prepared in accordance with both section 11 and Schedule 22 of Ontario Regulation 170/03. The requirements of the regulation 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 Drinking Water System (DWS) on the performance of the system over the past calendar year from January 1 to December 31, 2021.

This report encompasses all elements as 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 definition 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 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 prior to being pumped to the distribution system. Water from the deep wells is also disinfected prior to being pumped to the distribution system. On a typical day our customers use approximately 30,000,000 litres of water. Three water storage reservoirs located in the distribution system 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 2021 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

2021 Expenditures

During the year of 2021, expenses were incurred to maintain and replace various treatment and distribution assets:

Gros Cap Pump Station:

- Replacement of diesel storage tank and controls, level sensors replaced for intake wells

SSM WTP:

- Interior lighting replaced, backwash valve and check valve replaced, primary transformer and feed cables for MCC #1 replaced, MCC contacts replaced for high lift and backwash pumps, basement heater conduit and wiring replaced, emergency lighting conduit and wiring replaced

Goulais Pump Station:

- Air relief valves and piping replaced on both wells

Shannon Pump Station:

- Exterior door replaced, heater replaced

Zone 2 Booster:

- Pumps 1 and 2 replaced, MCC replaced, new outdoor generator to power entire site, diesel pumps removed, new isolation valves installed

Distribution System:

- Repairs – 69 water main breaks

Drinking Water System Changes

Form 1 – Record of Watermains Authorized as a Future Alteration

- Chatfield Drive - Greenfield Subdivision (phase 5)
- Thorneloe Crescent watermain reconstruction
- Crestwood Ave – Denwood Subdivision (phase 7&8)
- Mark Street reconstruction (Chrurchill to Lake St.)
- Castle Heights Subdivision
- Looped watermain through City Public Works
- Third Line E watermain re-alignment
- Eastside Condo (phase 3)
- 2021 CIPP Lining - Lorraine Ave, Meadow Park Cres, MacDonald Ave (Pim to Fauquier)
- 2021 SIPP Lining – Second Line (Edison to Nichol), Vivian Ave., Murton (Kingford to Cheshire)

Form 2 – Record of Minor Modification or Replacements

- Gros Cap level sensors
- SSM WTP backwash valve and check valve
- Goulais Pumping Station air relief valves
- Gros Cap diesel tank replacement
- Zone 2 Booster, pumps, isolation valves

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

- Zone 2 Booster Station generator

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 available in the event that demand for water increases. Distribution samples are collected from 14 locations throughout the system. In total 1196 microbiological samples were collected in the DWS.

One adverse bacteriological sample was reported for the WTP for presence of total coliform. The free chlorine residual at time of collection was 1.26 mg/L. A resample produced results of non-detect of total coliform, confirming the safety of the water supply.

Table 1a: Microbiological Sample Results

Production Site or Distribution	Raw, Treated or Distribution	# samples	EC (range)	TC (range)	# HPC samples	HPC (range)
WTP	Raw	52	0 - 2	0 - 100	-	-
	Treated	53	0	0 - 11	52	0 - 70
Goulais #1	Raw	46	0	0	-	-
	Treated	46	0	0	46	0
Goulais #2	Raw	38	0	0	-	-
	Treated	38	0	0	38	0 - 10
Steelton	Raw	52	0	0	-	-
	Treated	52	0	0	52	0 - 2000
Shannon	Raw	52	0	0	-	
	Treated	52	0	0	52	0 - 10
Lorna #1 *	Raw	2	0	0	-	-
	Treated	-	-	-	-	-
Lorna #2 *	Raw	13	0	0 - 7	-	-
	Treated	-	-	-	-	-
Various Locations	Distribution	1196	0	0	407	0 - 20

**Lorna wells flushed and sampled to be available for production if required but not operated in production to the system in 2021.*

Operational Checks and Testing

Operational testing is completed as 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 measurement of filter turbidity and chlorine residuals. Data summaries for turbidity and chlorine 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 - 0.11	0.03	0.02 - 0.10	0.02	0.02 - 0.08	0.03	0.03 - 0.10	100
Feb	0.02	0.02 - 0.08	0.02	0.02 - 0.08	0.02	0.02 - 0.07	0.03	0.02 - 0.08	100
Mar	0.02	0.02 - 0.08	0.03	0.02 - 0.12	0.02	0.01 - 0.06	0.03	0.02 - 0.10	100
Apr	0.02	0.02 - 0.08	0.02	0.02 - 0.08	0.02	0.02 - 0.07	0.03	0.02 - 0.08	100
May	0.02	0.02 - 0.08	0.03	0.02 - 0.08	0.02	0.02 - 0.08	0.03	0.02 - 0.09	100
Jun	0.03	0.02 - 0.08	0.03	0.02 - 0.09	0.03	0.02 - 0.09	0.03	0.02 - 0.10	100
Jul	0.03	0.02 - 0.08	0.03	0.02 - 0.07	0.03	0.02 - 0.08	0.03	0.02 - 0.07	100
Aug	0.03	0.02 - 0.10	0.03	0.02 - 0.09	0.03	0.02 - 0.08	0.03	0.02 - 0.09	100
Sep	0.03	0.02 - 0.08	0.03	0.02 - 0.09	0.03	0.02 - 0.09	0.04	0.02 - 0.09	100
Oct	0.02	0.02 - 0.06	0.03	0.02 - 0.18	0.02	0.02 - 0.06	0.03	0.02 - 0.08	100
Nov	0.02	0.02 - 0.07	0.03	0.02 - 0.07	0.03	0.02 - 0.06	0.03	0.02 - 0.07	100
Dec	0.03	0.02 - 0.08	0.04	0.02 - 0.11	0.03	0.02 - 0.08	0.03	0.03 - 0.10	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 WTP 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	1.24	1.09 - 1.40	1.18	0.70 - 1.49	1.01	0.79 - 1.23	0.95	0.60 - 1.18
Feb	1.26	1.11 - 1.36	1.11	0.82 - 1.25	1.05	0.83 - 1.11	0.97	0.62 - 1.13
Mar	1.25	1.13 - 1.35	1.08	0.57 - 1.28	1.02	0.76 - 1.26	0.96	0.52 - 1.12
Apr	1.23	1.08 - 1.44	1.10	0.83 - 1.29	1.03	0.76 - 1.13	0.90	0.20 - 1.37
May	1.22	1.11 - 1.35	1.11	0.81 - 1.27	1.06	0.85 - 1.15	0.92	0.64 - 1.05
Jun	1.23	1.07 - 1.37	1.11	0.81 - 1.45	1.10	0.89 - 1.24	0.88	0.63 - 1.04
Jul	1.23	1.10 - 1.43	1.15	0.92 - 1.37	1.05	0.50 - 1.27	0.92	0.59 - 1.16
Aug	1.22	1.06 - 1.38	1.13	0.93 - 1.51	1.06	0.47 - 1.73	0.93	0.20 - 1.39
Sep	1.24	1.06 - 1.36	1.16	0.87 - 1.49	1.07	0.89 - 1.16	0.92	0.55 - 1.02
Oct	1.22	1.05 - 1.33	1.06	0.85 - 1.18	1.08	0.81 - 1.19	0.92	0.61 - 1.43
Nov	1.23	1.05 - 1.38	1.11	0.89 - 1.29	0.82	1.01 - 1.52	0.82	0.47 - 0.99
Dec	1.24	1.02 - 1.35	1.15	0.92 - 1.22	0.98	0.76 - 1.08	0.81	0.51 - 1.15

Chlorine residuals are continuously monitored and tracked in real time in SCADA. Minimum residuals were maintained at all times 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 every 12 months and quarterly sampling 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 production of water to distribution system in year 2021.

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	3	**25**
Barium	9	33	32	37	60	**1000**
Boron	5	20	20	20	211	**5000**
Cadmium	<0.1	<0.1	<0.1	<0.1	<0.1	**5**
Chromium	<1	2	2	2	<1	**50**
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	**1**
Selenium	<0.2	0.4	0.5	0.6	2.9	**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	0.046	0.208	**1.5**
*Sodium	3.46	10.2	11.9	10.1	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 would require notifications if exceeded.**

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	0.29	0.86	0.49	0.82	<0.05	**10**
Q2	NO_2	0.32	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	<0.05	0.81	0.82	0.78	<0.05	**10**
Q3	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.35	1.05	0.8	0.96	<0.05	**10**
Q4	NO_2	<0.05	<0.05	<0.05	<0.05	<0.05	**1.0**
	NO_3	0.38	<0.05	1.0	<0.05	<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
Sub 4	8.2	4.8	10	8.1	**100**
Sub 15	3.1	3.8	8	9.3	**100**
Q Average	5.7	4.3	9	8.7	**100**
RAA	Running Annual Average (ug/L)			6.9	**100**
HAA	**Q1**	**Q2**	**Q3**	**Q4**	**MAC**
Sub 4	14	14	10	11	**80**
Sub 15	11	9	9	8	**80**
Q Average	12.5	11.5	9.5	9.5	**80**
RAA	Running Annual Average (ug/L)			10.8	**80**

Sub 4 (MacDonald Ave.) Sub 15 (Spring St.) Running annual average (RAA) is calculated by using the average results tested each quarter.

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

Table 8: Schedule 24 Organics – WTP

Parameter	Date	Result	Unit	MAC
Alachlor	17-Feb-21	<0.224	µg/L	5
Atrazine + N-dealkylated metabolites	17-Feb-21	<0.5	µg/L	5
Azinphos-methyl	17-Feb-21	<0.168	µg/L	20
Benzene	25-Feb-21	<0.1	µg/L	5
Benzo(a)pyrene	17-Feb-21	<0.009	µg/L	0.01
Bromoxynil	17-Feb-21	<0.0945	µg/L	5
Carbaryl	17-Feb-21	<1	µg/L	90
Carbofuran	17-Feb-21	<2	µg/L	90
Carbon Tetrachloride	25-Feb-21	<0.2	µg/L	5
Chlorpyrifos	17-Feb-21	<0.168	µg/L	90
Diazinon	17-Feb-21	<0.168	µg/L	20
Dicamba	17-Feb-21	<0.0827	µg/L	120
1,2-Dichlorobenzene	25-Feb-21	<0.3	µg/L	200
1,4-Dichlorobenzene	25-Feb-21	<0.3	µg/L	5
1,2-Dichloroethane	25-Feb-21	<0.3	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	25-Feb-21	<0.3	µg/L	14
Dichloromethane	25-Feb-21	<0.3	µg/L	50
2-4 Dichlorophenol	25-Feb-21	<1	µg/L	900
2,4-Dichlorophenoxy acetic acid	17-Feb-21	<0.2	µg/L	100
Diclofop-methyl	17-Feb-21	<0.354	µg/L	9
Dimethoate	17-Feb-21	<0.118	µg/L	20
Diquat	17-Feb-21	<0.168	µg/L	70
Diuron	25-Feb-21	<0.2	µg/L	150
Glyphosate	25-Feb-21	<20	µg/L	280
Malathion	17-Feb-21	<0.168	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	17-Feb-21	<5.91	µg/L	100
Metolachlor	17-Feb-21	<0.112	µg/L	50
Metribuzin	17-Feb-21	<0.112	µg/L	80
Monochlorobenzene	25-Feb-21	<0.5	µg/L	80
Paraquat	25-Feb-21	<0.5	µg/L	10
Pentachlorophenol	17-Feb-21	<0.3	µg/L	60
Phorate	17-Feb-21	<0.112	µg/L	2
Picloram	17-Feb-21	<0.0827	µg/L	190
Polychlorinated Byphenols (PCB)	17-Feb-21	<0.05	µg/L	3
Prometryne	17-Feb-21	<0.0561	µg/L	1
Simazine	17-Feb-21	<0.168	µg/L	10
Terbufos	17-Feb-21	<0.112	µg/L	1
Tetrachloroethylene	17-Feb-21	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	17-Feb-21	<0.3	µg/L	100
Triallate	17-Feb-21	<0.112	µg/L	230
Trichloroethylene	17-Feb-21	<0.112	µg/L	5
2,4,6-Trichlorophenol	25-Feb-21	<0.2	µg/L	5
Trifluralin	17-Feb-21	<0.2	µg/L	45
Vinyl Chloride	17-Feb-21	<0.112	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

Parameter	Goulais 1	Goulais 2	Unit	MAC
Alachlor	<0.267	<0.261	µg/L	5
Atrazine + N-dealkylated metabolites	<0.5	<0.5	µg/L	5
Azinphos-methyl	<0.2	<0.196	µg/L	20
Benzene	<0.1	<0.1	µg/L	5
Benzo(a)pyrene	<0.01	<0.01	µg/L	0.01
Bromoxynil	<0.102	<0.0996	µg/L	5
Carbaryl	<1	<1	µg/L	90
Carbofuran	<2	<2	µg/L	90
Carbon Tetrachloride	<0.2	<0.2	µg/L	5
Chlorpyrifos	<0.2	<0.196	µg/L	90
Diazinon	<0.2	<0.196	µg/L	20
Dicamba	<0.0889	<0.0872	µg/L	120
1,2-Dichlorobenzene	<0.2	<0.3	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	<0.381	<0.374	µg/L	100
Diclofop-methyl	<0.127	<0.127	µg/L	9
Dimethoate	<0.2	<0.196	µg/L	20
Diquat	<0.2	<0.3	µg/L	70
Diuron	<6	<6	µg/L	150
Glyphosate	<20	<20	µg/L	280
Malathion	<0.2	<0.196	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	<6.35	<6.35	µg/L	100
Metolachlor	<0.133	<0.131	µg/L	50
Metribuzin	<0.133	<0.131	µg/L	80
Monochlorobenzene	<0.5	<0.5	µg/L	80
Paraquat	<0.2	<0.3	µg/L	10
Pentachlorophenol	<0.3	<0.3	µg/L	60
Phorate	<0.133	<0.131	µg/L	2
Picloram	<0.0889	<0.0889	µg/L	190
Polychlorinated Byphenols (PCB)	<0.06	<0.07	µg/L	3
Prometryne	<0.0666	<0.0654	µg/L	1
Simazine	<0.2	<0.196	µg/L	10
Terbufos	<0.133	<0.131	µg/L	1
Tetrachloroethylene	<0.3	<0.3	µg/L	30
2,3,4,6-Tetrachlorophenol	<0.2	<0.2	µg/L	100
Triallate	<0.133	<0.131	µg/L	230
Trichloroethylene	<0.133	<0.133	µg/L	5
2,4,6-Trichlorophenol	<0.2	<0.2	µg/L	5
Trifluralin	<0.2	<0.2	µg/L	45
Vinyl Chloride	<0.133	<0.133	µg/L	2

Dates Sampled: Goulais Wells 1 and 2 – June 8, 2021

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

Table 10: Schedule 24 Organics – Shannon & Steelton Wells

Parameter	Steelton	Shannon	Unit	MAC
Alachlor	<0.214	<0.218	µg/L	5
Atrazine + N-dealkylated metabolites	<0.5	<0.5	µg/L	5
Azinphos-methyl	<0.16	<0.164	µg/L	20
Benzene	<0.2	<0.2	µg/L	5
Benzo(a)pyrene	<0.01	<0.01	µg/L	0.01
Bromoxynil	<0.0891	<0.102	µg/L	5
Carbaryl	<1	<1	µg/L	90
Carbofuran	<2	<2	µg/L	90
Carbon Tetrachloride	<0.2	<0.2	µg/L	5
Chlorpyrifos	<0.16	<0.164	µg/L	90
Diazinon	<0.16	<0.164	µg/L	20
Dicamba	<0.078	<0.0892	µg/L	120
1,2-Dichlorobenzene	<0.5	<0.5	µg/L	200
1,4-Dichlorobenzene	<0.5	<0.5	µg/L	5
1,2-Dichloroethane	<0.5	<0.5	µg/L	5
1,1-Dichloroethylene (vinylidene chloride)	<0.5	<0.5	µg/L	14
Dichloromethane	<5	<5	µg/L	50
2-4 Dichlorophenol	<0.2	<0.2	µg/L	900
2,4-Dichlorophenoxy acetic acid	<0.334	<0.382	µg/L	100
Diclofop-methyl	<0.111	<0.127	µg/L	9
Dimethoate	<0.16	<0.164	µg/L	20
Diquat	<0.9	<0.6	µg/L	70
Diuron	<7	<6	µg/L	150
Glyphosate	<20	<20	µg/L	280
Malathion	<0.16	<0.164	µg/L	190
2-Methyl-4-Chlorophenoxyacetic Acid (MCPA)	<5.57	<6.37	µg/L	100
Metolachlor	<0.107	<0.109	µg/L	50
Metribuzin	<0.107	<0.109	µg/L	80
Monochlorobenzene	<0.5	<0.5	µg/L	80
Paraquat	<0.4	<0.3	µg/L	10
Pentachlorophenol	<0.3	<0.3	µg/L	60
Phorate	<0.107	<0.109	µg/L	2
Picloram	<0.078	<0.0892	µg/L	190
Polychlorinated Byphenols (PCB)	<0.06	<0.07	µg/L	3
Prometryne	<0.0535	<0.0546	µg/L	1
Simazine	<0.16	<0.164	µg/L	10
Terbufos	<0.107	<0.164	µg/L	1
Tetrachloroethylene	<0.5	<0.5	µg/L	30
2,3,4,6-Tetrachlorophenol	<0.3	<0.3	µg/L	100
Triallate	<0.107	<0.109	µg/L	230
Trichloroethylene	<0.107	<0.109	µg/L	5
2,4,6-Trichlorophenol	<0.5	<0.5	µg/L	5
Trifluralin	<0.2	<0.2	µg/L	45
Vinyl Chloride	<0.107	<0.109	µg/L	2

Dates Sampled: Steelton and Shannon Wells – September 20, 2021

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 as a result 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 (mg/L)	Number of Location Exceedances
Plumbing Residential and Non-Residential	22	0 - 19.2	3
Distribution	8	0 - 2.0	0

In 2021, 3 of 22 plumbing locations 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. Minimum samples were collected during the pandemic. Zero lead service lines were replaced in 2021 , the program will be continuing in 2022 .

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 the 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 offer service pipe lining when pandemic restrictions are eased and as an affordable alternative to replacement. Another option the PUC provides to 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 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) that is 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 2021, the Sault Ste. Marie DWS reported two incidents of adverse water quality.

Table 12: Adverse Water Quality Incidents

Date	Incident Reported
2021-08-12	Total coliform - WTP treated
2021-10-25	High sodium – Distribution

2021-08-12 – One adverse bacteriological sample was reported for the WTP for presence of total coliform. The free chlorine residual at time of collection was 1.26 mg/L. A resample produced results of non-detect of total coliform confirming the safety of the water supply.

2021-10-25 – High sodium levels (30.2 & 31.4 ug/L) were detected in two distribution samples collected from an area of known high sodium levels. Sodium has an aesthetic objective of 200 mg/L but has a limit of 20 mg/L for medical reasons requiring notification.

Annual Drinking Water System Inspection

The annual DWS inspection took place on March 12, 2021 by the Ministry of the Environment, Conservation and Parks (MECP). There were zero non-conformances, and zero recommendations and best practices identified.

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

Maximum Question Rating: 528

Table 13: MECP Risk Assessment Rating

Inspection Module	Non-Compliance Rating
Source	0 / 14
Capacity Assessment	0 / 30
Treatment Processes	0 / 89
Operations Manuals	0 / 28
Logbooks	0 / 14
Certification and Training	0 / 42
Water Quality Monitoring	0 / 112
Reporting & Corrective Actions	0 / 66
Treatment Process Monitoring	0 / 133
TOTAL 0 / 528	**TOTAL 0 / 528**

Inspection Risk Rating 0.00%

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 12.

Table 14: Permit to Take Water

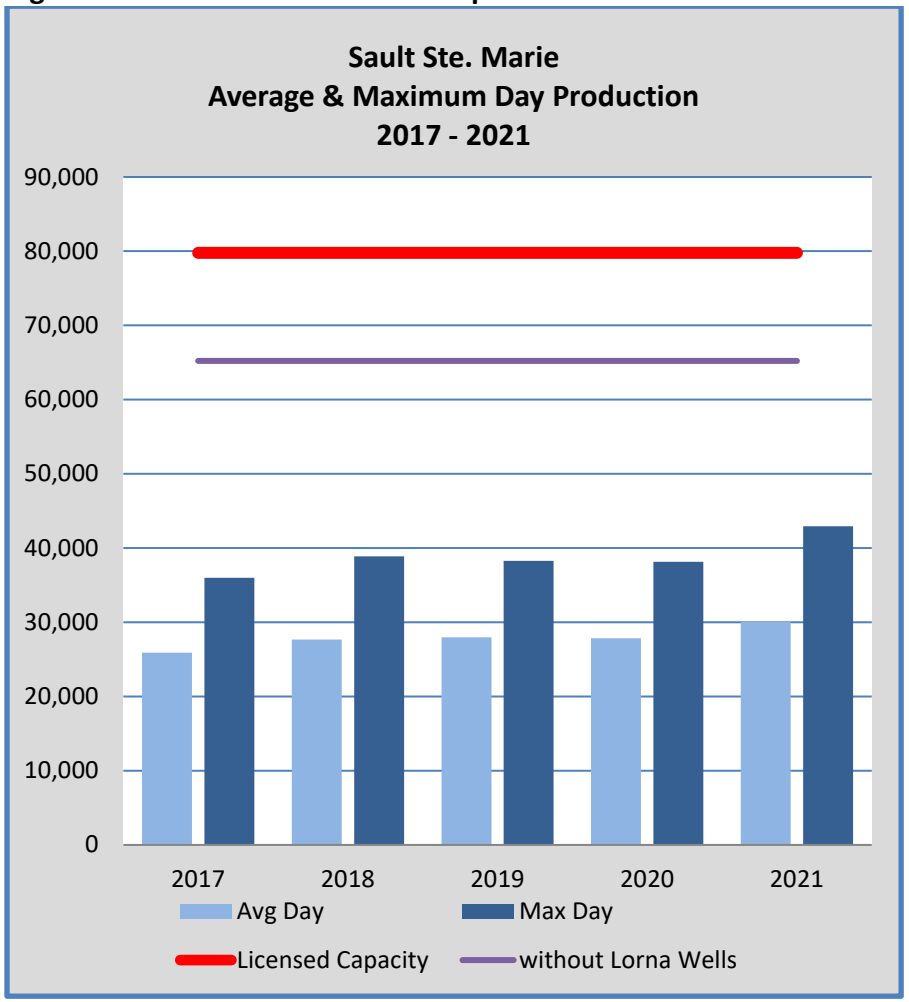
Facility	Permit to Take Water
Gros Cap Pump Station	75,000 m^3/d
Goulais Wells	10,013 m^3/d
Steelton Well	8,208 m^3/d
Shannon Well	7,000 m^3/d
Lorna Wells	14,558.4 m^3/d

$1m^3$ = 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 11,026,207 m^3 of water during the year of 2021.
The average daily treated flow was 30,083 m^3, and the maximum daily flow was 42,949 m^3 on June 8th, 2021.

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 2021

2021	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	457,502	12,287	19,597	14,758	445,027	11,082	17,668	14,356	44.2
February	410,464	12,813	17,172	14,659	398,166	10,060	18,664	14,220	46.7
March	469,460	11,060	18,904	15,144	457,261	10,729	18,507	14,750	46.3
April	410,987	12,276	15,821	13,700	399,921	8,757	17,483	13,331	43.7
May	425,862	12,231	16,238	13,737	417,968	11,539	15,516	13,483	38.8
June	524,897	12,797	24,415	17,497	513,360	9,901	24,950	17,112	62.4
July	501,912	11,981	18,840	16,191	498,119	10,562	20,750	16,068	51.9
August	499,465	13,721	18,592	16,112	471,726	10,897	19,034	15,217	47.6
September	421,414	9,633	16,141	14,047	395,816	6,941	17,328	13,194	43.3
October	392,986	11,425	15,303	12,677	379,362	8,591	17,658	12,237	44.1
November	401,475	11,903	16,215	13,383	384,380	8,478	17,280	12,813	43.2
December	422,584	11,812	15,814	13,632	403,124	8,183	16,214	13,004	40.5

Figure 2: Sault Ste. Marie WTP Production 2021

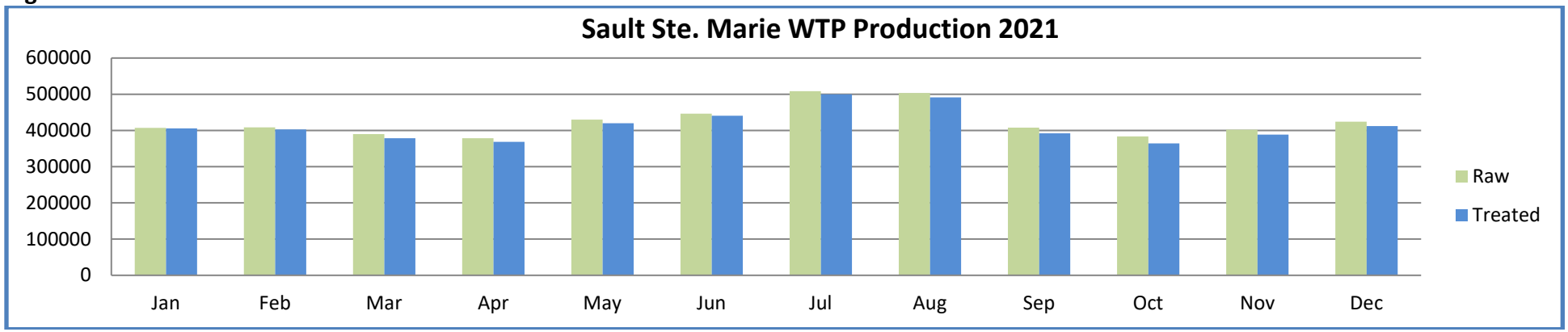


Table 16: Goulais Wells Production 2021

2021	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	58,617	0	5,674	1,891	85.9	15,171	0	3,043	489	89.3
February	99,735	0	5,206	3,562	78.8	21,526	0	3,038	769	89.2
March	71,822	0	5,010	2,317	75.8	52,611	0	3,041	1,754	89.3
April	82,077	0	5,022	2,736	76.0	38,288	0	3,037	1,276	89.1
May	156,360	0	6,461	5,044	97.8	6,322	0	3,032	204	89.0
June	144,720	0	6,027	4,824	91.2	6,531	0	3,029	218	88.9
July	152,571	903	6,015	4,922	91.1	15,505	0	3,210	500	94.2
August	162,325	2,886	6,019	5,236	91.1	7,819	0	2,473	252	72.6
September	140,559	1,747	5,767	4,685	87.3	8,191	0	2,210	273	64.9
October	151,728	0	6,010	4,894	91.0	11,336	0	3,409	366	100
November	141,554	1,783	5,902	4,718	89.3	7,519	0	2,999	251	88.0
December	150,867	3,352	5,203	4,867	78.8	1,599	0	983	52	28.9

Figure 3: Goulais Wells Production 2021

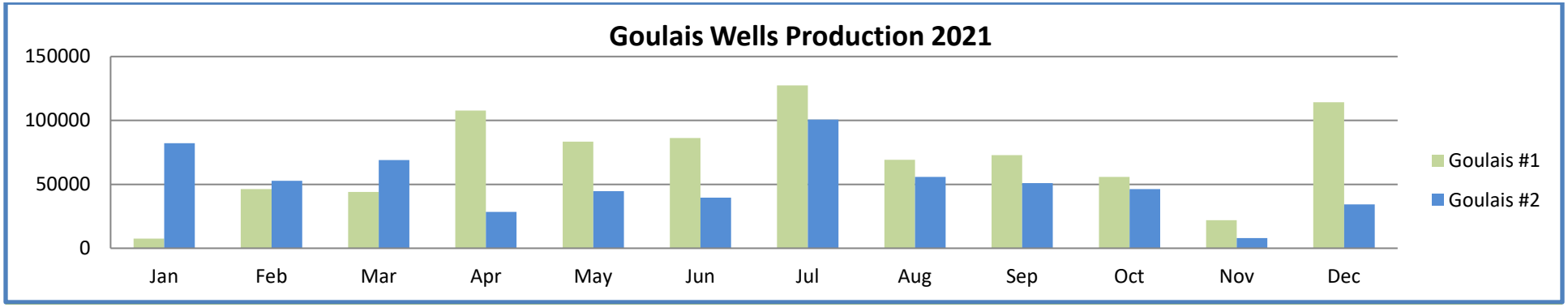
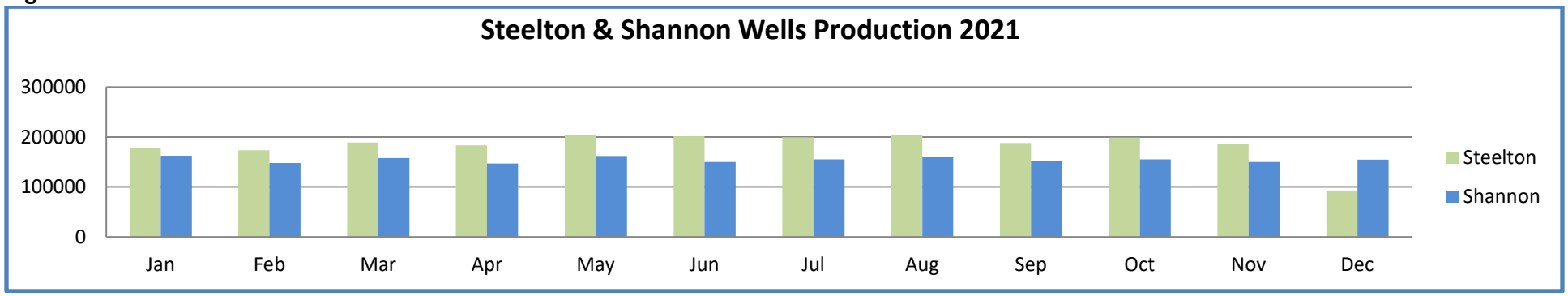


Table 17: Steelton & Shannon Wells Production 2021

2021	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	178,277	2,021	7,499	5,751	91.4	162,369	3,968	6,000	5,238	85.7
February	173,634	5,022	7,495	6,201	91.3	147,903	3,444	6,079	5,282	86.8
March	188,927	4,624	7,605	6,094	92.7	157,918	4,000	6,249	5,094	89.3
April	183,434	4,999	6,998	6,114	85.3	146,800	2,642	6,000	4,893	85.7
May	204,362	4,932	7,901	6,592	96.3	162,194	4,247	6,500	5,232	92.9
June	201,582	5,382	7,797	6,719	95.0	150,316	4,000	5,977	5,011	85.4
July	199,571	3,305	7,052	6,438	85.9	155,502	4,335	5,500	5,016	78.6
August	204,140	4,367	7,600	6,585	92.6	159,609	3,417	6,487	5,149	92.7
September	188,187	5,000	7,649	6,273	93.2	152,596	4,436	6,150	5,087	87.9
October	199,081	4,999	7,861	6,422	95.8	155,340	4,446	6,000	5,011	85.7
November	186,989	4,364	7,497	6,233	91.3	150,037	4,326	5,730	5,001	81.9
December	192,920	4,999	7,000	6,223	85.3	154,936	4,965	5,000	4,998	71.4

Figure 4: Steelton & Shannon Wells Production 2021



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, 2021 has been prepared in accordance to 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, 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