

THUNDER BAY PULP AND PAPER

THUNDER BAY, ONTARIO

AMBIENT AIR QUALITY MONITORING – ANNUAL 2023

RWDI #2202257

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SUBMITTED TO

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1 INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by Thunder Bay Pulp and Paper (TBPP) to complete the annual ambient air quality monitoring (AAQM) program and reporting associated with the Frederica Station #1, MECP ID 63500 and Bailey Station #2, MECP ID 63510. The location of each monitoring station is illustrated in **Figure 1** provided in the **Figures** section of this report.

This report provides a summary of the monitoring and reporting program for the period of January 2023 to December 2023, in accordance with the Ministry of Environment, Conservation and Parks (MECP) Operations Manual for Air Quality Monitoring, dated January 2018 (Operations Manual). The following station parameters were monitored and reported in 2023:

FREDERICA STATION – MECP ID 63500

CONTINUOUS MONITORING:

- Total Reduced Sulphur (TRS)
- Wind speed (WS) and Wind direction (WD)
- Ambient Temperature (ET), Incoming Solar Radiation (GR), Relative Humidity (RH) and Barometric Pressure (BP)

NON - CONTINUOUS MONITORING:

- Total Suspended Particulate (TSP)

BAILEY STATION – MECP ID 63510

CONTINUOUS MONITORING:

- Total Reduced Sulphur (TRS)
- Wind speed (WS) and Wind direction (WD)

NON - CONTINUOUS MONITORING:

- Total Suspended Particulate (TSP)

The statistical summaries, overall equipment performance, and data summaries prepared for this report represent the information collected from January 2023 to December 2023.

2 AIR QUALITY MONITORING & REPORTING REQUIREMENTS

TBPP is required to monitor and report emissions of TRS, TSP and meteorological data of wind speed and wind direction in accordance with the MECP's Operations Manual and the following requirements.



Location	Ambient Air Monitoring Station Number	Monitored Parameters
Frederica Street	63500	TRS – Continuous Monitoring WS & WD – Continuous Monitoring TSP – Non-Continuous Monitoring
Bailey Avenue	63510	TRS – Continuous Monitoring WS & WD – Continuous Monitoring TSP – Non-Continuous Monitoring

Since 2008, there have been various changes to the monitoring and reporting requirements. A summary of the changes since 2009 are noted below:

As of January 1, 2009:

- All data is reported in clock-based half-hour averages as half-hour beginning from 00:00 to 23:30.
- All data comparisons to Ministry thresholds are done as rolling averages; where a rolling half-hour is averaged at 5-minute intervals and a rolling 24-hour is averaged at 1-hour intervals.
- All data is expressed as whole numbers.

As of February 1, 2013:

- MECP Schedule 3 Standard for 10-minute TRS concentration greater than 9 ppb phased in.
- MECP Guideline for half-hour TRS concentrations greater than 27 ppb phased out.
- MECP Schedule 3 Standard for 24-hour TRS concentration greater than 10 ppb phased in, with AAQC 24-Hour TRS concentration greater than 10 ppb phased out.

As of February 27, 2015:

- MECP Schedule 3 Standard for 10-minute TRS concentration greater than 9 ppb phased out.
- O. Reg. 419/05 Pulp and Paper Technical Standard for half-hour TRS concentrations greater than 27 ppb phased in.

As of July 1, 2016:

- O. Reg. 419/05 Pulp and Paper Technical Standard for 10-minute TRS concentrations greater than 27 ppb more than two (2) times in any six-month period phased in.
- O. Reg. 419/05 Pulp and Paper Technical Standard for half-hour TRS concentrations greater than 27 ppb phased out.

As of July 1, 2018:

- Statistical TRS averages will be reported to one (1) decimal place.
- When determining the number of exceedances for an averaging period, multiple exceedances will no longer be reported as clock defined periods. The exceedance will be reported as the first value calculated for each averaging period that exceeds the limit.
- The range of the exceedance period will now be reported for successive running averages.



As of January 1, 2020:

- Statistical TRS averages will be reported as whole numbers.
- O.Reg. 419/05 Schedule 3 Standards and O.Reg. 419/05 Schedule 6 Standards are not applicable to the AAQM stations since the facility registered for O.Reg. 419/05 Pulp & Paper Technical Standards to Manage Air Pollution (Registration #: 503-15-393-rv0 on February 27, 2015).

3 ANNUAL OPERATIONS SUMMARY

For the 2023 operating year, the Frederica and Bailey Stations operated in accordance with the MECP's Operations Manual. The stations collected TRS data from January 1, 2023 to December 31, 2023 and TSP samples were collected based on the North American 6-day sampling schedule. Meteorological parameters were recorded and reported.

The annual parameters monitored, list of monitoring equipment located at each station, and audit and data flag summaries are provided in **Appendix A**. A summary of the overall operations is provided in **Appendix B, C and D**.

DAILY CHECKS, WEEKLY VISITS AND MONTHLY CALIBRATIONS

Daily data checks (Monday – Friday excluding holidays) for anomalous data were performed. Routine data back-up and archiving was completed throughout the year. The daily zero/span values were routinely reviewed to verify instrument performance. Weekly site visits were conducted over the course of 2023; a TRS pollution logbook is kept at both stations and is updated as part of the weekly station visit. Copies of the 2023 log sheets were provided to the MECP. Routine monthly calibrations were completed to verify instrument performance and the reports are available by request.

A cut-off wind speed value of 3 km/h was applied to the pollution roses. This ensures that only the most accurate wind direction values are used to determine monthly episodes. The wind rose graphically indicates the amount of time that the wind originates from a given direction. The pollution rose indicates the amount of time that the wind originates from a given direction coupled with any measured pollutant levels that exceeded specific threshold levels or classes.

QUARTERLY / SEMI-ANNUAL AUDITS

Quarterly / Semi-Annual MECP audits were conducted on the following dates:

1. April 27th, 2023
2. June 15th, 2023
3. September 14th, 2023
4. November 22nd, 2023



The results from the Frederica station audits showed that the TRS and TSP monitoring equipment were operating within the MECP specifications during each audit event. Bailey station passed the Q1, Q2, and Q4 MECP TRS audits and the semi-annual MECP TSP audits, while marginally failing the Q3 TRS MECP audit due to a failing UV source. The UV source was replaced after the audit and the analyzer was later sent for maintenance to improve its performance.

The Frederica Station met the MECP's desirable target of 95% for TRS, WS/WD, ET, RH, GR, and BP continuous monitoring parameters for the year. The Bailey Station met the MECP's desirable target of 95% for TRS and WS/WD continuous monitoring for the year.

4 ANNUAL TRS SUMMARY

Both the Frederica and Bailey Stations sample for TRS on a continuous basis. For TRS the Frederica Station collected 97.5% valid data, while the Bailey Station collected 96.2% valid data. There were no TRS occurrences recorded at either Frederica Station or Bailey station above the 10-min Technical Standard of 27 ppb (O. Reg. 419/05 P&P Technical Standard exceedance: 10-Minute TRS Concentration > 27 ppb, more than two (2) times in any six-month period).

4.1 Station #1 – Frederica (MECP ID 63500)

In 2023, the Frederica Station collected 97.5% of the available TRS data. Data collected at the station suggests that relatively low concentrations of TRS were emitted from the mill. The highest 2023 clock-based and rolling half-hour concentrations of TRS were 20 ppb and 21 ppb respectively, with the highest rolling 10-minute average being 27 ppb.

4.2 Station #2 – Bailey (MECP ID 63510)

In 2023, the Bailey Station collected 96.2% of the available TRS data. Data collected at the station suggests that low concentrations of TRS were emitted from mill operations. The highest 2023 clock-based and rolling half-hour concentrations of TRS were 15 ppb and 17 ppb respectively, with the highest rolling 10-minute average being 18 ppb.

5 ANNUAL METEOROLOGICAL SUMMARY

Meteorological data collected as part of the monitoring program for both stations includes wind speed and wind direction. Ambient temperature, incoming solar radiation, barometric pressure and relative humidity were additional parameters recorded at the Frederica Station. The ambient temperature, incoming solar radiation, barometric pressure and relative humidity sensors were replaced in June 2019. The percent valid wind data was calculated based on the amount of time per month the sensor output a valid data record. The annual calculated percent valid wind data for the Frederica Station was 100% and 99.5% for the Bailey Station.



6 ANNUAL TSP SUMMARY

Both the Frederica and Bailey Stations sample for TSP following the North American 6-day sampling schedule. Frederica Station achieved 100.0% of possible samples, while Bailey Station recorded 98.3% of possible samples. The maximum TSP concentration recorded at the Frederica Station was 114.3 $\mu\text{g}/\text{m}^3$ on May 30th. The maximum concentration measured at the Bailey Station was 129.4 $\mu\text{g}/\text{m}^3$, which occurred on April 12th. Annual geometric means recorded at both stations reveal that slightly higher TSP concentrations were recorded at the Bailey Station.

Neither station experienced an annual geometric mean in excess of the MECP AAQC of 60 $\mu\text{g}/\text{m}^3$. Bailey station had one (1) event where the TSP concentrations exceeded the MECP 24-hour AAQC of 120 $\mu\text{g}/\text{m}^3$, while Frederica station had no events exceeding the MECP 24-hour AAQC. 2023 has seen forest fires have a significant impact on the air quality of Thunder Bay.

A summary of the annual monitored results for TSP at both stations is provided in **Appendix D**.

7 DATA COMPARISON SUMMARY

The stations have been in operation since February 6, 2004. A summary of the data comparisons for the period 2017 to 2023 are provided in **Appendix E, F and G**.

Based on our review of the data from the period 2017 to 2023, we have noted the following observations:

TRS: 2018 recorded some of the lowest concentrations for the Frederica Station, while 2021 and 2023 recorded some of the lowest concentrations at the Bailey Station. The Bailey Station saw higher concentrations in 2017 through 2020 in comparison to 2023.

Wind: On average, wind speeds remained consistent at each station for the past 7 years of monitoring. Both Frederica and Bailey Stations have averaged similar wind speeds throughout the year.

Meteorological: There are no definite trends noted for ambient temperature, relative humidity, solar radiation or barometric pressure.

TSP: Both stations show a decline in the annual geometric means from 2018 until 2022.



8 CLOSING

We trust that this annual summary will meet the necessary MECP reporting requirements for the annual reporting. Electronic copies of this report will be forwarded to Thunder Bay Pulp and Paper to provide to the MECP.

If you have any questions with respect to this report or any other aspect of our services, please do not hesitate to contact me at (807) 344-0662.

Yours very truly,

A handwritten signature in black ink that reads "Karri Legarrie". The signature is written in a cursive style with a large initial 'K'.

Karri Legarrie
Senior Project Manager

KLL/klm
Attach.



9 GENERAL STATEMENT OF LIMITATIONS

This report entitled Ambient Air Quality Monitoring – Annual 2023, dated April 23, 2024, was prepared by RWDI AIR Inc. (“RWDI”) for Thunder Bay Pulp and Paper (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein (“Project”). This report was prepared using scientific principles, published methodologies and professional judgment in assessing available information and data. The findings presented within this document are based on available data within the limits of the existing information, budgeted scope of work, and schedule. The conclusions contained in this report are based on the information available to RWDI when this report was prepared; subsequent changes made by the Client after the date of this report have not been reflected in the conclusions.




This report was prepared for the exclusive use of Thunder Bay Pulp and Paper and the MECP. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. RWDI accepts no responsibility for damages, if any, suffered by any third party as result of decisions made or actions based on this report.

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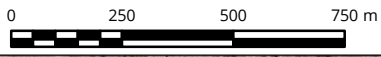
FIGURES



Legend

-  Frederica Station
MECP ID 63500
-  Bailey Station
MECP ID 63510
-  Thunder Bay Pulp and Paper

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Ambient Monitoring Stations



Drawn by: MPA	Figure: 1
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Date Revised: Oct 18, 2023	



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APPENDIX A

Thunder Bay Pulp and Paper**2023 Annual Summary****Parameter/Equipment Summary****Frederica Station - MECP ID 63500**

Parameter	Instrument Make	Instrument Model	Instrument S/N
TRS - Total Reduced Sulphur	TECO	43C	0333503280
Thermal Oxidizer	CD Nova	CDN-101	421
WS/WD - Wind Speed/Wind Direction	RM Young	05103-10	x
ET - Ambient Temperature	Campbell Scientific	HMP 155A	R1120891
GR - Incoming Solar Radiation	LI-COR	LI-200/R	PY 107686
RH - Relative Humidity	Campbell Scientific	HMP 155A	R1120891
BP - Barometric Pressure	Campbell Scientific	CS106	x
*TSP - Total Suspended Particulate	Tisch	MFC: TE-300-310	1258

Notes: * - Non-continuous Parameter

Bailey Station - MECP ID 63510

Parameter	Instrument Make	Instrument Model	Instrument S/N
TRS - Total Reduced Sulphur	TECO	43C	0333503281
Thermal Oxidizer	CD Nova	CDN-101	442
WS/WD - Wind Speed/Wind Direction	RM Young	05103-10	x
*TSP - Total Suspended Particulate	Tisch	MFC: TE-300-310	0354

Notes: * - Non-continuous Parameter

**Thunder Bay Pulp and Paper
2023 Annual Summary
Equipment Audit Summary**

Station Name / MECP Station ID	Date	Parameter	Instrument Make	Instrument S/N	Auditor	RWDI Station Operator Present During Audit	Criteria Met	Reason for Audit
Frederica 63500	27-Apr-23	TRS	TECO 43C	0333503280	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	421				
Bailey 63510	27-Apr-23	TRS	TECO 43C	0333503281	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	442				
Frederica 63500	15-Jun-23	TRS	TECO 43C	0333503280	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	421			Y	
		TSP	TE 300-313	418				
Bailey 63510	15-Jun-23	TRS	TECO 43C	0333503281	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	442			Y	
		TSP	TE 300-313	354				
Frederica 63500	14-Sep-23	TRS	TECO 43C	0333503280	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	421			Y	
		TSP	TE 300-313	418				
Bailey 63510	14-Sep-23	TRS	TECO 43C	0333503281	Jim Stachowich (MECP)	Anthony Dineen	N*	Routine
		Oxidizer	CDN-101	442			Y	
		TSP	TE 300-313	354				
Frederica 63500	22-Nov-23	TRS	TECO 43C	0333503280	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	421				
Bailey 63510	22-Nov-23	TRS	TECO 43C	0333503281	Jim Stachowich (MECP)	Anthony Dineen	Y	Routine
		Oxidizer	CDN-101	442				

Note: *Marginal fail as a result of a failing UV source.

Thunder Bay Pulp and Paper
2023 Annual Summary
Data Flag Summary
Continuous Parameters

Flag	Notes
"C" or "c"	Calibration: (C - Valid Hour; c - Invalid Hour) TRS calibrations are routinely done on a monthly basis so to check the integrity of the analyzer. Linearity between different concentrations are checked as well as stability and oxidizer efficiency. Calibrations on other pieces of equipment are not required to be performed as frequently. Audits performed by the MECP are also flagged as calibration.
"B" or "b"	Bad Condition: (B - Valid Hour; b - Invalid Hour) A bad condition flag is applied to data records in the occurrence that the analyzer or sensor is not working under proper conditions. Either issues with the instrument have occurred or an external factor is causing the instrument to not function properly.
"R" or "r"	Rate of Change: (R - Valid Hour; r - Invalid Hour) A rate of change flag is applied to data records if the data recorded changes at a rate unacceptable to normal operating conditions.
"D" or "d"	Offline: (D - Valid Hour; d - Invalid Hour) An analyzer and/or sensor is flagged as offline during periods of time in which maintenance is being performed, or invalid data records are recorded for reasons other than power or concentration range issues. Usually, the station operator manually applies the offline flag while at the station in order to perform changes or checks on the equipment. An analyzer or sensor can be flagged offline if there is an issue with the data logger.
"P" or "p"	Power Failure: (P- Valid Hour; p - Invalid Hour) A power failure flag is applied when power failures or power fluctuations occur at the station. Extra time may be flagged beyond the duration of the actual power failure to account for equipment stability and warm-up time.
- or "l"	Negative Over Range: ("-" Valid Hour; l - Invalid Hour) A negative over range flag is applied to data records if the sensor or analyzer results drift into an unacceptable negative range.
+ or "m"	Positive Over Range: ("+" Valid Hour; m - Invalid Hour) A positive over range flag is applied to data records if the sensor or analyzer increase past 100% of the equipment's output.

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APPENDIX B

**Thunder Bay Pulp and Paper
2023 Annual Summary
Missing Data Summary - Half-Hour Summary
Continuous Parameters
Frederica Station - MECP ID 63500**

Station	Parameter	Calibration	Rate of Change	Offline	Power Failure	Negative Over Range	Positive Over Range	Bad Condition	Total Half-Hours Of Missing Data
Frederica	TRS	427	0	0	19	0	0	0	446
	WS/WD	2	0	0	5	0	0	0	7
	ET	0	0	0	5	0	0	0	5
	GR	0	0	0	5	0	0	0	5
	RH	0	0	0	5	0	0	0	5
	BP	0	0	0	5	0	0	0	5

Frederica station significant data loss summary:

TRS:

The TRS analyzer experienced 446 half-hours of lost data during 2023. A total of 427 half-hours were flagged for calibrations; 364 half-hours were flagged for daily zero/span checks, and the remainder of half-hours flagged for calibrations were towards routine monthly calibrations and the MECP's quarterly audits. 19 half-hours were flagged due to power failures.

MET Sensors and Wind:

The wind monitor lost 7 half-hours of data during 2023. 2 half-hours were flagged as calibration and 5 half-hour was flagged due to power failure. The ET sensor lost 5 half-hours due to power failure. The GR sensor lost 5 half-hour flagged offline due a power failure. The RH sensor lost 5 half-hours due to power failure. The BP sensor lost 5 half-hours due to a power failure.

Thunder Bay Pulp and Paper
Continuous Sampling - 2023 Annual Data Summary
Total Reduced Sulphur (TRS) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1453	35	35	0	100.0	97.6	97.6%	YES
	Feb	1344	1344	1312	32	32	0	100.0	97.6		
	Mar	1488	1488	1453	35	35	0	100.0	97.6		
2nd Quarter 2023	Apr	1440	1440	1398	42	37	2	99.8	97.1	97.2%	YES
	May	1488	1488	1452	36	36	0	100.0	97.6		
	Jun	1440	1440	1397	43	36	1	99.6	97.0		
3rd Quarter 2023	Jul	1488	1488	1449	39	35	0	99.7	97.4	97.5%	YES
	Aug	1488	1488	1452	36	34	0	99.9	97.6		
	Sep	1440	1440	1404	36	34	2	100.0	97.5		
4th Quarter 2023	Oct	1488	1488	1452	36	35	0	99.9	97.6	97.5%	YES
	Nov	1440	1440	1405	35	34	1	100.0	97.6		
	Dec	1488	1488	1447	41	38	0	99.8	97.2		
	Total	17520	17520	17074	446	421	6				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

TRS Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	97.5

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

Thunder Bay Pulp and Paper
Continuous Sampling - 2023 Annual Data Summary
Total Reduced Sulphur (TRS) - Data Summary
Frederica Station - MECP ID 63500

Continuous Ambient Monitoring - TRS (ppb)

Month	Maximum Rolling 10-Minute ^a Concentration	Maximum Clock-based Half-Hour ^b Concentration	Maximum Rolling Half-Hour ^c Concentration	Maximum Rolling 24-Hour ^d Concentration	Monthly Mean ^e	No. of Readings > 10-Minute Standard ^f
Jan-23	27	20	21	4	0.4	0
Feb-23	19	12	12	2	0.2	0
Mar-23	4	2	3	0	0.0	0
Apr-23	6	4	4	1	0.1	0
May-23	6	5	5	0	0.0	0
Jun-23	4	3	3	0	0.0	0
Jul-23	2	1	1	0	0.0	0
Aug-23	11	7	8	0	0.0	0
Sep-23	5	5	5	0	0.0	0
Oct-23	4	2	2	0	0.0	0
Nov-23	1	1	1	0	0.0	0
Dec-23	12	6	6	0	0.0	0

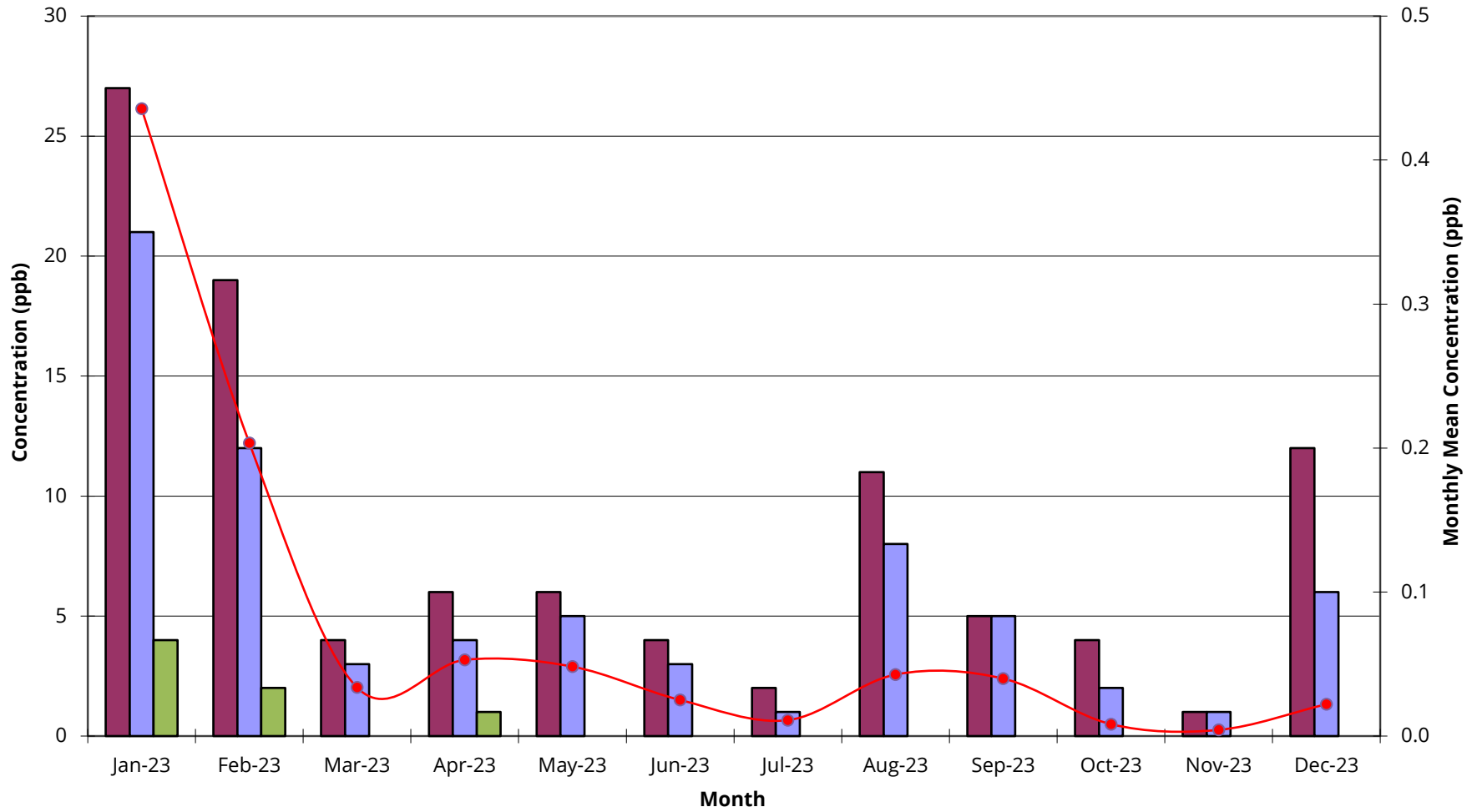
Notes:

- a - The rolling 10-minute maximum is the maximum 10-minute period averaged over every 5 minute interval.
- b - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
- c - The rolling half-hour maximum is the maximum half-hour period averaged over every 5 minute interval.
- d - The rolling 24-hour maximum is the maximum 24-hour period averaged over every 1 hour interval.
- e - Calculated using clock-based half-hour data.
- f - O. Reg. 419/05 P&P Technical Standard: 10-Minute TRS Concentration > 27 ppb (Phased in July 1, 2016)
- "-" - Not Applicable.

2023 TRS Annual Data Summary - MECP Stn ID 63500	Result
The maximum rolling 10-minute concentration was recorded on January 6.	27 ppb
The maximum rolling half-hour concentration was recorded on January 1, 5, and 6.	21 ppb
Maximum Rolling 24-hour Concentration	4 ppb
Annual Mean ^e Concentration	0.1 ppb
Number of 10-minute records greater than the 10-Minute Standard	0

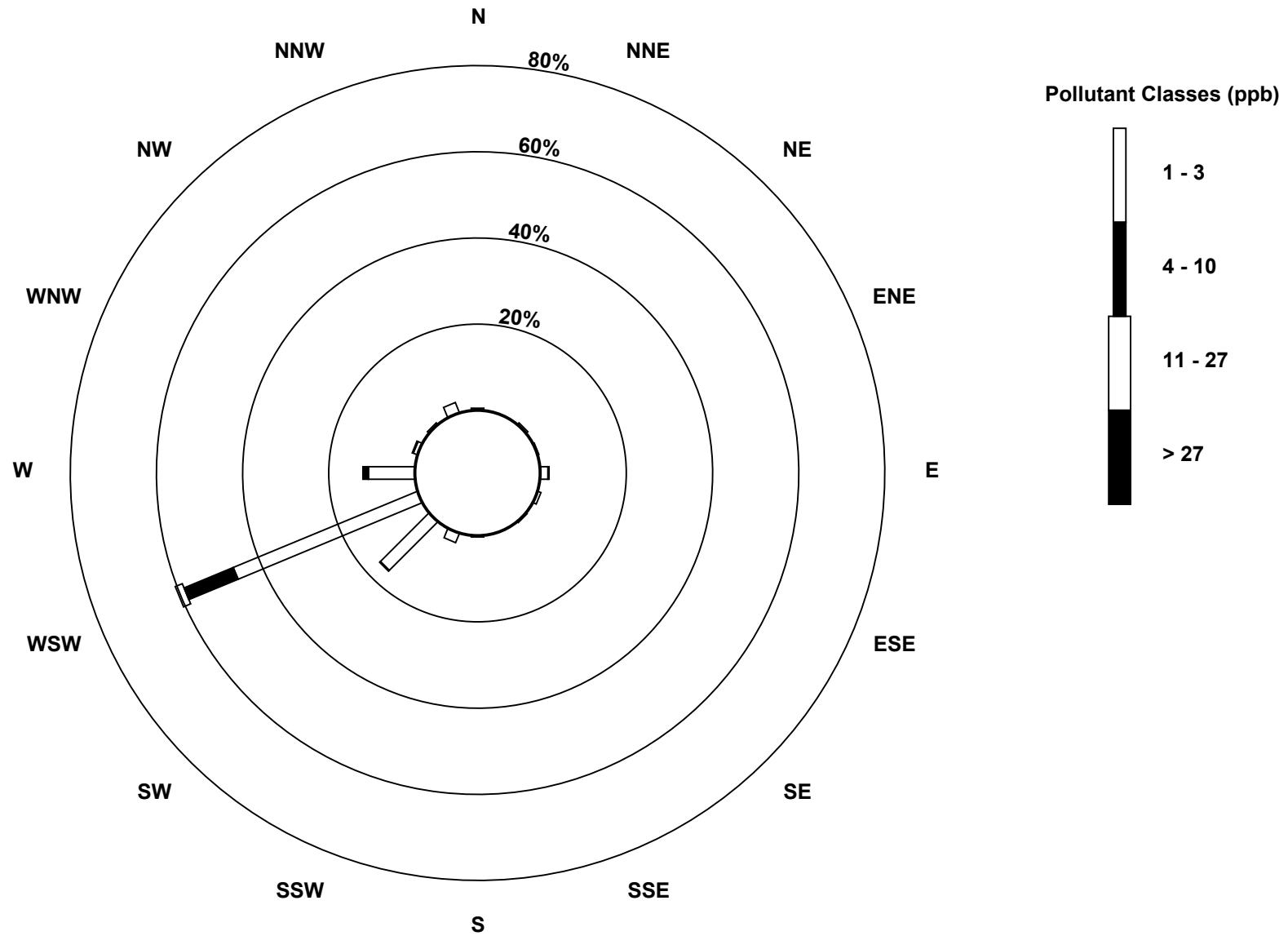
TRS
2023 Data Summary
Frederica Station - MECP ID 63500

Max Rolling 10-Minute Max Rolling Half-hour
Max Rolling 24-hour Monthly Mean



**Thunder Bay Pulp and Paper - Frederica (MECP ID: 63500)
Pollutant Rose**

**Total Reduced Sulphur (TRS) - ppb
Annual 2023**



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Wind Speed / Wind Direction (WS/WD) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	100.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1438	2	0	0	99.9	99.9		
3rd Quarter 2023	Jul	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1486	2	2	0	100.0	99.9	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1485	3	0	0	99.8	99.8		
	Total	17520	17520	17513	7	2	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

WS/WD Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	100.0

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
 Meteorological Monitoring - 2023 Annual Data Summary
 Wind Speed - Half-Hour Data Summary
 Frederica Station - MECP ID 63500**

Meteorological Monitoring - Wind Speed (km/h)

Month	Wind Speed (km/h)			Month	Wind Speed: Percent Frequency Distribution (%) per month						
	Maximum Half-Hour ^a Wind Speed	Maximum 24-Hour ^b Wind Speed	Average Monthly ^c Wind Speed		0 to 5 km/h	6 to 11 km/h	12 to 19 km/h	20 to 28 km/h	29 to 38 km/h	>38 km/h	Total (%)
Jan-23	18	10	6.4	Jan-23	38.4	56.3	5.4	0.0	0.0	0.0	100
Feb-23	19	12	7.0	Feb-23	42.5	41.5	16.0	0.0	0.0	0.0	100
Mar-23	19	13	7.4	Mar-23	35.7	46.1	18.2	0.0	0.0	0.0	100
Apr-23	30	18	8.7	Apr-23	29.8	44.3	22.2	3.5	0.1	0.0	100
May-23	21	15	7.7	May-23	35.7	43.4	20.6	0.3	0.0	0.0	100
Jun-23	17	9	6.0	Jun-23	47.2	48.5	4.4	0.0	0.0	0.0	100
Jul-23	16	6	4.6	Jul-23	66.7	30.8	2.5	0.0	0.0	0.0	100
Aug-23	16	9	5.1	Aug-23	60.3	36.4	3.4	0.0	0.0	0.0	100
Sep-23	16	11	5.4	Sep-23	55.9	38.2	5.9	0.0	0.0	0.0	100
Oct-23	21	12	5.5	Oct-23	53.5	42.7	3.6	0.2	0.0	0.0	100
Nov-23	21	12	6.9	Nov-23	41.3	44.3	14.3	0.1	0.0	0.0	100
Dec-23	19	13	6.1	Dec-23	49.9	38.8	11.3	0.0	0.0	0.0	100
Average (%)					46.4	42.6	10.6	0.4	0.0	0.0	

Wind Speed Annual Data Summary - MECP Stn ID 63500	Result
The maximum half-hour wind speed was recorded on April 5.	30 km/h
The maximum 24-hour wind speed was recorded on April 5.	18 km/h
Annual Mean Wind Speed ^c	6.4 km/h

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

**Thunder Bay Pulp and Paper
 Meteorological Monitoring - 2023 Annual Data Summary
 Wind Direction - Half-Hour Data Summary
 Frederica Station - MECP ID 63500**

Meteorological Monitoring - Wind Direction

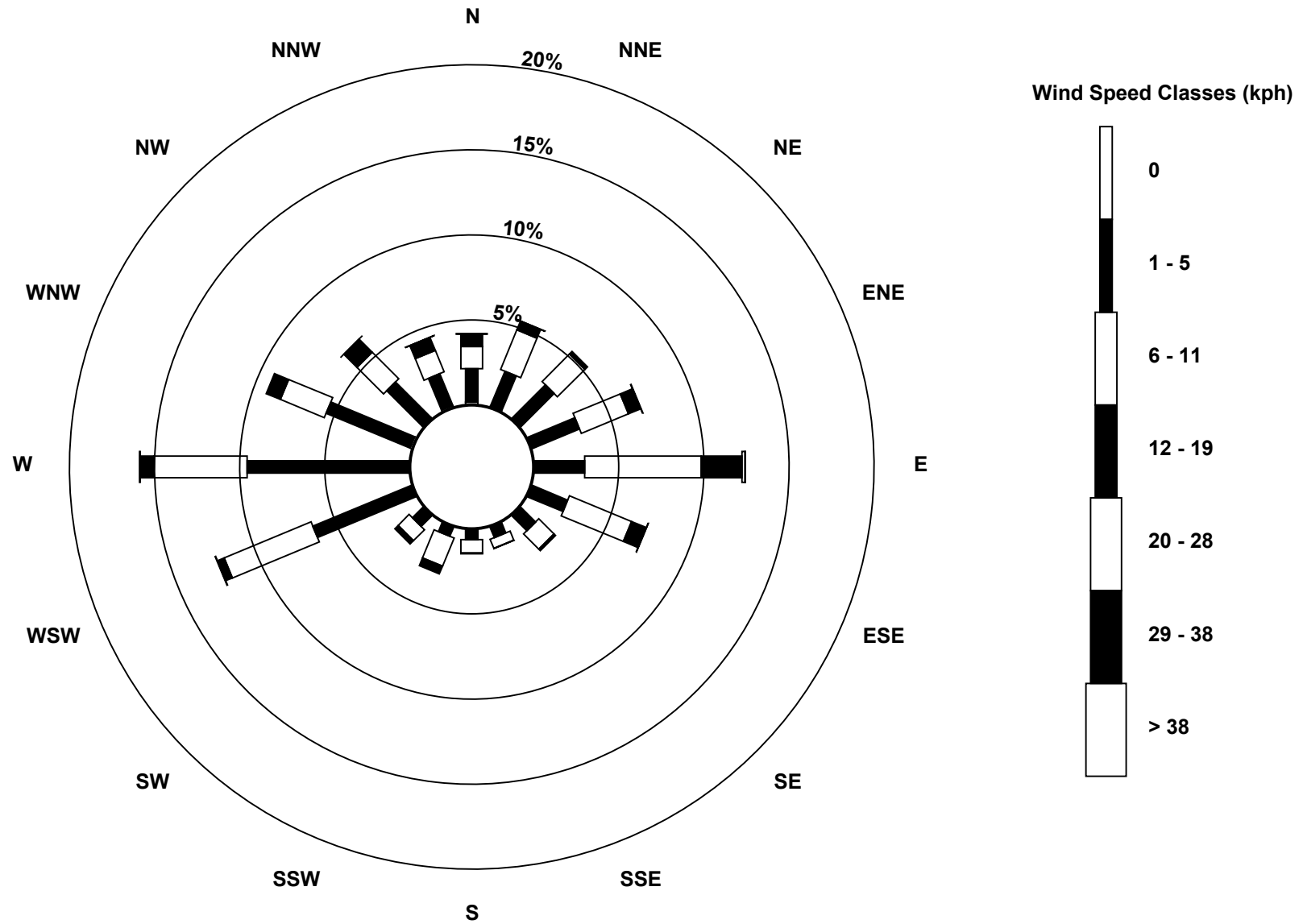
Month	Wind Direction: Percent Frequency Distribution (%)																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total (%)
Jan-23	0.3	0.3	7.4	9.4	7.9	4.0	2.4	2.7	2.9	2.8	1.6	17.1	21.3	16.0	4.0	0.1	100
Feb-23	3.2	3.7	5.6	4.2	4.6	4.1	1.1	0.7	1.0	1.4	2.3	13.4	22.4	17.9	8.3	6.3	100
Mar-23	5.6	6.9	8.0	11.2	11.4	7.7	1.5	0.7	1.1	3.1	1.7	11.5	15.1	7.5	4.1	3.1	100
Apr-23	11.0	9.3	5.7	7.2	17.4	7.1	2.9	1.1	1.1	3.0	1.9	7.8	9.1	5.1	4.3	6.0	100
May-23	3.6	2.5	6.3	9.9	28.2	14.6	3.9	1.0	0.8	1.8	0.5	5.2	8.5	5.5	3.4	4.3	100
Jun-23	4.5	7.9	5.4	9.1	22.9	13.9	3.3	1.0	0.9	2.2	1.3	11.6	9.9	3.2	1.7	1.3	100
Jul-23	2.8	3.2	3.9	5.4	6.7	6.5	3.4	1.8	2.0	6.1	4.9	15.4	17.1	8.9	8.9	3.0	100
Aug-23	3.0	4.0	3.0	4.4	10.1	6.1	2.4	1.3	1.3	4.0	3.2	17.5	20.7	8.1	7.5	3.4	100
Sep-23	3.3	7.6	5.5	7.1	20.4	11.3	3.2	1.2	1.9	3.9	3.1	10.0	10.1	5.8	3.1	2.6	100
Oct-23	6.3	9.6	6.3	4.8	5.5	2.0	1.5	0.5	0.7	3.1	2.6	13.5	15.9	9.1	9.2	9.6	100
Nov-23	2.8	3.8	1.8	1.5	2.6	3.8	2.6	1.6	1.9	1.7	1.6	14.2	26.8	14.6	13.5	5.4	100
Dec-23	4.0	6.2	5.1	8.0	11.3	5.5	3.9	1.8	1.9	1.6	0.9	10.6	14.2	8.9	8.8	7.3	100
Annual Average (%)	4.2	5.4	5.3	6.8	12.4	7.2	2.7	1.3	1.5	2.9	2.1	12.3	15.9	9.2	6.4	4.4	

Wind Direction Annual Data Summary - MECP Stn ID 63500

The Prevailing Wind Direction was from the West (15.9% of the time)

Thunder Bay Pulp and Paper - Frederica (MECP ID: 63500)
Wind Rose

Wind Speed (WS) - kph
Annual 2023



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Ambient Temperature (ET) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	100.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1438	2	0	0	99.9	99.9		
3rd Quarter 2023	Jul	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1488	0	0	0	100.0	100.0	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1485	3	0	0	99.8	99.8		
	Total	17520	17520	17515	5	0	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

ET Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	100.0

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
2023 Annual Data Summary
Ambient Temperature (ET) - Data Summary
Frederica Station - MECP ID 63500**

Ambient Temperature (°C)

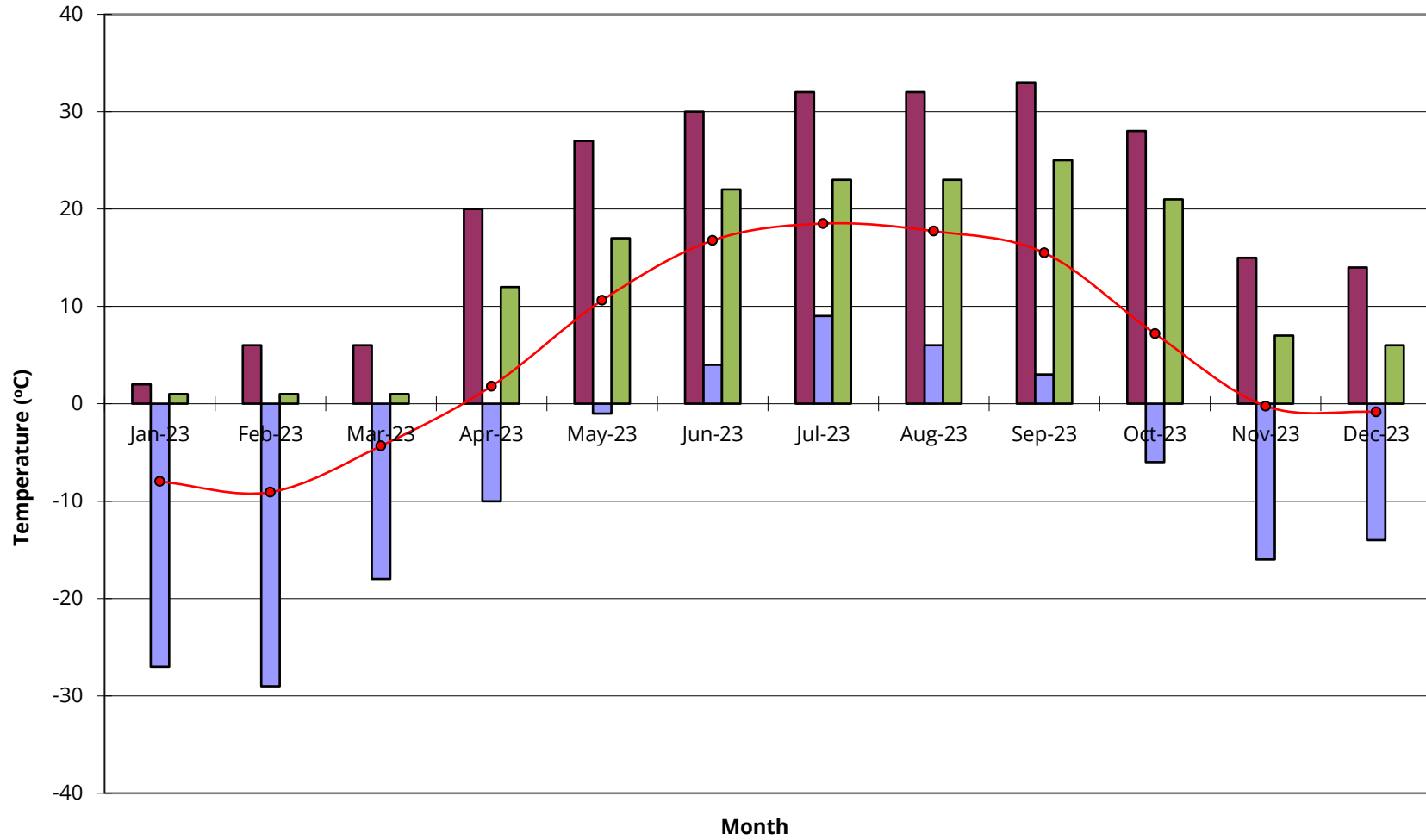
Month	Maximum Half-Hour ^a Record	Minimum Half-Hour ^a Record	Maximum 24-Hour ^b Record	Monthly Mean ^c
Jan-23	2	-27	1	-8.0
Feb-23	6	-29	1	-9.1
Mar-23	6	-18	1	-4.3
Apr-23	20	-10	12	1.8
May-23	27	-1	17	10.6
Jun-23	30	4	22	16.8
Jul-23	32	9	23	18.5
Aug-23	32	6	23	17.7
Sep-23	33	3	25	15.5
Oct-23	28	-6	21	7.2
Nov-23	15	-16	7	-0.2
Dec-23	14	-14	6	-0.8

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

ET Annual Data Summary - MECP Stn ID 63500	Result
The maximum half-hour value was recorded on September 2.	33 °C
The minimum half-hour value was recorded on February 3.	-29 °C
The maximum 24-hour value was recorded on September 2 and 3.	25 °C
Annual Mean ^c	5.6 °C

**Ambient Temperature
2023 Data Summary
Frederica Station (MECP ID 63500)**

Max Half-hour Min Half-hour
Max 24-hour Monthly Mean



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Relative Humidity (RH) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	100.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1438	2	0	0	99.9	99.9		
3rd Quarter 2023	Jul	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1488	0	0	0	100.0	100.0	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1485	3	0	0	99.8	99.8		
	Total	17520	17520	17515	5	0	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

RH Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	100.0

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
2023 Annual Data Summary
Relative Humidity (RH) - Data Summary
Frederica Station - MECP ID 63500**

Relative Humidity (%)

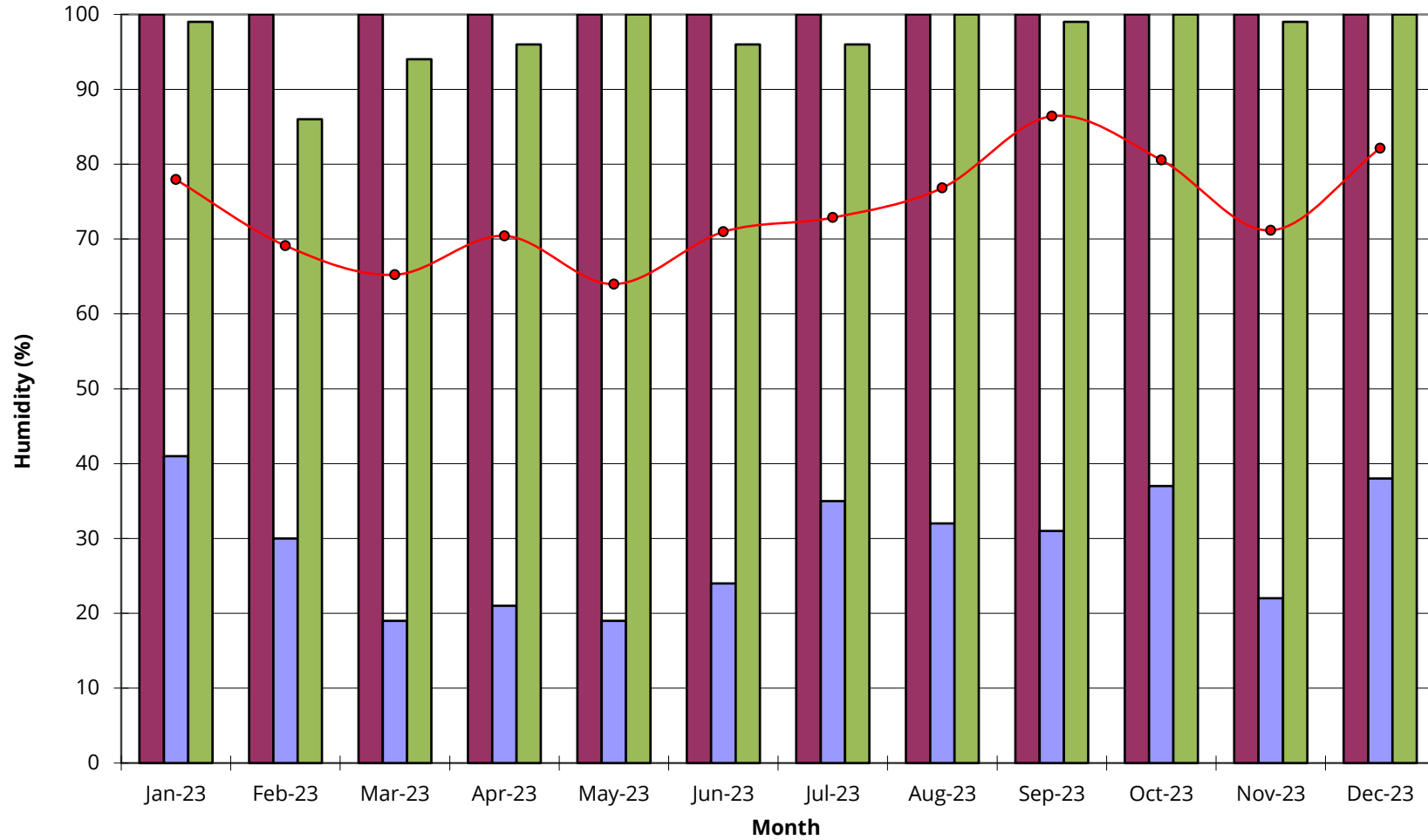
Month	Maximum Half-Hour ^a Record	Minimum Half-Hour ^a Record	Maximum 24-Hour ^b Record	Monthly Mean ^c
Jan-23	100	41	99	77.9
Feb-23	100	30	86	69.1
Mar-23	100	19	94	65.2
Apr-23	100	21	96	70.4
May-23	100	19	100	64.0
Jun-23	100	24	96	71.0
Jul-23	100	35	96	72.9
Aug-23	100	32	100	76.8
Sep-23	100	31	99	86.4
Oct-23	100	37	100	80.6
Nov-23	100	22	99	71.2
Dec-23	100	38	100	82.1

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

RH Annual Data Summary - MECP Stn ID 63500	Result
The maximum half-hour value was recorded throughout the year.	100%
The minimum half-hour value was recorded in March.	19%
The maximum 24-hour value was recorded in May, August, and December.	100%
Annual Mean ^c	74.0%

**Relative Humidity
2023 Data Summary
Frederica Station (MECP ID 63500)**

Max Half-hour Min Half-hour
Max 24-hour Monthly Mean



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Incoming Solar Radiation (GR) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	100.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1438	2	0	0	99.9	99.9		
3rd Quarter 2023	Jul	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1488	0	0	0	100.0	100.0	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1485	3	0	0	99.8	99.8		
	Total	17520	17520	17515	5	0	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

GR Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	100.0

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
2023 Annual Data Summary
Incoming Solar Radiation (GR) - Data Summary
Frederica Station - MECP ID 63500**

Global Radiation (W/m²)

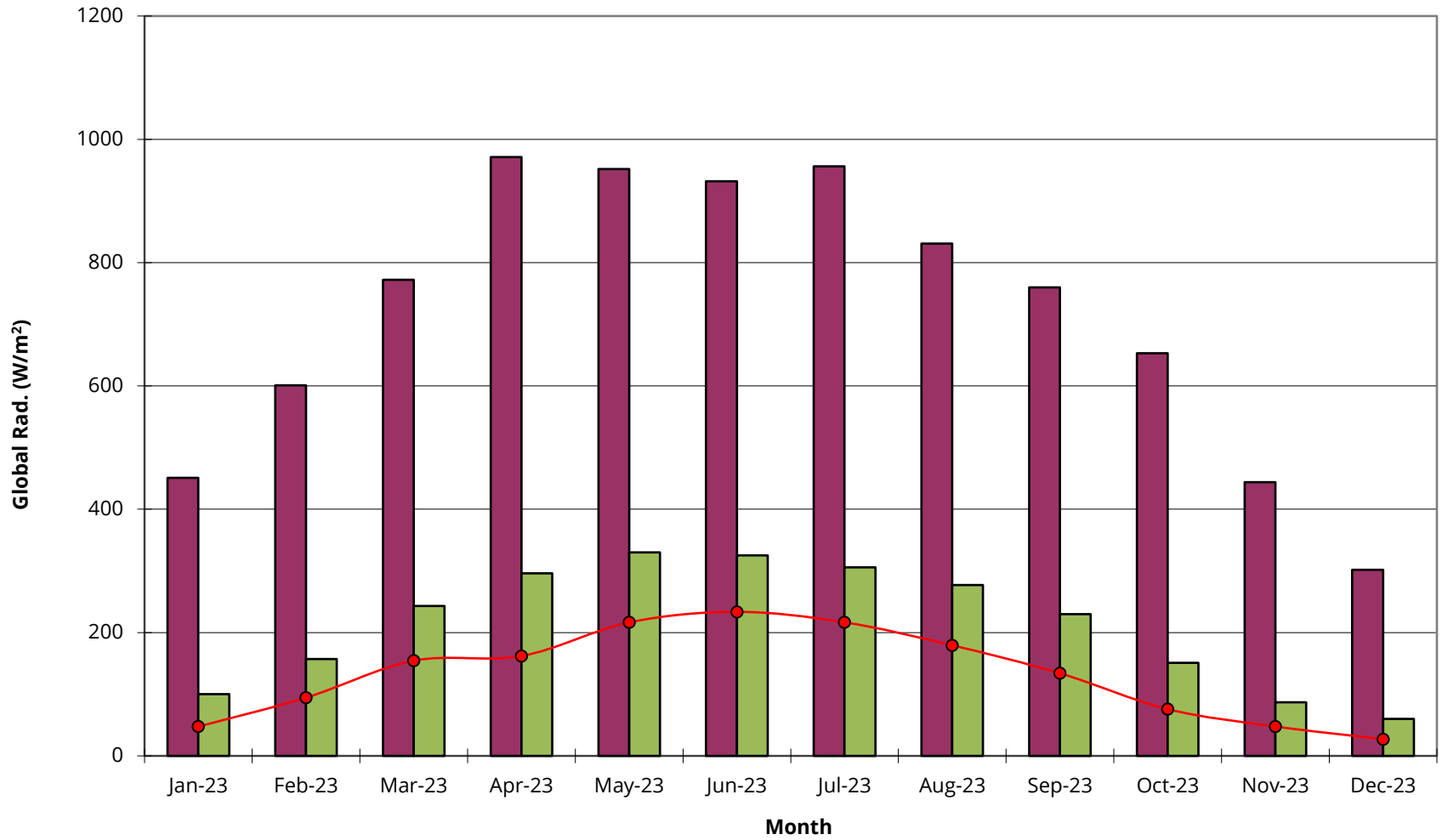
Month	Maximum Half-Hour ^a Record	Maximum 24-Hour ^b Record	Monthly Mean ^c
Jan-23	451	100	47.5
Feb-23	601	157	94.5
Mar-23	772	243	154.4
Apr-23	971	296	162.0
May-23	952	330	216.5
Jun-23	932	325	233.6
Jul-23	956	306	216.6
Aug-23	831	277	179.3
Sep-23	760	230	134.0
Oct-23	653	151	75.9
Nov-23	444	87	47.7
Dec-23	302	60	27.1

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

GR Annual Data Summary - MECP Stn ID 63500	Result
The maximum half-hour value was recorded on April 24.	971 W/m ²
The maximum 24-hour value was recorded on May 25.	330 W/m ²
Annual Mean ^c	132.6 W/m ²

Incoming Solar Radiation
2023 Data Summary
Frederica Station (MECP ID 63500)

Max Half-hour Max 24-hour Monthly Mean



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Barometric Pressure (BP) - Operational/Valid Data Summary
Frederica Station - MECP ID 63500

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	100.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1438	2	0	0	99.9	99.9		
3rd Quarter 2023	Jul	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1488	0	0	0	100.0	100.0	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1485	3	0	0	99.8	99.8		
	Total	17520	17520	17515	5	0	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

BP Annual Operational/Valid Data Summary - MECP Stn ID 63500	
Annual % Valid Data	100.0

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
2023 Annual Data Summary
Barometric Pressure (BP) - Data Summary
Frederica Station - MECP ID 63500**

Barometric Pressure (mmHg)

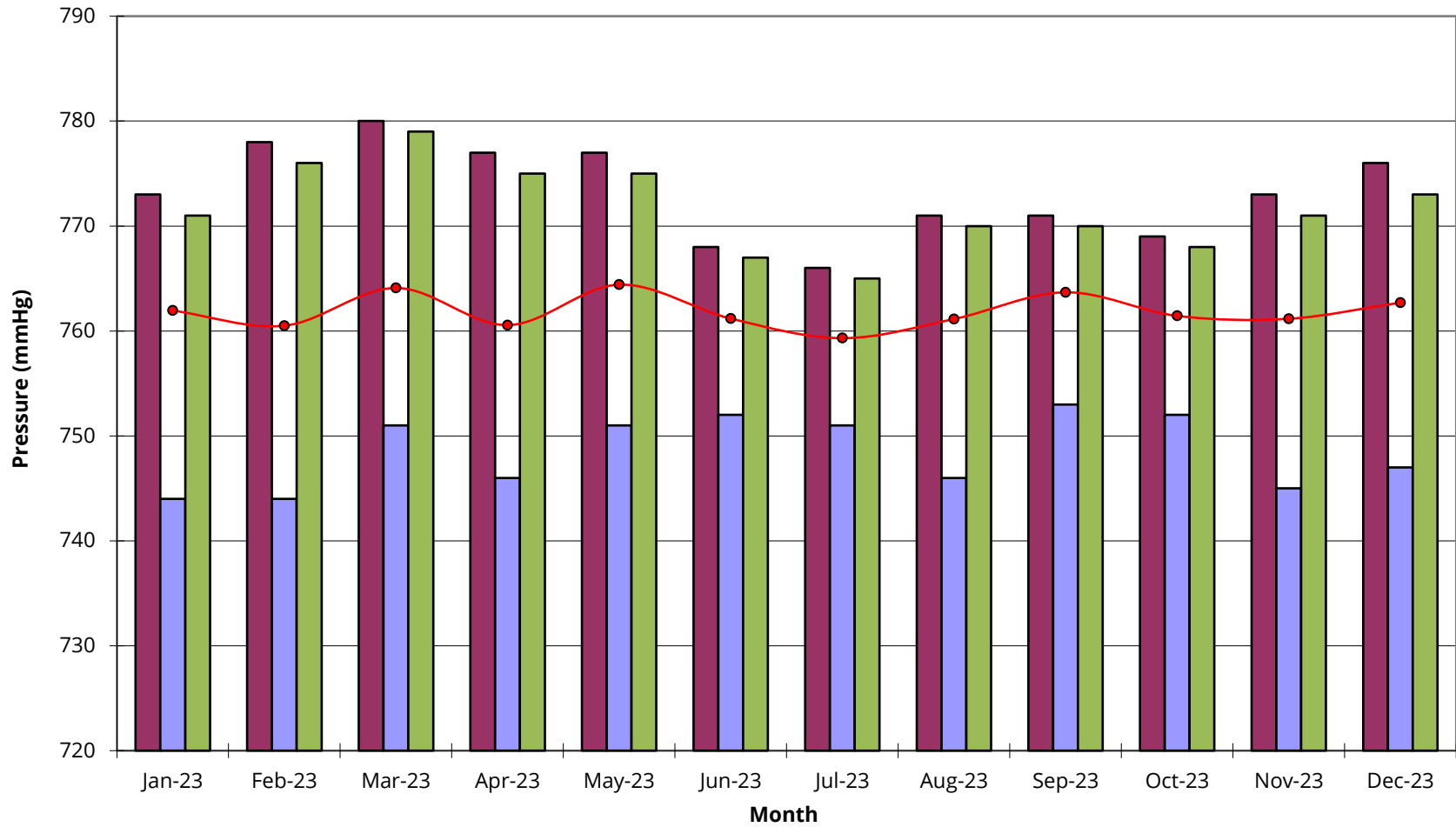
Month	Maximum Half-Hour ^a Record	Minimum Half-Hour ^a Record	Maximum 24-Hour ^b Record	Monthly Mean ^c
Jan-23	773	744	771	761.9
Feb-23	778	744	776	760.5
Mar-23	780	751	779	764.1
Apr-23	777	746	775	760.6
May-23	777	751	775	764.4
Jun-23	768	752	767	761.2
Jul-23	766	751	765	759.3
Aug-23	771	746	770	761.1
Sep-23	771	753	770	763.7
Oct-23	769	752	768	761.4
Nov-23	773	745	771	761.2
Dec-23	776	747	773	762.7

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

BP Annual Data Summary - MECP Stn ID 63500	Result
The maximum half-hour value was recorded in March.	780 mmHg
The minimum half-hour value was recorded in January and February.	744 mmHg
The maximum 24-hour value was recorded in March.	779 mmHg
Annual Mean ^c	761.9 mmHg

**Barometric Pressure
2023 Data Summary
Frederica Station (MECP ID 63500)**

Max Half-hour Min Half-hour
Max 24-hour Monthly Mean



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APPENDIX C

**Thunder Bay Pulp and Paper
2023 Annual Summary
Missing Data Summary - Half-Hour Summary
Continuous Parameters
Bailey Station - MECP ID 63510**

Station	Parameter	Calibration	Rate of Change	Offline	Power Failure	Negative Over Range	Positive Over Range	Bad Condition	Total Half-Hours Of Missing Data
Bailey	TRS	428	0	221	9	0	0	0	658
	WS/WD	2	0	85	0	0	0	0	87

Bailey station significant data loss summary:

TRS:

The TRS analyzer experienced 658 half-hours of lost data during 2023. A total of 428 half-hours were flagged for calibrations; 360 half-hours were flagged for daily zero/span checks, and the remainder of half-hours flagged for calibrations were towards routine monthly calibrations and the MECP's quarterly audits. 9 half-hours of data were flagged due to power failures and 221 half-hours of data were flagged as offline due to TRS analyzer maintenance.

Wind:

The wind data experienced 89 half-hours of lost data in 2023. A total of 87 half-hours were flagged offline as a result of data logger software issues and 2 half-hours were flagged as calibration.

Thunder Bay Pulp and Paper
Continuous Sampling - 2023 Annual Data Summary
Total Reduced Sulphur (TRS) - Operational/Valid Data Summary
Bailey Station - MECP ID 63510

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1450	38	37	0	99.9	97.4	97.6%	YES
	Feb	1344	1344	1312	32	32	0	100.0	97.6		
	Mar	1488	1488	1453	35	35	0	100.0	97.6		
2nd Quarter 2023	Apr	1440	1440	1402	38	35	1	99.9	97.4	95.6%	YES
	May	1488	1488	1450	38	35	0	99.8	97.4		
	Jun	1440	1440	1322	118	32	2	94.2	91.8		
3rd Quarter 2023	Jul	1488	1488	1444	44	37	0	99.5	97.0	94.7%	YES
	Aug	1488	1488	1450	38	37	0	99.9	97.4		
	Sep	1440	1440	1290	150	31	0	91.7	89.6		
4th Quarter 2023	Oct	1488	1488	1439	49	38	0	99.3	96.7	97.1%	YES
	Nov	1440	1440	1405	35	34	1	100.0	97.6		
	Dec	1488	1488	1445	43	41	0	99.9	97.1		
	Total	17520	17520	16862	658	424	4				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

TRS Annual Operational/Valid Data Summary - MECP Stn ID 63510	
Annual % Valid Data	96.2

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

Thunder Bay Pulp and Paper
Continuous Sampling - 2023 Annual Data Summary
Total Reduced Sulphur (TRS) - Data Summary
Bailey Station - MECP ID 63510

Continuous Ambient Monitoring - TRS (ppb)

Month	Maximum Rolling 10-Minute ^a Concentration	Maximum Clock-based Half-Hour ^b Concentration	Maximum Rolling Half-Hour ^c Concentration	Maximum Rolling 24-Hour ^d Concentration	Monthly Mean ^e	No. of Readings > 10-Minute Standard ^f
Jan-23	18	15	17	5	0.6	0
Feb-23	8	8	8	2	0.5	0
Mar-23	5	5	5	1	0.3	0
Apr-23	8	8	8	2	0.2	0
May-23	4	3	3	1	0.2	0
Jun-23	4	4	4	1	0.3	0
Jul-23	5	3	3	1	0.2	0
Aug-23	5	5	5	1	0.3	0
Sep-23	5	5	5	2	0.2	0
Oct-23	3	3	3	2	0.3	0
Nov-23	4	2	3	1	0.1	0
Dec-23	6	4	5	1	0.1	0

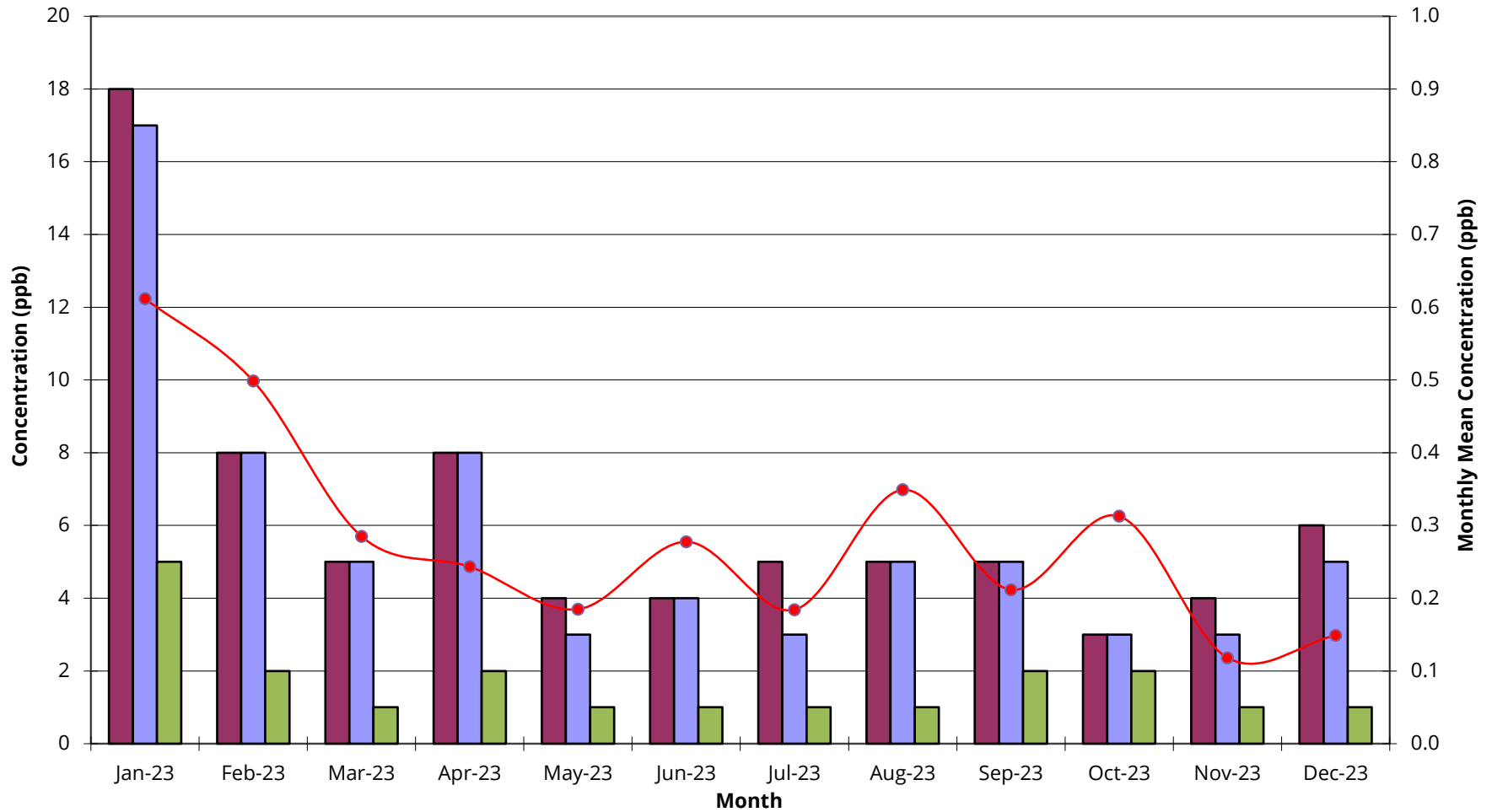
Notes:

- a - The rolling 10-minute maximum is the maximum 10-minute period averaged over every 5 minute interval.
- b - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
- c - The rolling half-hour maximum is the maximum half-hour period averaged over every 5 minute interval.
- d - The rolling 24-hour maximum is the maximum 24-hour period averaged over every 1 hour interval.
- e - Calculated using clock-based half-hour data.
- f - O. Reg. 419/05 P&P Technical Standard: 10-Minute TRS Concentration > 27 ppb (Phased in July 1, 2016)
- "-" - Not Applicable.

2023 TRS Annual Data Summary - MECP Stn ID 63510	Result
The maximum rolling 10-minute concentration was recorded on January 7.	18 ppb
The maximum rolling half-hour concentration was recorded on January 7.	17 ppb
Maximum Rolling 24-hour Concentration	5 ppb
Annual Mean ^e Concentration	0.3 ppb
Number of 10-minute records greater than the 10-Minute Standard	0

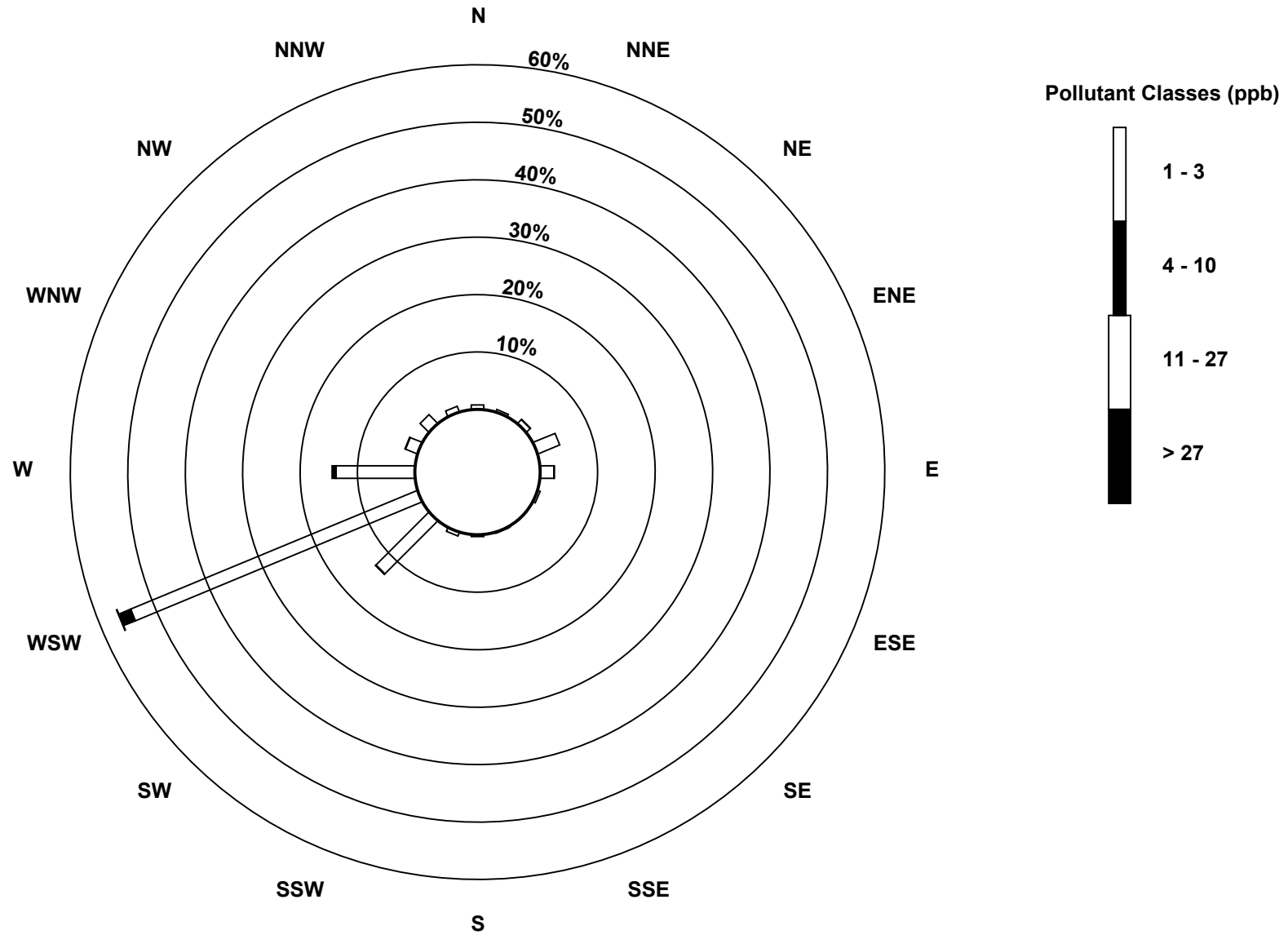
TRS
2023 Data Summary
Bailey Station - MECP ID 63510

Max Rolling 10-Minute Max Rolling Half Hour
Max Rolling 24-hour Monthly Mean



**Thunder Bay Pulp and Paper - Bailey (MECP ID: 63510)
Pollutant Rose**

**Total Reduced Sulphur (TRS) - ppb
Annual 2023**



Thunder Bay Pulp and Paper
Meteorological Monitoring - 2023 Annual Data Summary
Wind Speed / Wind Direction (WS/WD) - Operational/Valid Data Summary
Bailey Station - MECP ID 63510

	Month	Number of ¹ Half-Hours in Month	¹ Half-Hours Station In-Service	¹ Half-Hours of Valid Data Collected	^{1,2} Half-Hours of Missing Data	¹ Half-Hours of Calibration	¹ Half-Hours of MECP Audit	% Operational Uptime	% Valid Data	Valid Data Collected Quarterly	³ Quarterly Valid Data Target Met?
1st Quarter 2023	Jan	1488	1488	1488	0	0	0	100.0	100.0	100.0%	YES
	Feb	1344	1344	1344	0	0	0	100.0	100.0		
	Mar	1488	1488	1488	0	0	0	100.0	100.0		
2nd Quarter 2023	Apr	1440	1440	1440	0	0	0	100.0	100.0	99.0%	YES
	May	1488	1488	1488	0	0	0	100.0	100.0		
	Jun	1440	1440	1397	43	0	0	97.0	97.0		
3rd Quarter 2023	Jul	1488	1488	1448	40	0	0	97.3	97.3	99.1%	YES
	Aug	1488	1488	1488	0	0	0	100.0	100.0		
	Sep	1440	1440	1440	0	0	0	100.0	100.0		
4th Quarter 2023	Oct	1488	1488	1486	2	2	0	100.0	99.9	99.9%	YES
	Nov	1440	1440	1440	0	0	0	100.0	100.0		
	Dec	1488	1488	1486	2	0	0	99.9	99.9		
	Total	17520	17520	17433	87	2	0				

- Notes:**
- ¹ - Half-Hour refers to clock-based half-hour data.
 - ² - Half-Hours of Missing Data includes all flagged half-hour records; included are calibration and MECP audit half-hour records.
 - ³ - The Quarterly Valid Data Target for Continuous Monitors set by the MECP is a minimum of 90% valid data collection per quarter per parameter.

WS/WD Annual Operational/Valid Data Summary - MECP Stn ID 63510	
Annual % Valid Data	99.5

% Operational Uptime: Amount of time per month the analyzer/sensor operates properly. Operational Uptime considers audits and/or calibrations as a period of time in which the analyzer/sensor is operational.

% Valid Data: Amount of time per month the analyzer/sensor outputs a valid data record. Data cannot be considered valid during audits and/or calibrations.

**Thunder Bay Pulp and Paper
 Meteorological Monitoring - 2023 Annual Data Summary
 Wind Speed - Half-Hour Data Summary
 Bailey Station - MECP ID 63510**

Meteorological Monitoring - Wind Speed (km/h)

Month	Wind Speed (km/h)			Month	Wind Speed: Percent Frequency Distribution (%) per month						
	Maximum Half-Hour ^a Wind Speed	Maximum 24-Hour ^b Wind Speed	Average Monthly ^c Wind Speed		0 to 5 km/h	6 to 11 km/h	12 to 19 km/h	20 to 28 km/h	29 to 38 km/h	>38 km/h	Total (%)
Jan-23	17	10	6.7	Jan-23	34.7	58.1	7.1	0.0	0.0	0.0	100.0
Feb-23	19	12	7.3	Feb-23	36.6	48.7	14.7	0.0	0.0	0.0	100.0
Mar-23	18	12	7.1	Mar-23	35.5	53.3	11.2	0.0	0.0	0.0	100.0
Apr-23	25	16	8.0	Apr-23	32.5	47.9	18.5	1.2	0.0	0.0	100.0
May-23	21	14	6.6	May-23	41.0	49.0	9.9	0.1	0.0	0.0	100.0
Jun-23	13	7	4.7	Jun-23	63.7	35.9	0.4	0.0	0.0	0.0	100.0
Jul-23	19	7	4.3	Jul-23	71.3	26.9	1.8	0.0	0.0	0.0	100.0
Aug-23	15	8	4.7	Aug-23	61.8	37.2	0.9	0.0	0.0	0.0	100.0
Sep-23	14	8	4.2	Sep-23	72.2	26.7	1.0	0.0	0.0	0.0	100.0
Oct-23	21	12	5.3	Oct-23	55.5	41.7	2.8	0.1	0.0	0.0	100.0
Nov-23	21	13	7.6	Nov-23	34.9	46.4	18.6	0.1	0.0	0.0	100.0
Dec-23	23	13	6.1	Dec-23	48.5	41.9	9.2	0.5	0.0	0.0	100.0
				Average (%)	49.0	42.8	8.0	0.2	0.0	0.0	

Wind Speed Annual Data Summary - MECP Stn ID 63510	Result
The maximum half-hour wind speed was recorded on April 5.	25 km/h
The maximum 24-hour wind speed was recorded on April 5.	16 km/h
Annual Mean Wind Speed ^c	6.1 km/h

- Notes:**
- ^a - Half-Hour refers to clock-based half-hour data.
 - ^b - 24-Hour refers to daily averages from midnight to midnight.
 - ^c - Calculated using clock-based half-hour data.

**Thunder Bay Pulp and Paper
 Meteorological Monitoring - 2023 Annual Data Summary
 Wind Direction - Half-Hour Data Summary
 Bailey Station - MECP ID 63510**

Meteorological Monitoring - Wind Direction

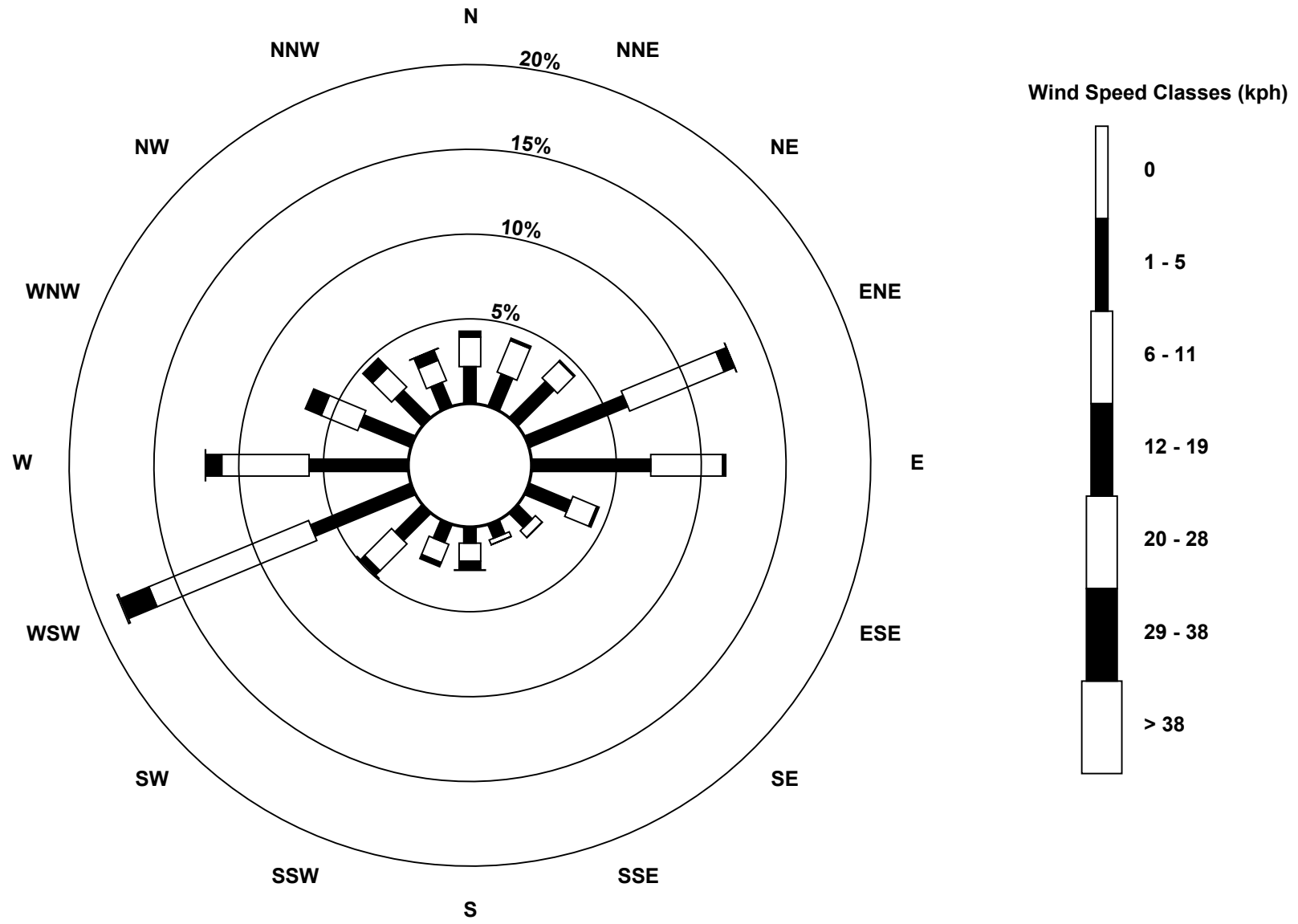
Month	Wind Direction: Percent Frequency Distribution (%)																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total (%)
Jan-23	0.3	0.2	4.4	11.6	5.5	3.0	3.1	2.2	3.0	2.2	4.5	28.5	15.7	11.1	4.5	0.4	100
Feb-23	3.4	4.4	2.9	6.5	4.5	2.3	1.3	0.5	1.0	2.1	5.7	23.0	21.1	10.3	7.4	3.8	100
Mar-23	6.1	6.0	7.3	16.6	10.1	3.9	1.1	0.3	2.1	3.2	4.0	19.3	8.9	5.3	2.3	3.7	100
Apr-23	9.4	4.7	4.2	19.3	12.4	4.2	1.0	1.2	1.9	2.1	3.8	12.3	6.9	4.3	4.5	7.9	100
May-23	2.0	3.0	5.0	26.7	21.2	7.7	2.7	0.8	1.9	1.2	3.1	6.5	7.2	3.6	3.6	3.9	100
Jun-23	4.2	6.5	4.5	19.8	23.8	6.4	1.0	1.4	2.2	2.0	4.0	11.8	6.3	1.6	1.4	3.0	100
Jul-23	3.3	2.5	4.2	7.7	11.1	4.5	2.9	1.8	5.4	4.6	6.3	19.8	11.5	7.9	4.6	1.9	100
Aug-23	3.2	3.3	2.8	9.5	10.7	3.2	1.3	1.1	3.6	3.6	5.3	23.1	17.3	4.8	4.5	2.7	100
Sep-23	5.1	5.9	5.4	15.4	20.7	6.2	1.7	1.6	3.4	3.8	5.0	12.0	7.8	2.5	2.0	1.5	100
Oct-23	8.1	6.2	5.8	7.3	4.7	2.0	0.4	0.7	2.7	2.5	6.8	20.5	12.5	5.7	7.9	6.3	100
Nov-23	2.3	3.4	1.1	2.7	3.3	4.5	1.9	0.9	1.9	2.7	5.2	27.6	19.0	14.5	6.0	2.8	100
Dec-23	4.2	5.0	6.1	12.5	9.5	4.3	2.6	1.5	1.6	0.9	5.0	17.9	10.1	7.9	7.3	3.8	100
Annual Average (%)	4.3	4.2	4.5	13.0	11.5	4.3	1.7	1.2	2.5	2.6	4.9	18.5	12.0	6.6	4.7	3.5	

Wind Direction Annual Data Summary - MECP Stn ID 63510

The Prevailing Wind Direction was from the West-Southwest (18.5% of the time)

Thunder Bay Pulp and Paper - Bailey (MECP ID: 63510)
Wind Rose

Wind Speed (WS) - kph
Annual 2023



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APPENDIX D

**Thunder Bay Pulp and Paper
2023 Annual Downtime Summary
Total Suspended Particulate (TSP) Matter**

MECP Stn ID 63500 - Frederica Street Station (Stn #1)

MECP Stn ID 63510 - Bailey Station (Stn #2)

DOWNTIME AND FLAG SUMMARY

Date	Location Name	Notes/Description/Action Taken
6-Apr-23	Frederica Station	<i>Edges of filter frayed/torn and loose filter material</i>
3-Oct-23	Frederica Station	<i>Loose filter material</i>
3-Oct-23	Bailey Station	<i>Motor failed. Action Taken - Replaced motor</i>
15-Oct-23	Frederica Station	<i>Filter torn</i>
27-Oct-23	Bailey Station	<i>Filter torn</i>
20-Nov-23	Frederica Station	<i>Loose filter material</i>
20-Nov-23	Bailey Station	<i>Filter torn</i>
14-Dec-23	Bailey Station	<i>Loose filter material</i>
26-Dec-23	Bailey Station	<i>Filter torn</i>

Thunder Bay Pulp and Paper

2023 Annual Summary

Total Suspended Particulate (TSP) Matter

Frederica Station (MECP ID 63500) & Bailey Station (MECP ID 63510)

	Date	MECP ID 63500	MECP ID 63510		MECP ID 63500	MECP ID 63510	
		Frederica TSP (µg/m ³)	Bailey TSP (µg/m ³)		Frederica TSP (µg/m ³)	Bailey TSP (µg/m ³)	
First Quarter 2023	6-Jan-23	14.0	14.1	Third Quarter 2023	5-Jul-23	55.6	31.6
	12-Jan-23	6.5	4.1		11-Jul-23	86.4	62.5
	18-Jan-23	4.3	4.1		17-Jul-23	55.8	21.7
	24-Jan-23	1.5	5.1		23-Jul-23	45.6	37.4
	30-Jan-23	11.0	16.3		29-Jul-23	51.3	32.0
	5-Feb-23	11.9	11.4		4-Aug-23	62.0	83.4
	11-Feb-23	25.2	15.4		10-Aug-23	61.4	18.3
	17-Feb-23	17.5	20.2		16-Aug-23	80.1	78.8
	23-Feb-23	34.8	41.0		22-Aug-23	24.2	28.4
	1-Mar-23	38.9	63.2		28-Aug-23	49.1	45.3
	7-Mar-23	18.1	31.5		3-Sep-23	71.0	67.9
	13-Mar-23	42.6	53.8		9-Sep-23	23.3	33.2
	19-Mar-23	12.2	11.3		15-Sep-23	20.0	24.5
	25-Mar-23	28.1	34.7		21-Sep-23	45.7	54.7
	31-Mar-23	47.4	57.7		27-Sep-23	38.9	42.4

	Date	MECP ID 63500	MECP ID 63510		MECP ID 63500	MECP ID 63510	
		Frederica TSP (µg/m ³)	Bailey TSP (µg/m ³)		Frederica TSP (µg/m ³)	Bailey TSP (µg/m ³)	
Second Quarter 2023	6-Apr-23	9.7	35.1	Fourth Quarter 2023	3-Oct-23	47.8	NS
	12-Apr-23	108.6	129.4		9-Oct-23	3.0	3.1
	18-Apr-23	28.5	19.7		15-Oct-23	11.2	9.1
	24-Apr-23	58.5	49.2		21-Oct-23	13.6	13.4
	30-Apr-23	10.9	10.5		27-Oct-23	3.0	4.3
	6-May-23	13.5	13.0		2-Nov-23	28.8	39.0
	12-May-23	84.0	115.0		8-Nov-23	5.7	6.7
	18-May-23	64.9	69.5		14-Nov-23	51.5	59.1
	24-May-23	25.0	29.2		20-Nov-23	32.5	52.8
	30-May-23	114.3	107.4		26-Nov-23	19.3	35.9
	5-Jun-23	63.0	69.3		2-Dec-23	41.7	46.9
	11-Jun-23	34.1	38.8		8-Dec-23	19.1	20.3
	17-Jun-23	52.0	64.5		14-Dec-23	32.9	52.6
	23-Jun-23	109.8	107.7		20-Dec-23	24.3	34.1
	29-Jun-23	58.0	53.2		26-Dec-23	2.9	3.0

Notes:

NS - No Sample / Invalid Sample

Highlighted Results - Calculated using half of Bureau Veritas's reportable detection limit of 5.0mg, average flow rate, and length of sample.

Highlighted Results - Bureau Veritas attached comment based on condition of filter.

Frederica Station - MECP ID 63500	
Annual Geometric Mean	26.3
Annual Geometric Mean > AAQC	No
Max (µg/m ³)	114.3
Min (µg/m ³)	1.5
No. of Samples >24hr. AAQC	0
No. of possible samples	60
No. of valid samples	60
Valid Samples (%)	100.0

Ambient Air Quality Criteria (AAQC):

24hr. AAQC: 120 µg/m³

Annual Geometric Mean AAQC: 60 µg/m³

Bailey Station - MECP ID 63510	
Annual Geometric Mean	28.0
Annual Geometric Mean > AAQC	No
Max (µg/m ³)	129.4
Min (µg/m ³)	3.0
No. of Samples >24hr. AAQC	1
No. of possible samples	60
No. of valid samples	59
Valid Samples (%)	98.3

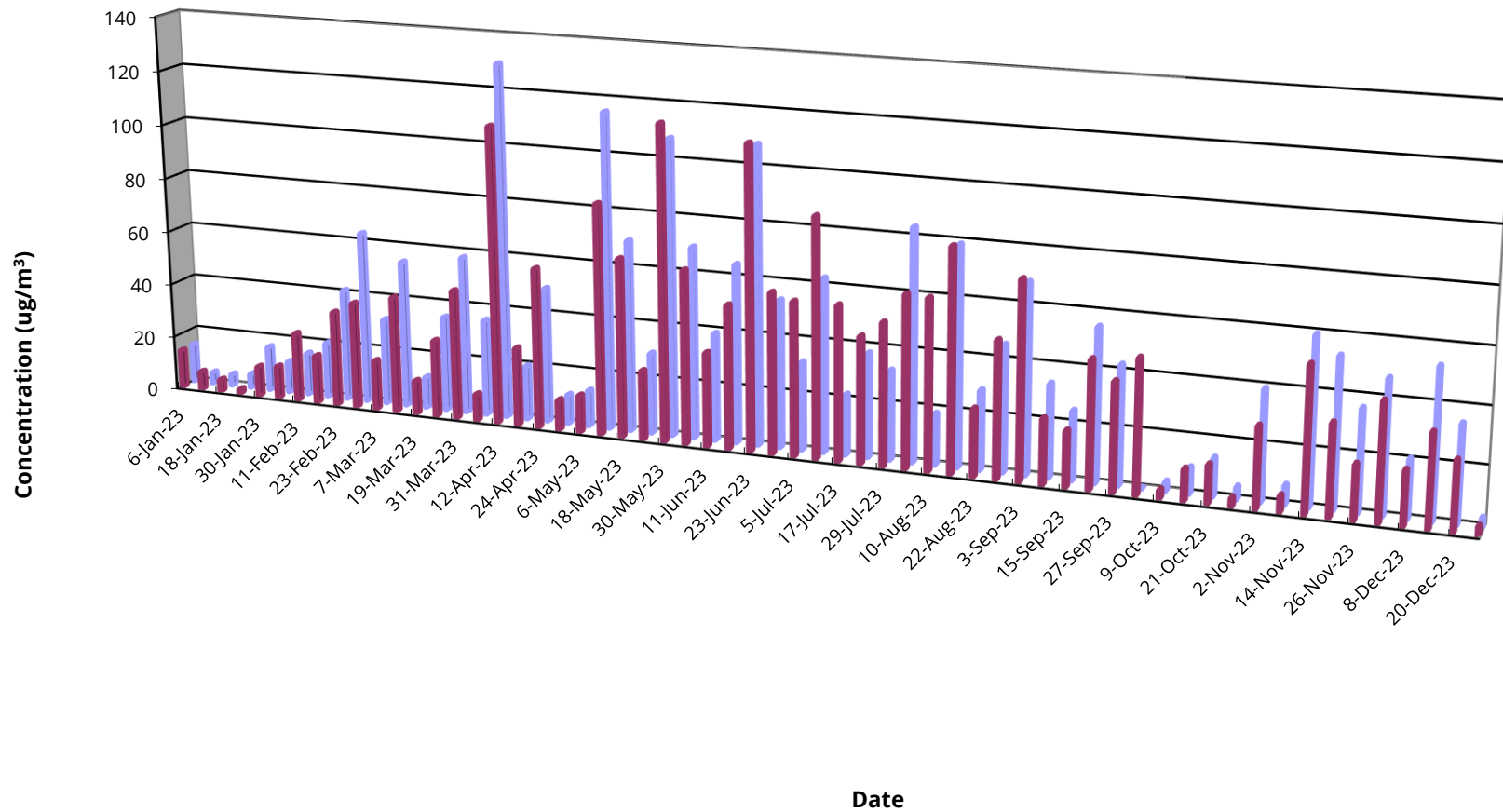
Ambient Air Quality Criteria (AAQC):

24hr. AAQC: 120 µg/m³

Annual Geometric Mean AAQC: 60 µg/m³

**TSP (Total Suspended Particulate)
2023 Data Summary
Frederica Station (MECP ID 63500) & Bailey Station (MECP ID 63510)**

Frederica Bailey



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APPENDIX E

Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Total Reduced Sulphur (TRS) - Data Summary
Frederica Station - MECP ID 63500

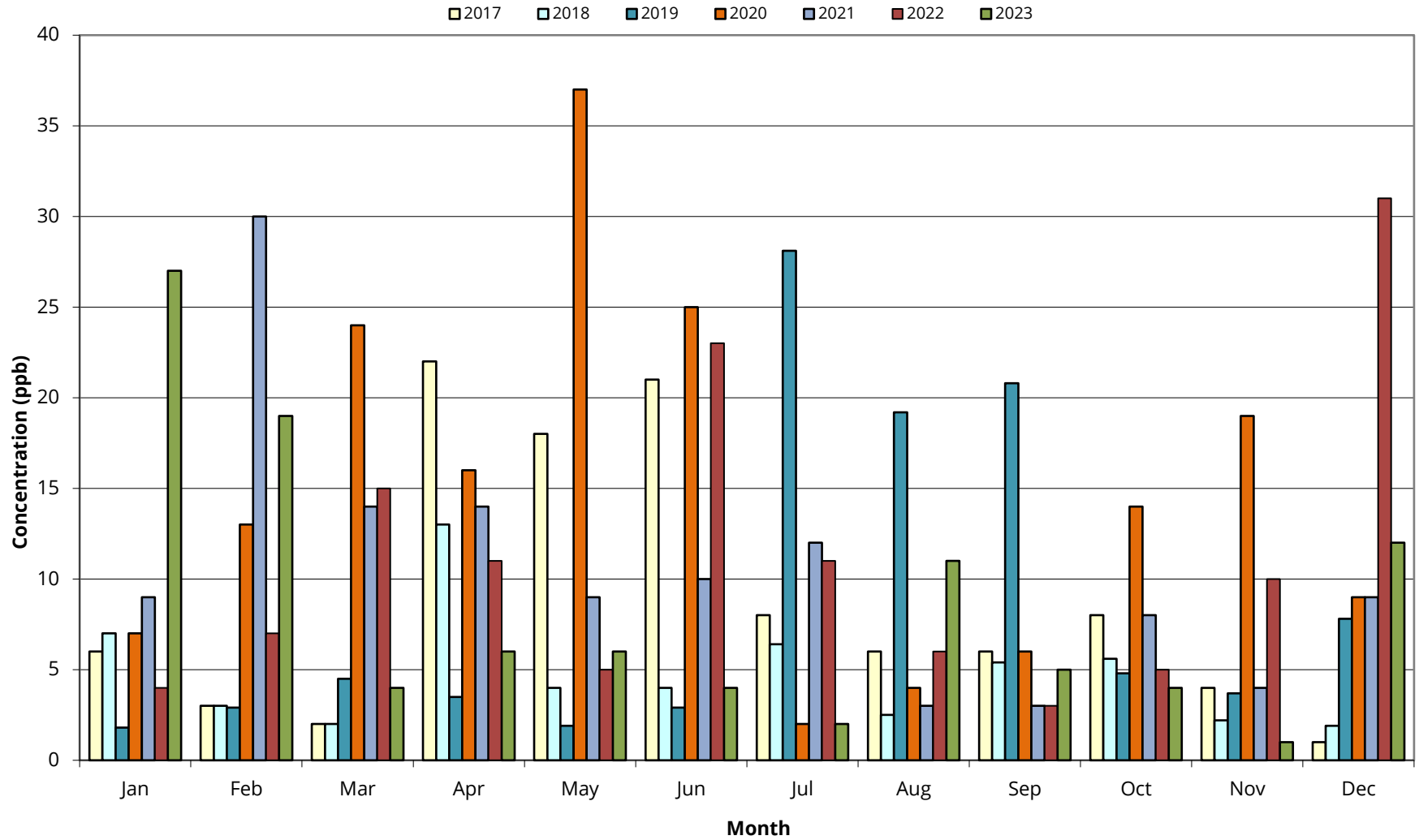
Continuous Ambient Monitoring - TRS (ppb)																												
Month	Maximum Rolling 10-Minute ^a Concentrations							Maximum Half-Hour ^{b,c} Concentrations							Maximum 24-Hour ^{c,d} Concentrations							Monthly Mean ^c Concentrations						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Jan	6	7	1.8	7	9	4	27	4	5	1.5	4	7	3	20	0	0	0.2	1	1	0	2	0.0	0.1	0.1	0.1	0.2	0.0	0.4
Feb	3	3	2.9	13	30	7	19	2	2	2.6	8	16	5	12	0	0	0.5	1	1	0	1	0.0	0.0	0.1	0.1	0.2	0.1	0.2
Mar	2	2	4.5	24	14	15	4	1	2	2.7	21	10	13	2	0	0	0.5	1	1	1	0	0.0	0.0	0.1	0.2	0.2	0.2	0.0
Apr	22	13	3.5	16	14	11	6	6	10	2.6	14	11	7	4	0	0	0.4	2	1	0	1	0.0	0.1	0.1	0.2	0.2	0.0	0.1
May	18	4	1.9	37	9	5	6	7	3	1.4	27	7	4	5	1	0	0.3	1	0	0	0	0.0	0.1	0.1	0.2	0.1	0.0	0.0
Jun	21	4	2.9	25	10	23	4	15	3	2	15	8	15	3	1	0	0.2	1	0	1	0	0.1	0.1	0.1	0.2	0.1	0.2	0.0
Jul	8	6.4	28.1	2	12	11	2	4	2.3	10.5	1	6	8	1	0	0.3	0.4	0	1	1	0	0.1	0.1	0.1	0.0	0.2	0.2	0.0
Aug	6	2.5	19.2	4	3	6	11	5	1.9	12.6	3	3	4	7	0	0.3	0.9	0	0	0	0	0.0	0.1	0.2	0.0	0.1	0.1	0.0
Sep	6	5.4	20.8	6	3	3	5	4	3.6	8.6	3	2	2	5	1	0.3	0.4	0	1	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Oct	8	5.6	4.8	14	8	5	4	5	4.0	2.7	9	5	2	2	0	0.2	0.4	1	0	0	0	0.0	0.1	0.1	0.1	0.1	0.0	0.0
Nov	4	2.2	3.7	19	4	10	1	2	1.3	2.9	8	2	7	1	0	0.1	0.5	0	0	1	0	0.0	0.1	0.1	0.1	0.0	0.1	0.0
Dec	1	1.9	7.8	9	9	31	12	1	1.3	6.0	5	6	21	6	0	0.1	0.6	1	1	2	0	0.0	0.1	0.2	0.1	0.1	0.4	0.0

Average	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Max	22	13	28.1	37	30	31	27	15	10	12.6	27	16	21	20	1	0.3	0.9	2	1	2	2	0.1	0.1	0.2	0.2	0.2	0.4	0.4	

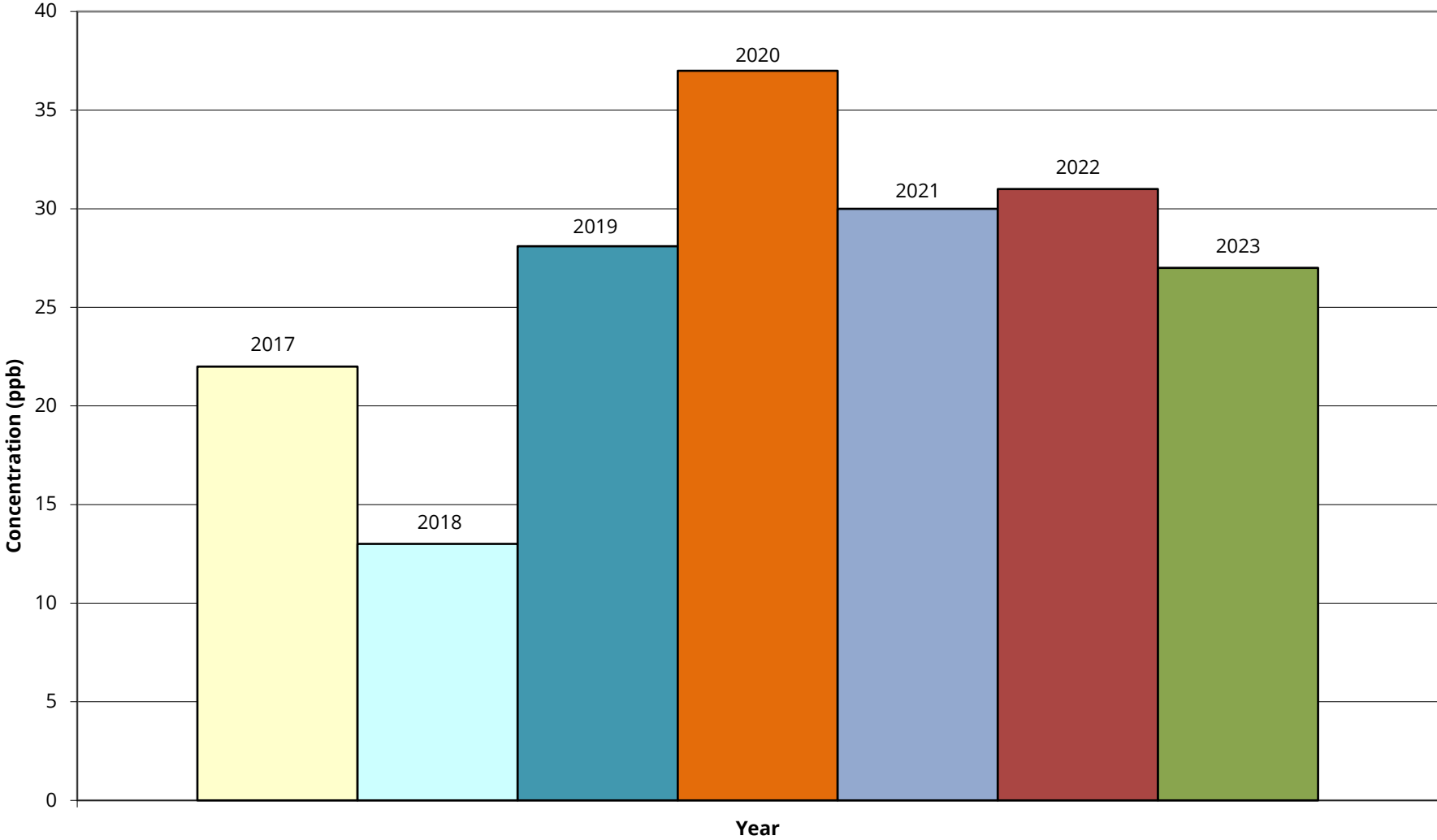
- Notes:** The 2016 averages have been removed from the annual report and have been archived.
Starting February 1, 2013 10-minute data was phased in as a reportable requirement for exceedances by the MECP.
From July 1, 2018 until December 31, 2020 statistical TRS averages were reported to one (1) decimal place.
- ^a - The rolling 10-minute maximum is the maximum 10-minute period averaged over every 5 minute interval.
 - ^b - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
 - ^c - Calculated using clock-based half-hour data.
 - ^d - 24-hour concentrations refer to daily averages from midnight to midnight.

2017 - 2023 Maximum TRS Annual Data Summary - MECP Stn ID 63500	
The maximum 10-minute concentration was 37 ppb, this event occurred in May of 2020.	
The maximum half-hour concentration was 27 ppb, this event occurred in May of 2020.	
The maximum 24-hour concentration was 2 ppb, this event occurred in April of 2020, December of 2022, and January of 2023.	

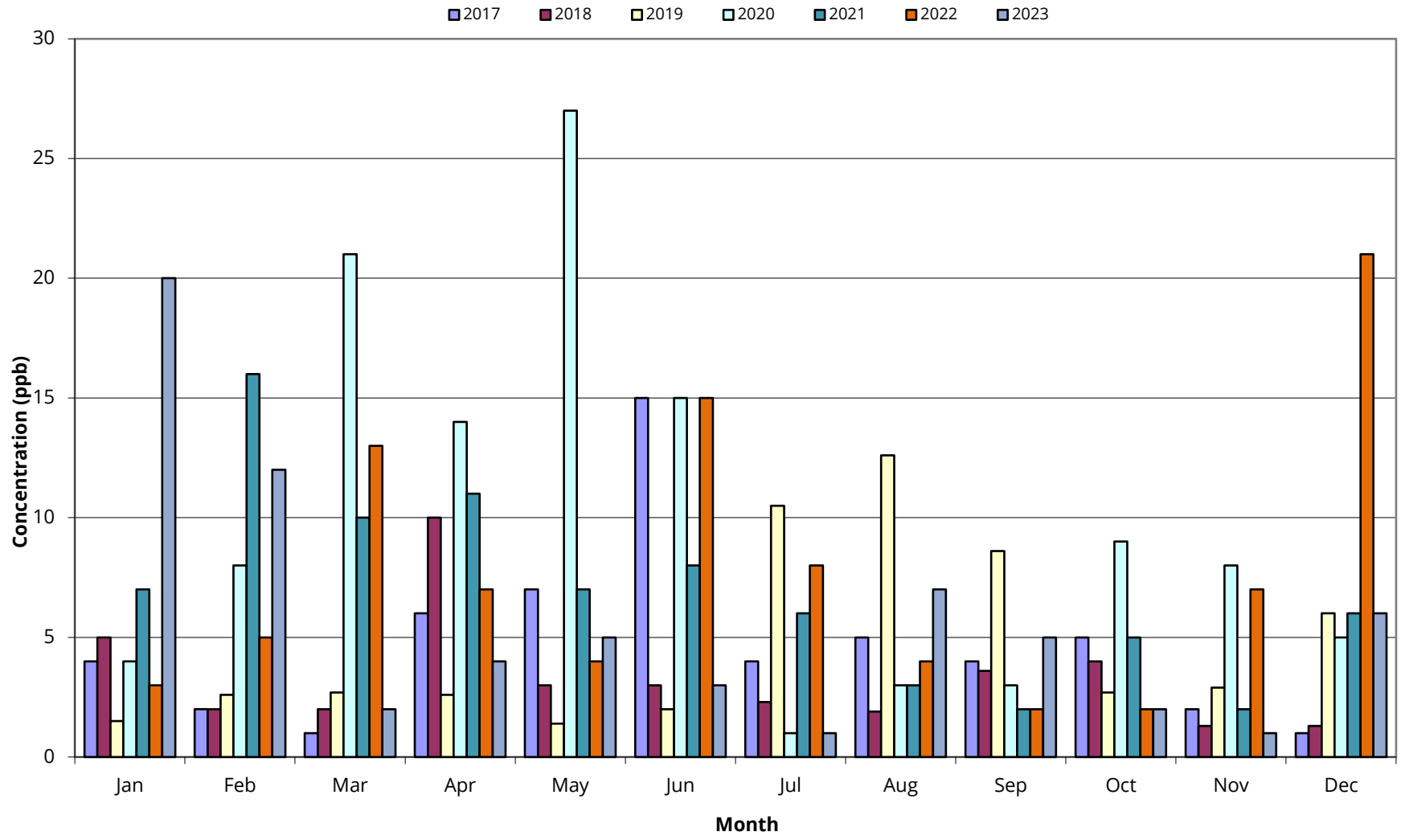
TRS
Monthly Maximum 10-Minute Averages Comparison
2017 - 2023
Frederica Station (MECP ID 63500)



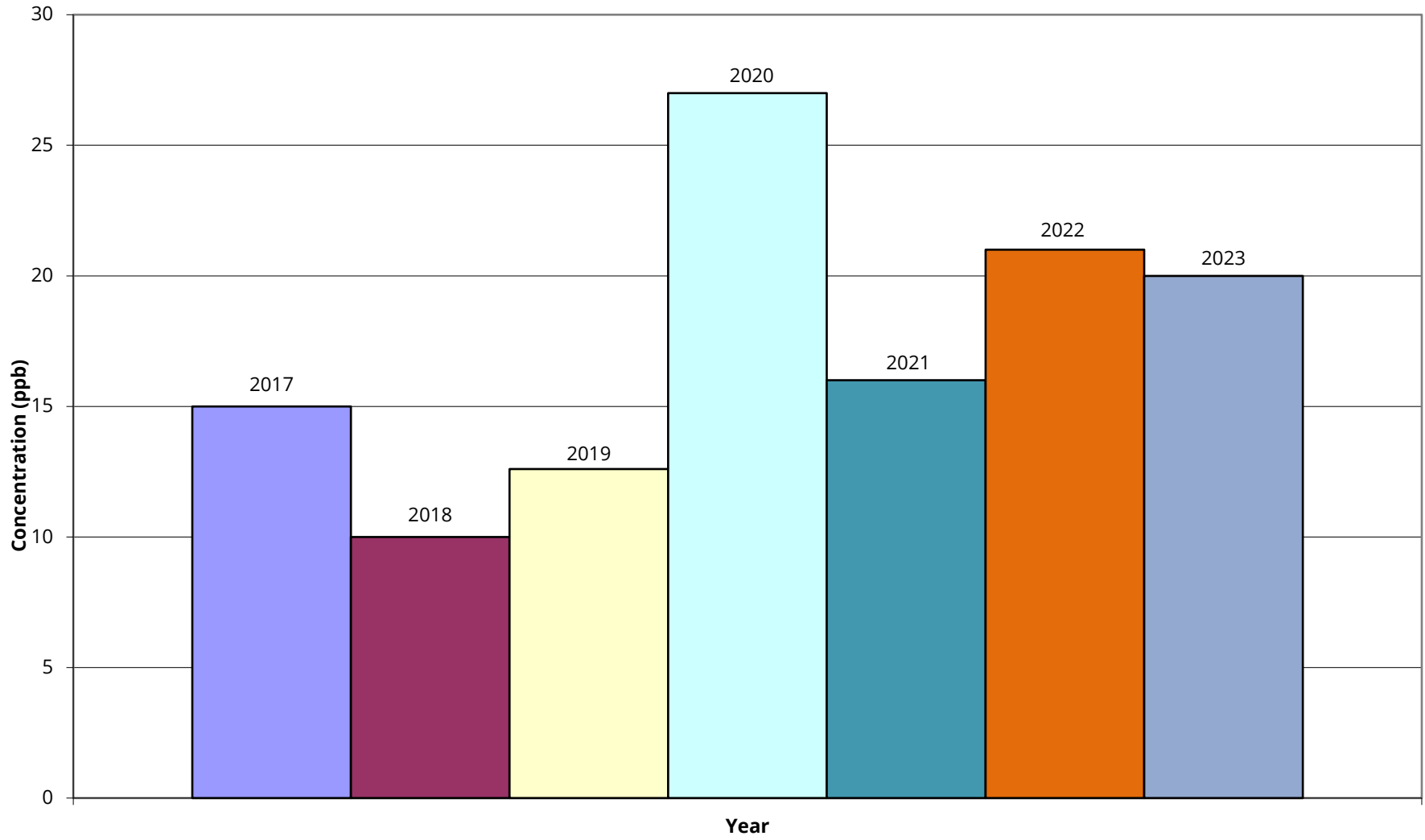
TRS
Annual Maximum 10-Minute Concentrations Recorded
2017 - 2023
Frederica Station (MECP ID 63500)



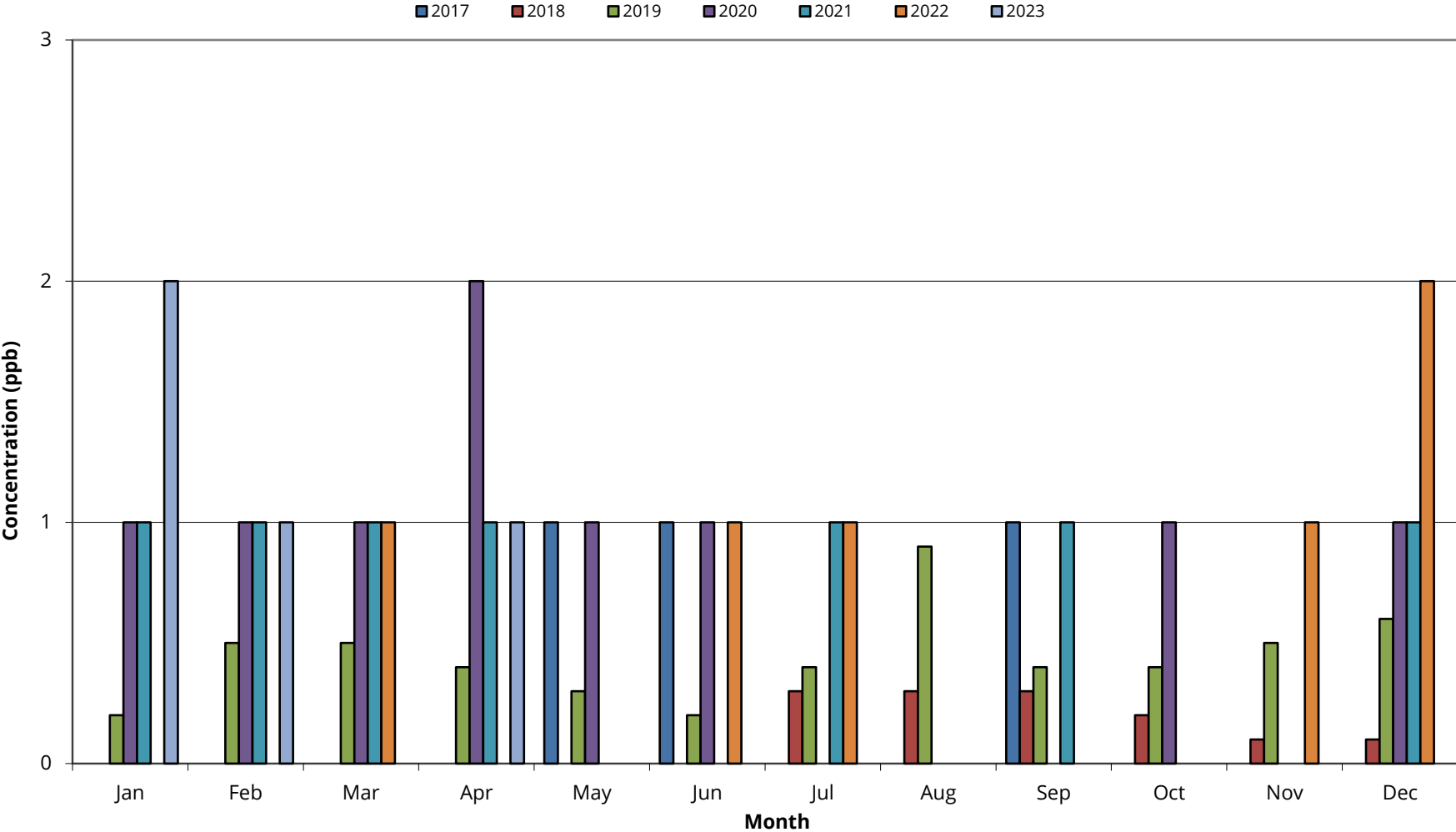
TRS
Monthly Maximum Half-Hour Averages Comparison
2017 - 2023
Frederica Station (MECP ID 63500)



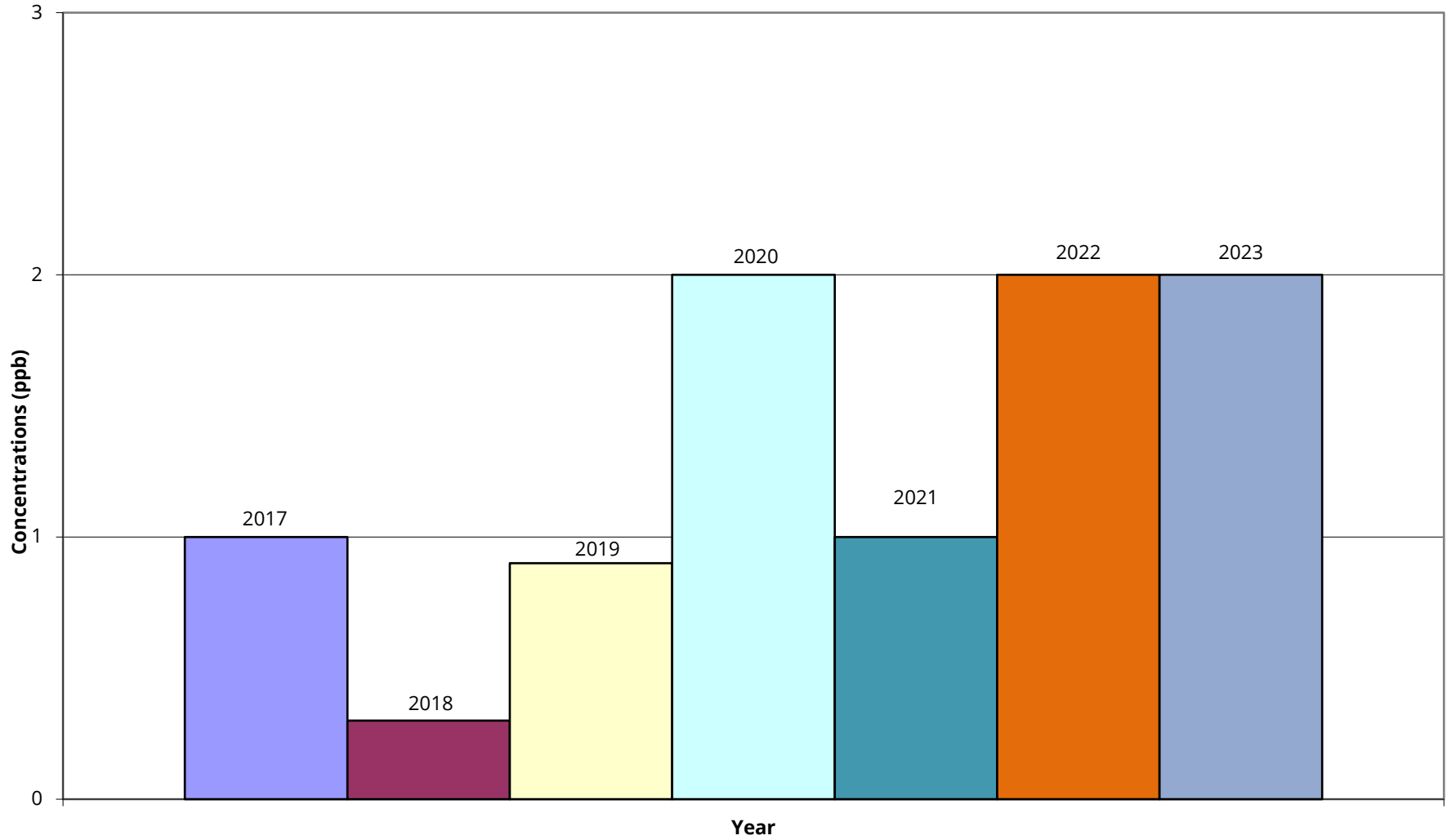
TRS
Annual Maximum Half-Hour Concentrations Recorded
2017 - 2023
Frederica Station (MECP ID 63500)



TRS
Monthly Maximum 24-Hour Averages Comparison
2017 - 2023
Frederica Station (MECP ID 63500)



TRS
Annual Maximum 24-Hour Concentrations Recorded
2017 - 2023
Frederica Station (MECP ID 63500)



Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Wind Speed (km/h) - Data Summary
Frederica Station - MECP ID 63500

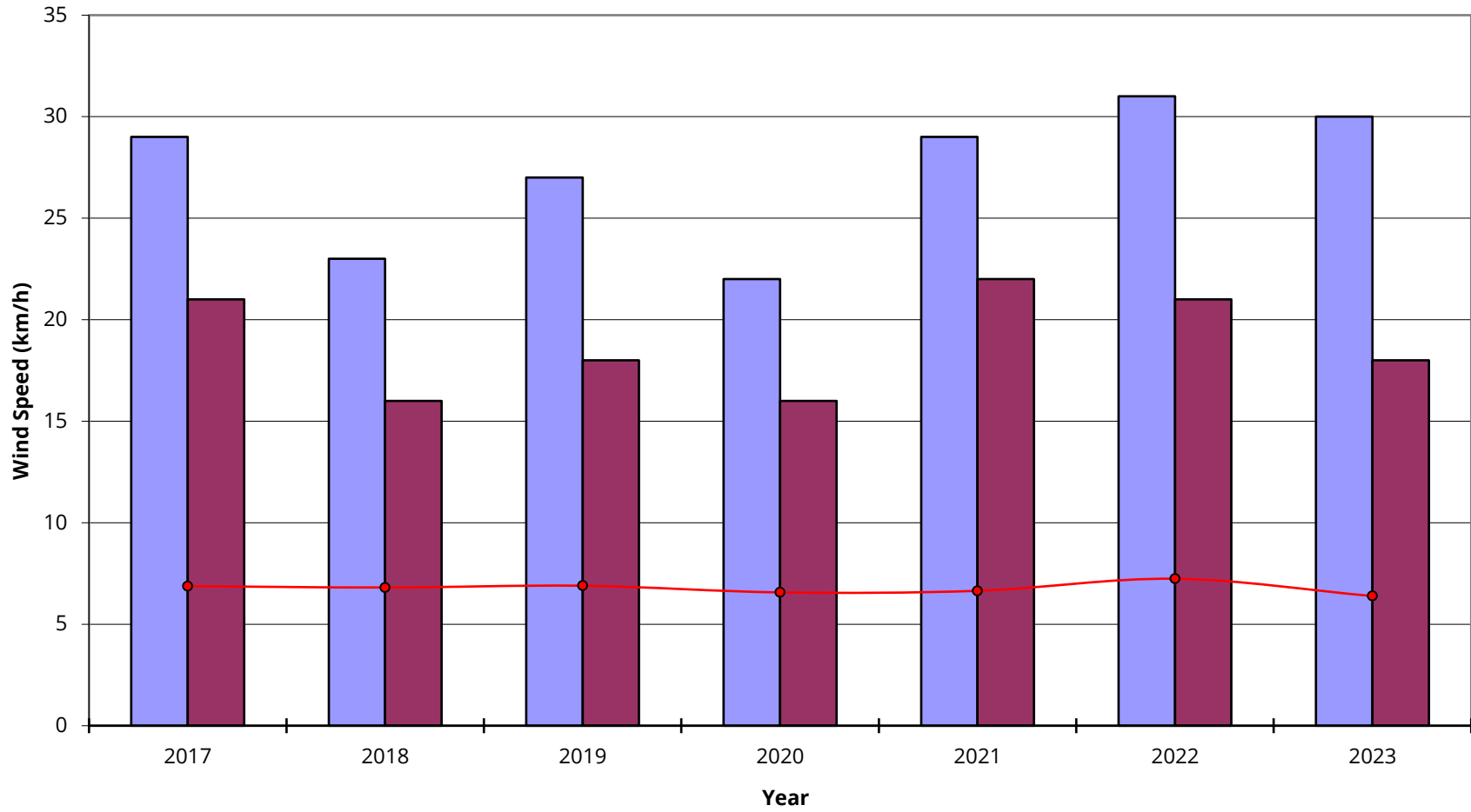
Continuous Ambient Monitoring - Wind Speed (km/h)																						
Month	Maximum Half-Hour ^{a,b} Records								Maximum 24-Hour ^{b,c} Concentrations							Average Monthly ^b Wind Speed						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	
Jan	25	21	19	18	23	22	18	12	14	14	12	12	15	10	6.8	7.1	7.0	6.5	6.2	7.4	6.4	
Feb	21	21	21	22	19	23	19	13	14	12	12	14	14	12	8.0	7.4	7.0	7.3	7.0	7.5	7.0	
Mar	29	21	20	21	26	25	19	21	13	12	16	16	16	13	8.2	7.2	7.9	7.3	7.2	8.3	7.4	
Apr	20	21	24	22	23	26	30	14	16	15	14	15	17	18	7.6	8.3	8.0	7.9	7.8	9.6	8.7	
May	21	21	22	20	21	31	21	13	12	12	10	10	17	15	7.2	7.3	7.2	7.1	7.0	8.2	7.7	
Jun	17	22	17	20	23	21	17	11	13	8	10	10	14	9	6.0	6.6	6.4	6.6	6.1	7.5	6.0	
Jul	16	18	19	20	15	17	16	12	9	9	10	7	8	6	5.9	6.0	5.8	5.7	5.6	5.8	4.6	
Aug	15	16	19	18	20	17	16	9	8	10	9	13	10	9	5.6	5.3	5.7	5.7	6.5	5.6	5.1	
Sep	16	22	21	18	16	18	16	9	13	14	11	8	13	11	5.6	6.1	6.6	5.8	5.7	5.4	5.4	
Oct	25	23	27	20	17	19	21	16	15	15	13	12	12	12	7.2	7.4	7.2	6.4	5.9	6.4	5.5	
Nov	23	22	18	19	29	20	21	13	12	13	13	22	14	12	7.3	6.6	6.9	6.5	7.4	6.9	6.9	
Dec	24	20	24	17	24	26	19	19	13	18	10	16	21	13	7.3	6.3	7.0	6.0	7.5	8.2	6.1	
Max	29	23	27	22	29	31	30	21	16	18	16	22	21	18	8.2	8.3	8.0	7.9	7.8	9.6	8.7	
Average	x	x	x	x	x	x	x	x	x	x	x	x	x	x	6.9	6.8	6.9	6.6	6.6	7.2	6.4	

- Notes:** The 2016 averages have been removed from the annual report and have been archived.
- ^a - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
 - ^b - Calculated using clock-based half-hour data.
 - ^c - 24-hour concentrations refer to daily averages from midnight to midnight.

2017 - 2023 Wind Speed Annual Data Comparison Summary - MECP Stn ID 63500
The maximum half-hour wind speed was recorded in May of 2022 at 31 km/h.
The maximum 24-hour wind speed was 22 km/h and was recorded in November of 2021.
The wind speeds on average are the highest in 2022.

**Wind Speed
Annual Summary
2017 - 2023
Frederica Station (MECP ID 63500)**

Max Half-Hr Avg Max 24-Hr Avg Annual Avg



**Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Ambient Temperature (ET) - Data Summary
Frederica Station - MECP ID 63500**

Continuous Ambient Monitoring - Ambient Temperature (°C)

	Maximum Half-Hour ^{a,b} Record							Minimum Half-Hour ^{a,b} Record							Maximum 24-Hour ^{b,c} Concentrations						Monthly Mean ^b								
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	
Month	Jan	6	5	4	1	2	0	2	-29	-30	-35	-25	-25	-27	1	1	0	-2	0	-7	1	-9.1	-12.5	-15.1	-8.4	-8.3	-	-8.0	
	Feb	13	8	0	9	5	1	6	-23	-29	-33	-30	-33	-31	-29	5	0	-3	1	3	-4	1	-7.3	-12.4	-13.1	-10.1	-13.4	-14.8	-9.1
	Mar	14	10	14	10	13	12	6	-23	-17	-28	-18	-19	-22	-18	5	3	4	5	8	4	1	-4.5	-4.5	-4.0	-2.6	-1.5	-4.6	-4.3
	Apr	20	21	20	17	16	10	20	-7	-13	-10	-10	-12	-8	-10	11	8	11	10	8	6	12	3.2	0.1	2.7	1.6	3.5	1.0	1.8
	May	22	27	21	26	26	24	27	-3	-3	-3	-6	-2	-2	-1	14	19	15	19	17	16	17	8.4	11.0	7.9	9.2	9.4	9.6	10.6
	Jun	26	32	28	30	31	33	30	5	5	1	2	6	3	4	19	23	21	22	24	25	22	15.2	15.1	14.3	16.0	17.5	15.4	16.8
	Jul	33	32	29	34	35	33	32	7	10	9	11	6	9	9	25	25	23	26	28	25	23	19.0	20.0	19.7	20.2	19.7	18.6	18.5
	Aug	29	31	27	29	33	32	32	4	7	7	6	8	9	6	24	23	21	21	24	22	23	16.7	17.8	17.2	17.9	19.4	18.8	17.7
	Sep	28	28	25	26	28	29	33	2	-1	2	-2	4	-1	3	21	22	21	19	22	21	25	13.7	13.0	13.0	11.9	14.3	13.3	15.5
	Oct	21	20	19	19	22	22	28	-3	-7	-4	-10	-3	-3	-6	17	12	14	13	15	15	21	7.9	4.0	5.6	2.9	9.7	7.4	7.2
	Nov	7	7	5	20	13	20	15	-18	-19	-19	-14	-16	-17	-16	3	5	2	14	10	16	7	-3.1	-4.8	-3.9	0.0	-0.3	-0.4	-0.2
	Dec	6	7	3	8	10	3	14	-30	-24	-27	-26	-24	-25	-14	3	2	1	3	0	2	6	-12.4	-6.7	-8.6	-7.3	-7.9	-8.1	-0.8
	Max	33	32	29	34	35	33	33	x	x	x	x	x	x	x	25	25	23	26	28	25	25	19.0	20.0	19.7	20.2	19.7	18.8	18.5
	Min	x	x	x	x	x	x	x	-30	-30	-35	-30	-33	-31	-29	x	x	x	x	x	x	x	-12.4	-12.5	-15.1	-10.1	-13.4	-14.8	-9.1
	Avg.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4.0	3.3	3.0	4.3	5.5	5.0	5.6

Notes: The 2016 averages have been removed from the annual report and have been archived.

^a - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.

^b - Calculated using clock-based half-hour data.

^c - 24-hour concentrations refer to daily averages from midnight to midnight.

"x" - Valid data < 75% due to data logger issues.

2017 - 2023 Ambient Temperature Annual Data Comparison Summary - MECP Stn ID 63500

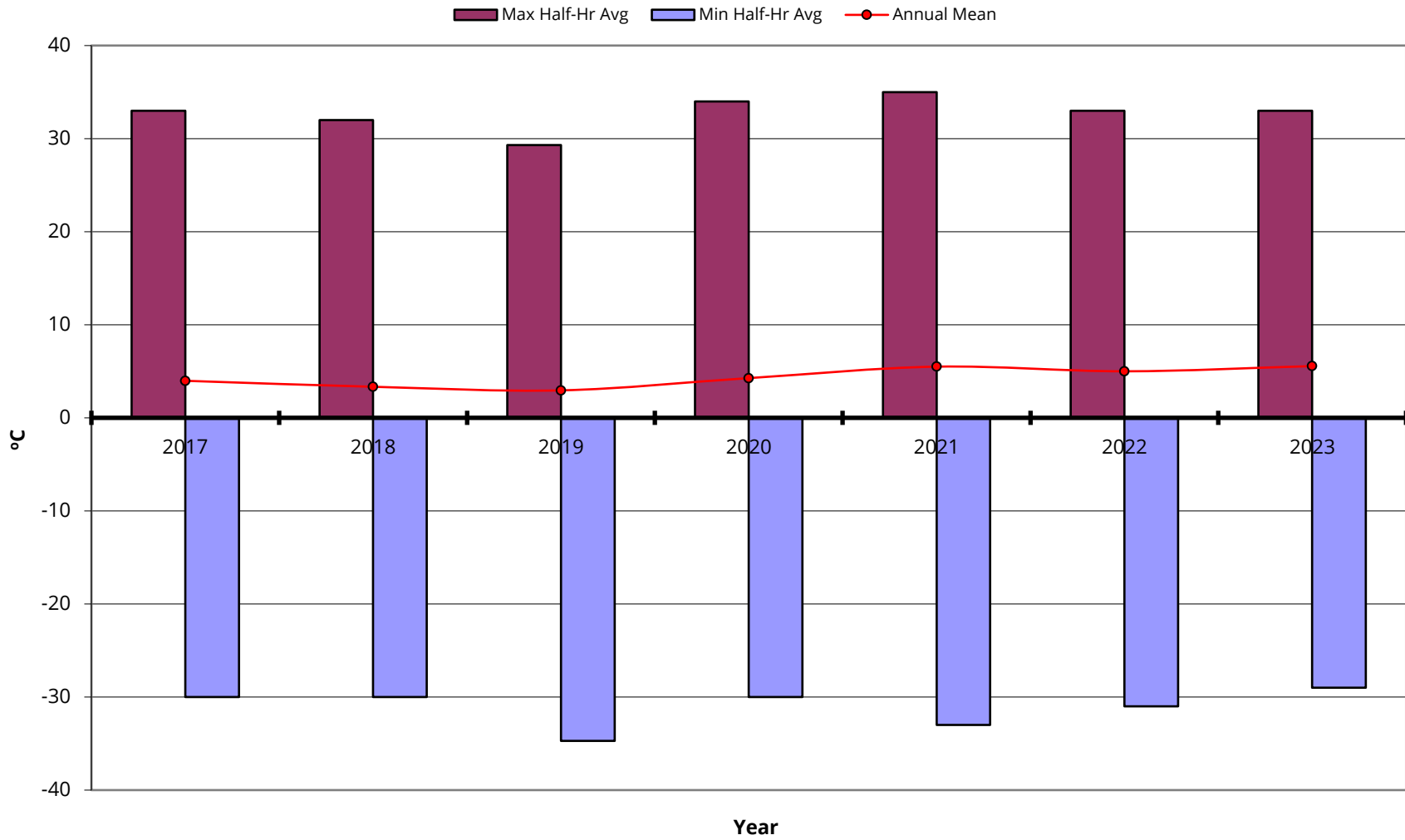
The maximum half-hour reading of 35°C was recorded in 2021.

The minimum half-hour reading of -35°C was recorded in 2019.

The maximum daily temperature recorded was 28°C in July 2021.

2019 reached the lowest annual mean, with 2019 having the minimum monthly mean and the maximum in 2020.

**Ambient Temperature
Annual Summary
2017 - 2023
Frederica Station (MECP ID 63500)**



Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Incoming Solar Radiation (GR) - Data Summary
Frederica Station - MECP ID 63500

Continuous Ambient Monitoring - Solar Radiation (W/m²)

	Maximum Half-Hour ^{a,b} Record							Maximum 24-Hour ^{b,c} Concentrations							Monthly Mean ^b							
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	
Month	Jan	194	226	194	372	415	410	451	45	52	49	84	95	96	100	22.6	23.4	24.7	43.5	50.3	-	47.5
	Feb	255	288	247	605	681	600	601	68	85	64	157	149	139	157	41.2	55.1	36.4	102.2	103.6	78.1	94.5
	Mar	364	372	319	753	804	783	772	108	121	103	233	213	239	243	70.8	81.6	68.6	143.7	151.3	147.0	154.4
	Apr	382	410	358	892	864	884	971	139	152	125	301	302	291	296	82.3	112.1	73.1	204.4	167.1	138.3	162.0
	May	407	427	394	932	927	927	952	151	159	143	325	331	312	330	89.8	118.9	83.9	242.9	216.1	189.4	216.5
	Jun	417	433	992	970	946	966	932	154	162	344	333	325	331	325	96.7	119.2	234.4	242.7	234.7	237.4	233.6
	Jul	418	442	944	1032	913	938	956	148	160	320	306	327	319	306	107.6	113.9	249.7	231.1	242.3	223.5	216.6
	Aug	393	411	880	886	854	876	831	132	142	293	280	271	281	277	85.6	88.9	204.5	178.9	185.3	199.8	179.3
	Sep	351	365	782	742	780	741	760	103	123	244	224	238	236	230	60.9	68.9	112.7	145.2	153.9	141.0	134.0
	Oct	296	330	637	581	566	599	653	79	83	164	160	163	161	151	42.5	35.8	84.7	79.1	78.9	94.8	75.9
	Nov	213	283	503	447	418	425	444	48	58	93	101	103	100	87	18.9	24.9	48.9	49.6	50.5	43.7	47.7
	Dec	187	187	363	323	326	313	302	37	41	69	63	62	63	60	21.6	18.7	40.4	33.4	31.4	26.8	27.1

Max	418	442	992	1032	946	966	971	154	162	344	333	331	331	330	107.6	119.2	249.7	242.9	242.3	237.4	233.6
Avg.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	61.7	71.8	105.2	141.4	140.5	137.6	132.6

Notes: The 2016 averages have been removed from the annual report and have been archived.

^a - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.

^b - Calculated using clock-based half-hour data.

^c - 24-hour concentrations refer to daily averages from midnight to midnight.

"-" - Valid data < 75% due to data logger issues.

2017 - 2023 Solar Radiation Annual Data Comparison Summary - MECP Stn ID 63500

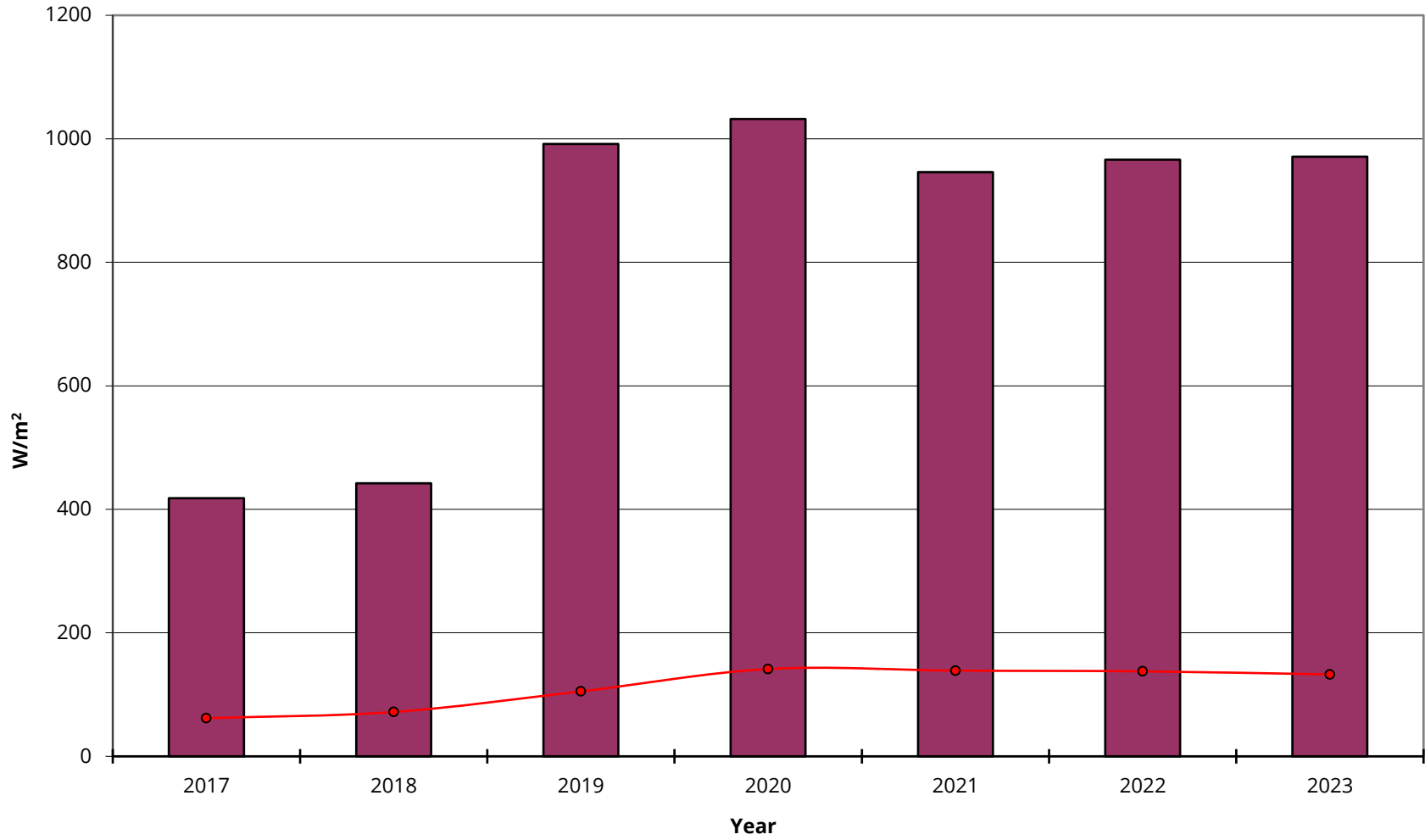
The maximum half-hour value was recorded in July 2020 @ 1032 W/m².

The maximum 24-hour value was recorded in June 2019 @ 344 W/m².

The maximum monthly mean recorded was in June 2019 @ 249.7 W/m² and the lowest maximum monthly mean was 107.6 W/m² in July 2017.

**Incoming Solar Radiation
Annual Summary
2017 - 2023
Frederica Station (MECP ID 63500)**

Max Half-Hr Avg Annual Mean



Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Relative Humidity (RH) - Data Summary
Frederica Station - MECP ID 63500

Continuous Ambient Monitoring - Relative Humidity (%)

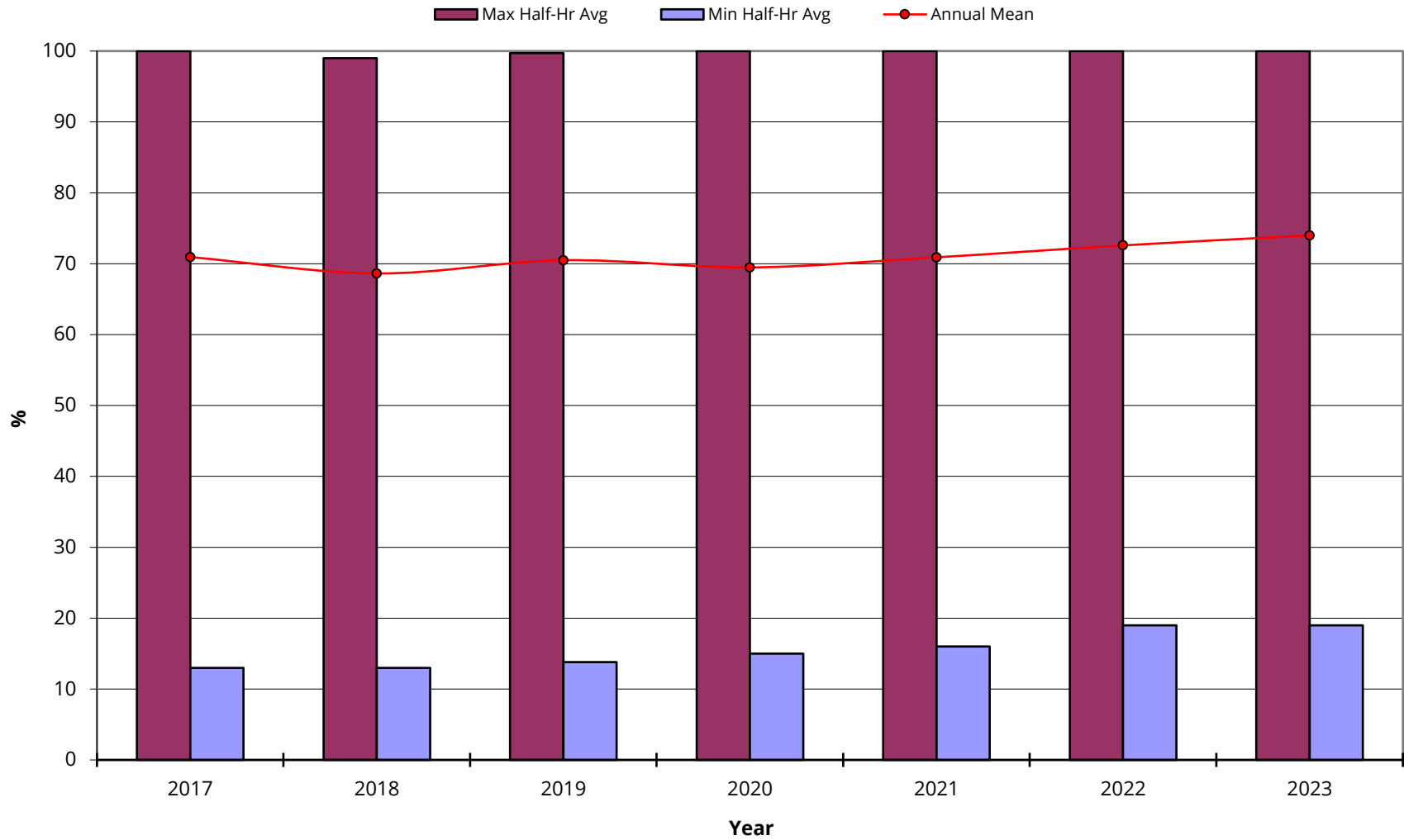
	Maximum Half-Hour ^{a,b} Record							Minimum Half-Hour ^{a,b} Record							Maximum 24-Hour ^{b,c} Concentrations							Monthly Mean ^b							
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	
Month	Jan	100	97	99	97	97	89	100	39	33	34	45	41	42	42	99	94	95	89	92	80	99	77.1	73.1	70.8	76.8	77.7	-	77.9
	Feb	99	98	97	98	95	98	100	32	29	23	24	26	30	30	87	85	93	84	86	81	86	68.9	65.1	70.8	63.4	65.5	67.8	69.1
	Mar	99	97	98	98	98	100	100	15	19	14	19	23	25	19	96	82	91	90	90	98	94	61.9	60.2	60.2	66.2	62.5	67.6	65.2
	Apr	99	95	99	99	100	100	100	13	13	14	20	16	22	21	91	79	95	92	95	98	96	65.8	50.4	67.8	59.3	70.7	73.1	70.4
	May	97	98	98	99	100	100	100	16	13	16	15	17	26	20	93	93	91	92	100	95	100	66.5	59.9	64.2	59.4	65.2	69.3	64.0
	Jun	98	97	98	99	100	100	100	21	21	19	17	21	19	24	95	92	94	87	95	90	96	70.2	66.6	66.1	66.5	69.5	65.9	70.9
	Jul	98	97	99	98	100	100	100	29	26	27	23	22	27	35	88	93	86	87	87	95	96	68.6	67.3	68.6	71.8	64.3	70.4	72.9
	Aug	98	97	99	100	100	100	100	25	23	26	22	27	28	33	94	89	86	97	96	92	100	72.8	75.0	72.1	75.8	71.3	75.6	76.8
	Sep	98	97	100	99	100	100	100	22	25	35	25	35	26	32	94	95	97	93	88	99	99	79.5	76.7	82.2	74.1	76.2	78.3	86.4
	Oct	97	97	100	99	100	100	100	16	23	28	30	32	20	37	91	93	91	91	100	93	100	71.7	75.8	74.9	70.8	81.2	74.3	80.5
	Nov	98	97	99	100	100	100	100	36	40	27	36	22	35	22	92	94	92	86	89	95	99	74.1	75.4	73.5	72.7	70.5	78.3	71.2
	Dec	99	99	99	99	100	100	100	40	40	33	43	45	49	39	96	96	95	88	88	91	100	74.1	78.1	74.8	77.0	76.2	77.9	82.1

Max	100	99	100	100	100	100	100	x	x	x	x	x	x	x	x	99	96	97	97	100	99	100	79.5	78.1	82.2	77.0	81.2	78.3	86.4
Min	x	x	x	x	x	x	x	13	13	14	15	16	19	19	x	x	x	x	x	x	x	x	61.9	50.4	60.2	59.3	62.5	65.9	64.0
Avg.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	70.9	68.6	70.5	69.5	70.9	72.6	74.0

- Notes:** The 2016 averages have been removed from the annual report and have been archived.
- ^a - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
 - ^b - Calculated using clock-based half-hour data.
 - ^c - 24-hour concentrations refer to daily averages from midnight to midnight.
 - "-" - Valid data < 75% due to data logger issues.

2017 - 2023 Relative Humidity Annual Data Comparison Summary - MECP Stn ID 63500	
The maximum half-hour value was recorded in 2017, 2019, 2020, 2021, 2022, and 2023.	
The minimum half-hour value was recorded in 2017 and 2018.	
The maximum 24-hour value of 100% occurred in May and October of 2021 and May, August, October, and December of 2023.	
The lowest annual mean occurred in 2018 and the highest annual mean occurred in 2023.	

**Relative Humidity
Annual Summary
2017 - 2023
Frederica Station (MECP ID 63500)**



Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Barometric Pressure (BP) - Data Summary
Frederica Station - MECP ID 63500

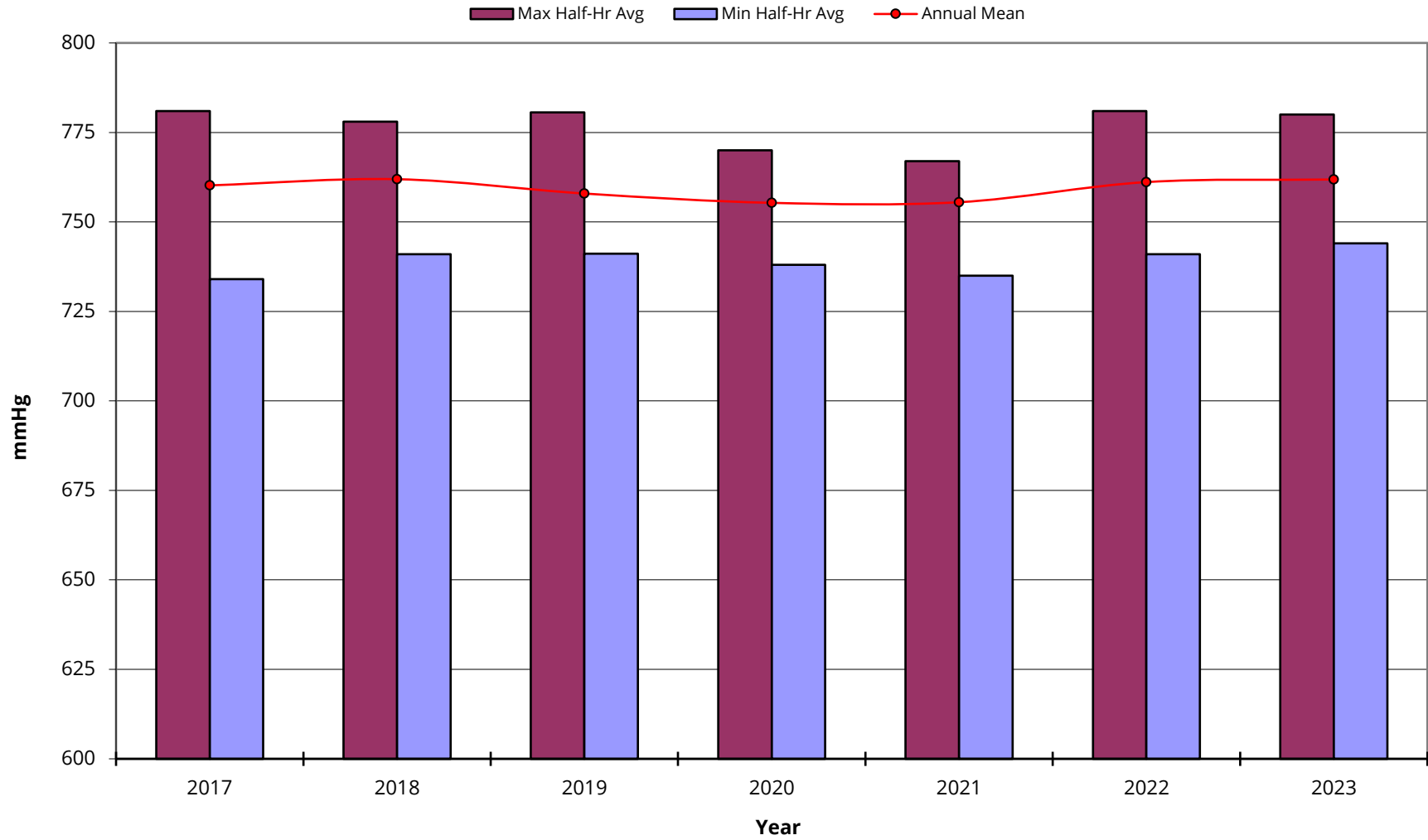
Continuous Ambient Monitoring - Barometric Pressure (mmHg)

Month	Maximum Half-Hour ^{a,b} Record							Minimum Half-Hour ^{a,b} Record							Maximum 24-Hour ^{b,c} Concentrations							Monthly Mean ^b						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Jan	781	776	777	770	767	771	773	740	743	746	743	741	752	744	778	775	775	767	766	768	771	758.9	763.4	763.2	756.9	756.7	-	761.9
Feb	766	778	781	766	766	780	778	744	741	742	743	741	742	744	765	775	779	765	765	778	776	757.6	762.7	763.8	755.6	757.1	764.7	760.5
Mar	777	776	771	770	767	773	780	734	753	742	744	742	749	751	775	774	770	768	765	771	779	764.9	765.3	761.9	756.6	757.3	761.4	764.1
Apr	771	775	773	761	765	775	777	747	753	747	744	745	744	746	770	773	771	760	764	773	775	761.4	763.0	760.7	754.4	755.0	760.5	760.6
May	771	770	770	761	763	771	777	748	748	751	749	746	741	751	769	768	769	760	762	769	775	758.5	760.0	760.6	756.6	757.3	760.3	764.4
Jun	766	769	764	764	760	772	768	742	753	747	742	746	749	752	765	767	763	763	759	770	767	756.9	760.1	755.4	754.4	753.6	759.0	761.2
Jul	767	772	761	758	760	769	766	755	751	748	738	749	746	751	765	770	759	758	759	767	765	760.9	761.3	754.5	754.2	755.9	759.4	759.3
Aug	770	766	762	759	766	770	771	753	752	746	747	748	746	746	769	765	761	759	760	768	770	761.6	760.0	754.4	754.6	754.7	761.3	761.1
Sep	773	773	764	764	761	776	771	752	745	745	741	747	752	753	771	771	762	763	760	774	770	761.3	762.8	755.3	754.8	754.3	762.9	763.7
Oct	770	773	765	765	761	775	769	744	744	741	744	747	745	752	768	771	763	762	761	773	768	758.5	760.9	754.2	755.7	755.6	760.4	761.4
Nov	778	774	766	765	762	781	773	739	746	744	741	744	745	745	775	771	765	764	761	777	771	760.6	761.9	756.0	754.7	755.1	761.1	761.2
Dec	778	774	764	763	764	776	776	735	750	745	745	735	749	747	777	772	761	762	762	772	773	761.1	761.9	755.1	755.5	753.4	761.6	762.7
Max	781	778	781	770	767	781	780	x	x	x	x	x	x	x	778	775	779	768	766	778	779	764.9	765.3	763.8	756.9	757.3	764.7	764.4
Min	x	x	x	x	x	x	x	734	741	741	738	735	741	744	x	x	x	x	x	x	x	756.9	760	754.2	754.2	753.4	759.0	759.3
Avg.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	760.2	761.9	757.9	755.3	755.5	761.1	761.9

Notes: The 2016 averages have been removed from the annual report and have been archived.
The pressures are represented as sea-level corrected.
^a - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
^b - Calculated using clock-based half-hour data.
^c - 24-hour concentrations refer to daily averages from midnight to midnight.
"-." - Valid data < 75% due to data logger issues.

2017 - 2023 Barometric Pressure Annual Data Comparison Summary - MECP Stn ID 63500
There are no obvious trends to report.

**Barometric Pressure
Annual Summary
2017 - 2023
Frederica Station (MECP ID 63500)**



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APPENDIX F

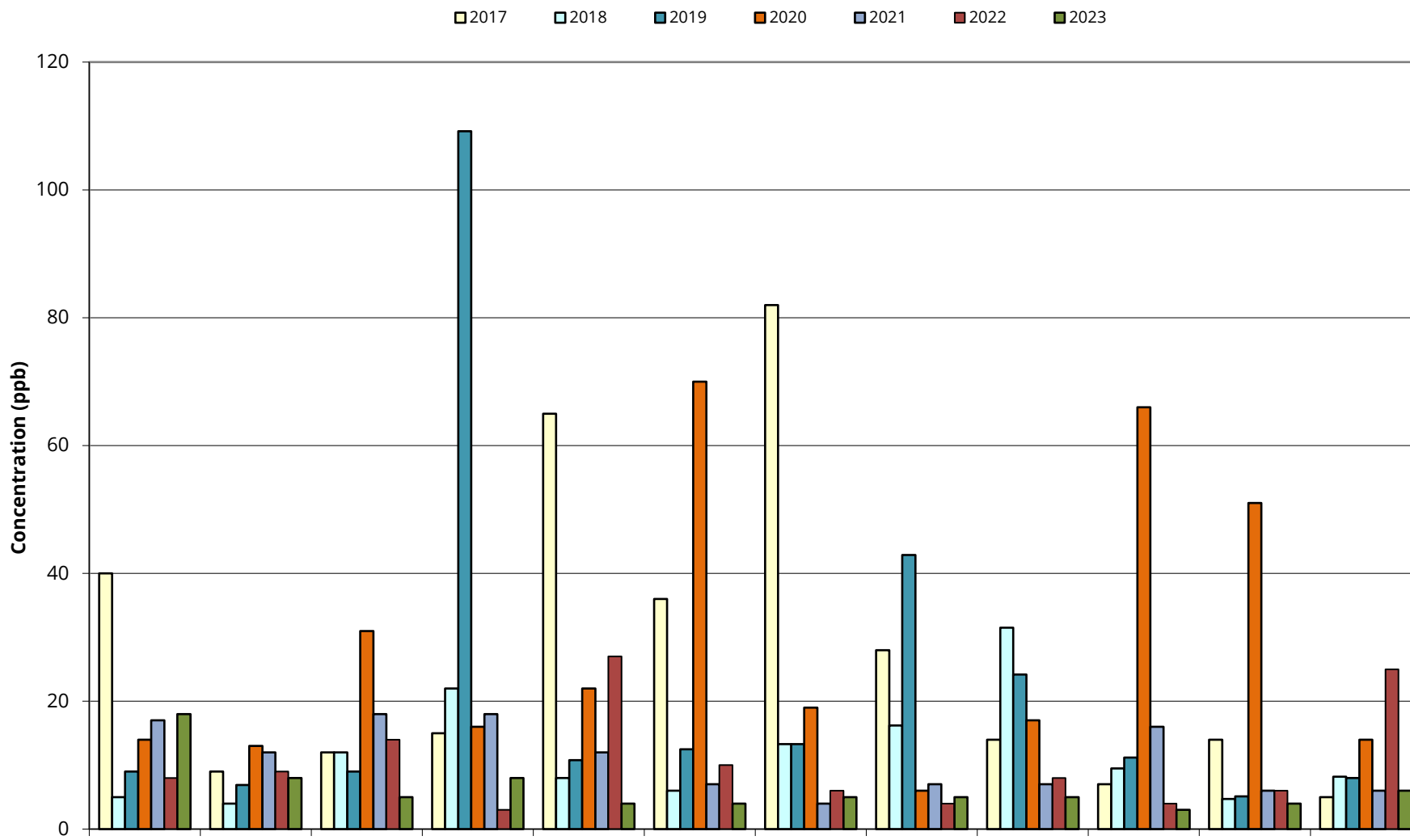
Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Total Reduced Sulphur (TRS) - Data Summary
Bailey Station - MECP ID 63510

Continuous Ambient Monitoring - TRS (ppb)																													
	Maximum Rolling 10-Minute ^a Concentrations							Maximum Half-Hour ^{b,c} Concentrations							Maximum 24-Hour ^{c,d} Concentrations							Monthly Mean ^c Concentrations							
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	
Month	Jan	40	5	9.0	14	17	8	18	33	3	8.0	9	13	8	15	2	1	1.0	2	2	1	4	0.2	0.1	0.3	0.3	0.8	0.4	0.6
	Feb	9	4	6.9	13	12	9	8	7	3	3.9	9	9	7	8	1	1	0.7	1	2	2	2	0.1	0.1	0.2	0.4	0.7	0.5	0.5
	Mar	12	12	9.0	31	18	14	5	7	5	5.6	15	15	10	5	1	1	0.6	2	3	2	1	0.1	0.2	0.2	0.5	0.5	0.5	0.3
	Apr	15	22	109.2	16	18	3	8	9	17	18.5	12	16	2	8	1	1	1.1	2	3	0	2	0.2	0.2	0.4	0.4	0.5	0.1	0.2
	May	65	8	10.8	22	12	27	4	29	6	5.5	15	10	20	3	1	1	0.7	2	2	1	1	0.2	0.2	0.2	0.4	0.3	0.2	0.2
	Jun	36	6	12.5	70	7	10	4	20	3	9.6	52	3	9	4	1	1	1.4	4	1	2	1	0.2	0.1	0.3	0.5	0.3	0.4	0.3
	Jul	82	13.3	13.3	19	4	6	5	47	11.2	5.2	12	3	6	3	3	1.3	0.9	2	1	2	1	0.3	0.3	0.3	0.5	0.4	0.5	0.2
	Aug	28	16.2	42.9	6	7	4	5	10	8.8	30.0	5	5	3	5	2	0.6	2.3	1	1	1	1	0.3	0.2	0.6	0.3	0.2	0.2	0.3
	Sep	14	31.5	24.2	17	7	8	5	11	19.7	9.3	8	6	7	5	2	1.4	1.2	1	1	1	1	0.3	0.4	0.2	0.4	0.4	0.2	0.2
	Oct	7	9.5	11.2	66	16	4	3	5	6.9	9.4	33	14	4	3	0	0.8	1.2	2	2	1	1	0.1	0.2	0.2	0.5	0.3	0.2	0.3
	Nov	14	4.7	5.1	51	6	6	4	10	3.8	3.6	36	5	6	2	1	0.5	1.0	2	1	1	1	0.1	0.1	0.3	0.3	0.2	0.3	0.1
	Dec	5	8.2	8.0	14	6	25	6	4	4.7	6.5	11	6	24	4	0	0.7	1.1	2	1	6	1	0.1	0.2	0.4	0.5	0.2	0.7	0.1
Average	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.2	0.2	0.3	0.4	0.4	0.3	0.3
Max	82	31.5	109.2	70	18	27	18	47	19.7	30.0	52	16	24	15	3	1.4	2.3	4	3	6	4	0.3	0.4	0.6	0.5	0.8	0.7	0.6	

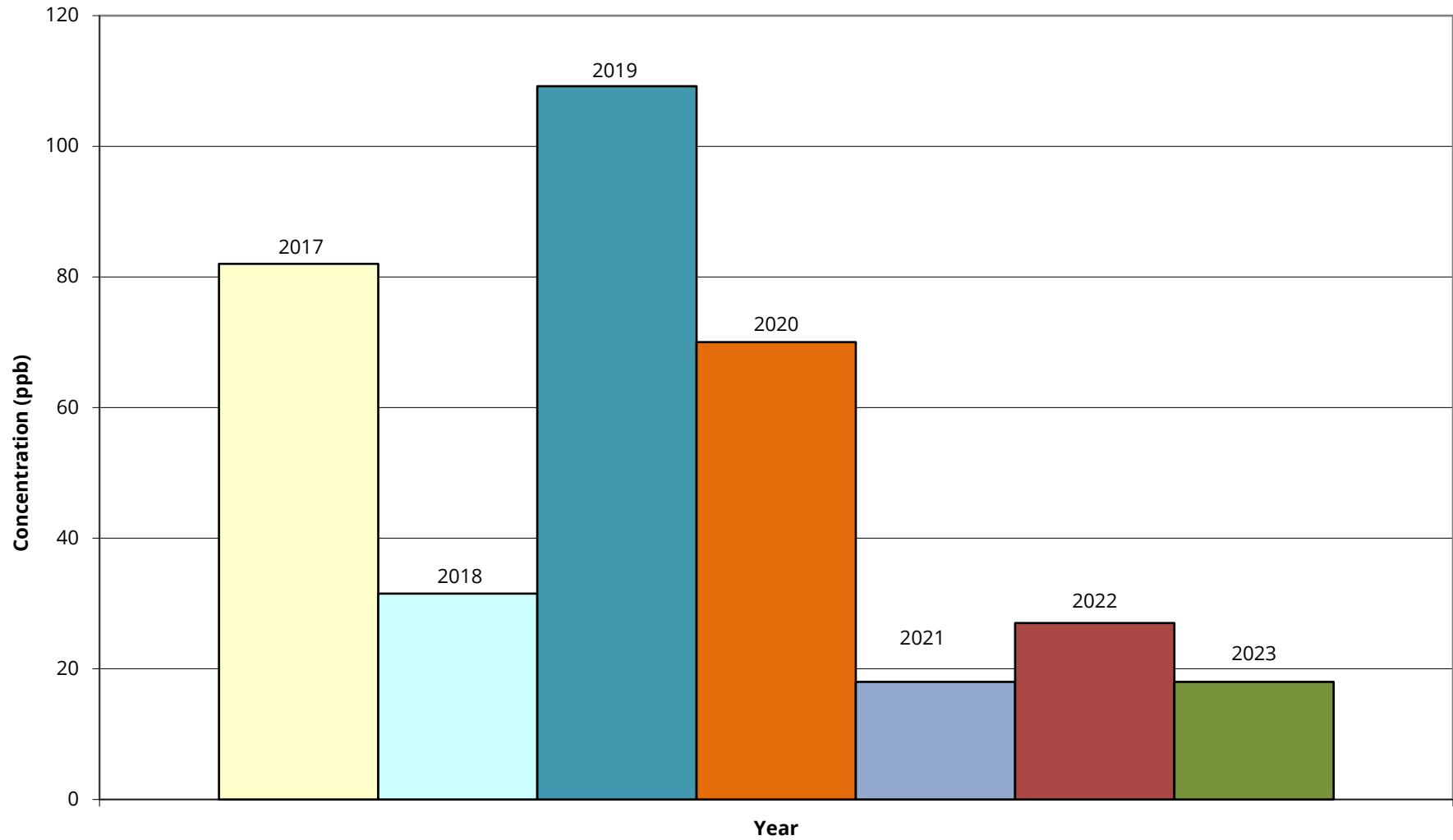
- Notes:** The 2016 averages have been removed from the annual report and have been archived.
Starting February 1, 2013 10-minute data was phased in as a reportable requirement for exceedances by the MECP.
From July 1, 2018 until December 31, 2020 statistical TRS averages were reported to one (1) decimal place.
^a - The rolling 10-minute maximum is the maximum 10-minute period averaged over every 5 minute interval.
^b - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
^c - Calculated using clock-based half-hour data.
^d - 24-hour concentrations refer to daily averages from midnight to midnight.

2017 - 2023 Maximum TRS Annual Data Summary - MECP Stn ID 63510	
The maximum 10-minute concentration was 109.2 ppb, this event occurred in April of 2019.	
The maximum half-hour concentration was 52 ppb, this event occurred in June of 2020.	
The maximum 24-hour concentration was 6 ppb, this event occurred in December of 2022.	

TRS
Monthly Maximum 10-Minute Averages Comparison
2017 - 2023
Bailey Station (MECP ID 63510)

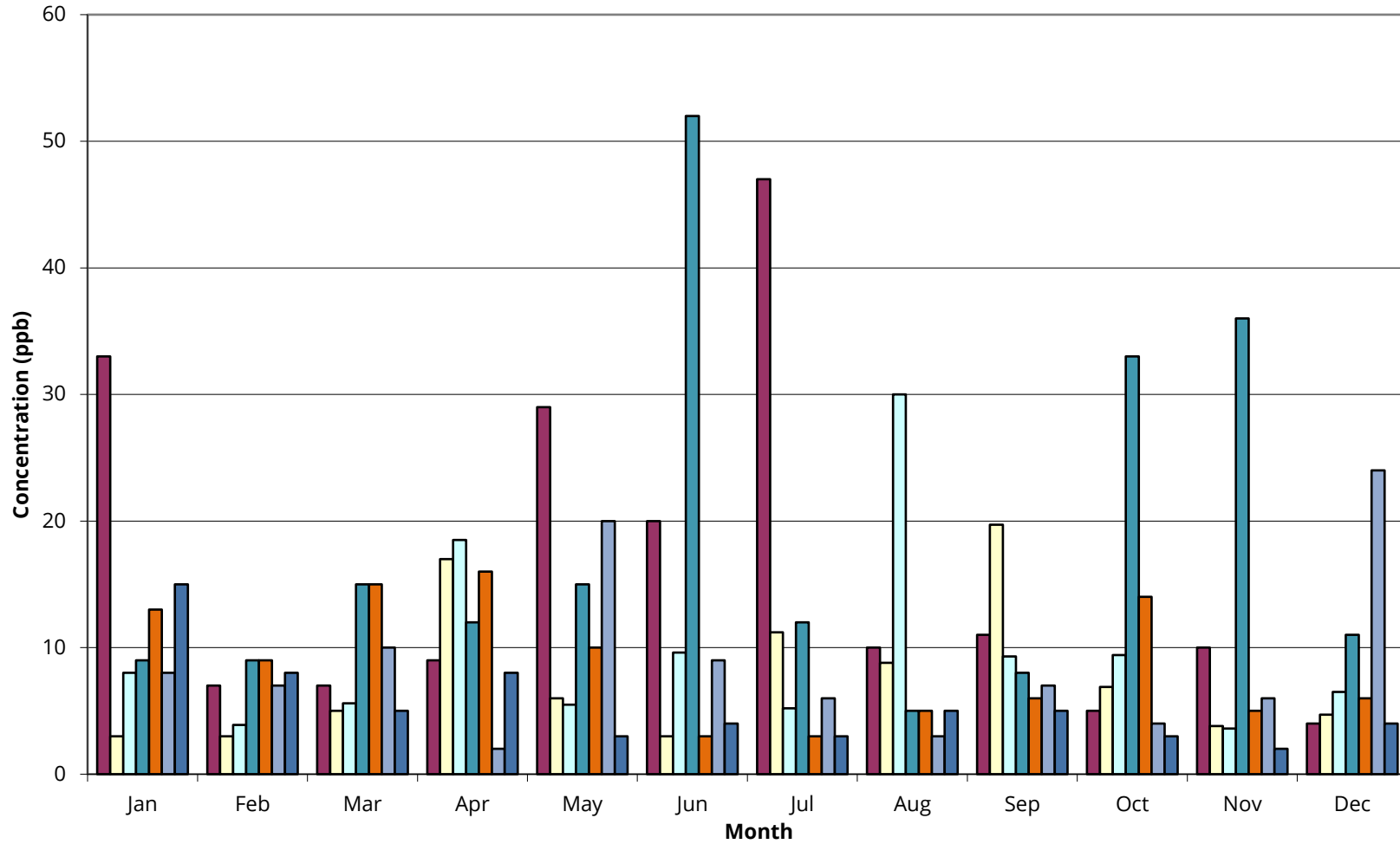


TRS
Annual Maximum 10-Minute Concentrations Recorded
2017 - 2023
Bailey Station (MECP ID 63510)

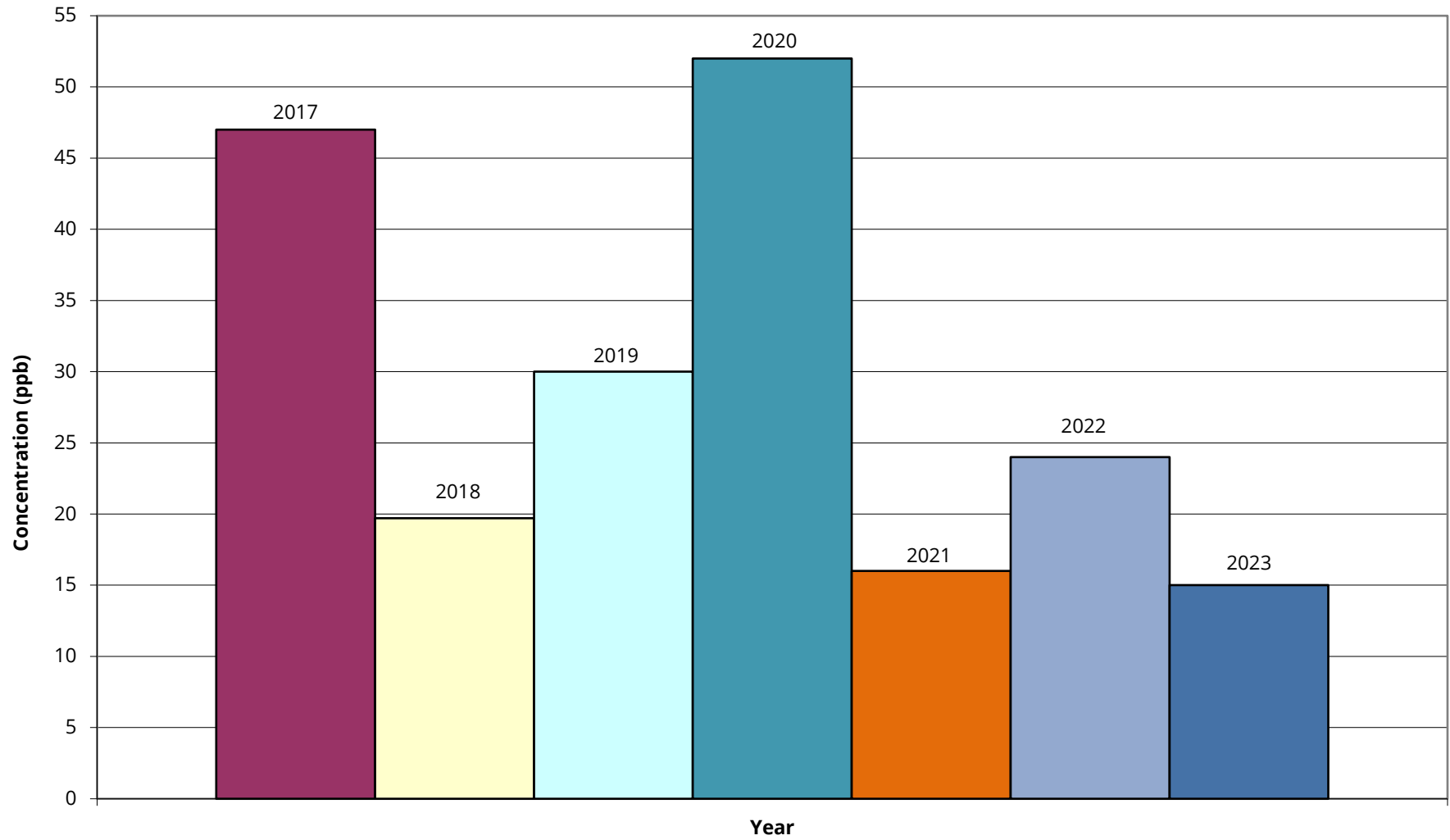


TRS
Monthly Maximum Half-Hour Averages Comparison
2017 - 2023
Bailey Station (MECP ID 63510)

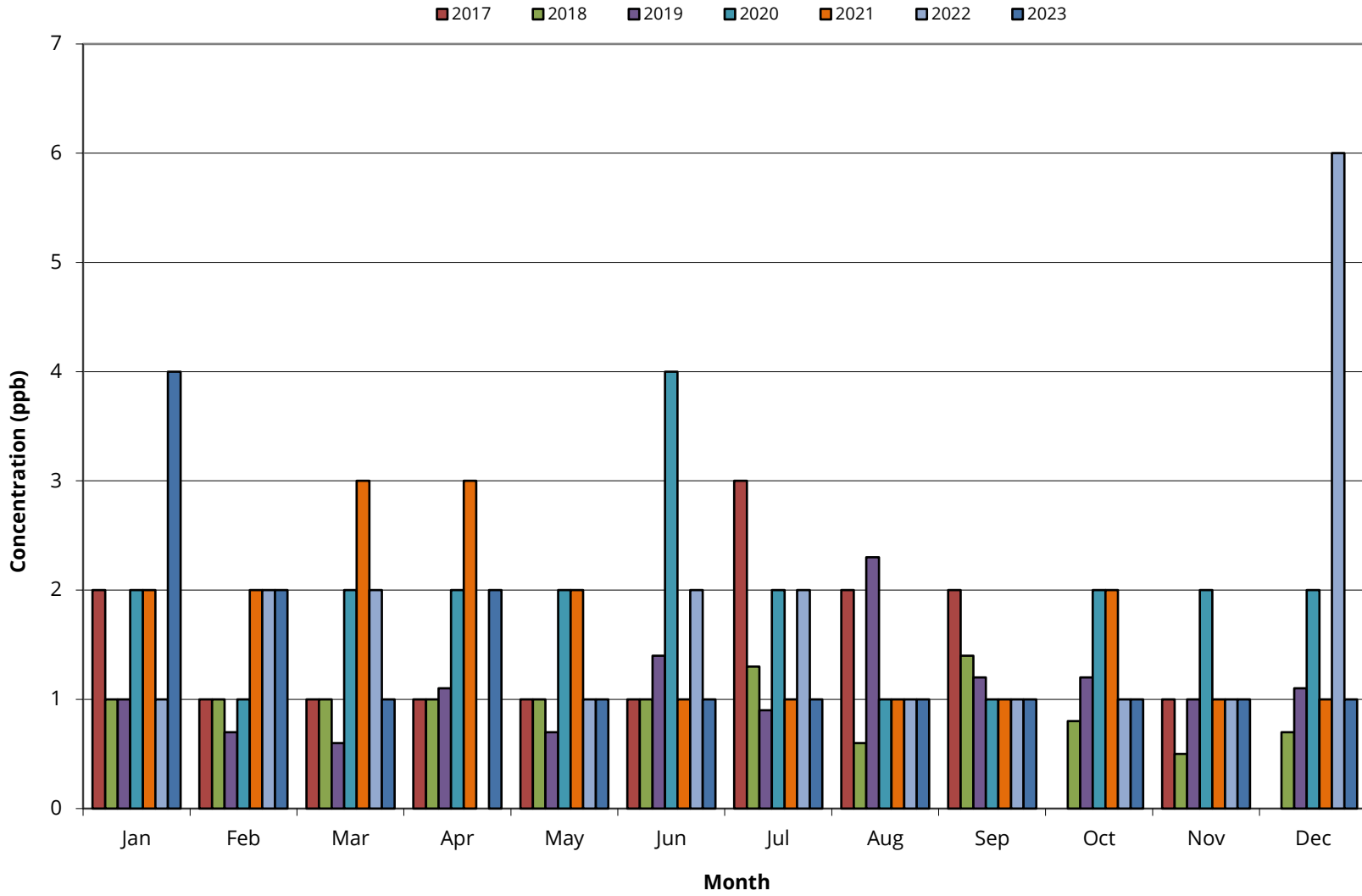
2017 2018 2019 2020 2021 2022 2023



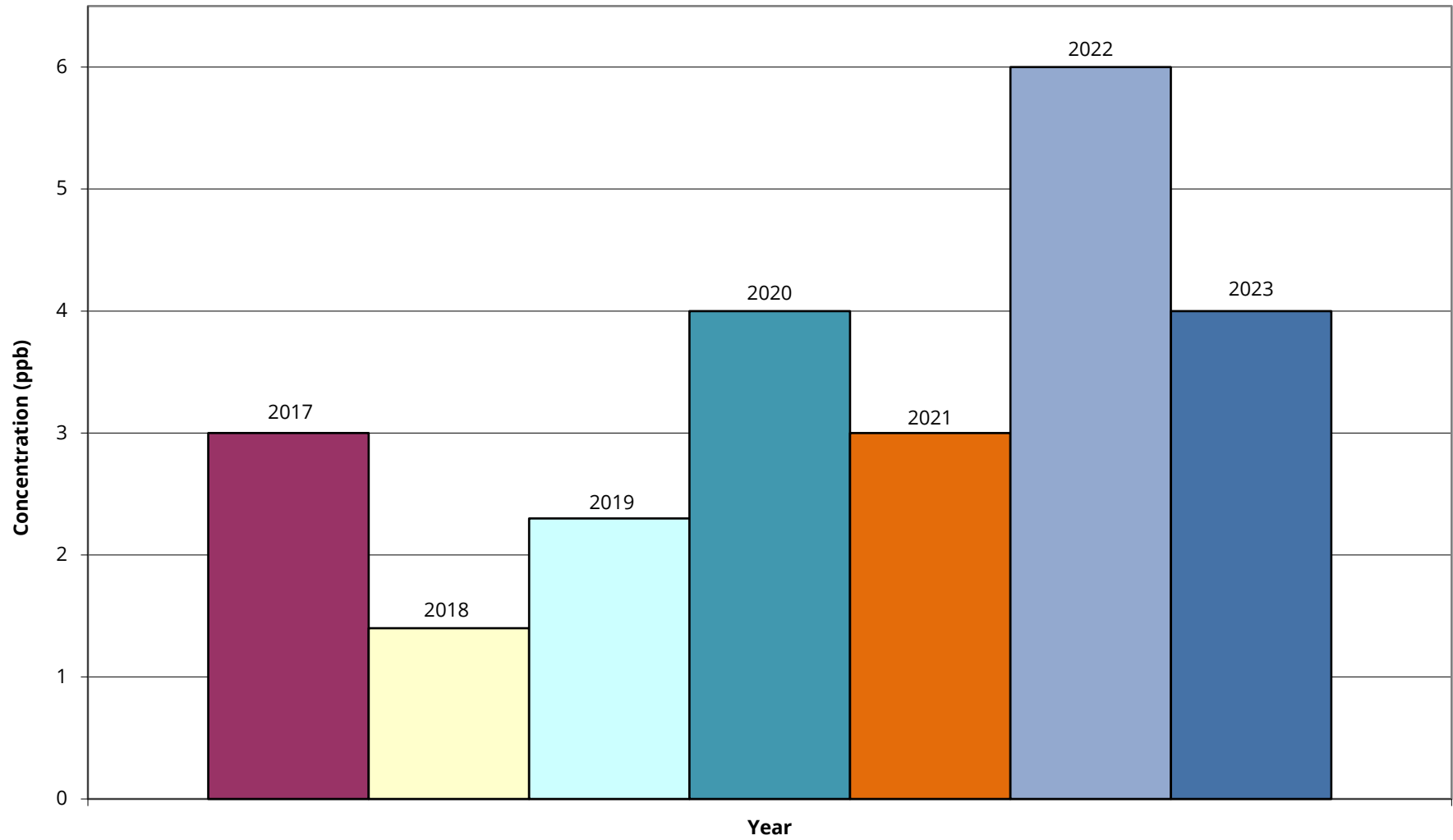
TRS
Annual Maximum Half-Hour Concentrations Recorded
2017 - 2023
Bailey Station (MECP ID 63510)



TRS
Monthly Maximum 24-Hour Averages Comparison
2017 - 2023
Bailey Station (MECP ID 63510)



TRS
Annual Maximum 24-Hour Concentrations Recorded
2017 - 2023
Bailey Station (MECP ID 63510)



Thunder Bay Pulp and Paper
Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Total Reduced Sulphur (TRS) - Data Summary
Bailey Station - MECP ID 63510

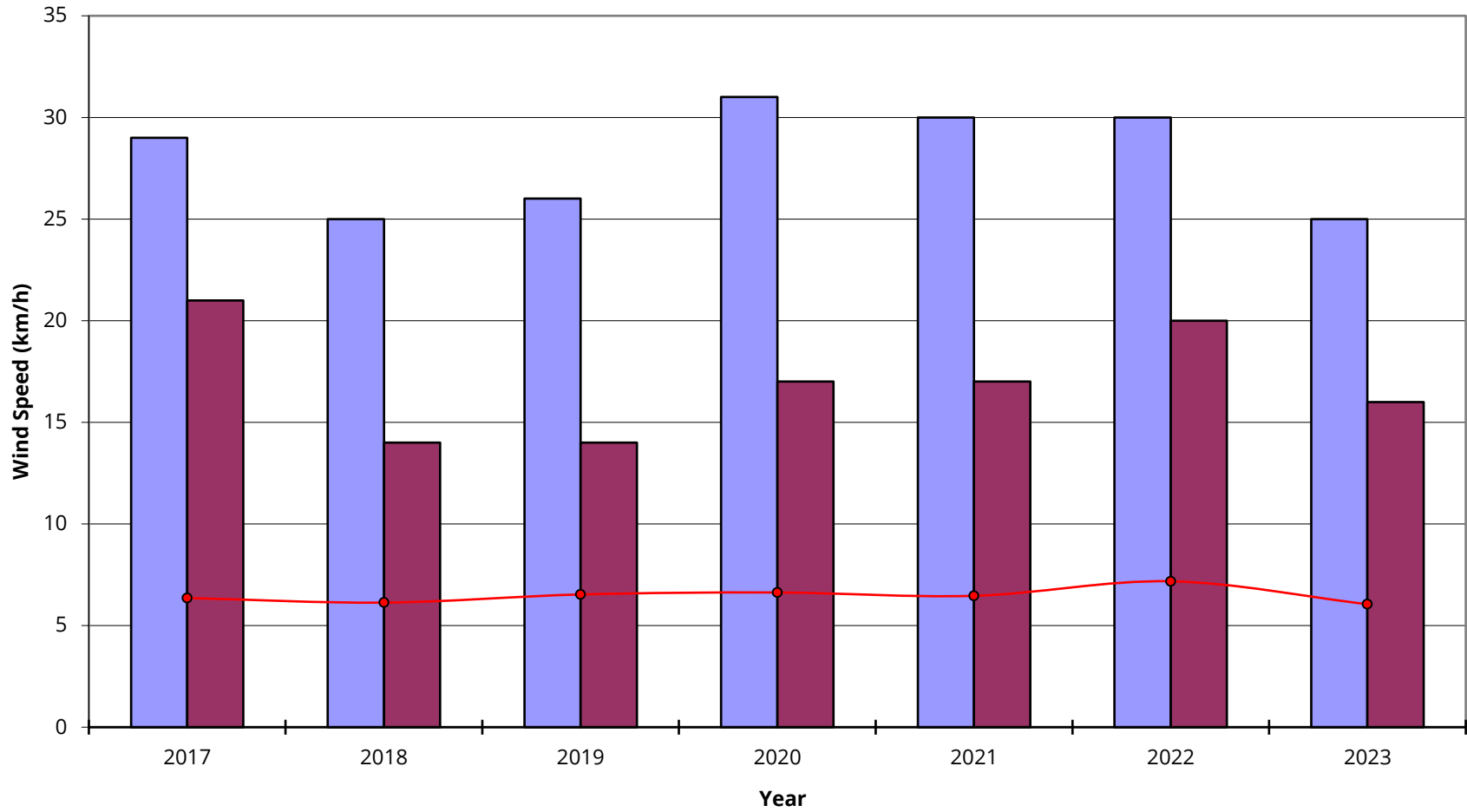
Continuous Ambient Monitoring - TRS (ppb)																												
Month	Maximum Rolling 10-Minute ^a Concentrations							Maximum Half-Hour ^{b,c} Concentrations							Maximum 24-Hour ^{c,d} Concentrations							Monthly Mean ^c Concentrations						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Jan	40	5	9.0	14	17	8	18	33	3	8.0	9	13	8	15	2	1	1.0	2	2	1	4	0.2	0.1	0.3	0.3	0.8	0.4	0.6
Feb	9	4	6.9	13	12	9	8	7	3	3.9	9	9	7	8	1	1	0.7	1	2	2	2	0.1	0.1	0.2	0.4	0.7	0.5	0.5
Mar	12	12	9.0	31	18	14	5	7	5	5.6	15	15	10	5	1	1	0.6	2	3	2	1	0.1	0.2	0.2	0.5	0.5	0.5	0.3
Apr	15	22	109.2	16	18	3	8	9	17	18.5	12	16	2	8	1	1	1.1	2	3	0	2	0.2	0.2	0.4	0.4	0.5	0.1	0.2
May	65	8	10.8	22	12	27	4	29	6	5.5	15	10	20	3	1	1	0.7	2	2	1	1	0.2	0.2	0.2	0.4	0.3	0.2	0.2
Jun	36	6	12.5	70	7	10	4	20	3	9.6	52	3	9	4	1	1	1.4	4	1	2	1	0.2	0.1	0.3	0.5	0.3	0.4	0.3
Jul	82	13.3	13.3	19	4	6	5	47	11.2	5.2	12	3	6	3	3	1.3	0.9	2	1	2	1	0.3	0.3	0.3	0.5	0.4	0.5	0.2
Aug	28	16.2	42.9	6	7	4	5	10	8.8	30.0	5	5	3	5	2	0.6	2.3	1	1	1	1	0.3	0.2	0.6	0.3	0.2	0.2	0.3
Sep	14	31.5	24.2	17	7	8	5	11	19.7	9.3	8	6	7	5	2	1.4	1.2	1	1	1	1	0.3	0.4	0.2	0.4	0.4	0.2	0.2
Oct	7	9.5	11.2	66	16	4	3	5	6.9	9.4	33	14	4	3	0	0.8	1.2	2	2	1	1	0.1	0.2	0.2	0.5	0.3	0.2	0.3
Nov	14	4.7	5.1	51	6	6	4	10	3.8	3.6	36	5	6	2	1	0.5	1.0	2	1	1	1	0.1	0.1	0.3	0.3	0.2	0.3	0.1
Dec	5	8.2	8.0	14	6	25	6	4	4.7	6.5	11	6	24	4	0	0.7	1.1	2	1	6	1	0.1	0.2	0.4	0.5	0.2	0.7	0.1
Average	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0.2	0.2	0.3	0.4	0.4	0.3	0.3
Max	82	31.5	109.2	70	18	27	18	47	19.7	30.0	52	16	24	15	3	1.4	2.3	4	3	6	4	0.3	0.4	0.6	0.5	0.8	0.7	0.6

- Notes:** The 2016 averages have been removed from the annual report and have been archived.
Starting February 1, 2013 10-minute data was phased in as a reportable requirement for exceedances by the MECP.
From July 1, 2018 until December 31, 2020 statistical TRS averages were reported to one (1) decimal place.
^a - The rolling 10-minute maximum is the maximum 10-minute period averaged over every 5 minute interval.
^b - The clock-based half-hour maximum is the maximum half-hour period averaged over every clock-based half-hour.
^c - Calculated using clock-based half-hour data.
^d - 24-hour concentrations refer to daily averages from midnight to midnight.

2017 - 2023 Maximum TRS Annual Data Summary - MECP Stn ID 63510	
The maximum 10-minute concentration was 109.2 ppb, this event occurred in April of 2019.	
The maximum half-hour concentration was 52 ppb, this event occurred in June of 2020.	
The maximum 24-hour concentration was 6 ppb, this event occurred in December of 2022.	

**Wind Speed
Annual Summary
2017 - 2023
Bailey Station (MECP ID 63510)**

Max Half-Hr Avg Max 24-Hr Avg Annual Avg



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APPENDIX G

**Thunder Bay Pulp and Paper
Non-Continuous Sampling: 2017 - 2023 Quarterly Data Comparisons
Total Suspended Particulate (TSP) Matter**

Frederica Station - MECP ID 63500

	Quarterly Geometric Mean							Maximum 24-Hr Sample							Minimum 24-Hr Sample						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
1st Quarter	20.4	21.5	14.8	14.7	21.9	8.5	15.3	63.2	73.0	42.1	45.9	57.5	15.2	47.4	8.4	7.5	6.2	3.2	6.0	3.2	1.5
2nd Quarter	38.9	54.4	39.8	30.2	30.2	32.3	42.7	76.8	99.8	74.3	73.0	74.7	90.6	114.3	19.2	36.3	14.0	10.8	10.1	8.8	9.7
3rd Quarter	37.2	40.3	31.0	23.3	35.7	28.9	47.3	75.8	78.9	76.8	65.2	70.8	70.0	86.4	14.9	12.4	3.6	9.4	15.1	12.2	20.0
4th Quarter	21.6	15.3	14.5	17.1	14.8	10.6	15.4	50.8	31.7	42.2	35.9	48.0	52.0	51.5	6.7	3.5	4.9	7.2	4.1	1.5	2.9
Max	38.9	54.4	39.8	30.2	35.7	32.3	47.3	76.8	99.8	76.8	73.0	74.7	90.6	114.3	x	x	x	x	x	x	x
Min	20.4	15.3	14.5	14.7	14.8	8.5	15.3	x	x	x	x	x	x	x	6.7	3.5	3.6	3.2	4.1	1.5	1.5

Bailey Station - MECP ID 63510

	Quarterly Geometric Mean							Maximum 24-Hr Sample							Minimum 24-Hr Sample						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
1st Quarter	20.4	24.5	16.3	16.9	26.4	9.8	18.0	104.0	108.5	46.3	50.0	59.7	23.2	63.2	8.9	8.7	6.9	4.9	9.6	3.0	4.1
2nd Quarter	46.3	64.4	43.1	31.7	32.6	28.5	47.7	112.5	99.2	87.5	93.7	61.4	104.5	129.4	20.3	41.8	13.0	9.6	8.5	9.2	10.5
3rd Quarter	39.9	42.0	39.4	24.8	37.9	31.1	39.9	77.9	77.5	96.8	48.0	79.2	65.6	83.4	19.0	13.5	6.6	10.5	12.7	9.4	18.3
4th Quarter	20.1	16.1	14.4	22.2	15.2	11.3	17.5	65.3	41.6	32.8	54.0	61.4	57.4	59.1	5.9	6.8	5.9	7.6	6.1	1.5	3.0
Max	46.3	64.4	43.1	31.7	37.9	31.1	47.7	112.5	108.5	96.8	93.7	79.2	104.5	129.4	x	x	x	x	x	x	x
Min	20.1	16.1	14.4	16.9	15.2	9.8	17.5	x	x	x	x	x	x	x	5.9	6.8	5.9	4.9	6.1	1.5	3.0

Ambient Air Quality Criteria (AAQC):

24-Hr AAQC: 120 µg/m³

Annual Geometric Mean AAQC: 60 µg/m³

Thunder Bay Pulp and Paper
Non-Continuous Sampling: 2017 - 2023 Annual Data Comparisons
Total Suspended Particulate (TSP) Matter

	Valid Data Collected							Maximum 24-Hr Sample							No. of Samples > 24-Hr AAQC						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Frederica	100%	100%	100%	97%	100%	93%	100%	76.8	99.8	76.8	73.0	74.7	90.6	114.3	0	0	0	0	0	0	0
Bailey	97%	100%	97%	95%	93%	97%	98%	112.5	108.5	96.8	93.7	79.2	104.5	129.4	0	0	0	0	0	0	1

	Annual Geometric Mean							Annual Geometric Mean > AAQC						
	2017	2018	2019	2020	2021	2022	2023	2017	2018	2019	2020	2021	2022	2023
Frederica	28.4	29.3	22.8	20.5	24.1	17.3	26.3	No	No	No	No	No	No	No
Bailey	29.8	32.3	25.3	23.2	26.8	17.6	28.0	No	No	No	No	No	No	No

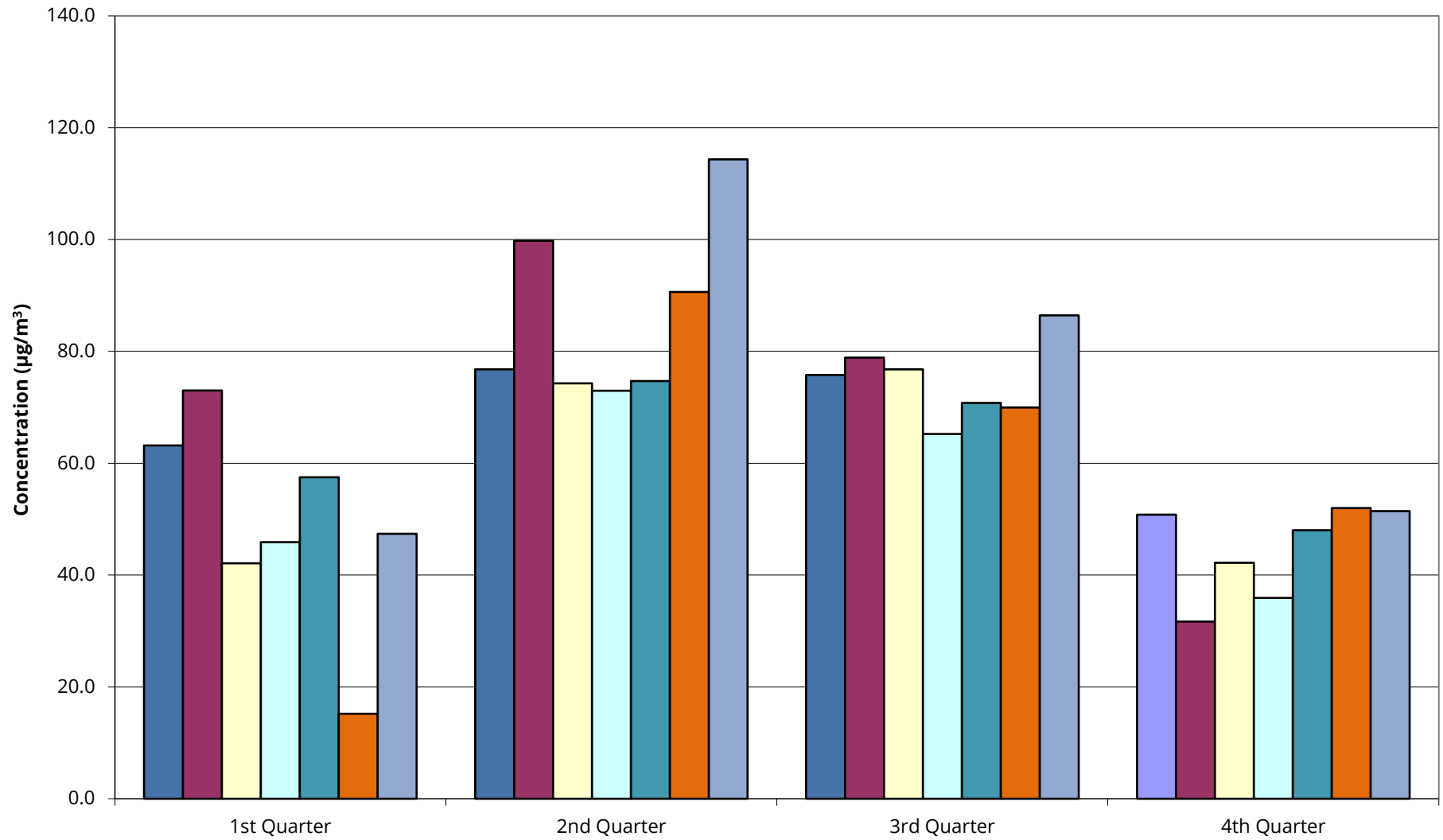
Ambient Air Quality Criteria (AAQC):

24-Hr AAQC: 120 µg/m³

Annual Geometric Mean AAQC: 60 µg/m³

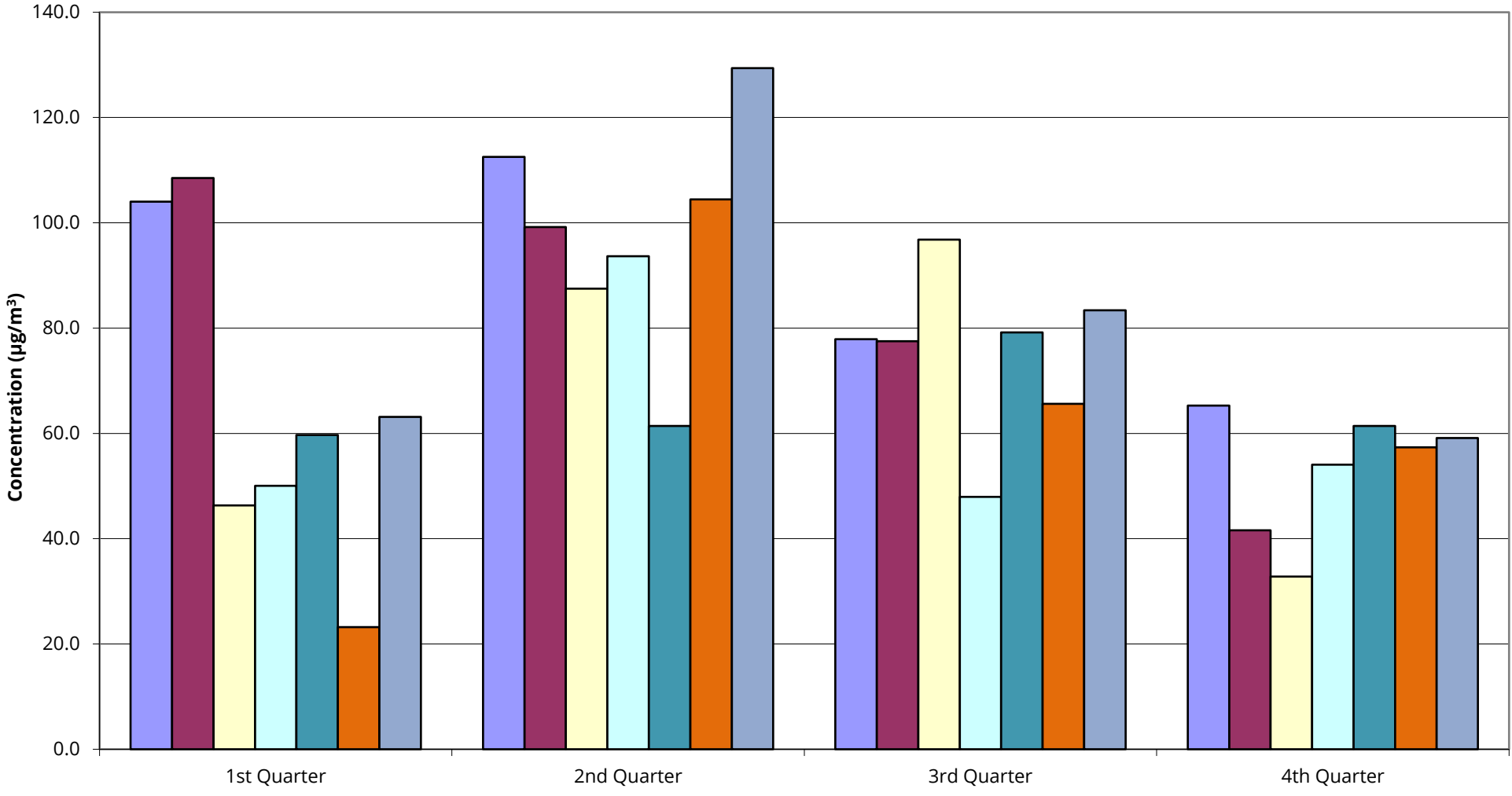
**TSP (Total Suspended Particulate)
Quarterly Maximum 24-Hr Sample Comparison
2017 - 2023
Frederica Station (MECP ID 63500)**

■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023

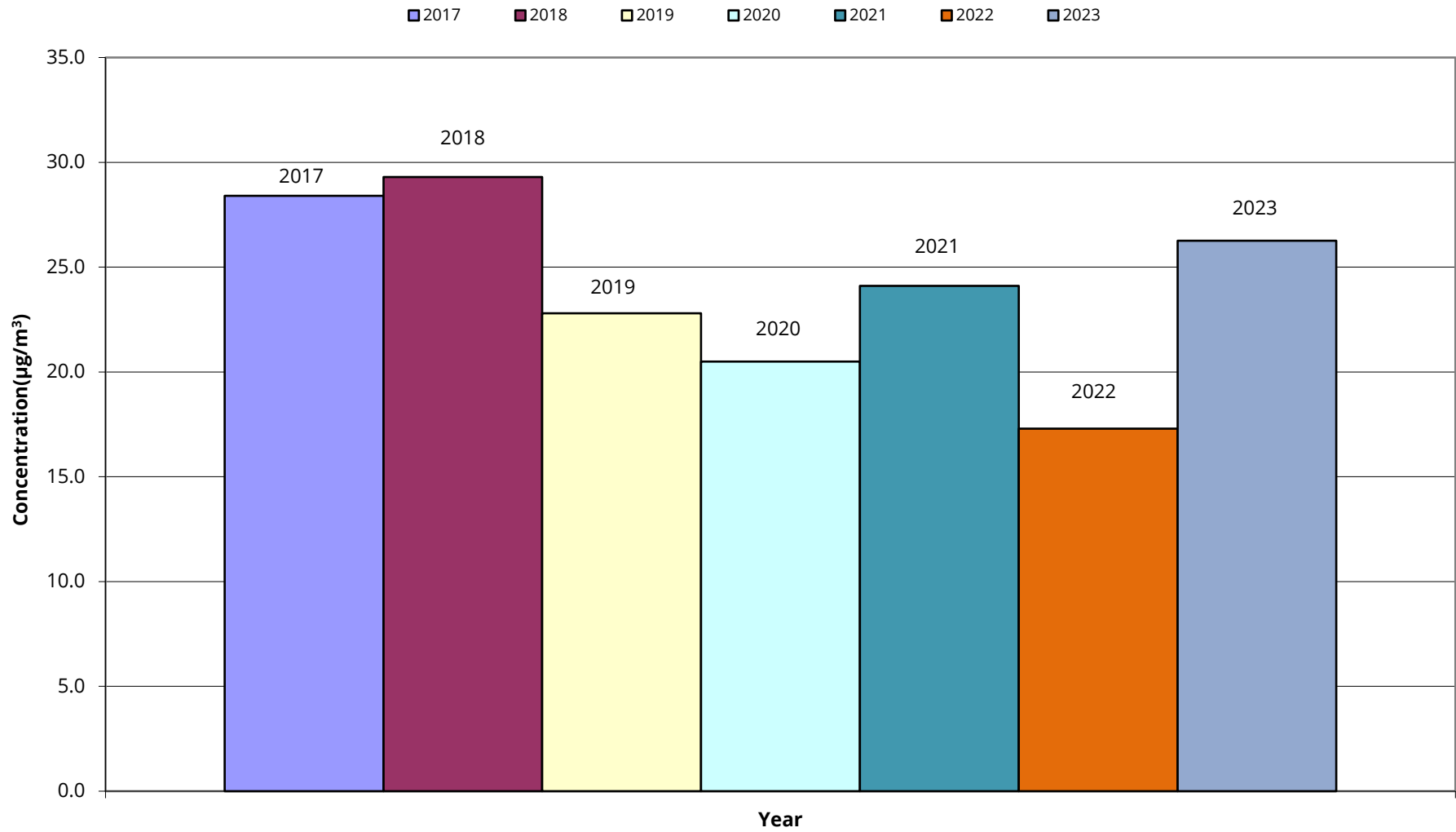


**TSP (Total Suspended Particulate)
Quarterly Maximum 24-Hr Sample Comparison
2017 - 2023
Bailey Station (MECP ID 63510)**

■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023



**TSP (Total Suspended Particulate)
Annual Geometric Mean Comparison
2017 - 2023
Frederica Station (MECP ID 63500)**



**TSP (Total Suspended Particulate)
Annual Geometric Mean Comparison
2017 - 2023
Bailey Station (MECP ID 63510)**

■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023

