



**Lakeland Industry & Community Association**

**DECEMBER 2023**

**Monthly Ambient Air Quality Monitoring Report**

**LICA-202312**

**Operation and Maintenance:**

Bureau Veritas Canada

**Data Validation and Report:**

Lakeland Industry & Community Association

January 15, 2024

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**January 15, 2024**

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11th Floor, Oxbridge Place

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Edmonton, AB, T5K 2J6

**RE: LICA – December 2023 Monthly Ambient Air Quality Monitoring Report**

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Enclosed is the December 2023 Monthly Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Lakeland Industry & Community Association (LICA) regional air quality monitoring network.

The representative of the Person Responsible for this monitoring program is

LICA Airshed

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This report has been reviewed by Michael Bisaga of the LICA Airshed.

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## LIST OF ACRONYMS

AAAQOs	Alberta Ambient Air Quality Objectives
AEP	Alberta Environment and Parks
AMD	Air Monitoring Directive
AT	Ambient Temperature
BP	Barometric Pressure
CH <sub>4</sub>	Methane
EPEA	Environmental Protection and Enhancement Act
H <sub>2</sub> S	Hydrogen Sulphide
kph	kilometers per hour
LICA	Lakeland Industry & Community Association
mb	millibar
mm	millimeter
NMHC	Non-Methane Hydrocarbons
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Oxide of Nitrogen
PAC	Polycyclic Aromatic Compounds
ppb	parts per billion
ppm	parts per million
RH	Relative Humidity
SO <sub>2</sub>	Sulphur Dioxide
ST	Station Temperature
STDWD	Standard Deviation Wind Direction
THC	Total Hydrocarbons
TRS	Total Reduced Sulphur
VWD	Vector Wind Direction
VWS	Vector Wind Speed
WD	Wind Direction
WS	Wind Speed
°C	Degrees Celsius

NETWORK STATION SUMMARY

Listing of Continuous Monitoring Stations and Integrated Sampling Stations

Station Name		Cold Lake South	Tamarack	St. Lina	Lac La Biche
Station ID		1174	1248	1250	1690
Coordinates		54.41402	54.604935	54.215961	54.76516
		-110.23316	-110.452637	-111.503304	-111.9714490
Continuous Monitoring Parameter	SO2	√	√	√	√
	H2S		√	√	√
	TRS	√			
	NOX	√	√	√	√
	NOX	√	√	√	√
	NO2	√	√	√	√
	O3	√	√	√	√
	THC	√	√	√	√
	CH4	√	√	√	√
	NMHC	√	√	√	√
	RH	√	√	√	√
	BP	√	√	√	√
	AT	√	√	√	√
	ST	√	√	√	√
	PRECEIPITATION		√	√	
	WS	√	√	√	√
	WD	√	√	√	√
STDWD	√	√	√	√	
Integrated Sampling	VOCs	√			
	PAHs	√			
	Partisol	√			
	Passive	√			√
	NMHC Canister				√
	PAC			√	

**List of Contractors performing air monitoring activities**

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Prepared By	Electronic Submission Conducted By
Continuous Monitoring Station	Bureau Veritas Canada	Bureau Veritas Canada	LICA / Bureau Veritas Canada	LICA
Intermittent ( VOCs/PAHs)	Bureau Veritas Canada	InnoTech Alberta Inc	InnoTech Alberta Inc	LICA
Partisol	Bureau Veritas Canada	InnoTech Alberta Inc	InnoTech Alberta Inc	LICA
Passive	Bureau Veritas Canada	Bureau Veritas Canada	Bureau Veritas Canada	LICA
PAC	Bureau Veritas Canada	ECCC	AEP	Not Applicable
NMHC Canister	Bureau Veritas Canada	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable

**Monitoring Notes during the Month of December 2023**

**Cold Lake South**

- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) and/or Alberta Ambient Air Quality Guidelines (AAAQGs) where applicable.
- An internal station audit was conducted by Bureau Veritas on December 6 and December 7. No major issues were identified. The audit results were included in the calibration report.
- **PM2.5:** A firmware update was completed, and a new alignment factor was activated on the T640 analyzer on December 20.

**Tamarack**

- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) and/or Alberta Ambient Air Quality Guidelines (AAAQGs) where applicable, except PM2.5. One 1-hour PM2.5 exceedance was recorded this month. The exceedance of the PM2.5 guideline on December 12 is believed to be the result of low wind speeds and an active excavation near the station.

Date	Time (MST)	Parameter	Average Period	Concentration ( $\mu\text{g}/\text{m}^3$ )	Wind speed (km/hr)	Wind Direction	Reference #
12-Dec	10	PM2.5	1-Hour	159	2.9	217°(SW)	422981

- An internal station audit was conducted by Bureau Veritas on December 12 and December 13. No major issues were identified. The audit results were included in the calibration report.

### St. Lina Station

- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime.
- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) and/or Alberta Ambient Air Quality Guidelines (AAAQGs) where applicable.
- An internal station audit was conducted by Bureau Veritas on December 5 and December 6. No major issues were identified. The audit results were included in the calibration report.

### Lac La Biche Station

- All data collected this month were compliant with the requirements outlined in the AMD 2016.
- All parameters met the 90% operational uptime requirement.
- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) and/or Alberta Ambient Air Quality Guidelines (AAAQGs) where applicable.
- An internal station audit was conducted by Bureau Veritas on December 14 and December 15. No major issues were identified. The audit results were included in the calibration report.
- **THC/CH4/NMHC:** The Teledyne 701 zero air generator, s/n: 1813, was replaced with the Teledyne T701H, s/n: 1110, on December 14.
- **H2S:** The daily span check results failed between December 5 and December 7. It was caused by higher case temperatures affecting permeation gas temperature stability rather than an issue with the analyzer itself. This issue was corrected on December 7. Data quality was not affected by this issue.
- **O3:** The analyzer failed the daily zero-span checks from December 21 onwards. The problem was traced to the failed zero-span pump, and it was corrected in January 2024. The issue did not affect the analyzer's performance.

### Integrated Sampling

All the integrated sampling analytical results are included in the December 2023 Integrated Sampling Report.

- **VOCs Sampling System:**
  - The VOC sampler is programmed to collect a 24-hour sample of air every sixth day as per the National Air Pollution Surveillance schedule (NAPS).
  - Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
  - Five samples were collected this month: on December 2, 8, 14, 20 and 26.
- **PAHs Sampling System:**
  - The PUF sampler is programmed to collect a 24-hour sample of air every sixth day as per the National Air Pollution Surveillance schedule (NAPS).

- Measured parameters were below Alberta Ambient Air Quality Objectives (AAAQOs) where applicable.
- Five samples were collected this month: on December 2, 8, 14, 20 and 26.
- **Passive Sampling System:**
  - There were no exceedances of the AAAQOs for all monitored parameters at any of the passive stations during this month.
  - The passive sample filters were installed at the stations between November 30 and December 2, and were removed between December 30, 2023 and January 3, 2024.
  - A total of 13 duplicate samples were collected: 2 for H<sub>2</sub>S, 3 for SO<sub>2</sub>, 2 for NO<sub>2</sub>, 2 for O<sub>3</sub>, 2 for HNO<sub>3</sub> and 2 for NH<sub>3</sub>.
- **PAC Sampling System:**
  - The PAC sampling program began in December 2019, and is designed to collect a 2-month integrated sample.
  - The media for the November/December monitoring period were installed between October 29 and November 3. The media were removed between December 30, 2023 and January 3, 2024.
  - The media for the January/February 2024 monitoring period were installed between December 30, 2023 and January 3, 2024. The media are scheduled to be removed by the end February.
- **NMHC canister Sampling System:**
  - The canister sampling program collects a 1-hour sample of air when the continuously non-methane hydrocarbon (NMHC) concentration reaches a specified trigger point. The current trigger point is 0.3 ppm and is based on real-time monitoring data that are averaged over a 5-minute period.
  - Two canister events were recorded this month; the canister system was triggered on December 7 at 12:10 when the NMHC concentration reached to 0.68ppm at 12:05, and on December 14 at 08:45 when the NMHC concentration reached to 0.92ppm at 08:40.
  - To address issues of missing canister events, which occurred earlier this year, a pressure sensor was installed on the canister system on December 15. The pressure sensor is connected to the datalogger, so the pressure changes can be monitor daily. Alerts/ notifications are also setup to enhance the canister system's reliability.

**Revisions to Alberta’s Ambient Air Quality Data Warehouse**

**St. Lina:** THC/CH4/NMHC data collected between August 13 hour 14 and September 26 hour 15 were reviewed and revised during annual data review. It was noticed that NMHC noises were recorded by the Thermo 55i analyzer, s/n: 1180030034, after August 13’s monthly calibration. As the analyzer passed daily zero-span checks each day, August 18’s repeat multi-point calibration and August 25’s shut-down calibration, data were deemed valid during the monthly report preparation. The replacement Thermo 55i analyzer, s/n: 1236656107, were installed following a successful installation calibration on August 26. Elevated NMHC concentration continued being record until the zero-air generator was replaced on September 26. During annual data review, it was determined that data collected between August 13 hour 14 and September 26 hour 15 were more likely analyzer’s noise and therefore were invalidated.

Month	Operational Uptime (%)	EDGE # / DINC #	ETS Request #	Notes
August	40.7	EDGE419572	4630622	Event was reported to AEPA and EDGE # were received in September 2023.
September	10.8	DINC0003583	4630625	Event was reported to AEPA and DINC # were received in January 2024.

**Tamarack:** THC/CH4/NMHC data collected between September 17 hour 15 and October 19 hour 15 were reviewed and revised during annual data review. It was noticed that elevated NMHC concentrations were recorded by the Thermo 55i analyzer, s/n: 1180030034 after the analyzer’s installation calibration on September 17. The analyzer was removed from the station following a successful shut-down calibration on October 19. As the analyzer passed daily zero-span checks each day, September 17’s installation calibration and October 19’s shut-down calibration, data were deemed valid during the monthly report preparation. However, during annual data review which was conducted in January 2024, it was determined that data collected between September 17 hour 15 and October 19 hour 15 were more likely analyzer’s noise and therefore were invalidated.

Month	Operational Uptime (%)	EDGE # / DINC #	ETS Request #	Notes
September	46.9	DINC0003584	4630625	Event was reported to AEPA and DINC # were received in January 2024.
October	37.4	DINC0003584	4630628	Event was reported to AEPA and DINC # were received in January 2024.



## **Deviations from Authorized Monitoring Methods**

No deviations from authorized monitoring methods were recorded this month.

## **Disclaimer**

Baseline correction were performed on the 1-minute data. 5-minute and hourly data were calculated based on the post-baseline correction 1-minute data set. Data verification/validation were then performed on the 5-minute and hourly data. Hourly data that are included in this report are the post-validation hourly data set.

Equipment calibration / maintenance records were provided by Bureau Veritas Canada.

## Certification

This report was prepared and submitted by Lily Lin in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).



Lily Lin, Data & Reporting Specialist, LICA Airshed

This report was reviewed by Michael Bisaga in accordance with Chapter 9 of the Air Monitoring Directive (AMD 2016).

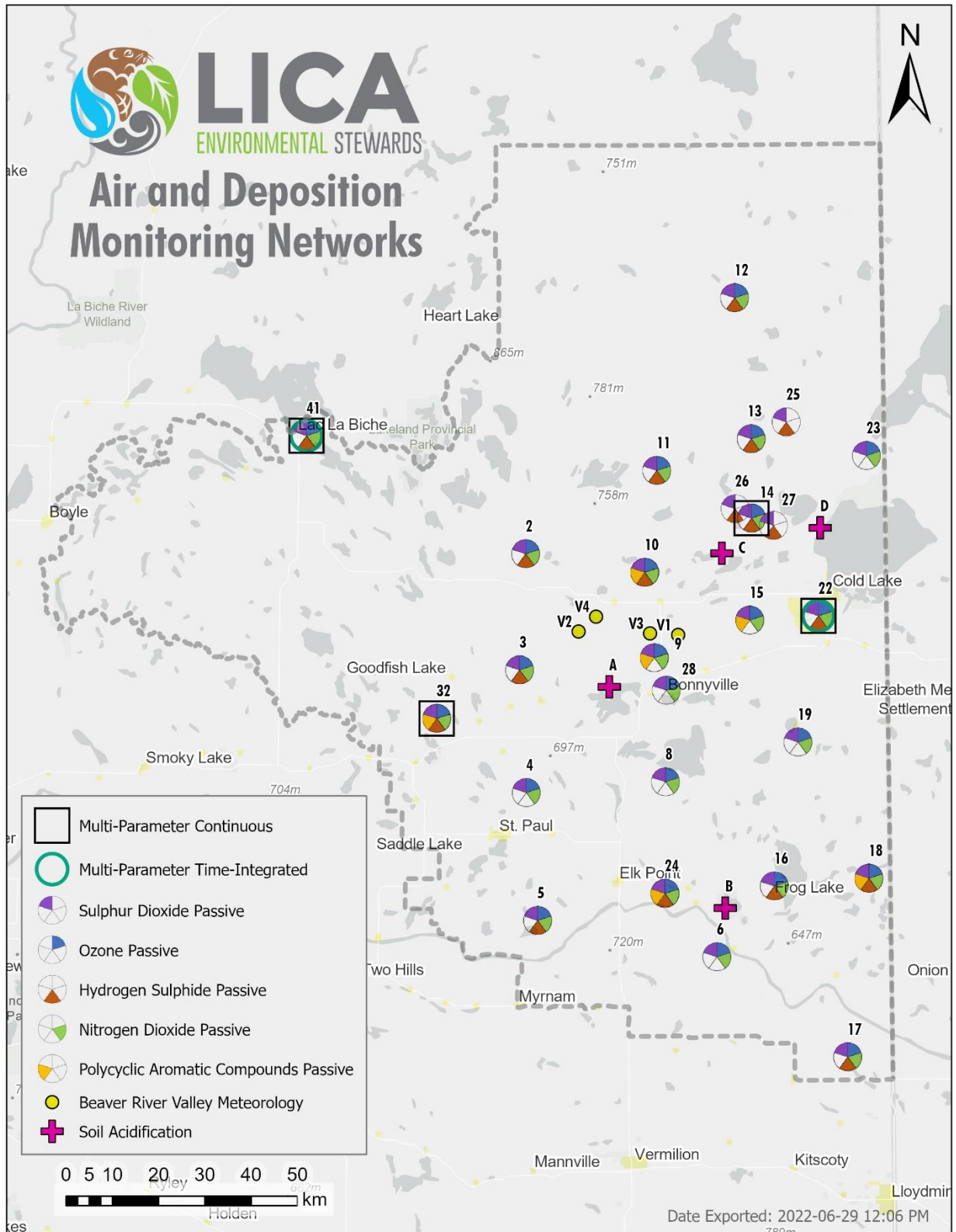
I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe and the specified analysis, summarization and reporting requirements. I also certify that at the time of this report's submission, all air data have been electronically uploaded to Alberta's Ambient Air Quality Data Warehouse as required by the AMD. Uploading of VOC data from the canister sampling program was not required at the time of completing this report.



Michael Bisaga, Monitoring Programs Manager, LICA Airshed

January 15, 2024

# Map of LICA Continuous Monitoring Network



## CONTINUOUS NETWORK EQUIPMENT AND MONITORING RESULTS SUMMARY

### Cold Lake South Station

#### Equipment Operation Summary

Parameter	Calibration Date	Equipment Operational Summary
<b>SO2</b>  Thermo 43i-TLE #1180260018	December 7, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified.</li> <li>An internal station audit was conducted by BV on December 6 and December 7. An audit was performed on the analyzer on December 6. No major issues were identified.</li> </ul>
<b>TRS</b>  Thermo 450i #812728560  <b>TRS convertor</b> CD Nova CDN-101 #501	December 7, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified.</li> <li>An internal station audit was conducted by BV on December 6 and December 7. An audit was performed on the analyzer on December 6. No major issues were identified.</li> </ul>
<b>NOx/NO/NO2</b>  Thermo 42i #1505664393	December 6, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified.</li> <li>An internal station audit was conducted by BV on December 6 and December 7. An audit was performed on the analyzer on December 6. No major issues were identified.</li> </ul>
<b>O3</b>  Thermo 49iQ #12208316585	December 7, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified.</li> <li>An internal station audit was conducted by BV on December 6 and December 7. An audit was performed on the analyzer on Dec 7. No major issues were identified.</li> </ul>
<b>THC/CH4/NMHC</b>  Thermo 55i #1180930025  <b>H2 Generator</b> HG300 #210567071	December 7, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified.</li> <li>An internal station audit was conducted by BV on December 6 and December 7. An audit was performed on the analyzer on December 6. No major issues were identified.</li> <li>A new span gas cylinder was installed on December 30. An additional zero-span check was completed afterwards to obtain a new span expected value. Two hours of downtime were recorded.</li> </ul>

Parameter	Calibration Date	Equipment Operational Summary
<b>PM2.5</b>  Teledyne T640 #575	December 27, 2023	<ul style="list-style-type: none"> <li>• Due to COMMS issues, data collected between December 15 hour 13 and December 16 hour 18 were lost. The analyzer was reset to restore the system. Thirty hours of downtime were recorded due to this event.</li> <li>• A firmware update was completed, and a new alignment factor was activated on the T640 analyzer on December 20.</li> </ul>
Parameter	Verification Date	Equipment Operational Summary
<b>RH</b>  Rotronic HC2A-S3 #20257103	December 6, 2023	<ul style="list-style-type: none"> <li>• No operational issues were identified.</li> <li>• An internal station audit was conducted by BV on December 6 and December 7. A meteorological system audit was completed on December 6. No major issues were identified.</li> </ul>
<b>BP</b>  Met One 092 #Y23368	December 6, 2023	<ul style="list-style-type: none"> <li>• No operational issues were identified.</li> <li>• An internal station audit was conducted by BV on December 6 and December 7. A meteorological system audit was completed on December 6. No major issues were identified.</li> </ul>
<b>AT</b>  Rotronic HC2A-S3 #20257103	December 6, 2023	<ul style="list-style-type: none"> <li>• No operational issues were identified.</li> <li>• An internal station audit was conducted by BV on December 6 and December 7. A meteorological system audit was completed on December 6. No major issues were identified.</li> </ul>
<b>ST</b>  COMET #NA	November 12, 2023	<ul style="list-style-type: none"> <li>• No operational issues were identified.</li> </ul>
<b>WS/WD/STDWD</b>  RM Young 05305AQ #177354	December 27, 2023	<ul style="list-style-type: none"> <li>• Wind direction data contained in this report represents where the wind is coming from.</li> <li>• An annual wind system calibration was completed on December 27, 2023.</li> <li>• An internal station audit was conducted by BV on December 6 and December 7. A meteorological system audit was completed on December 6. No major issues were identified.</li> <li>• The signal cable was damaged on December 17 hour 8. The repair was completed, and the instrument was back online on December 19 hour 10. Fifty hours of downtime were recorded due to this event.</li> </ul>

### Monitored Data Summary for Cold Lake South Station

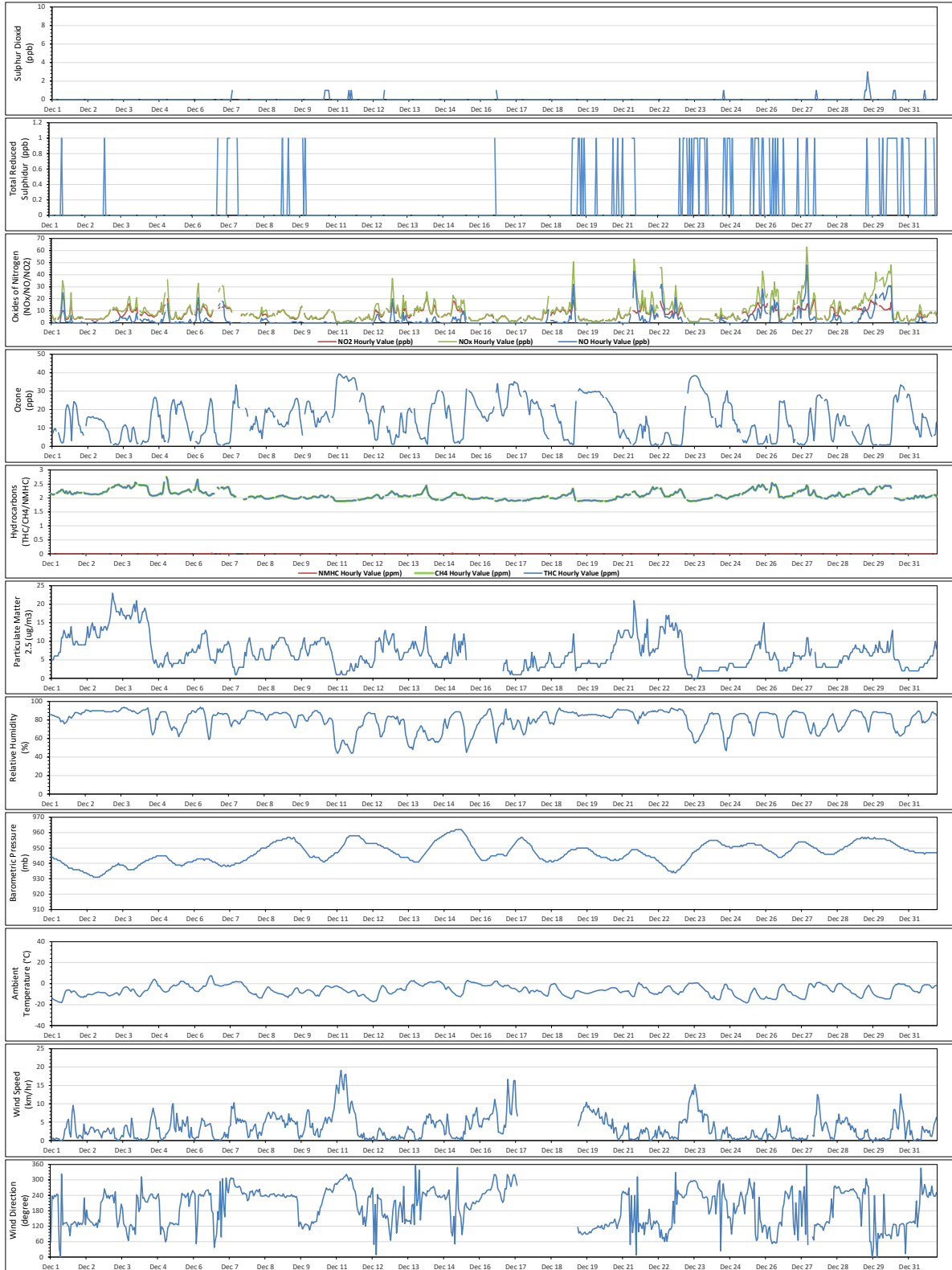
Parameter	Objectives/Guidelines			Exceedances			Monthly Avg.	Min. 1-hr	Max. 1-hr	Date/Time	VWS (km/hr)	VWD (sector)	Max. 24-hr	Date	Operational Uptime (%)	Valid Data (%)
	1-hr	24-hr	30-day	1-hr	24-hr	30-day										
SO2 (ppb)	172	48	11	0	0	0	0.0	0	3	Dec 29 at hr 13	3.1	W	0.3	Dec 29	100.0	94.6
TRS (ppb)	-	-	-	-	-	-	0.1	0	1	Dec 1 at hr 10	0.7	SE	0.7	Dec 23	100.0	94.6
NOx (ppb)	-	-	-	-	-	-	10.0	0	63	Dec 27 at hr 10	0.3	N	20.7	Dec 29	100.0	94.1
NO (ppb)	-	-	-	-	-	-	2.9	0	48	Dec 27 at hr 10	0.3	N	11.5	Dec 30	100.0	94.1
NO2 (ppb)	159	-	-	0	-	-	7.1	0	22	Dec 14 at hr 3	6.8	SW	13.0	Dec 29	100.0	94.1
O3 (ppb)	76	-	-	0	-	-	14.7	0.4	39.5	Dec 11 at hr 1	12.8	WNW	34.1	Dec 11	100.0	95.0
THC (ppm)	-	-	-	-	-	-	2.11	1.89	2.75	Dec 5 at hr 1	1.9	ENE	2.41	Dec 3	99.7	94.2
CH4 (ppm)	-	-	-	-	-	-	2.11	1.89	2.75	Dec 5 at hr 1	1.9	ENE	2.41	Dec 3	99.7	94.2
NMHC (ppm)	-	-	-	-	-	-	0.00	0.00	0.03	Dec 6 at hr 15	1.4	S	0.00	Dec 6	99.7	94.2
PM2.5 (µg/m3)	80	29	-	0	0	-	7.0	0	23	Dec 3 at hr 3	3	SW	18.2	Dec 3	95.8	95.6
RH (%)	-	-	-	-	-	-	80.1	44	94	Dec 3 at hr 14	4.2	ESE	90.5	Dec 3	100.0	100.0
BP (millibar)	-	-	-	-	-	-	947	931	962	Dec 15 at hr 3	0.5	NE	956	Dec 15	100.0	100.0
Ext. Temp. (°C)	-	-	-	-	-	-	-6.3	-18.3	7.6	Dec 6 at hr 13	4.7	WSW	-0.6	Dec 14	100.0	100.0
Stn. Temp. (°C)	-	-	-	-	-	-	23.1	21.2	25.1	Dec 7 at hr 9	10.3	NW	24.0	Dec 7	100.0	100.0
WSV (km/hr)	-	-	-	-	-	-	1.4	0.0	19.1	Dec 11 at hr 3	19.1	WNW	9.0	Dec 11	93.3	92.9
WDV (sector)	-	-	-	-	-	-	231 (SW)	-	-	-	-	-	-	-	93.3	92.9

1- Date/ Time given is the first minimum and maximum value that was recorded

### Alberta Ambient Air Quality Objectives (AAQOs) Exceedances

The measured ambient air quality was within the AAQOs for all monitored parameters.

Timeseries Chart of Hourly Average for the month of Dec 2023 - Cold Lake South Station



## Tamarack Station

### Equipment Operation Summary

Parameter	Calibration Date	Equipment Operational Summary
<b>SO2</b>  Thermo 43i-TLE #1180930031	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. An audit was performed on the analyzer on December 12. No major issues were identified.</li> <li>Thirteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>H2S</b>  Thermo 450i #CM17360005	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. An audit was performed on the analyzer on December 12. No major issues were identified.</li> <li>Thirteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>NOx/NO/NO2</b>  Thermo 42i #1180930028	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. An audit was performed on the analyzer on December 12. No major issues were identified.</li> <li>Thirteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>THC/CH4/NMHC</b>  Thermo 55i #1505664392	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. An audit was performed on the analyzer on December 12. No major issues were identified.</li> <li>Thirteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>O3</b>  Thermo 49i #1002240371	December 13, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. An audit was performed on the analyzer on December 13. No major issues were identified.</li> <li>Thirteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>PM2.5</b>  Thermo Sharp 5030 #CM2209	December 13, 2023	<ul style="list-style-type: none"> <li>No major operational issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>



Parameter	Verification Date	Equipment Operational Summary
<b>RH</b>  Rotronic HC2A-S3 #20433166	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. A meteorological system audit was completed on December 12. No major issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>BP</b>  Met One 090D #F4497	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. A meteorological system audit was completed on December 12. No major issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>AT</b>  Rotronic HC2A-S3 #20433166	December 12, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 12 and December 13. A meteorological system audit was completed on December 12. No major issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>ST</b>  COMET #NA	November 22, 2023	<ul style="list-style-type: none"> <li>No major operational issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>Precipitation</b>  MetOne 387 #C13580	November 22, 2023	<ul style="list-style-type: none"> <li>No major operational issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>
<b>WS/WD/STDWD</b>  RM Young 05305VK #161465	December 12, 2023	<ul style="list-style-type: none"> <li>Wind direction data contained in this report represents where the wind is coming from.</li> <li>An annual wind system calibration was completed on September 17, 2023.</li> <li>An internal station audit was conducted by BV on December 12 and December 13. A meteorological system audit was completed on December 12. No major issues were identified.</li> <li>Fourteen hours of downtime were recorded due to intermittent polling errors this month.</li> </ul>

**Monitored Data Summary for Tamarack Site**

Parameter	Objectives/Guidelines			Exceedances			Monthly Avg.	Min. 1-hr	Max. 1-hr	Date/Time	VWS (km/hr)	VWD (sector)	Max. 24-hr	Date	Operational Uptime (%)	Valid Data (%)
	1-hr	24-hr	30-day	1-hr	24-hr	30-day										
SO2 (ppb)	172	48	11	0	0	0	0.6	0	12	Dec 11 at hr 5	10.9	NW	3.5	Dec 11	98.3	93.1
H2S (ppb)	10	3	-	0	0	-	0.1	0	10	Dec 7 at hr 1	1.6	S	1.0	Dec 7	98.3	93.1
NOx (ppb)	-	-	-	-	-	-	8.5	0	60	Dec 21 at hr 9	0.9	S	17.8	Dec 6	98.3	92.7
NO (ppb)	-	-	-	-	-	-	1.4	0	46	Dec 21 at hr 9	0.9	S	6.3	Dec 3	98.3	92.7
NO2 (ppb)	159	-	-	0	-	-	7.0	0	24	Dec 6 at hr 17	1.1	SSW	14.2	Dec 6	98.3	92.7
O3 (ppb)	76	-	-	0	-	-	18.1	0.4	39.1	Dec 11 at hr 8	8.7	NNW	31.3	Dec 11	98.3	93.1
THC (ppm)	-	-	-	-	-	-	2.11	1.93	5.13	Dec 7 at hr 1	1.6	S	2.38	Dec 3	98.3	93.1
CH4 (ppm)	-	-	-	-	-	-	2.10	1.93	2.69	Dec 7 at hr 1	1.6	S	2.38	Dec 3	98.3	93.1
NMHC (ppm)	-	-	-	-	-	-	0.01	0.00	2.44	Dec 7 at hr 1	1.6	S	0.23	Dec 7	98.3	93.1
PM2.5 (µg/m3)	80	29	-	1	0	-	6.0	1	159	Dec 12 at hr 10	2.9	SW	22.7	Dec 12	98.1	98.0
RH (%)	-	-	-	-	-	-	83.9	43	100	Dec 4 at hr 7	5.2	SSW	98.5	Dec 22	98.1	98.1
BP (millibar)	-	-	-	-	-	-	932	915	946	Dec 15 at hr 2	0.8	SSW	941	Dec 15	98.1	98.1
Ext. Temp. (°C)	-	-	-	-	-	-	-6.0	-18.1	6.1	Dec 6 at hr 13	3.7	SW	0.2	Dec 14	98.1	98.1
Stn. Temp. (°C)	-	-	-	-	-	-	20.6	19.0	24.3	Dec 12 at hr 17	7.2	SSW	21.5	Dec 12	98.1	98.1
WSV (km/hr)	-	-	-	-	-	-	2.4	0.0	16.4	Dec 10 at hr 23	16.4	WNW	10.4	Dec 23	98.1	98.1
WDV (sector)	-	-	-	-	-	-	231 (SW)	-	-	-	-	-	-	-	98.1	98.1

1- Date/ Time given is the first minimum and maximum value that was recorded

\* Data represents the total (sum) for the indicated time frame

**Alberta Ambient Air Quality Objectives (AAAOs) and/or Alberta Ambient Air Quality Guidelines (AAAQs) Exceedances**

The following exceedances of AAAQs were observed at the Tamarack Site.

Date	Time (MST)	Parameter	Average Period	AAAOs / AAAQs	Concentration	Wind speed	Wind Direction	Reference #
Dec 12	10	PM2.5	1-Hour	80 µg/m3	159 µg/m3	2.9 km/hr	217° (SW)	422981

- The exceedance of the PM2.5 objective on December 12 is believed to be the result of local buildup of emissions, given the low wind speeds recorded at the time.

Timeseries Chart of Hourly Average for the month of Dec 2023 - Tamarack Site



**St. Lina Station**

**Equipment Operation Summary**

<b>Parameter</b>	<b>Calibration Date</b>	<b>Equipment Operational Summary</b>
<b>SO2</b>  Thermo 43i #1226154720	December 5, 2023	<ul style="list-style-type: none"> <li>• An internal station audit was conducted by BV on December 5 and December 6. An audit was performed on the analyzer on December 5. No major issues were identified.</li> <li>• Due to datalogger polling errors, forty-eight hours of downtime were recorded this month.</li> </ul>
<b>H2S</b>  Teledyne T100 #1014	December 5, 2023	<ul style="list-style-type: none"> <li>• An internal station audit was conducted by BV on December 5 and December 6. An audit was performed on the analyzer on December 5. No major issues were identified.</li> <li>• The permeation oven temperature was changed to reduce span value on December 2. The system was allowed time to stabilize. The expected span value was updated on December 6.</li> <li>• Due to datalogger polling errors, forty-one hours of downtime were recorded this month.</li> </ul>
<b>NOx/NO/NO2</b>  Thermo 42i #1180930029	December 6, 2023	<ul style="list-style-type: none"> <li>• An internal station audit was conducted by BV on December 5 and December 6. An audit was performed on the analyzer on December 5. No major issues were identified.</li> <li>• Due to datalogger polling errors, forty-eight hours of downtime were recorded this month.</li> </ul>
<b>O3</b>  Thermo 49iQ #12208316586	December 5, 2023	<ul style="list-style-type: none"> <li>• An internal station audit was conducted by BV on December 5 and December 6. An audit was performed on the analyzer on December 5. No major issues were identified.</li> <li>• Due to datalogger polling errors, forty-two hours of downtime were recorded this month.</li> </ul>
<b>PM2.5</b>  Thermo Sharp 5030i #CM17091001	December 24, 2023	<ul style="list-style-type: none"> <li>• Due to datalogger polling errors, forty-eight hours of downtime were recorded this month.</li> </ul>

Parameter	Calibration Date	Equipment Operational Summary
<b>THC/CH4/NMHC</b>  Thermo 55i # 1180930026	December 5, 2023	<ul style="list-style-type: none"> <li>The analyzer failed due to the carrier gas depletion on December 2 hour 14. The gas cylinder was replaced on December 4. Forty-nine hours of downtime were recorded due to this event.</li> <li>An internal station audit was conducted by BV on December 5 and December 6. An audit was performed on the analyzer on December 5. No major issues were identified.</li> <li>A new span gas cylinder was installed on December 24. An additional zero-span check was completed afterwards to obtain a new expected span value. One hour of downtime was recorded.</li> <li>Due to datalogger polling errors, thirteen hours of downtime were recorded this month.</li> </ul>
Parameter	Verification Date	Equipment Operational Summary
<b>RH</b>  Rotronic HC2A-S3 #20404750	December 10, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 5 and December 6. A meteorological system audit was completed on December 5. No major issues were identified.</li> <li>Due to datalogger polling errors, forty-six hours of downtime were recorded this month.</li> </ul>
<b>BP</b>  Met One 090D #F4498	December 10, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 5 and December 6. A meteorological system audit was completed on December 5. No major issues were identified.</li> <li>Due to datalogger polling errors, forty-six hours of downtime were recorded this month.</li> </ul>
<b>AT</b>  Rotronic HC2A-S3 #20404750	December 10, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 5 and December 6. A meteorological system audit was completed on December 5. No major issues were identified.</li> <li>Due to datalogger polling errors, forty-six hours of downtime were recorded this month.</li> </ul>
<b>ST</b>  COMET #NA	December 6, 2023	<ul style="list-style-type: none"> <li>Due to datalogger polling errors, forty-two hours of downtime were recorded this month.</li> </ul>
<b>Precipitation</b>  MetOne 387D #A23775	December 6, 2023	<ul style="list-style-type: none"> <li>Due to datalogger polling errors, forty-six hours of downtime were recorded this month.</li> </ul>

Parameter	Verification Date	Equipment Operational Summary
<p><b>WS/WD/STDWD</b></p> <p>RM Young 05305VK #161466</p>	<p>December 20, 2023</p>	<ul style="list-style-type: none"> <li>• Wind direction data contained in this report represents where the wind is coming from.</li> <li>• An annual wind system calibration was completed on December 20, 2023.</li> <li>• An internal station audit was conducted by BV on December 5 and December 6. A meteorological system audit was completed on December 5. The wind direction was found to be mis-aligned by around 10 degrees. It was corrected during the annual wind system calibration/audit on December 20.</li> <li>• The wind system was brought down on December 16 between 15:50 and 16:10 for St. FX students to remove the sample inlet of their Methane project.</li> <li>• Due to datalogger polling errors, forty-five hours of downtime were recorded this month.</li> </ul>

**Monitored Data Summary for St. Lina Site**

Parameter	Objectives/Guidelines			Exceedances			Monthly Avg.	Min. 1-hr	Max. 1-hr	Date/Time	VWS (km/hr)	VWD (sector)	Max. 24-hr	Date	Operational Uptime (%)	Valid Data (%)
	1-hr	24-hr	30-day	1-hr	24-hr	30-day										
SO2 (ppb)	172	48	11	0	0	0	0.2	0	4	Dec 12 at hr 12	13.2	SW	0.9	Dec 12	93.5	88.7
H2S (ppb)	10	3	-	0	0	-	0.0	0	1	Dec 2 at hr 14	3.4	SE	0.0	Dec 1	94.5	89.6
NOx (ppb)	-	-	-	-	-	-	4.3	0	24	Dec 6 at hr 3	10.8	WSW	7.2	Dec 12	93.5	87.9
NO (ppb)	-	-	-	-	-	-	0.2	0	5	Dec 12 at hr 11	12.1	SW	0.8	Dec 12	93.5	87.9
NO2 (ppb)	159	-	-	0	-	-	4.2	0	24	Dec 6 at hr 3	10.8	WSW	6.4	Dec 12	93.5	87.9
O3 (ppb)	76	-	-	0	-	-	23.2	2.7	39.0	Dec 11 at hr 1	20.4	NW	34.7	Dec 11	94.4	89.5
THC (ppm)	-	-	-	-	-	-	2.05	1.90	2.45	Dec 1 at hr 19	12.5	S	2.25	Dec 1	91.5	86.7
CH4 (ppm)	-	-	-	-	-	-	2.05	1.90	2.45	Dec 1 at hr 19	12.5	S	2.25	Dec 1	91.5	86.7
NMHC (ppm)	-	-	-	-	-	-	0.00	0.00	0.00	Dec 1 at hr 0	7.9	SW	0.00	Dec 1	91.5	86.7
PM2.5 (µg/m3)	80	29	-	0	0	-	4.5	0	18	Dec 9 at hr 17	11.6	S	8.7	Dec 6	93.5	93.0
RH (%)	-	-	-	-	-	-	76.1	42	98	Dec 4 at hr 5	11.8	SW	89.7	Dec 8	93.8	93.8
BP (millibar)	-	-	-	-	-	-	916	899	929	Dec 15 at hr 2	10.9	SW	924	Dec 14	93.8	93.8
Ext. Temp. (°C)	-	-	-	-	-	-	-3.9	-13.4	5.7	Dec 6 at hr 13	5.3	SSW	1.6	Dec 6	93.8	93.8
Stn. Temp. (°C)	-	-	-	-	-	-	22.0	19.7	24.7	Dec 5 at hr 11	12.8	SW	23.1	Dec 5	94.4	94.4
Precipitation (mm)*	-	-	-	-	-	-	1.3	0.0	0.6	Dec 16 at hr 21	16.2	WNNW	0.7	Dec 16	93.8	93.8
WSV (km/hr)	-	-	-	-	-	-	6.8	0.6	22.6	Dec 30 at hr 19	22.6	S	15.7	Dec 30	94.0	93.4
WDV (sector)	-	-	-	-	-	-	229 (SW)	-	-	-	-	-	-	-	94.0	93.4

1- Date/ Time given is the first minimum and maximum value that was recorded

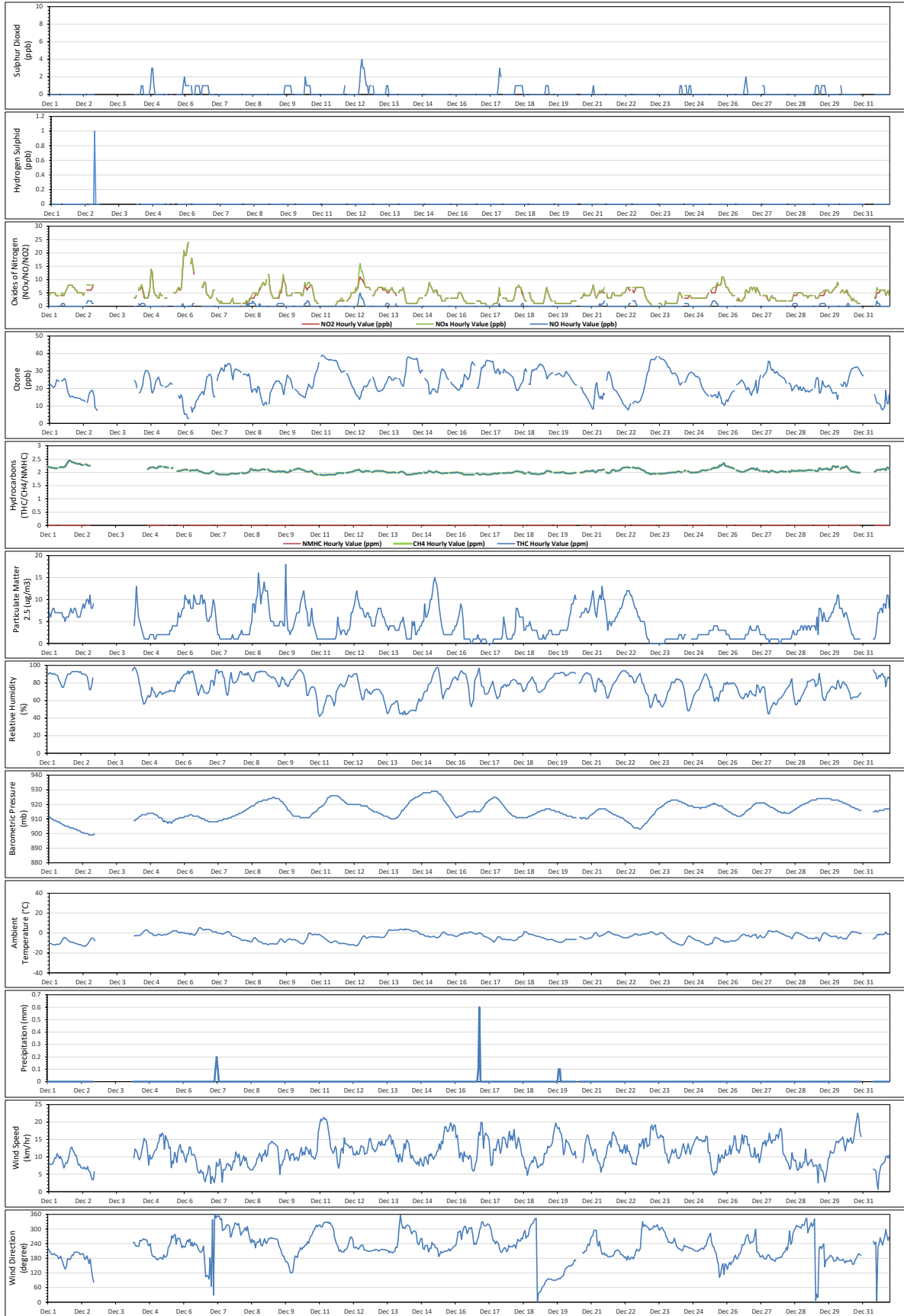
\* Data represents the total (sum) for the indicated time frame

**Alberta Ambient Air Quality Objectives (AAQOs) and/or Alberta Ambient Air Quality Guidelines (AAQGs) Exceedances**

The measured ambient air quality was within the AAQOs and/or AAQGs for all monitored parameters.



Timeseries Chart of Hourly Average for the month of Dec 2023 - St. Lina Site



## Lac La Biche Station

### Equipment Operation Summary

Parameter	Calibration Date	Equipment Operational Summary
<b>SO2</b>  Thermo 43i-TLE #1180320043	December 14, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified this month.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. An audit was performed on the analyzer on December 14. No major issues were identified.</li> </ul>
<b>H2S</b>  Thermo 450i #CM17360002	December 14, 2023	<ul style="list-style-type: none"> <li>The daily span check results failed between December 5 and December 7. It was caused by higher case temperatures affecting permeation gas temperature stability rather than an issue with the analyzer itself. This issue was corrected on December 7. Data quality was not affected by this issue.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. An audit was performed on the analyzer on December 14. No major issues were identified.</li> </ul>
<b>NOx/NO/NO2</b>  Thermo 42i #1180930027	December 14, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified this month.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. An audit was performed on the analyzer on December 14. No major issues were identified.</li> </ul>
<b>O3</b>  Thermo 49i #1002240372	December 15, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 14 and December 15. An audit was performed on the analyzer on December 15. No major issues were identified.</li> <li>Serval hours of invalid readings were record due to low cell intensity alert between December 17 and December 18. The alert threshold was adjusted on December 18. Fourteen hours of downtime were invalidated due to this event.</li> <li>The analyzer failed the daily zero-span checks from December 21 onwards. The problem was traced to the failed zero-span pump, and it was corrected in January 2024. The issue did not affect the analyzer's performance. Two hours of downtime were recorded due to the additional quality check performed on December 22.</li> </ul>

Parameter	Calibration Date	Equipment Operational Summary
<b>THC/CH4/NMHC</b>  Thermo 55i #1180030044	December 15, 2023	<ul style="list-style-type: none"> <li>An internal station audit was conducted by BV on December 14 and December 15. An audit was performed on the analyzer on December 14. No major issues were identified.</li> <li>Following the audit on December 14, maintenance was conducted; the Teledyne 701 zero air generator, s/n: 1813, was replaced with the Teledyne T701H, s/n: 1110, the sample pump was rebuilt, and the N2 and H2 gas pressures were adjusted. The analyzer was allowed time to stabilize overnight. A successful post-repair calibration was completed on December 15. Nineteen hours of downtime were recorded.</li> </ul>
<b>PM2.5</b>  Thermo Sharp 5030i #CM17071016	December 15, 2023	<ul style="list-style-type: none"> <li>No operational issues were identified this month.</li> </ul>
Parameter	Verification Date	Equipment Operational Summary
<b>RH</b>  Rotronic HC2A-S3 #0020357518	December 25, 2023	<ul style="list-style-type: none"> <li>No operational issues were recorded this month.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. A meteorological system audit was completed on December 14. No major issues were identified.</li> </ul>
<b>BP</b>  Met One 092 #Y23360	December 25, 2023	<ul style="list-style-type: none"> <li>No operational issues were recorded this month.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. A meteorological system audit was completed on December 14. No major issues were identified.</li> </ul>
<b>AT</b>  Rotronic HC2A-S3 #0020357518	December 25, 2023	<ul style="list-style-type: none"> <li>No operational issues were recorded this month.</li> <li>An internal station audit was conducted by BV on December 14 and December 15. A meteorological system audit was completed on December 14. No major issues were identified.</li> </ul>
<b>ST</b>  COMET #NA	December 25, 2023	<ul style="list-style-type: none"> <li>No operational issues were recorded this month.</li> </ul>

Parameter	Verification Date	Equipment Operational Summary
<p><b>WS/WD/STDWD</b></p> <p>RM Young 05305VK #56778</p>	<p>December 25, 2023</p>	<ul style="list-style-type: none"> <li>• Wind direction data contained in this report represents where the wind is coming from.</li> <li>• The last annual wind system calibration was completed on September 15, 2023.</li> <li>• No operational issues were recorded this month.</li> <li>• An internal station audit was conducted by BV on December 14 and December 15. A meteorological system audit was completed on December 14. No major issues were identified.</li> </ul>

**Monitored Data Summary for Lac La Biche Station**

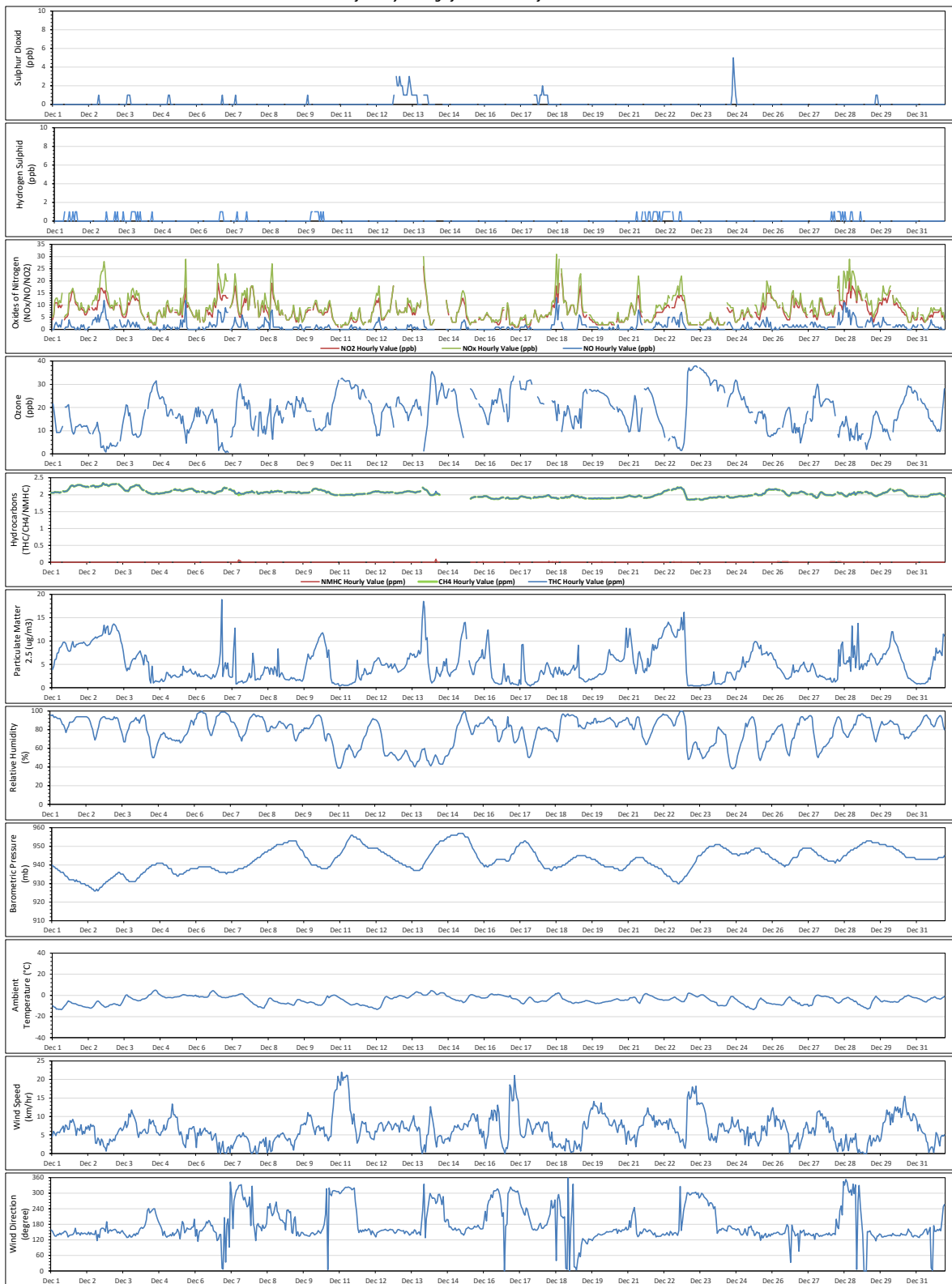
Parameter	Objectives/Guidelines			Exceedances			Monthly Avg.	Min. 1-hr	Max. 1-hr	Date/Time	VWS (km/hr)	VWD (sector)	Max. 24-hr	Date	Operational Uptime (%)	Valid Data (%)
	1-hr	24-hr	30-day	1-hr	24-hr	30-day										
SO2 (ppb)	172	48	11	0	0	0	0.1	0	5	Dec 24 at hr 15	8.3	SSE	1.2	Dec 13	100.0	94.9
H2S (ppb)	10	3	-	0	0	-	0.1	0	1	Dec 1 at hr 8	6.8	SE	0.0	Dec 1	100.0	94.9
NOx (ppb)	-	-	-	-	-	-	8.8	1	31	Dec 18 at hr 12	1.7	NE	16.8	Dec 28	100.0	94.5
NO (ppb)	-	-	-	-	-	-	1.3	0	13	Dec 18 at hr 12	1.7	NE	4.5	Dec 28	100.0	94.5
NO2 (ppb)	159	-	-	0	-	-	7.4	1	26	Dec 13 at hr 21	0.9	SW	12.4	Dec 28	100.0	94.5
O3 (ppb)	76	-	-	0	-	-	18.2	0.6	37.9	Dec 23 at hr 7	16.2	WNW	34.4	Dec 23	97.8	93.0
THC (ppm)	-	-	-	-	-	-	2.04	1.85	2.34	Dec 2 at hr 19	1.9	SSE	2.26	Dec 2	97.4	92.4
CH4 (ppm)	-	-	-	-	-	-	2.03	1.85	2.34	Dec 2 at hr 19	1.9	SSE	2.26	Dec 2	97.4	92.4
NMHC (ppm)	-	-	-	-	-	-	0.00	0.00	0.09	Dec 14 at hr 8	1.7	WSW	0.01	Dec 7	97.4	92.4
PM2.5 (µg/m3)	80	29	-	0	0	-	4.9	0	19	Dec 6 at hr 21	1.5	SE	12.2	Dec 22	100.0	99.9
RH (%)	-	-	-	-	-	-	77.9	38	100	Dec 6 at hr 6	6.4	SSE	93.7	Dec 22	100.0	100.0
BP (millibar)	-	-	-	-	-	-	943	926	957	Dec 15 at hr 2	7.8	SSE	952	Dec 11	100.0	100.0
Ext. Temp. (°C)	-	-	-	-	-	-	-4.3	-13.4	4.9	Dec 4 at hr 13	7.5	WSW	0.8	Dec 14	100.0	100.0
Stn. Temp. (°C)	-	-	-	-	-	-	23.2	19.4	25.1	Dec 6 at hr 7	6.9	SSE	24.4	Dec 5	100.0	100.0
WSV (km/hr)	-	-	-	-	-	-	3.5	0.0	22.0	Dec 11 at hr 1	22	WNW	11.6	Dec 11	100.0	100.0
WDV (sector)	-	-	-	-	-	-	164 (SSE)	-	-	-	-	-	-	-	100.0	100.0

1- Date/ Time given is the first minimum and maximum value that was recorded

**Alberta Ambient Air Quality Objectives (AAAQOs) and/or Alberta Ambient Air Quality Guidelines (AAAQGs) Exceedances**

The measured ambient air quality was within the AAAQOs and/or AAAQGs for all monitored parameters.

Timeseries Chart of Hourly Average for the month of Dec 2023 - Lac La Biche Station



## TABLES AND CHARTS

**COLD LAKE SOUTH STATION**

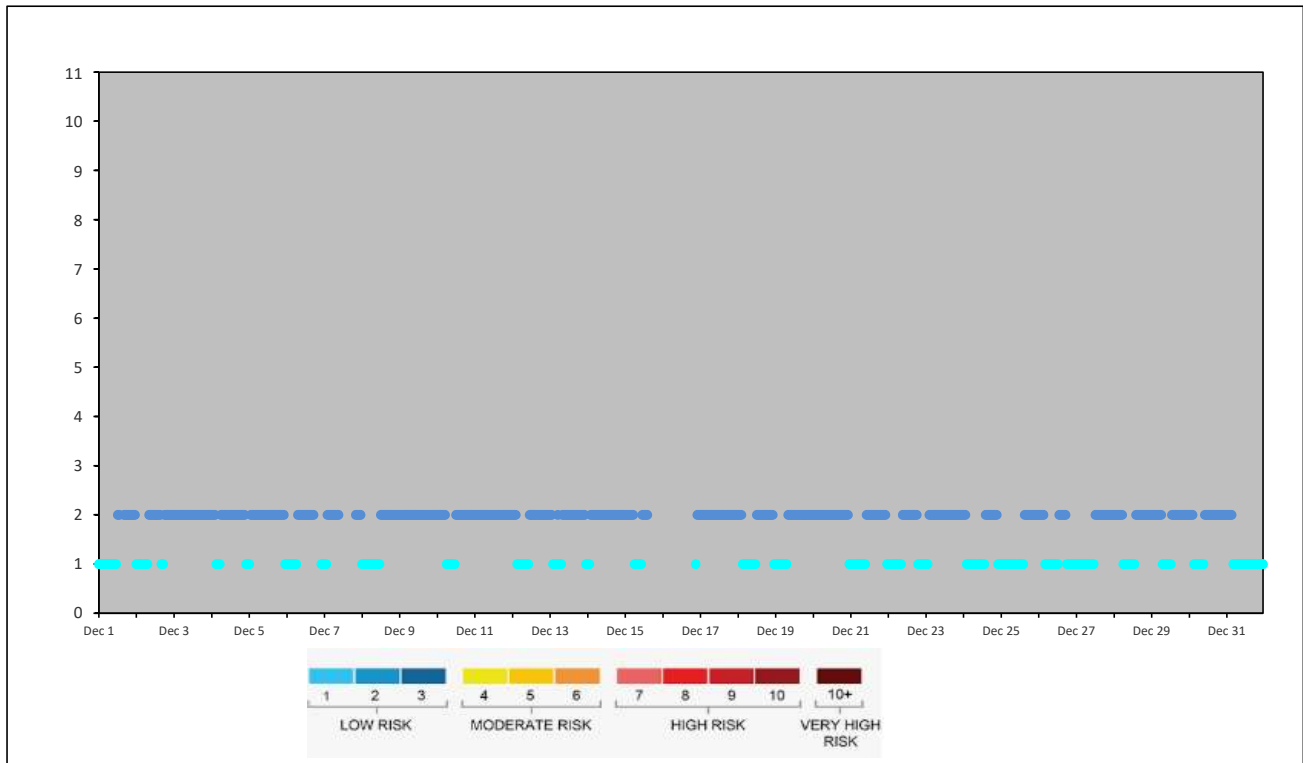


# LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

Cold Lake South Station - December 2023

## AIR QUALITY HEALTH INDEX

Day	Hourly Period Starting at (MST)																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Dec 1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Dec 2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2
Dec 3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 4	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
Dec 5	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 6	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
Dec 7	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 8	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Dec 9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 10	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Dec 11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 12	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 13	2	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 14	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 15	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
Dec 17	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 18	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1
Dec 19	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 21	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 22	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Dec 23	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 24	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1
Dec 25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Dec 26	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1
Dec 27	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Dec 28	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Dec 29	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Dec 30	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 31	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

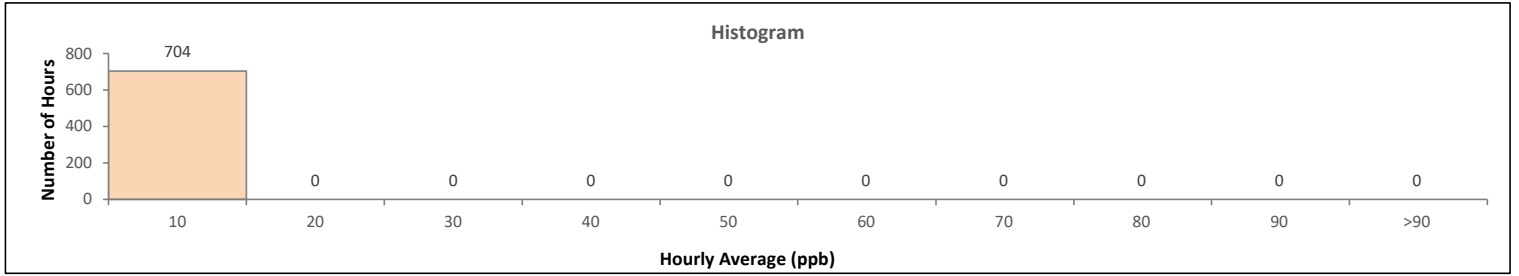
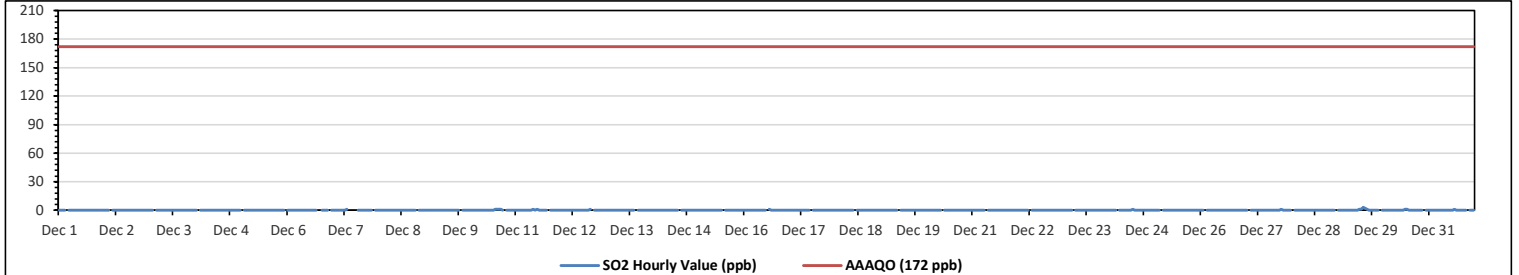


**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**SULPHUR DIOXIDE (SO<sub>2</sub>) in ppb**

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 172 ppb, 24-Hour 48 ppb, 30-Day 11 ppb																											
Number of 1-Hour Exceedances: 0					Number of 24-Hour Exceedances: 0					30-Day Exceedance: 0																	
Maximum Hourly Value:	3	ppb	on Dec 29 at hr 13												Hours in Service:	744											
Maximum Daily Value:	0.3	ppb	on Dec 29												Hours of Data:	704											
Minimum Hourly Value:	0	ppb	on Dec 1 at hr 0												Hours of Missing Data:	0											
Minimum Daily Value:	0.0	ppb	on Dec 1												Hours of Calibration:	40											
Monthly Average:	0.0	ppb													Operational Uptime:	100.0											
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
Dec 1	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 2	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 3	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 4	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 5	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0.0
Dec 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Q	Q	0	0	0	0	0	S	0	0	0.0
Dec 7	0	0	0	0	0	0	0	1	C	C	C	C	C	0	0	0	0	0	0	0	0	0	S	0	0	1	0.1
Dec 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0.0
Dec 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0.0
Dec 10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0.2
Dec 11	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	S	0	0	0	0	0	0	0	1	0.1
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	1	0.0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	S	1	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 28	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0.0
Dec 29	0	0	0	0	0	0	0	0	0	0	0	1	1	3	2	1	0	0	0	0	0	0	0	S	0	3	0.3
Dec 30	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	S	0	1	0.1
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	S	0	1	0.0
Diurnal Maximum																								0	0	0	
Diurnal Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance  
**X** InValid Data (Equipment Malfunction /Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      **P** Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

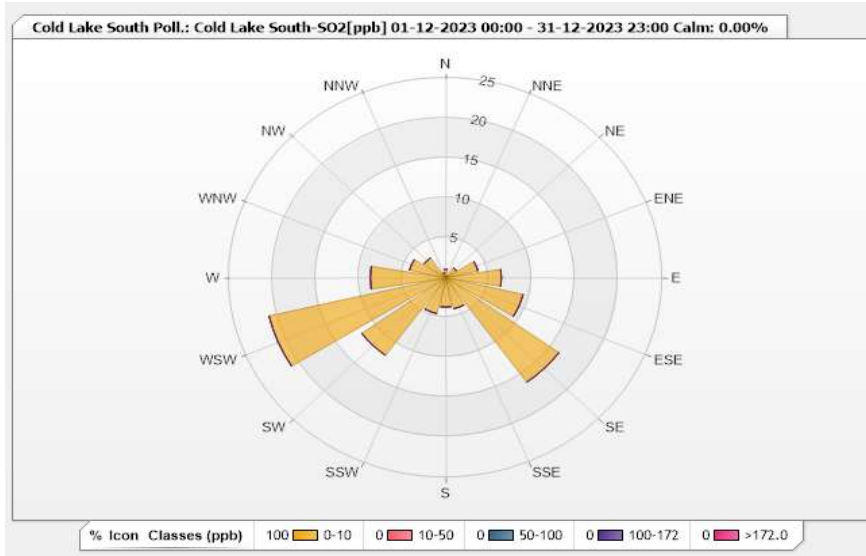


**Station: Cold Lake South Poll.: Cold Lake South-SO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.90%      Calm Avg: 0.00 [ppb]

Direction	0-10	10-50	50-100	100-172	>172.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.15	0	0	0	0	0.15
NE	1.53	0	0	0	0	1.53
ENE	3.82	0	0	0	0	3.82
E	6.42	0	0	0	0	6.42
ESE	9.17	0	0	0	0	9.17
SE	16.06	0	0	0	0	16.06
SSE	3.98	0	0	0	0	3.98
S	3.67	0	0	0	0	3.67
SSW	4.59	0	0	0	0	4.59
SW	11.93	0	0	0	0	11.93
WSW	20.95	0	0	0	0	20.95
W	8.72	0	0	0	0	8.72
WNW	4.28	0	0	0	0	4.28
NW	3.06	0	0	0	0	3.06
NNW	0.61	0	0	0	0	0.61
Summary	100	0	0	0	0	100



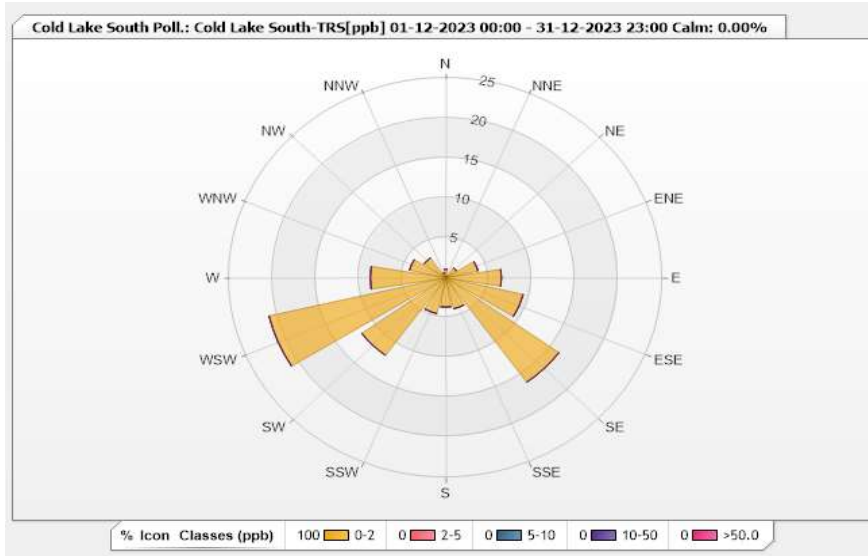


**Station: Cold Lake South Poll.: Cold Lake South-TRS[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.90%      Calm Avg: 0.00 [ppb]

Direction	0-2	2-5	5-10	10-50	>50.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.15	0	0	0	0	0.15
NE	1.53	0	0	0	0	1.53
ENE	3.82	0	0	0	0	3.82
E	6.42	0	0	0	0	6.42
ESE	9.17	0	0	0	0	9.17
SE	16.06	0	0	0	0	16.06
SSE	3.98	0	0	0	0	3.98
S	3.67	0	0	0	0	3.67
SSW	4.59	0	0	0	0	4.59
SW	11.93	0	0	0	0	11.93
WSW	20.95	0	0	0	0	20.95
W	8.72	0	0	0	0	8.72
WNW	4.28	0	0	0	0	4.28
NW	3.06	0	0	0	0	3.06
NNW	0.61	0	0	0	0	0.61
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

Cold Lake South Station - December 2023

Summary of Hourly Averages

OXIDES OF NITROGEN (NOx) in ppb

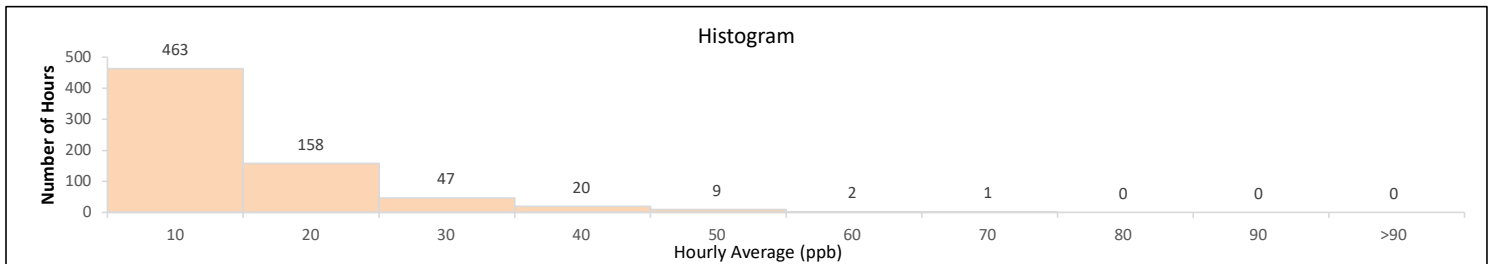
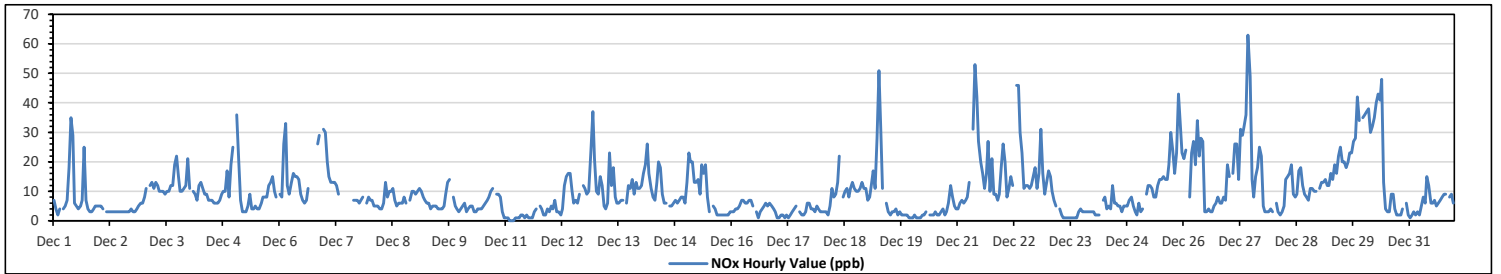
Maximum Hourly Value:	63	ppb	on Dec 27 at hr 10	Hours in Service:	744
Maximum Daily Value:	20.7	ppb	on Dec 29	Hours of Data:	700
Minimum Hourly Value:	0	ppb	on Dec 11 at hr 2	Hours of Missing Data:	0
Minimum Daily Value:	1.8	ppb	on Dec 11	Hours of Calibration:	44
Monthly Average:	10.0	ppb		Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	7	4	2	4	S	4	5	7	18	35	29	6	5	4	5	7	25	7	4	3	3	4	5	5	2	35	8.6	
Dec 2	5	5	4	S	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	4	5	6	6	3	6	3.7	
Dec 3	8	11	S	12	13	11	13	12	10	10	9	10	10	10	12	12	19	22	15	10	10	11	12	21	8	22	12.3	
Dec 4	11	S	10	9	7	12	13	11	9	9	7	7	6	6	6	7	9	10	10	17	8	19	25	6	25	10.2		
Dec 5	S	36	21	7	3	3	3	5	9	4	4	5	4	4	6	8	8	8	12	13	15	10	8	S	3	36	8.9	
Dec 6	9	8	26	33	12	9	13	16	15	15	14	9	7	6	7	11	Q	Q	Q	Q	26	29	S	31	6	33	15.6	
Dec 7	30	20	15	13	13	13	12	9	C	C	C	C	C	C	C	7	7	7	6	7	8	S	6	8	6	30	NA	
Dec 8	7	7	5	5	5	4	4	6	13	8	10	10	11	7	5	6	6	6	8	6	S	7	10	10	4	13	7.2	
Dec 9	9	10	11	10	8	7	6	6	4	5	5	4	4	4	5	9	13	14	S	8	5	4	3	3	14	6.9		
Dec 10	4	5	6	3	4	5	5	3	3	4	4	4	5	6	7	8	10	11	S	9	9	8	3	1	1	11	5.5	
Dec 11	1	1	0	0	0	1	1	1	2	2	1	2	1	1	1	3	4	S	5	4	2	2	4	3	0	5	1.8	
Dec 12	5	4	7	3	3	2	4	12	15	16	16	10	6	7	6	9	S	12	11	9	10	24	37	21	2	37	10.8	
Dec 13	10	9	15	12	5	4	6	23	12	18	8	6	6	7	7	S	5	6	12	11	14	9	13	11	11	4	23	10.2
Dec 14	12	16	19	26	16	11	8	7	13	20	18	9	6	6	S	5	5	6	7	6	7	8	8	6	5	26	10.7	
Dec 15	13	23	20	20	13	13	14	9	19	16	19	8	3	S	5	4	2	2	2	2	2	2	2	3	2	23	9.4	
Dec 16	3	3	4	4	5	7	7	6	6	7	7	5	S	3	1	3	4	5	6	5	6	5	4	3	1	7	4.7	
Dec 17	1	1	2	2	1	2	1	2	3	4	5	S	3	2	2	3	6	6	4	4	3	5	4	3	1	6	3.0	
Dec 18	3	3	3	2	5	11	8	9	13	22	S	8	10	11	8	11	13	11	10	10	11	13	11	11	2	22	9.4	
Dec 19	7	8	12	17	11	28	51	30	11	S	6	3	2	3	3	4	2	3	2	2	2	2	1	1	1	51	9.2	
Dec 20	1	2	1	1	1	2	2	3	S	2	2	2	3	2	2	3	4	2	3	6	12	8	5	4	1	12	3.2	
Dec 21	4	6	7	6	7	8	13	S	31	53	42	27	20	16	11	16	27	10	21	9	9	7	9	18	4	53	16.4	
Dec 22	26	20	8	11	15	12	S	46	46	30	23	11	12	12	11	12	15	18	11	16	31	16	9	13	8	46	18.4	
Dec 23	17	15	10	7	5	S	4	2	1	1	1	1	1	1	1	1	3	4	3	3	3	3	3	3	1	17	4.0	
Dec 24	3	2	2	2	S	7	8	4	5	4	12	6	6	5	5	3	5	5	5	7	8	5	3	2	2	12	5.0	
Dec 25	6	3	4	S	9	12	12	11	8	8	12	14	14	15	14	14	19	30	24	16	23	43	34	23	3	43	16.0	
Dec 26	21	24	S	8	23	27	19	34	22	28	27	3	3	4	3	3	5	6	8	6	6	8	7	19	3	34	13.7	
Dec 27	15	S	16	26	26	14	31	29	32	36	63	49	14	8	15	18	25	22	5	3	3	4	3	3	63	20.0		
Dec 28	S	6	3	2	3	5	14	15	16	19	9	8	9	17	18	12	9	8	7	11	11	10	10	S	2	19	10.1	
Dec 29	11	13	13	14	12	12	16	14	19	16	22	25	20	20	18	20	23	23	27	28	42	34	S	35	11	42	20.7	
Dec 30	36	37	38	30	32	35	40	43	41	48	13	4	3	3	9	9	4	2	2	4	S	6	2	2	2	48	19.3	
Dec 31	1	2	3	2	3	2	5	8	6	15	12	6	6	7	5	6	7	8	9	9	S	8	9	6	1	15	6.3	
Diurnal Maximum	36	37	38	33	32	35	51	46	46	53	63	49	20	20	18	20	27	30	27	28	42	43	37	35				
Diurnal Average	9.9	10.5	9.9	10.0	9.1	9.5	11.4	12.9	14.0	15.8	13.9	9.1	7.0	6.9	6.9	7.7	9.7	9.7	8.8	8.0	10.5	10.6	8.8	10.3				

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction/Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.

Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

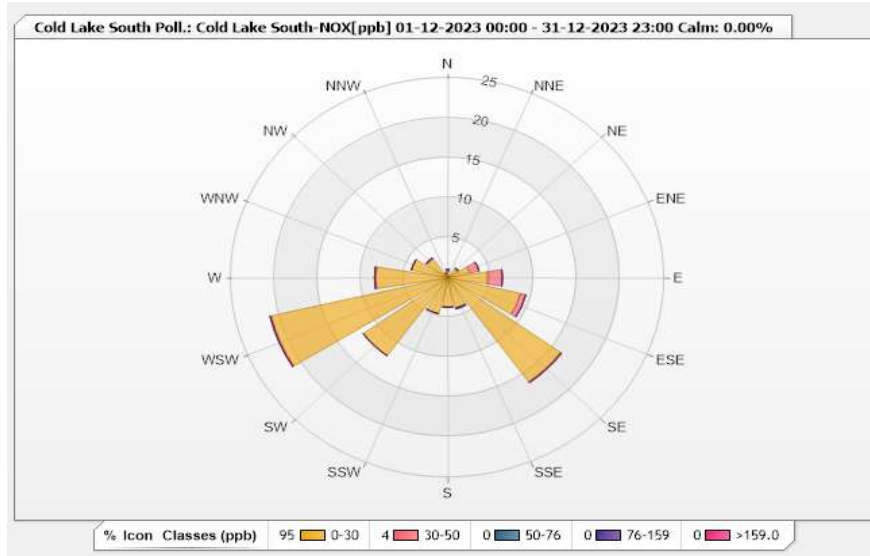


**Station: Cold Lake South Poll.: Cold Lake South-NOX[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.37%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	0.77	0.15	0.15	0	0	1.07
NNE	0.15	0	0	0	0	0.15
NE	1.38	0.15	0	0	0	1.53
ENE	2.62	1.08	0	0	0	3.7
E	4.62	1.69	0	0	0	6.31
ESE	8.62	0.62	0	0	0	9.24
SE	16	0.15	0	0	0	16.15
SSE	3.85	0	0.15	0	0	4
S	3.69	0	0	0	0	3.69
SSW	4.62	0	0	0	0	4.62
SW	12	0	0	0	0	12
WSW	20.92	0.15	0	0	0	21.07
W	8.31	0.15	0	0	0	8.46
WNW	4.31	0	0	0	0	4.31
NW	2.92	0.15	0	0	0	3.07
NNW	0.46	0.15	0	0	0	0.61
Summary	95.24	4.44	0.3	0	0	100





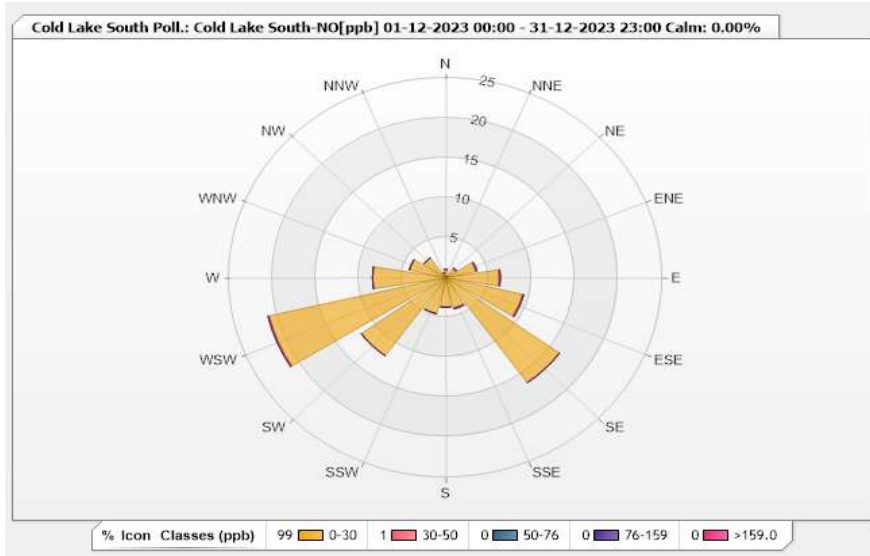


**Station: Cold Lake South Poll.: Cold Lake South-NO[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.37%      Calm Avg: 0.00 [ppb]

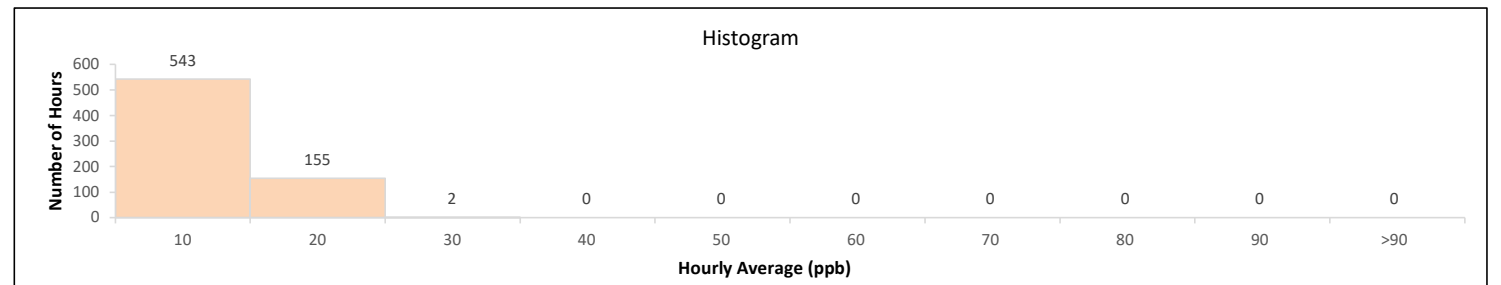
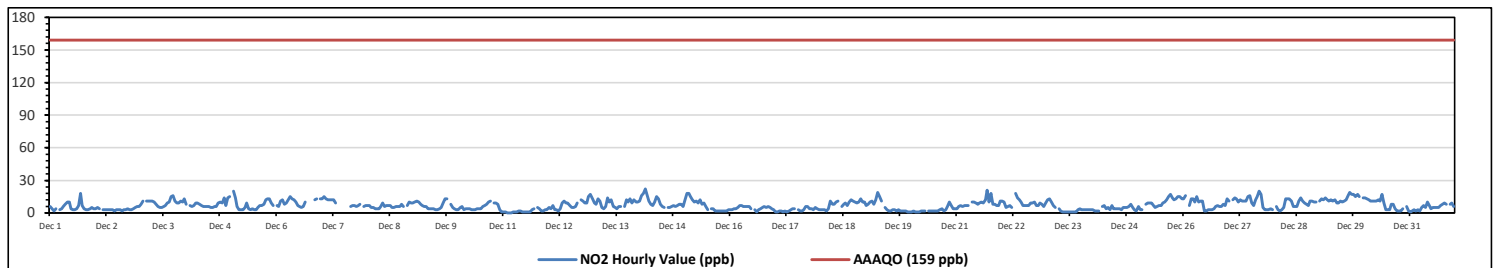
Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	0.92	0.15	0	0	0	1.07
NNE	0.15	0	0	0	0	0.15
NE	1.38	0.15	0	0	0	1.53
ENE	3.54	0.15	0	0	0	3.69
E	6.15	0.15	0	0	0	6.3
ESE	9.08	0.15	0	0	0	9.23
SE	16.15	0	0	0	0	16.15
SSE	3.85	0.15	0	0	0	4
S	3.69	0	0	0	0	3.69
SSW	4.62	0	0	0	0	4.62
SW	12	0	0	0	0	12
WSW	20.92	0.15	0	0	0	21.07
W	8.46	0	0	0	0	8.46
WNW	4.31	0	0	0	0	4.31
NW	3.08	0	0	0	0	3.08
NNW	0.62	0	0	0	0	0.62
Summary	98.92	1.05	0	0	0	100



**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**NITROGEN DIOXIDE (NO<sub>2</sub>) in ppb**

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 159 ppb																																																											
Number of 1-Hour Exceedances: 0																																																											
Maximum Hourly Value: 22 ppb on Dec 14 at hr 3														Hours in Service: 744																																													
Maximum Daily Value: 13.0 ppb on Dec 29														Hours of Data: 700																																													
Minimum Hourly Value: 0 ppb on Dec 11 at hr 2														Hours of Missing Data: 0																																													
Minimum Daily Value: 1.7 ppb on Dec 11														Hours of Calibration: 44																																													
Monthly Average: 7.1 ppb														Operational Uptime: 100.0																																													
Day	Hourly Period Starting at (MST)																											Daily Minimum	Daily Maximum	Daily Average																													
Dec 1	6	4	2	4	S	3	4	6	8	10	10	4	3	3	4	7	18	7	4	3	3	4	5	4	2	18	5.5																																
Dec 2	4	5	4	S	3	3	3	3	3	2	3	3	3	2	3	3	4	3	3	4	5	6	6	2	6	3.5																																	
Dec 3	8	11	S	11	11	11	11	10	8	6	5	5	6	7	9	10	15	16	11	9	9	11	10	13	5	16	9.7																																
Dec 4	8	S	7	6	7	9	9	8	7	6	6	6	6	5	5	6	6	9	10	9	14	7	14	15	5	15	8.0																																
Dec 5	S	20	14	6	3	3	3	5	9	4	3	4	3	3	5	7	7	8	12	13	13	9	7	S	3	20	7.3																																
Dec 6	7	6	11	12	8	9	12	15	13	12	10	7	6	5	6	10	Q	Q	Q	Q	12	13	S	13	5	15	9.8																																
Dec 7	13	15	13	12	12	12	12	9	C	C	C	C	C	C	C	6	7	7	6	7	8	S	6	7	6	15	NA																																
Dec 8	7	7	5	5	4	4	4	6	9	6	7	7	7	5	5	6	6	6	8	6	S	7	10	9	4	10	6.3																																
Dec 9	9	10	11	10	8	7	6	6	4	4	4	4	3	3	4	5	9	13	13	S	8	5	4	3	3	13	6.7																																
Dec 10	3	5	6	3	4	4	4	3	3	3	4	4	4	6	7	8	10	11	S	9	9	8	3	1	1	11	5.3																																
Dec 11	1	1	0	0	0	1	1	1	2	2	1	1	1	1	1	3	4	S	5	4	2	2	3	3	0	5	1.7																																
Dec 12	5	4	7	3	3	2	4	9	11	9	9	7	5	5	6	9	S	12	11	9	9	15	17	13	2	17	8.0																																
Dec 13	9	8	13	11	5	4	6	14	10	12	6	5	4	6	6	S	6	12	10	13	9	12	10	10	4	14	8.7																																
Dec 14	11	16	18	22	16	11	8	7	10	15	13	8	6	5	S	5	5	6	7	6	7	8	8	6	5	22	9.7																																
Dec 15	12	18	18	15	12	10	11	9	12	8	9	6	3	S	4	4	2	2	2	2	2	2	2	3	2	18	7.3																																
Dec 16	3	3	4	4	5	7	7	6	6	6	6	4	S	3	1	3	4	5	6	5	6	5	4	3	1	7	4.6																																
Dec 17	1	1	2	2	1	2	1	2	3	4	4	S	3	2	2	3	6	6	4	4	3	5	4	3	1	6	3.0																																
Dec 18	3	3	3	2	4	11	8	8	10	11	S	6	8	9	7	10	12	11	10	9	10	13	10	10	2	13	8.2																																
Dec 19	7	8	10	11	8	12	19	15	11	S	5	3	2	2	3	3	2	3	2	2	2	2	1	1	1	19	5.8																																
Dec 20	1	2	1	1	1	2	2	2	S	2	2	2	2	2	2	3	4	2	3	6	10	7	4	4	1	10	2.9																																
Dec 21	4	6	7	6	7	7	7	S	10	10	9	8	9	10	9	12	21	10	18	8	8	7	7	11	4	21	9.2																																
Dec 22	11	10	5	6	7	5	S	18	14	12	10	7	7	7	7	9	9	10	7	7	9	8	6	9	5	18	8.7																																
Dec 23	12	13	10	7	5	S	4	2	1	1	1	1	1	1	1	3	4	3	3	3	3	3	3	1	13	3.7																																	
Dec 24	3	2	2	2	S	6	7	4	5	3	7	4	4	4	4	3	5	5	5	6	8	5	3	2	2	8	4.3																																
Dec 25	6	3	3	S	8	9	9	9	7	5	6	7	7	9	10	12	15	17	14	12	13	15	13	3	17	9.7																																	
Dec 26	13	16	S	7	13	13	10	15	10	11	11	2	2	3	3	4	6	7	6	6	8	7	13	2	16	8.2																																	
Dec 27	11	S	12	14	13	10	12	11	11	11	15	16	9	7	12	15	20	17	5	3	3	4	3	3	20	10.3																																	
Dec 28	S	6	3	2	3	5	13	13	13	11	6	6	6	11	14	11	9	8	7	11	11	10	10	S	2	14	8.6																																
Dec 29	11	13	12	14	12	11	12	11	12	9	9	11	10	11	12	16	19	17	17	15	17	15	S	14	9	19	13.0																																
Dec 30	14	13	12	11	11	11	11	12	11	17	9	3	3	3	8	8	4	2	2	2	4	S	6	2	2	17	7.8																																
Dec 31	1	2	3	2	3	2	5	7	5	10	7	4	5	5	5	7	8	9	8	9	S	8	9	6	1	10	5.5																																
Diurnal Maximum	14	20	18	22	16	13	19	18	14	17	15	16	10	11	14	16	21	17	18	15	17	15	17	15																																			
Diurnal Average	7.0	8.0	7.5	7.3	6.8	6.9	7.5	8.2	8.2	7.7	6.8	5.3	4.8	5.0	5.7	6.9	8.3	8.4	7.6	6.9	7.7	7.7	6.8	7.0																																			
C	Monthly Calibration														S	Daily Zero-Span Check														Q	Quality Assurance																												
K	Collection Error														ND	No Data (Machine Not in Service)														Y	Routine Maintenance														P	Power Failure													
X	InValid Data (Equipment Malfunction /Recovery)														NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																											

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

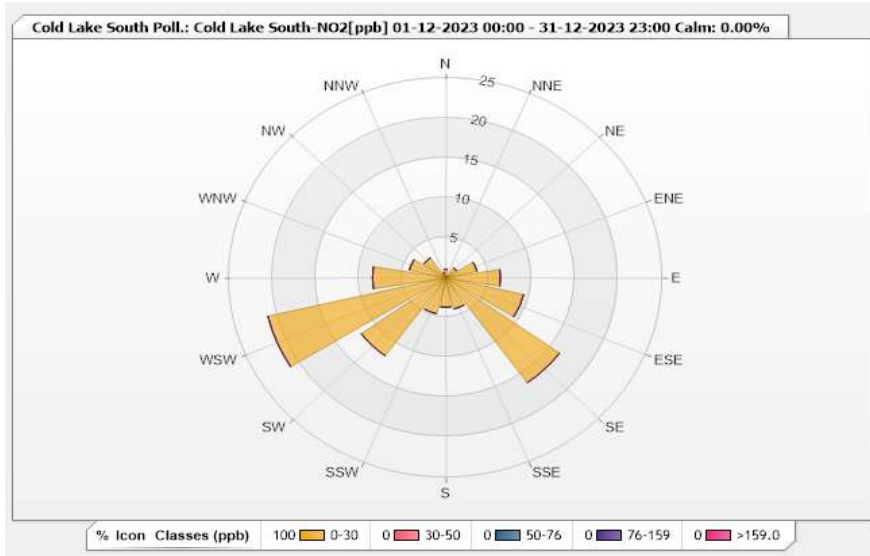


**Station: Cold Lake South Poll.: Cold Lake South-NO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.37%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.08	0	0	0	0	1.08
NNE	0.15	0	0	0	0	0.15
NE	1.54	0	0	0	0	1.54
ENE	3.69	0	0	0	0	3.69
E	6.31	0	0	0	0	6.31
ESE	9.23	0	0	0	0	9.23
SE	16.15	0	0	0	0	16.15
SSE	4	0	0	0	0	4
S	3.69	0	0	0	0	3.69
SSW	4.62	0	0	0	0	4.62
SW	12	0	0	0	0	12
WSW	21.08	0	0	0	0	21.08
W	8.46	0	0	0	0	8.46
WNW	4.31	0	0	0	0	4.31
NW	3.08	0	0	0	0	3.08
NNW	0.62	0	0	0	0	0.62
Summary	100	0	0	0	0	100

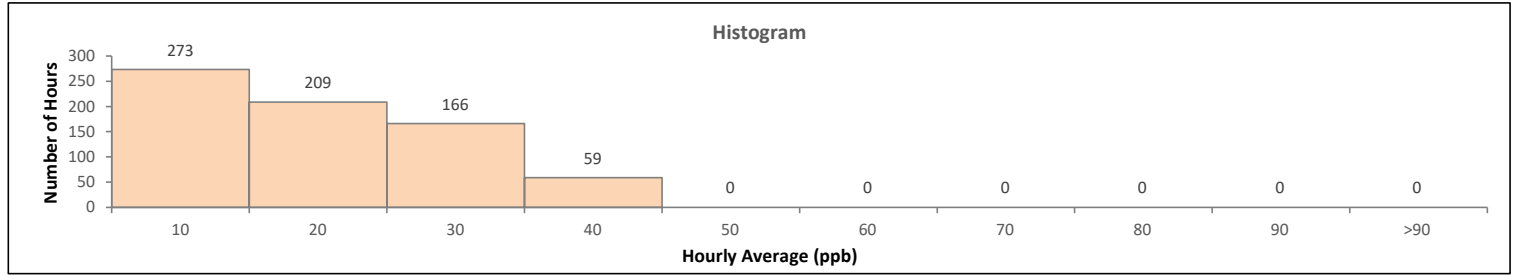
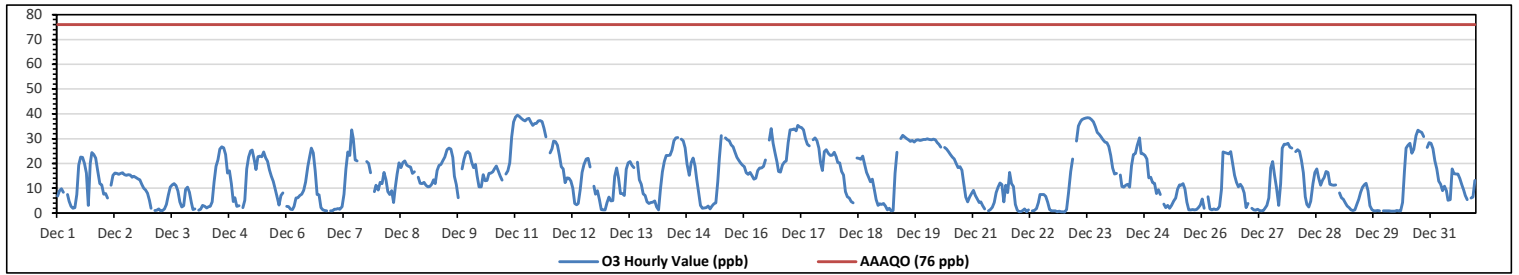


**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**OZONE (O<sub>3</sub>) in ppb**

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 76 ppb																											
Number of 1-Hour Exceedances: 0																											
Maximum Hourly Value: 39.5 ppb on Dec 11 at hr 1										Hours in Service: 744																	
Maximum Daily Value: 34.1 ppb on Dec 11										Hours of Data: 707																	
Minimum Hourly Value: 0.4 ppb on Dec 23 at hr 0										Hours of Missing Data: 0																	
Minimum Daily Value: 2.3 ppb on Dec 22										Hours of Calibration: 37																	
Monthly Average: 14.7 ppb										Operational Uptime: 100.0																	
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	6.8	8.9	9.8	8.4	S	7.5	4.7	2.7	1.9	2.2	7.5	19.4	22.6	22.4	19.9	16.1	3.1	19.9	24.4	23.7	22.1	17.3	11.8	11.3	1.9	24.4	12.8
Dec 2	7.6	7.8	6.1	S	11.2	15.2	16.1	16	15.5	16	16.2	15.4	15.2	15.4	15.3	14.5	14.9	14.3	13.7	13.4	11.6	10	9.2	8	6.1	16.2	13.0
Dec 3	5.1	1.9	S	1	1.1	1.6	0.9	1	1.7	3.5	7.2	10.4	11.3	11.8	11	8.8	4.5	2.4	2.9	9.5	10.5	8.4	4.2	1.4	0.9	11.8	5.3
Dec 4	1.7	S	1.1	1.5	3.1	2.7	2.1	2.5	2.6	4.5	12.5	18.8	21.5	25.8	26.7	26.3	23.6	16.1	17.1	11.8	4.6	6.2	2.6	2.9	1.1	26.7	10.4
Dec 5	S	2.2	5.1	17.7	22.5	25	25.4	21.7	17.5	22.7	23	22.7	24.6	22.3	20.9	17.4	14.9	12.8	9.6	6.4	3.2	7.1	8.1	S	2.2	25.4	16.0
Dec 6	2.6	2.5	1.5	1.4	2.7	6.1	6.2	7.1	7.6	9.1	12.5	18.9	23	26.1	24.2	17.1	7.4	7.3	2.2	1.2	1	0.9	S	0.9	0.9	26.1	8.2
Dec 7	0.8	1.5	1.5	1.8	1.5	2.5	7.6	17.7	24.6	23.2	33.5	30.1	21.5	21	Q	Q	C	C	20.7	20	16.3	S	8.6	11.1	0.8	33.5	14.0
Dec 8	9.2	12.4	11.9	16.4	13.5	8.7	7.5	8.9	4.2	10.1	15.7	20.2	18.3	20.3	21	19.4	18.8	18.6	15.9	16.6	S	14.5	12	11.8	4.2	21.0	14.2
Dec 9	12.4	11.2	10.6	10.7	11.6	13.4	11.9	17.2	19.2	19.6	21.2	22.6	25.5	26.2	25.8	22.4	14.9	11.4	6.2	S	17.7	21.6	24.2	24.7	6.2	26.2	17.5
Dec 10	23.9	20.5	18.3	19.6	15	10.6	15.4	13	13.1	15.9	16.1	16.6	17.8	19	17	15	13.2	S	15.7	17	20.2	30.7	36.7	10.6	36.7	17.9	10.6
Dec 11	38.7	39.5	38.9	38.2	37.5	37.1	37.9	38.2	36.6	35.3	36.1	37.1	37.3	36.8	34.2	30.7	S	24.2	25.9	29	28.7	27.3	23.3	23.3	23.3	39.5	34.1
Dec 12	18.7	17.7	12.2	14.2	14	12.9	10	3.8	3.3	3.9	9.3	16.4	19.6	21.7	22	18.5	S	10.9	7.6	8.9	5.5	1.4	1.2	1.2	1.2	22.0	11.1
Dec 13	4.3	6.4	4.9	5	14.8	18.2	14.1	7.8	7.9	7.1	17.6	20.2	20.7	19.3	18.3	S	20.5	13.3	11.6	7.7	7	4.5	3.8	4.2	3.8	20.7	11.3
Dec 14	4.4	4.9	2.4	1.2	9.8	16.7	20.7	23.2	23.2	23.4	25.4	29.2	30.3	30.4	S	29.8	29.1	26.3	19.7	15.2	20.4	22.2	19	13.7	1.2	30.4	19.2
Dec 15	8.5	3.1	1.9	2.1	2.2	2.8	1.6	2.8	3.7	4.1	12.6	22	31.2	S	30.3	29.5	29.2	27.5	26.7	24.5	22.4	21.4	20.2	19.4	1.6	31.2	15.2
Dec 16	18.7	16.3	15.5	16.4	15.1	13.6	14	17.2	18.1	18.1	18.9	21.5	S	29.4	34.1	28	24.2	20.6	16.8	16.5	19.4	20.5	21.1	28.4	13.6	34.1	20.1
Dec 17	33.6	33.7	34	33.1	35.3	34.6	34.4	33.6	30.1	27.8	27.1	S	29.6	30.2	29.2	26.1	20.5	17.2	24.7	25.5	23.9	23.2	23.4	24.5	17.2	35.3	28.5
Dec 18	22.7	20.4	20.2	16.8	15.3	8.6	6.6	6.1	4.6	4.1	S	22.1	22	21.6	23	19.6	16.4	14.6	12.6	13.6	9.7	5.4	3.1	3.7	3.1	23.0	13.6
Dec 19	3.4	3.8	2.8	1.3	1.9	0.9	1	16	24.5	S	30.1	31.4	30.7	30.1	29.5	28.9	29.3	28.6	29.4	29.6	29.3	29.4	29.7	29.7	0.9	31.4	20.5
Dec 20	29.9	29.7	29.6	29.8	29.6	28.3	27.7	26.5	S	26.4	25.8	24.7	23.7	22.6	21.7	20	18.3	18.7	17.3	12.6	6.5	4.5	6.4	7.9	4.5	29.9	21.2
Dec 21	9.1	7	5.7	4.3	4.5	2.9	1.6	S	0.9	1.4	2.3	4.2	8.2	10.4	12.1	11.4	4.5	11.1	8.3	16.4	11.8	10.7	3.5	1.1	0.9	16.4	6.7
Dec 22	0.5	0.6	1	1.6	0.5	1.2	S	0.9	1	1.8	4.2	7.5	7.5	7.4	6.7	4.4	1.4	0.8	0.8	0.9	0.5	0.7	0.5	0.5	0.5	7.5	2.3
Dec 23	0.4	1.4	8	16.8	21.7	S	29	35	36.7	37.6	38.1	38.3	38.5	38.3	37.7	36.7	34.8	32.5	31.7	30.7	29.5	28.6	28.4	26.8	0.4	38.5	28.6
Dec 24	23.2	18.1	15.7	16	S	15.3	10.7	10.4	11.2	11.6	10.4	19.1	23.7	24	27.4	30.2	23.9	23.8	23.2	21.7	14.2	14.5	12.2	12	10.4	30.2	17.9
Dec 25	7.9	9.4	7.5	S	3.6	2.2	3.1	1.9	3.1	4.8	6.1	9.6	11.3	11.1	11.8	9.6	4.4	1.3	1.2	1.4	1.3	1.4	2.2	3.2	1.2	11.8	5.2
Dec 26	5.7	2	S	6.6	1.7	1.2	1.6	1.4	1.5	2.6	9.4	24.6	24.4	24.1	23.8	24.8	19.9	15.2	12.4	10.6	11.6	10.4	8.1	2.2	1.2	24.8	10.7
Dec 27	3.8	S	2	1.2	1.1	1.5	1	0.9	1	2	3	6	18.1	20.8	15.2	10.3	3.1	11.8	26.2	27.7	27.8	28	26.6	26.2	0.9	28.0	11.5
Dec 28	S	24.8	25.6	24.9	21.3	16.2	6.6	3.4	2.4	4.7	11.8	16.4	17.8	14	11.1	13.2	14.3	16.8	16.4	11.6	11.3	11.2	11.3	S	2.4	25.6	14.0
Dec 29	8.1	6.2	5.5	4.1	2.8	2.2	1.2	1	1.2	3.4	5.5	8.4	10.4	11.4	12	8.9	2.9	1.4	0.8	0.8	1	0.8	S	0.9	0.8	12.0	4.4
Dec 30	0.9	0.8	0.8	0.7	0.7	0.7	1	0.9	0.9	4.2	17	26.1	27.4	28	24.1	25.7	31.2	33.4	32.9	32.4	30.8	S	26.4	28.4	0.7	33.4	16.3
Dec 31	28.1	25.9	21	17.8	12.9	11.6	9	10.8	8.9	5.1	5.4	17.8	15.8	15.7	15.7	13.9	11.4	9.3	7	5.4	S	6	6.4	13.1	5.1	28.1	12.8
Diurnal Maximum	38.7	39.5	38.9	38.2	37.5	37.1	37.9	38.2	36.7	37.6	38.1	38.3	38.5	38.3	37.7	36.7	34.8	33.4	32.9	32.4	30.8	29.4	30.7	36.7			
Diurnal Average	11.7	11.7	11.1	11.4	11.3	10.7	10.9	11.7	11.0	11.8	16.0	19.9	21.6	21.9	21.6	20.1	16.8	15.6	15.5	15.3	14.4	13.1	13.5	13.1			

<b>C</b>	Monthly Calibration	<b>S</b>	Daily Zero-Span Check	<b>Q</b>	Quality Assurance
<b>K</b>	Collection Error	<b>ND</b>	No Data (Machine Not in Service)	<b>Y</b>	Routine Maintenance
<b>X</b>	In/Valid Data (Equipment Malfunction/Recovery)	<b>NRM</b>	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b>	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

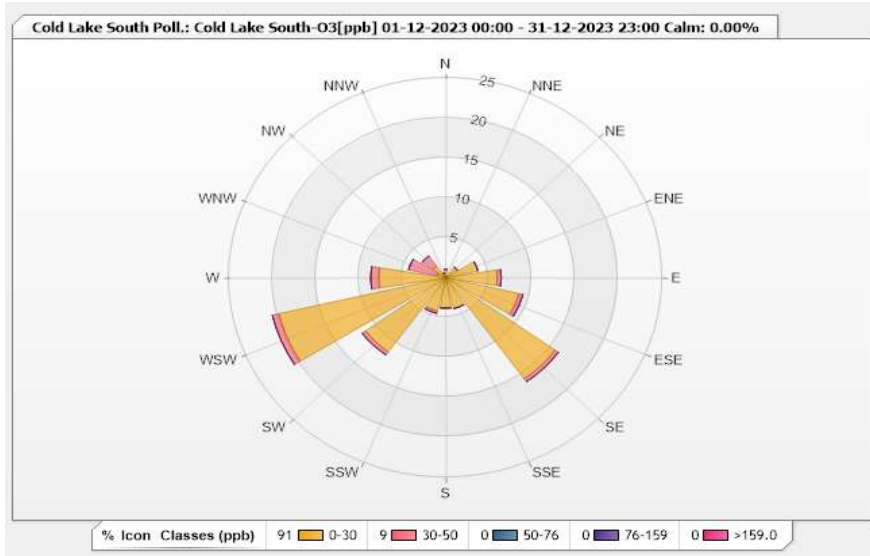


Station: Cold Lake South Poll.: Cold Lake South-O3[ppb] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 88.31%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.15	0	0	0	0	0.15
NE	1.67	0	0	0	0	1.67
ENE	3.81	0	0	0	0	3.81
E	5.94	0.46	0	0	0	6.4
ESE	8.68	0.46	0	0	0	9.14
SE	15.53	0.46	0	0	0	15.99
SSE	3.96	0	0	0	0	3.96
S	3.81	0	0	0	0	3.81
SSW	4.26	0.3	0	0	0	4.56
SW	11.42	0.46	0	0	0	11.88
WSW	19.79	0.76	0	0	0	20.55
W	7.76	0.91	0	0	0	8.67
WNW	1.07	3.35	0	0	0	4.42
NW	1.83	1.52	0	0	0	3.35
NNW	0.61	0	0	0	0	0.61
Summary	91.36	8.68	0	0	0	100



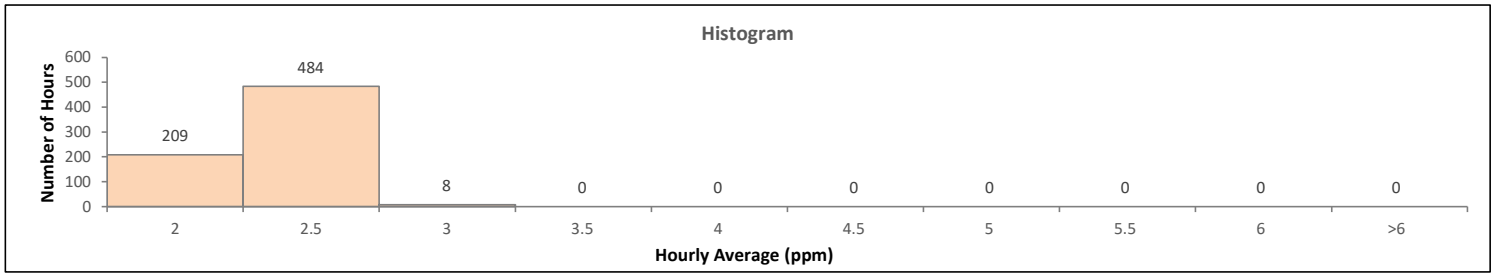
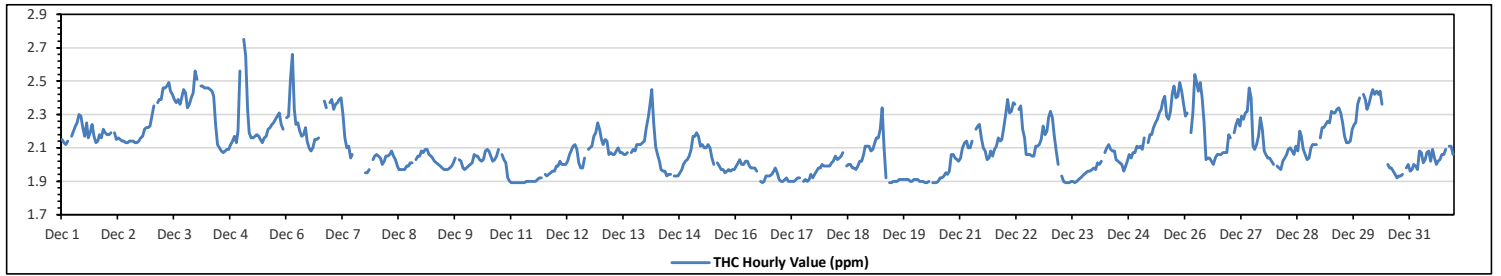
**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**TOTAL HYDROCARBONS (THC) in ppm**

Maximum Hourly Value:	2.75 ppm	on Dec 5 at hr 1	Hours in Service:	744
Maximum Daily Value:	2.41 ppm	on Dec 3	Hours of Data:	701
Minimum Hourly Value:	1.89 ppm	on Dec 11 at hr 0	Hours of Missing Data:	2
Minimum Daily Value:	1.91 ppm	on Dec 11	Hours of Calibration:	41
Monthly Average:	2.11 ppm		Operational Uptime:	99.7

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	2.15	2.13	2.12	2.14	S	2.17	2.20	2.23	2.25	2.30	2.29	2.22	2.17	2.25	2.16	2.19	2.24	2.17	2.13	2.14	2.18	2.16	2.21	2.19	2.12	2.30	2.19	
Dec 2	2.18	2.18	2.19	S	2.19	2.15	2.16	2.15	2.14	2.14	2.13	2.13	2.14	2.14	2.14	2.13	2.13	2.14	2.16	2.17	2.21	2.22	2.22	2.23	2.13	2.23	2.16	
Dec 3	2.29	2.35	S	2.37	2.39	2.39	2.46	2.46	2.47	2.49	2.44	2.42	2.39	2.37	2.39	2.36	2.40	2.45	2.43	2.34	2.36	2.40	2.43	2.56	2.29	2.56	2.41	
Dec 4	2.51	S	2.47	2.47	2.46	2.46	2.46	2.45	2.44	2.41	2.24	2.12	2.10	2.08	2.07	2.08	2.09	2.12	2.14	2.17	2.13	2.20	2.56	2.07	2.56	2.27		
Dec 5	S	2.75	2.65	2.33	2.19	2.16	2.16	2.17	2.18	2.17	2.15	2.13	2.16	2.17	2.21	2.22	2.24	2.25	2.27	2.29	2.31	2.24	2.21	S	2.13	2.75	2.26	
Dec 6	2.28	2.29	2.51	2.66	2.33	2.24	2.25	2.20	2.17	2.18	2.22	2.14	2.10	2.08	2.10	2.15	2.15	2.16	Q	Q	Q	2.38	2.34	S	2.37	2.08	2.66	2.25
Dec 7	2.39	2.33	2.36	2.37	2.39	2.40	2.30	2.16	2.10	2.11	2.04	2.06	C	C	C	C	C	C	1.95	1.95	1.97	S	2.03	2.05	1.95	2.40	NA	
Dec 8	2.06	2.05	2.04	2.00	2.02	2.05	2.05	2.06	2.08	2.05	2.03	1.99	1.97	1.97	1.97	1.97	1.99	1.99	2.01	2.01	S	2.03	2.05	2.05	1.97	2.08	2.02	
Dec 9	2.08	2.07	2.09	2.09	2.02	2.05	2.04	2.02	2.01	2.00	1.99	1.98	1.97	1.97	1.98	1.99	2.01	2.04	S	2.03	2.02	1.98	1.97	1.97	1.97	2.09	2.02	
Dec 10	1.98	1.99	2.00	2.01	2.06	2.05	2.05	2.03	2.02	2.03	2.08	2.09	2.08	2.05	2.02	2.03	2.05	2.09	S	2.06	2.03	2.01	1.92	1.90	1.90	2.09	2.03	
Dec 11	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.90	1.90	1.90	1.90	1.90	1.90	1.91	1.92	1.92	S	1.94	1.93	1.94	1.95	1.96	1.96	1.89	1.96	1.91	
Dec 12	1.99	1.99	2.02	2.00	2.00	2.00	2.02	2.06	2.08	2.11	2.12	2.09	2.01	1.98	1.98	2.04	S	2.09	2.10	2.11	2.17	2.19	2.25	2.21	1.98	2.25	2.07	
Dec 13	2.15	2.12	2.15	2.14	2.06	2.07	2.06	2.06	2.08	2.10	2.07	2.07	2.06	2.06	2.07	S	2.07	2.09	2.08	2.12	2.12	2.12	2.13	2.14	2.06	2.15	2.10	
Dec 14	2.22	2.28	2.35	2.45	2.25	2.11	2.06	2.02	1.97	1.96	1.96	1.93	1.94	1.94	S	1.93	1.93	1.93	1.95	1.97	2.00	2.02	2.03	2.05	1.93	2.45	2.05	
Dec 15	2.09	2.17	2.17	2.19	2.17	2.11	2.12	2.10	2.10	2.12	2.10	2.04	2.00	S	2.01	1.99	1.97	1.97	1.95	1.96	1.97	1.96	1.97	1.97	1.95	2.19	2.05	
Dec 16	1.99	2.01	2.03	2.00	2.00	2.02	2.02	1.99	1.98	1.98	1.98	1.98	1.96	S	1.90	1.89	1.90	1.93	1.93	1.93	1.94	1.96	1.98	1.95	1.91	1.89	2.03	1.96
Dec 17	1.90	1.90	1.91	1.92	1.90	1.90	1.90	1.90	1.91	1.92	1.92	S	1.90	1.91	1.90	1.91	1.94	1.92	1.94	1.96	1.98	1.98	2.00	1.99	1.90	2.00	1.93	
Dec 18	1.99	1.99	1.99	2.01	2.02	2.05	2.03	2.04	2.05	2.07	S	1.89	1.99	2.00	2.00	1.98	1.98	1.97	1.99	2.02	2.02	2.06	2.11	2.11	2.11	1.97	2.11	2.03
Dec 19	2.08	2.09	2.13	2.16	2.16	2.21	2.34	2.10	1.92	S	1.89	1.89	1.90	1.90	1.90	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.89	2.34	1.99	
Dec 20	1.91	1.91	1.90	1.90	1.90	1.89	1.89	1.90	S	1.89	1.89	1.89	1.90	1.92	1.92	1.93	1.95	1.94	1.96	2.06	2.06	2.04	2.03	2.02	1.89	2.06	1.94	
Dec 21	2.04	2.10	2.13	2.14	2.10	2.10	2.14	S	2.21	2.23	2.24	2.16	2.10	2.08	2.03	2.04	2.08	2.05	2.09	2.11	2.16	2.14	2.15	2.22	2.03	2.24	2.12	
Dec 22	2.30	2.39	2.31	2.32	2.37	2.36	S	2.33	2.35	2.21	2.16	2.06	2.06	2.06	2.05	2.05	2.11	2.11	2.12	2.15	2.23	2.18	2.20	2.28	2.05	2.39	2.21	
Dec 23	2.32	2.28	2.17	2.08	2.00	S	1.93	1.90	1.89	1.89	1.89	1.90	1.90	1.89	1.90	1.91	1.92	1.93	1.94	1.95	1.96	1.96	1.97	1.98	1.89	2.32	1.98	
Dec 24	1.97	2.01	2.00	2.02	S	2.07	2.10	2.12	2.09	2.08	2.08	2.03	2.02	2.01	2.00	1.96	1.99	2.02	2.06	2.04	2.07	2.07	2.11	2.10	1.96	2.12	2.04	
Dec 25	2.11	2.09	2.16	S	2.13	2.18	2.18	2.22	2.25	2.27	2.31	2.33	2.38	2.41	2.29	2.27	2.32	2.43	2.47	2.40	2.41	2.49	2.44	2.36	2.09	2.49	2.30	
Dec 26	2.29	2.31	S	2.19	2.31	2.54	2.49	2.44	2.49	2.40	2.25	2.03	2.04	2.04	2.02	2.00	2.04	2.06	2.06	2.06	2.07	2.07	2.18	2.00	2.54	2.19		
Dec 27	2.16	S	2.19	2.24	2.27	2.23	2.29	2.27	2.31	2.32	2.46	2.40	2.11	2.09	2.12	2.17	2.28	2.21	2.08	2.06	2.04	2.02	2.00	2.00	2.46	2.19		
Dec 28	S	1.99	1.98	1.97	2.02	2.04	2.06	2.09	2.10	2.08	2.06	2.11	2.08	2.20	2.17	2.09	2.06	2.03	2.04	2.10	2.12	2.12	S	2.00	1.97	2.20	2.07	
Dec 29	2.16	2.22	2.22	2.24	2.26	2.25	2.32	2.31	2.31	2.33	2.34	2.31	2.25	2.17	2.13	2.13	2.14	2.21	2.24	2.25	2.36	2.40	S	2.42	2.13	2.42	2.26	
Dec 30	2.39	2.33	2.36	2.41	2.45	2.42	2.44	2.42	2.44	2.36	NRM	NRM	2.00	1.98	1.98	1.96	1.94	1.92	1.93	1.93	1.94	S	1.98	2.00	1.92	2.45	2.17	
Dec 31	1.96	1.97	2.00	1.99	1.97	2.08	2.07	2.01	2.03	2.07	2.08	2.02	2.09	2.04	2.00	2.02	2.03	2.06	2.06	2.09	S	2.11	2.11	2.06	1.96	2.11	2.04	
Diurnal Maximum	2.51	2.75	2.65	2.66	2.46	2.54	2.49	2.46	2.49	2.46	2.42	2.39	2.41	2.39	2.36	2.40	2.45	2.47	2.40	2.41	2.49	2.44	2.56					
Diurnal Average	2.13	2.14	2.15	2.16	2.15	2.15	2.14	2.14	2.14	2.11	2.08	2.06	2.05	2.04	2.06	2.06	2.07	2.07	2.07	2.08	2.11	2.12	2.09	2.13				

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance      **P** Power Failure  
**X** InValid Data (Equipment Malfunction/Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

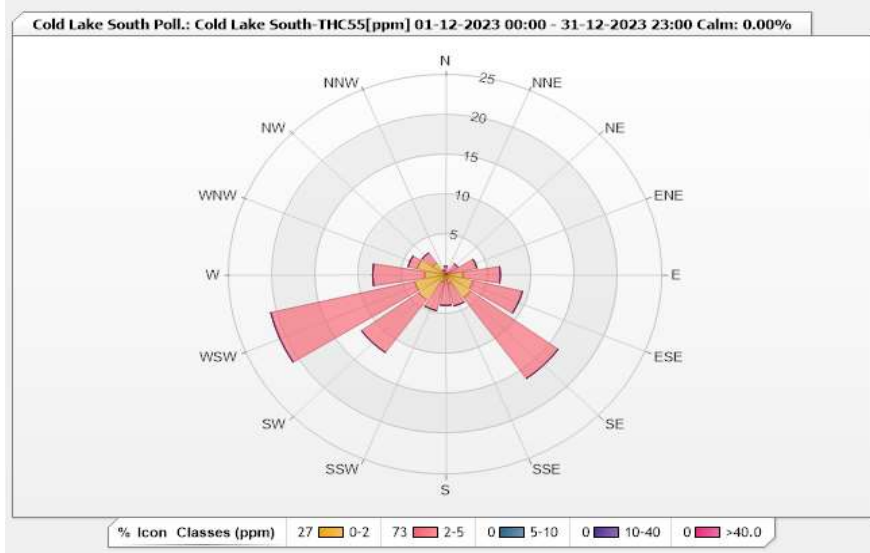


**Station: Cold Lake South Poll.: Cold Lake South-THC55[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.50%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-40	>40.0	Total
N	0	1.08	0	0	0	1.08
NNE	0	0.15	0	0	0	0.15
NE	0	1.69	0	0	0	1.69
ENE	0	3.69	0	0	0	3.69
E	2	4.3	0	0	0	6.3
ESE	3.23	5.84	0	0	0	9.07
SE	3.53	12.44	0	0	0	15.97
SSE	1.08	2.92	0	0	0	4
S	0.61	3.23	0	0	0	3.84
SSW	0.92	3.69	0	0	0	4.61
SW	3.84	8.14	0	0	0	11.98
WSW	3.69	17.05	0	0	0	20.74
W	2.46	5.99	0	0	0	8.45
WNW	3.38	1.08	0	0	0	4.46
NW	1.84	1.54	0	0	0	3.38
NNW	0	0.61	0	0	0	0.61
Summary	26.58	73.44	0	0	0	100



Lakeland Industry & Community Association

Cold Lake South Station - December 2023

Summary of Hourly Averages

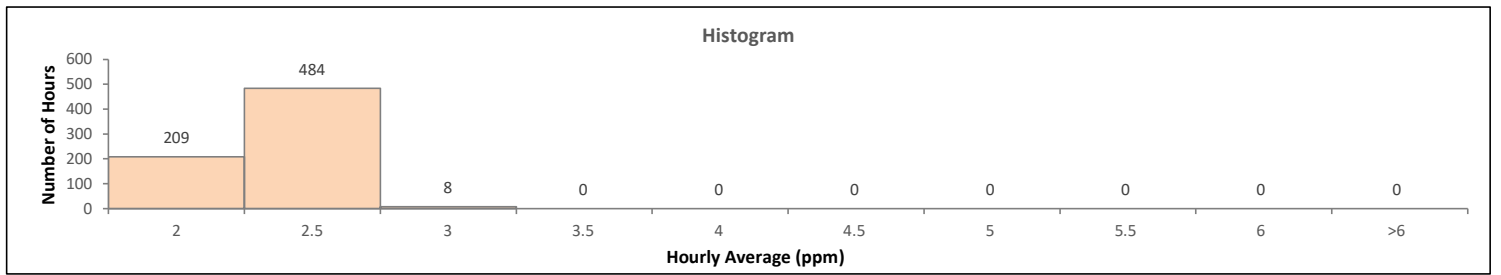
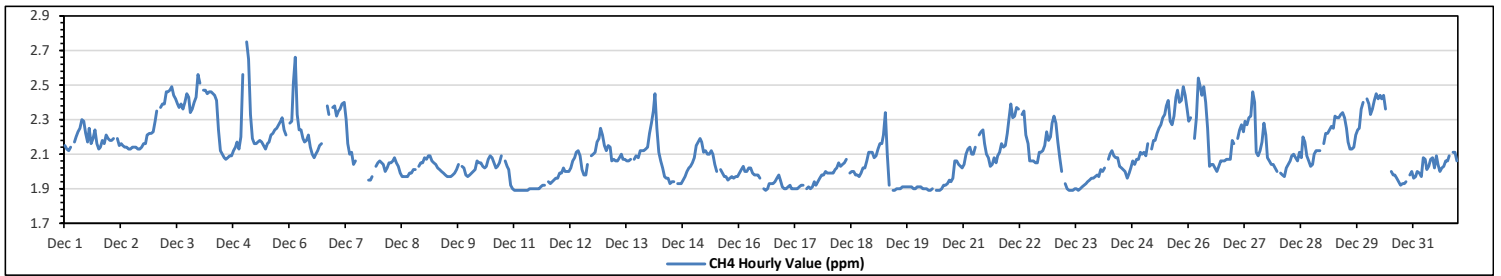
METHANE (CH4) in ppm

Maximum Hourly Value:	2.75 ppm	on Dec 5 at hr 1	Hours in Service:	744
Maximum Daily Value:	2.41 ppm	on Dec 3	Hours of Data:	701
Minimum Hourly Value:	1.89 ppm	on Dec 11 at hr 0	Hours of Missing Data:	2
Minimum Daily Value:	1.91 ppm	on Dec 11	Hours of Calibration:	41
Monthly Average:	2.11 ppm		Operational Uptime:	99.7

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	2.15	2.13	2.12	2.14	S	2.17	2.20	2.23	2.25	2.30	2.29	2.22	2.17	2.25	2.16	2.19	2.24	2.16	2.13	2.14	2.18	2.16	2.21	2.19	2.12	2.30	2.19	
Dec 2	2.18	2.18	2.19	S	2.19	2.15	2.16	2.15	2.14	2.14	2.13	2.13	2.14	2.14	2.14	2.13	2.13	2.14	2.16	2.21	2.22	2.22	2.23	2.13	2.23	2.16		
Dec 3	2.29	2.35	S	2.37	2.39	2.39	2.46	2.46	2.47	2.49	2.44	2.42	2.39	2.37	2.39	2.36	2.40	2.45	2.43	2.34	2.36	2.40	2.43	2.56	2.29	2.56	2.41	
Dec 4	2.51	S	2.47	2.47	2.45	2.46	2.46	2.45	2.44	2.41	2.24	2.12	2.10	2.08	2.07	2.08	2.09	2.12	2.14	2.17	2.13	2.20	2.56	2.07	2.56	2.27		
Dec 5	S	2.75	2.65	2.33	2.19	2.16	2.16	2.17	2.18	2.17	2.15	2.13	2.16	2.17	2.21	2.22	2.24	2.25	2.27	2.29	2.31	2.24	2.21	S	2.13	2.75	2.26	
Dec 6	2.28	2.29	2.51	2.66	2.33	2.24	2.24	2.19	2.17	2.18	2.21	2.14	2.10	2.08	2.12	2.12	2.15	2.16	Q	Q	2.38	2.33	S	2.37	2.08	2.66	2.25	
Dec 7	2.38	2.32	2.35	2.36	2.39	2.40	2.30	2.16	2.10	2.11	2.04	2.06	C	C	C	C	C	1.95	1.95	1.97	S	2.03	2.05	1.95	2.40	NA		
Dec 8	2.06	2.05	2.04	2.00	2.02	2.05	2.05	2.06	2.08	2.05	2.03	1.99	1.97	1.97	1.97	1.97	1.99	1.99	2.01	2.01	S	2.03	2.05	2.05	1.97	2.08	2.02	
Dec 9	2.08	2.07	2.09	2.09	2.06	2.05	2.04	2.02	2.01	2.00	1.99	1.98	1.97	1.97	1.97	1.98	1.99	2.01	2.04	S	2.03	2.02	1.98	1.97	1.97	2.09	2.02	
Dec 10	1.98	1.99	2.00	2.01	2.06	2.05	2.05	2.03	2.02	2.03	2.07	2.09	2.08	2.05	2.02	2.03	2.05	2.09	S	2.06	2.03	2.01	1.92	1.90	1.90	2.09	2.03	
Dec 11	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.90	1.90	1.90	1.90	1.90	1.90	1.91	1.92	1.92	S	1.94	1.93	1.94	1.95	1.96	1.96	1.89	1.96	1.91	
Dec 12	1.99	1.99	2.02	2.00	2.00	2.00	2.02	2.06	2.08	2.11	2.12	2.09	2.01	1.98	1.98	2.04	S	2.09	2.10	2.11	2.17	2.19	2.25	2.21	1.98	2.25	2.07	
Dec 13	2.15	2.12	2.15	2.14	2.06	2.07	2.06	2.06	2.08	2.10	2.07	2.07	2.06	2.06	2.07	S	1.93	2.07	2.09	2.08	2.12	2.12	2.12	2.13	2.14	2.06	2.15	2.10
Dec 14	2.22	2.28	2.35	2.45	2.25	2.11	2.06	2.02	1.97	1.96	1.96	1.96	1.93	1.94	1.94	S	1.93	1.93	1.93	1.95	1.97	2.00	2.02	2.03	2.05	1.93	2.45	2.05
Dec 15	2.08	2.15	2.17	2.19	2.17	2.11	2.12	2.10	2.10	2.12	2.10	2.04	2.00	S	2.01	1.99	1.97	1.97	1.95	1.96	1.97	1.96	1.97	1.96	1.97	1.95	2.19	2.05
Dec 16	1.99	2.01	2.03	2.00	2.00	2.02	2.02	1.99	1.98	1.98	1.98	1.98	1.96	S	1.90	1.89	1.90	1.93	1.93	1.93	1.94	1.96	1.98	1.95	1.91	1.89	2.03	1.96
Dec 17	1.90	1.90	1.91	1.92	1.90	1.90	1.90	1.90	1.91	1.92	1.92	S	1.90	1.91	1.90	1.91	1.94	1.92	1.94	1.96	1.98	1.98	2.00	1.99	1.90	2.00	1.93	
Dec 18	1.99	1.99	1.99	2.01	2.02	2.05	2.03	2.04	2.05	2.07	S	1.89	1.99	2.00	2.00	1.98	1.98	1.97	1.99	2.02	2.02	2.06	2.11	2.11	2.11	1.97	2.11	2.03
Dec 19	2.08	2.09	2.13	2.16	2.16	2.21	2.34	2.10	1.92	S	1.89	1.89	1.90	1.90	1.90	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.89	2.34	1.99	
Dec 20	1.91	1.91	1.90	1.90	1.90	1.89	1.89	1.90	S	1.89	1.89	1.89	1.90	1.92	1.92	1.93	1.95	1.94	1.96	2.06	2.06	2.04	2.03	2.02	1.89	2.06	1.94	
Dec 21	2.04	2.10	2.13	2.14	2.10	2.10	2.14	S	2.21	2.23	2.24	2.16	2.10	2.08	2.03	2.04	2.08	2.05	2.09	2.11	2.16	2.14	2.15	2.22	2.03	2.24	2.12	
Dec 22	2.30	2.39	2.31	2.32	2.37	2.36	S	2.33	2.35	2.21	2.16	2.06	2.06	2.06	2.05	2.05	2.11	2.11	2.12	2.15	2.23	2.18	2.20	2.28	2.05	2.39	2.21	
Dec 23	2.32	2.28	2.17	2.08	2.00	S	1.93	1.90	1.89	1.89	1.89	1.90	1.90	1.89	1.90	1.91	1.92	1.93	1.94	1.95	1.96	1.96	1.97	1.98	1.89	2.32	1.98	
Dec 24	1.97	2.01	2.00	2.02	S	2.07	2.10	2.12	2.09	2.08	2.08	2.03	2.02	2.01	2.00	1.96	1.99	2.02	2.06	2.04	2.07	2.07	2.11	2.10	1.96	2.12	2.04	
Dec 25	2.11	2.09	2.16	S	2.13	2.18	2.18	2.22	2.25	2.27	2.31	2.33	2.38	2.41	2.29	2.27	2.32	2.43	2.47	2.40	2.41	2.49	2.44	2.36	2.09	2.49	2.30	
Dec 26	2.29	2.31	S	2.19	2.31	2.54	2.49	2.44	2.49	2.40	2.25	2.03	2.04	2.04	2.02	2.00	2.03	2.06	2.06	2.06	2.07	2.07	2.18	2.00	2.54	2.19		
Dec 27	2.16	S	2.19	2.24	2.27	2.23	2.29	2.27	2.31	2.32	2.46	2.40	2.11	2.09	2.12	2.17	2.28	2.21	2.08	2.06	2.04	2.02	2.00	2.00	2.46	2.19		
Dec 28	S	1.99	1.98	1.97	2.02	2.04	2.06	2.09	2.10	2.08	2.06	2.11	2.08	2.20	2.17	2.09	2.06	2.03	2.04	2.10	2.12	2.12	S	1.97	2.20	2.07		
Dec 29	2.16	2.22	2.22	2.24	2.26	2.25	2.32	2.31	2.31	2.33	2.34	2.31	2.25	2.17	2.13	2.13	2.14	2.21	2.24	2.25	2.36	2.40	S	2.42	2.13	2.42	2.26	
Dec 30	2.39	2.33	2.36	2.41	2.45	2.42	2.44	2.42	2.44	2.36	NRM	NRM	2.00	1.98	1.98	1.96	1.94	1.92	1.93	1.93	1.94	S	1.98	2.00	1.92	2.45	2.17	
Dec 31	1.96	1.97	2.00	1.99	1.97	2.08	2.07	2.01	2.03	2.07	2.08	2.02	2.09	2.04	2.00	2.02	2.03	2.06	2.06	2.06	2.09	S	2.11	2.11	2.06	1.96	2.11	2.04
Diurnal Maximum	2.51	2.75	2.65	2.66	2.45	2.54	2.49	2.46	2.49	2.46	2.42	2.39	2.41	2.39	2.36	2.40	2.45	2.47	2.40	2.41	2.49	2.44	2.56					
Diurnal Average	2.13	2.14	2.15	2.16	2.15	2.15	2.14	2.14	2.14	2.14	2.11	2.08	2.06	2.05	2.04	2.06	2.07	2.07	2.07	2.08	2.11	2.12	2.09	2.13				

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	In/Valid Data (Equipment Malfunction/Recovery)	NRM	Unit/Maint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



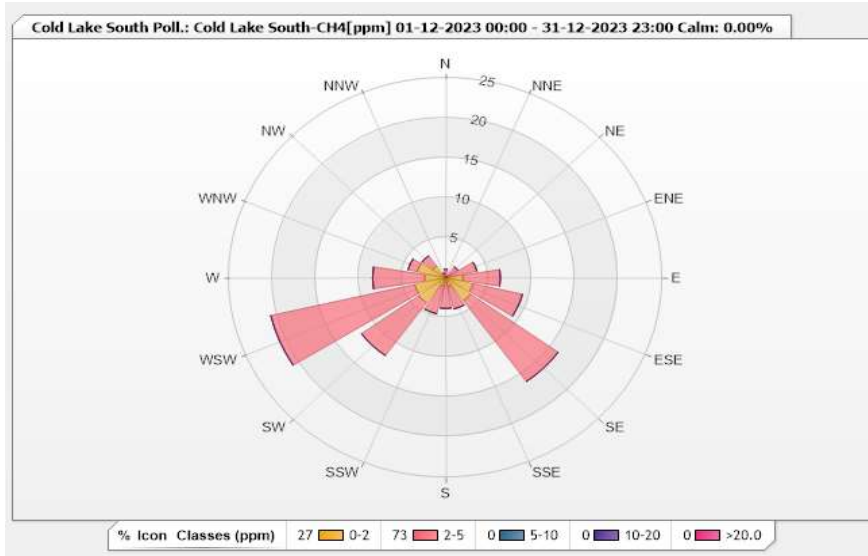


**Station: Cold Lake South Poll.: Cold Lake South-CH4[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.50%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-20	>20.0	Total
N	0	1.08	0	0	0	1.08
NNE	0	0.15	0	0	0	0.15
NE	0	1.69	0	0	0	1.69
ENE	0	3.69	0	0	0	3.69
E	2	4.3	0	0	0	6.3
ESE	3.23	5.84	0	0	0	9.07
SE	3.53	12.44	0	0	0	15.97
SSE	1.08	2.92	0	0	0	4
S	0.61	3.23	0	0	0	3.84
SSW	1.08	3.53	0	0	0	4.61
SW	3.84	8.14	0	0	0	11.98
WSW	3.69	17.05	0	0	0	20.74
W	2.46	5.99	0	0	0	8.45
WNW	3.38	1.08	0	0	0	4.46
NW	1.84	1.54	0	0	0	3.38
NNW	0	0.61	0	0	0	0.61
Summary	26.74	73.28	0	0	0	100



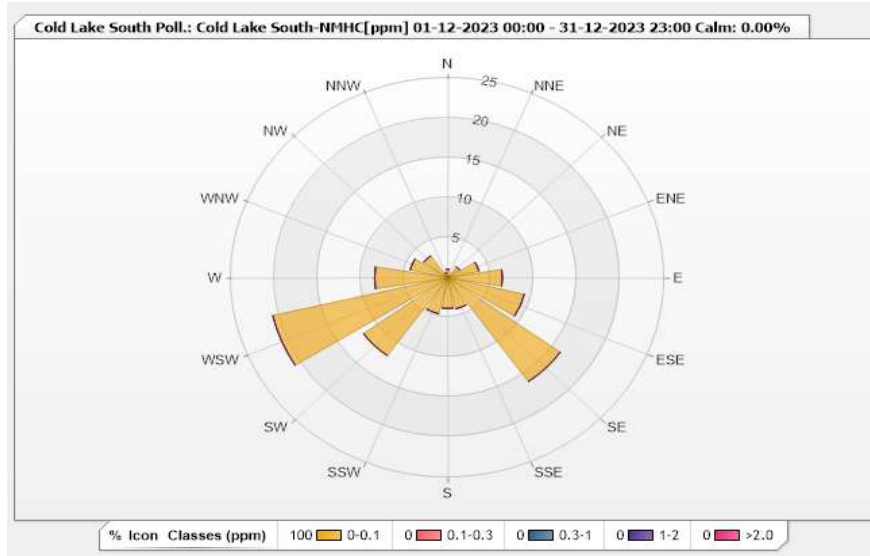


Station: Cold Lake South Poll.: Cold Lake South-NMHC[ppm] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.50%      Calm Avg: 0.00 [ppm]

Direction	0-0.1	0.1-0.3	0.3-1	1-2	>2.0	Total
N	1.08	0	0	0	0	1.08
NNE	0.15	0	0	0	0	0.15
NE	1.69	0	0	0	0	1.69
ENE	3.69	0	0	0	0	3.69
E	6.3	0	0	0	0	6.3
ESE	9.06	0	0	0	0	9.06
SE	15.98	0	0	0	0	15.98
SSE	3.99	0	0	0	0	3.99
S	3.84	0	0	0	0	3.84
SSW	4.61	0	0	0	0	4.61
SW	11.98	0	0	0	0	11.98
WSW	20.74	0	0	0	0	20.74
W	8.45	0	0	0	0	8.45
WNW	4.45	0	0	0	0	4.45
NW	3.38	0	0	0	0	3.38
NNW	0.61	0	0	0	0	0.61
Summary	100	0	0	0	0	100



**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**

**PARTICULATE MATTER 2.5 (PM<sub>2.5</sub>) in µg/m<sup>3</sup>**

Alberta Ambient Air Quality Guideline (AAAQG): 1-Hour 80 µg/m <sup>3</sup> , Alberta Ambient Air Quality Objective (AAAQO): 24-Hour 29 µg/m <sup>3</sup>	
Number of 1-Hour Exceedances:	0
Number of 24-Hour Exceedances:	0
Maximum Hourly Value:	23 µg/m <sup>3</sup> on Dec 3 at hr 3
Maximum Daily Value:	18.2 µg/m <sup>3</sup> on Dec 3
Minimum Hourly Value:	0 µg/m <sup>3</sup> on Dec 23 at hr 10
Minimum Daily Value:	3 µg/m <sup>3</sup> on Dec 17
Monthly Average:	7.0 µg/m <sup>3</sup>
Hours in Service:	744
Hours of Data:	711
Hours of Missing Data:	31
Hours of Calibration:	2
Operational Uptime:	95.8

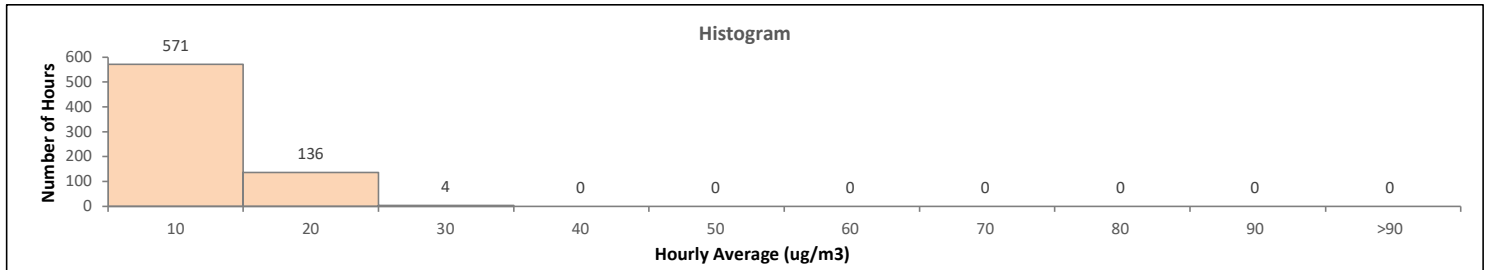
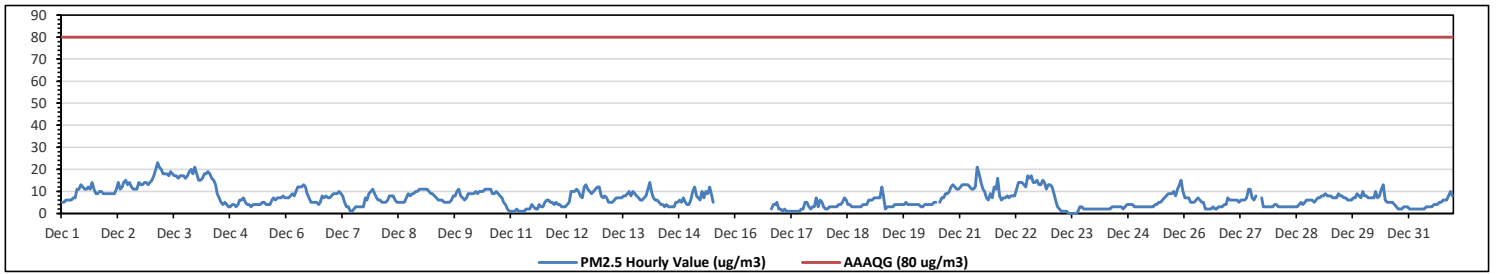
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average						
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23					
Dec 1	5	5	6	6	6	6	7	7	11	11	13	12	11	11	12	11	14	11	9	9	10	10	9	9	5	14	9.2					
Dec 2	9	9	9	9	9	11	14	11	12	14	15	13	14	12	11	11	11	14	13	13	14	14	13	14	9	15	12.0					
Dec 3	15	17	20	23	21	20	18	18	18	17	19	18	17	17	16	17	17	17	16	17	19	20	18	21	15	23	18.2					
Dec 4	18	15	15	16	18	18	19	18	16	15	13	9	7	5	4	5	4	3	3	4	4	3	4	6	3	19	10.1					
Dec 5	6	7	5	4	4	3	4	4	4	4	5	5	4	4	4	6	7	6	7	7	7	8	7	3	8	5.3						
Dec 6	7	7	8	9	8	10	12	12	12	13	12	9	7	5	5	5	4	5	8	7	8	7	7	4	13	8.0						
Dec 7	8	9	9	9	10	9	8	5	3	3	1	1	2	3	3	3	3	7	6	9	10	11	9	1	11	6.0						
Dec 8	7	6	6	5	5	5	6	8	8	8	6	5	5	5	5	7	9	8	9	9	10	10	11	5	11	7.0						
Dec 9	11	11	11	11	10	9	9	8	7	6	6	6	5	5	5	5	6	8	8	10	11	8	7	6	5	11	7.9					
Dec 10	7	9	9	9	9	10	9	10	10	11	11	11	11	11	9	9	10	9	8	7	5	4	2	1	1	11	8.3					
Dec 11	1	1	1	2	1	1	1	1	2	2	2	4	3	2	2	4	3	3	5	6	6	5	5	4	1	6	2.8					
Dec 12	5	4	4	3	3	3	4	5	10	10	10	11	10	8	7	12	13	11	10	9	10	11	12	12	3	13	8.2					
Dec 13	8	7	8	7	5	5	5	6	7	7	7	8	8	9	10	8	10	9	8	7	6	6	7	5	10	7.3						
Dec 14	8	11	14	10	7	6	6	5	4	4	3	4	3	3	3	5	5	6	5	7	5	4	4	3	14	5.6						
Dec 15	6	10	12	8	7	6	10	7	10	9	12	9	5	K	K	K	K	K	K	K	K	K	K	K	5	12	NA					
Dec 16	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	2	4	4	5	2	2	5	NA
Dec 17	2	1	2	1	1	1	1	1	1	1	2	2	2	5	5	3	2	3	3	7	3	6	5	3	1	7	2.6					
Dec 18	2	2	3	3	3	3	3	4	4	5	7	6	4	4	3	3	3	3	3	4	4	4	4	6	2	7	3.7					
Dec 19	6	6	7	7	7	7	12	8	2	3	3	3	3	4	4	4	4	4	5	4	4	4	4	2	12	5.0						
Dec 20	4	4	4	3	3	4	4	4	4	4	5	5	Y	5	7	7	9	9	10	12	13	12	11	11	3	13	6.7					
Dec 21	12	13	13	13	13	12	11	11	12	21	18	14	11	10	7	6	9	7	12	11	16	8	6	7	6	21	11.4					
Dec 22	7	8	7	8	8	8	11	14	14	13	12	17	16	17	14	14	15	13	13	15	14	11	13	7	17	12.3						
Dec 23	13	12	9	6	3	2	1	1	1	0	0	0	0	0	1	3	3	2	2	2	2	2	2	0	13	2.8						
Dec 24	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	3	4	4	4	4	3	3	3	2	4	2.8						
Dec 25	3	3	3	3	3	3	3	3	4	4	5	5	6	7	8	9	9	10	8	11	13	15	10	3	15	6.5						
Dec 26	7	7	7	5	5	5	6	7	6	5	5	2	2	2	2	3	2	2	3	3	3	4	4	2	7	4.3						
Dec 27	6	6	6	6	6	5	6	6	6	7	11	11	7	6	8	C	C	7	3	3	3	3	3	3	11	5.8						
Dec 28	4	4	3	3	3	3	3	3	3	3	3	3	3	4	5	4	5	6	6	6	6	5	6	7	3	7	4.2					
Dec 29	7	8	8	9	8	8	8	7	7	7	9	8	8	7	7	6	6	6	7	7	9	8	7	10	6	10	7.6					
Dec 30	8	8	7	7	7	7	8	10	7	8	11	13	6	5	5	5	4	3	2	2	3	3	3	2	13	5.9						
Dec 31	2	2	2	2	2	2	2	2	2	3	3	3	3	4	4	4	5	5	6	6	6	8	10	8	2	10	4.0					
Diurnal Maximum	18	17	20	23	21	20	19	18	18	21	19	18	17	17	17	17	17	17	16	17	19	20	18	21								
Diurnal Average	6.9	7.1	7.3	7.0	6.6	6.5	7.2	6.8	7.0	7.5	7.8	6.9	6.4	6.2	6.2	6.3	6.8	6.9	6.9	7.1	7.7	7.4	7.2	7.2								

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

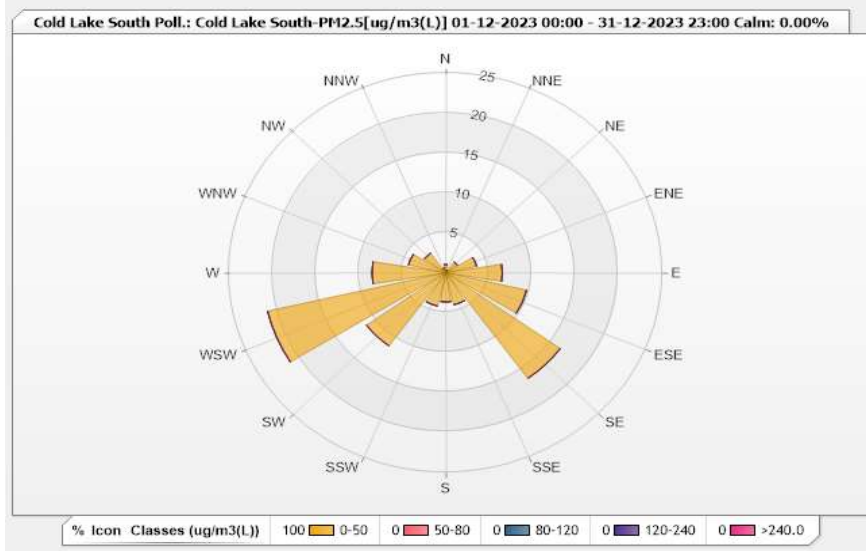


**Station: Cold Lake South Poll.: Cold Lake South-PM2.5[ug/m3(L)] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 88.44%      Calm Avg: 0.00 [ug/m3(L)]

Direction	0-50	50-80	80-120	120-240	>240.0	Total
N	1.06	0	0	0	0	1.06
NNE	0.3	0	0	0	0	0.3
NE	1.67	0	0	0	0	1.67
ENE	3.65	0	0	0	0	3.65
E	6.53	0	0	0	0	6.53
ESE	9.57	0	0	0	0	9.57
SE	16.26	0	0	0	0	16.26
SSE	4.1	0	0	0	0	4.1
S	3.65	0	0	0	0	3.65
SSW	4.26	0	0	0	0	4.26
SW	11.25	0	0	0	0	11.25
WSW	21.12	0	0	0	0	21.12
W	8.51	0	0	0	0	8.51
WNW	4.41	0	0	0	0	4.41
NW	3.04	0	0	0	0	3.04
NNW	0.61	0	0	0	0	0.61
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

Cold Lake South Station - December 2023

Summary of Hourly Averages

RELATIVE HUMIDITY (RH) in %

Maximum Hourly Value:	94 %	on Dec 3 at hr 14	Hours in Service:	744
Maximum Daily Value:	90.5 %	on Dec 3	Hours of Data:	744
Minimum Hourly Value:	44 %	on Dec 11 at hr 1	Hours of Missing Data:	0
Minimum Daily Value:	57.1 %	on Dec 11	Hours of Calibration:	0
Monthly Average:	80.1 %		Operational Uptime:	100.0

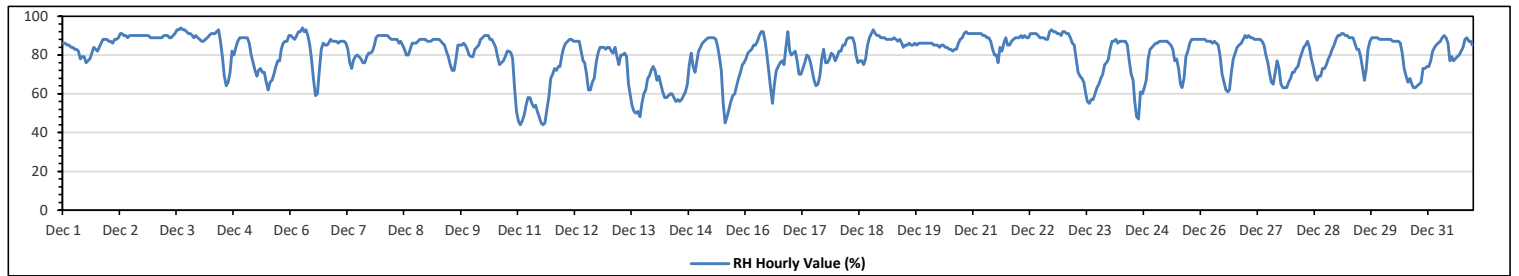
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	86	86	85	85	84	84	83	83	82	78	79	79	76	77	78	81	84	83	82	84	86	88	88	88	76	88	82.9	
Dec 2	87	87	86	88	88	89	91	91	90	90	89	90	90	90	90	90	90	90	90	90	90	90	89	89	86	91	89.3	
Dec 3	89	89	89	89	89	90	90	90	89	89	90	91	93	93	94	93	93	92	91	91	90	89	90	89	89	89	94	90.5
Dec 4	88	87	87	88	89	90	91	91	91	92	93	87	79	69	64	66	71	82	80	84	87	89	89	89	64	93	84.3	
Dec 5	89	89	86	80	76	72	69	72	73	71	71	66	62	66	67	70	74	77	77	83	86	87	87	90	62	90	76.7	
Dec 6	90	89	88	90	92	92	94	92	93	90	85	77	67	59	60	72	83	86	85	85	86	88	87	87	59	94	84.0	
Dec 7	87	86	87	87	87	86	83	76	73	77	79	80	79	78	76	76	79	81	81	82	85	89	90	73	90	82.3		
Dec 8	90	90	90	90	89	88	88	88	88	86	87	85	83	80	80	83	86	86	86	87	88	88	88	88	80	90	86.8	
Dec 9	87	87	87	88	88	88	88	87	86	85	82	79	75	72	72	78	85	85	85	86	85	83	80	79	72	88	83.2	
Dec 10	79	83	84	85	88	89	90	90	90	88	88	86	84	79	75	76	77	79	82	82	81	78	63	51	90	81.1		
Dec 11	46	44	46	49	54	58	58	55	53	54	51	48	45	44	45	52	58	68	70	73	72	74	74	80	44	80	57.1	
Dec 12	84	86	87	88	88	87	87	87	87	82	77	76	70	62	62	66	68	76	81	84	84	83	84	62	88	80.0		
Dec 13	84	82	81	84	79	75	80	80	81	79	65	59	54	51	50	51	48	55	60	62	68	69	72	74	48	84	68.5	
Dec 14	72	67	69	65	61	58	58	59	60	60	58	56	57	56	57	59	61	65	75	81	74	71	76	82	56	82	64.9	
Dec 15	84	86	87	88	89	89	89	89	88	84	79	72	55	45	48	52	56	59	60	64	68	71	75	76	45	89	73.0	
Dec 16	78	81	82	83	85	85	87	90	92	92	87	81	72	63	55	65	72	74	76	77	75	84	92	82	55	92	79.6	
Dec 17	80	81	82	77	70	70	73	76	80	79	76	71	67	64	65	69	78	83	76	76	78	81	80	77	64	83	75.4	
Dec 18	79	82	82	85	85	88	89	89	89	86	80	76	77	77	75	78	85	89	91	93	91	90	90	89	75	93	84.8	
Dec 19	89	89	88	88	88	88	89	88	87	88	86	84	85	85	86	85	86	85	86	86	86	86	86	86	84	89	86.6	
Dec 20	86	86	86	85	85	85	84	85	85	84	84	83	83	82	83	83	86	88	89	91	92	91	91	91	82	92	86.2	
Dec 21	91	91	91	91	91	90	90	89	89	87	83	80	80	76	84	82	86	89	85	85	87	88	89	89	76	91	86.8	
Dec 22	89	90	89	90	89	89	91	91	91	91	90	89	89	89	88	88	92	93	92	92	91	91	90	92	88	93	90.3	
Dec 23	92	91	91	89	86	85	78	71	69	68	66	60	56	55	57	57	60	63	65	68	70	75	76	78	55	92	71.9	
Dec 24	83	87	87	88	86	87	87	87	87	85	77	70	67	56	48	47	61	60	63	67	78	83	84	85	47	88	75.4	
Dec 25	86	86	87	87	87	87	87	86	85	83	77	78	73	65	63	68	79	82	86	88	88	88	88	88	63	88	82.2	
Dec 26	88	88	88	87	87	87	86	87	86	85	79	70	66	62	61	62	71	78	81	84	85	86	88	90	61	90	80.5	
Dec 27	89	90	89	89	88	88	88	88	87	85	80	76	70	66	65	71	77	73	65	63	63	66	68	63	90	77.0		
Dec 28	71	71	73	74	78	81	84	85	87	84	78	74	69	67	69	69	73	73	75	78	80	83	85	88	67	88	77.0	
Dec 29	90	90	91	91	90	90	89	89	89	86	83	79	73	67	72	83	87	89	89	89	89	88	88	88	67	91	86.6	
Dec 30	88	88	88	88	88	87	87	87	87	86	81	73	69	66	68	65	63	63	64	65	66	73	73	74	63	88	76.5	
Dec 31	74	77	82	84	85	86	87	89	90	89	86	77	79	77	78	79	80	82	84	88	89	87	87	85	74	90	83.4	
Diurnal Maximum	92	91	91	91	92	92	94	92	93	92	93	91	93	93	94	93	93	93	92	93	92	91	92	92				
Diurnal Average	83.7	84.1	84.4	84.5	84.2	84.1	84.4	84.1	84.0	82.7	79.5	76.0	72.6	69.2	68.7	71.1	75.6	78.3	79.1	80.9	81.9	83.1	83.4	83.4				

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.





**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**AMBIENT TEMPERATURE (AT) in Degree Celsius**

Maximum Hourly Value:	7.6 °C	on Dec 6 at hr 13	Hours in Service:	744
Maximum Daily Value:	-0.6 °C	on Dec 14	Hours of Data:	744
Minimum Hourly Value:	-18.3 °C	on Dec 25 at hr 7	Hours of Missing Data:	0
Minimum Daily Value:	-13.0 °C	on Dec 25	Hours of Calibration:	0
Monthly Average:	-6.3 °C		Operational Uptime:	100.0

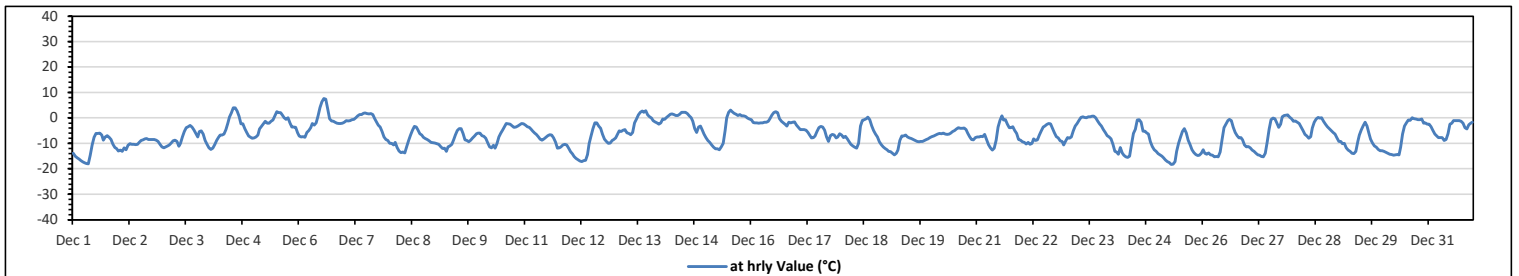
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	-13.9	-14.9	-15.6	-16.2	-16.8	-17.3	-17.6	-17.9	-18	-14.7	-10.6	-7.6	-6.1	-6.1	-5.9	-6.8	-8.7	-7.4	-6.9	-7.6	-8.5	-10.3	-11.6	-12	-18.0	-5.9	-11.6
Dec 2	-13	-12.6	-13.2	-11.8	-12.5	-10.8	-10.1	-10.3	-10.4	-10.5	-10.4	-9.6	-8.8	-8.6	-8.2	-8.1	-8.4	-8.5	-8.5	-8.5	-8.7	-9.3	-10.4	-11.4	-13.2	-8.1	-10.1
Dec 3	-11.8	-11.3	-11	-10.6	-9.8	-9	-8.7	-9.3	-11.1	-9.9	-7.5	-5.4	-3.9	-3.4	-2.9	-3.5	-4.7	-6.1	-7.4	-5.3	-5.1	-6.4	-8.9	-10.4	-11.8	-2.9	-7.6
Dec 4	-11.8	-12.3	-11.9	-10.5	-8.8	-7.6	-6.7	-6.8	-6.3	-4.6	-2	0.3	2	3.9	4	2.7	0.7	-2.3	-2.3	-4.2	-5.6	-7	-7.6	-8	-12.3	4.0	-4.7
Dec 5	-7.9	-7.4	-6.7	-4.3	-3.3	-2.3	-1.3	-2	-2	-1.3	-0.8	0.8	2.5	2.1	2.1	1.2	0.1	-0.5	0	-1.9	-3.5	-3.6	-3.7	-5.8	-7.9	2.5	-2.1
Dec 6	-7	-7.4	-7.3	-7.6	-5.6	-4.9	-3.8	-2.2	-2.8	-1.9	0.8	4.1	6.4	7.6	7.4	3.6	-0.2	-1.2	-1.4	-1.6	-2	-2.2	-2.2	-2.1	-7.6	7.6	-1.4
Dec 7	-1.6	-1.1	-1.2	-1	-0.7	-0.5	0	0.9	1.3	1.3	1.9	2	1.7	1.6	1.7	1.3	-0.3	-1.7	-2.8	-3.6	-5.4	-7.4	-8.5	-8.9	-8.9	2.0	-1.3
Dec 8	-9.9	-9.9	-10.6	-9.6	-11.6	-13	-13.6	-13.4	-13.7	-11.2	-8.8	-6.7	-4.8	-3.3	-3.5	-4.7	-6.2	-6.8	-7.6	-8.1	-8.4	-9	-9.6	-9.7	-13.7	-3.3	-8.9
Dec 9	-9.8	-10.1	-10.4	-11.2	-12	-11.9	-13.2	-11.3	-10.9	-10.4	-8.5	-6.8	-5	-4.2	-4.2	-6.1	-8.6	-8.8	-9.4	-8.7	-7.8	-7	-6.2	-6	-13.2	-4.2	-8.7
Dec 10	-6	-6.9	-7.2	-8	-9.7	-11.4	-11.8	-10.8	-11.9	-10.1	-7.4	-5.9	-4.7	-3.3	-2.2	-2.3	-2.5	-3	-3.7	-3.6	-3.1	-2.7	-2.2	-2.3	-11.9	-2.2	-5.9
Dec 11	-2.8	-3.4	-3.7	-4.3	-5.2	-5.9	-6.5	-7.3	-8.3	-8.2	-7.6	-6.9	-6.6	-6.8	-7.9	-9.5	-11.9	-11.8	-11.3	-10.6	-10.4	-10.6	-11.9	-11.9	-11.9	-2.8	-7.8
Dec 12	-13.3	-14.1	-15.1	-15.9	-16.3	-16.9	-17.2	-16.8	-16.6	-14.4	-10.1	-7	-4.2	-1.9	-1.9	-3.1	-4.1	-6.5	-8.3	-9.2	-9.9	-9.8	-8.9	-8.4	-17.2	-1.9	-10.4
Dec 13	-7.9	-6.3	-5.1	-5.3	-4.8	-4.5	-5.8	-6.1	-6.6	-5.6	-1.9	-0.4	1.2	2.2	2.7	2.3	2.8	1.2	0.4	-0.1	-1	-1.5	-1.9	-2.4	-7.9	2.8	-2.3
Dec 14	-1.9	-0.4	-0.5	0.2	0.9	1.4	1.6	1.3	1	1	1.5	2.2	2.3	2.2	1.7	0.9	0	-1.4	-4.2	-5.7	-3.5	-3.1	-4.6	-6.3	-6.3	2.3	-0.6
Dec 15	-7.7	-8.8	-9.6	-10.7	-11.5	-12.1	-12.1	-12.5	-11.4	-9.9	-4.9	0	2.3	3.1	2.5	1.9	1.4	1	1.3	0.8	0.8	0.6	-0.1	-0.4	-12.5	3.1	-4.0
Dec 16	-0.6	-1.8	-1.9	-1.9	-2.1	-1.9	-1.9	-1.7	-1.7	-1.3	-0.3	1.1	2.1	2.5	2.1	-0.3	-1.4	-1.9	-2.5	-3.2	-1.7	-1.9	-1.7	-1.5	-3.2	2.5	-1.1
Dec 17	-2.8	-3.7	-4.5	-4.6	-4.5	-4.8	-5.7	-6.7	-7.9	-7.7	-7	-5.3	-3.8	-3.3	-3.5	-4.8	-7.5	-9.3	-6.9	-6.5	-6.7	-7.9	-7.4	-6.2	-9.3	-2.8	-5.8
Dec 18	-6.7	-7.7	-7.2	-8.2	-9.3	-10.4	-11	-11.5	-11.9	-10	-3.1	-0.9	-0.7	-0.3	0.3	-0.7	-3	-5	-6.3	-7.4	-9.4	-10.5	-11.4	-12	-12.0	0.3	-6.8
Dec 19	-12.4	-13.1	-13.3	-13.9	-14.5	-13.8	-12.6	-8.8	-7	-7	-6.7	-7.4	-7.9	-8.1	-8.5	-8.9	-9.3	-9.4	-9.2	-9.2	-8.9	-8.5	-8.2	-7.7	-14.5	-6.7	-9.8
Dec 20	-7.3	-7	-6.7	-6.3	-6.1	-6.2	-6	-6.4	-6.5	-6.3	-6	-5.4	-4.9	-4.3	-3.9	-4.1	-4.1	-4	-4.5	-6	-7.3	-8.4	-8.6	-7.7	-8.6	-3.9	-6.0
Dec 21	-7.5	-7.4	-7.2	-7.3	-6.5	-8.5	-10.5	-11.7	-12.6	-11.9	-8.7	-3.6	-0.9	0.9	-0.8	-0.7	-2.5	-3.9	-3.9	-3.4	-4.9	-6.1	-8.4	-8.7	-12.6	0.9	-6.1
Dec 22	-9.4	-9.6	-10.2	-9.6	-10.3	-9.9	-8.2	-8.9	-8.6	-6.7	-5.1	-3.6	-3.1	-2.6	-2.2	-2.3	-4.1	-5.8	-7.3	-7.9	-9	-9.3	-10.6	-9.1	-10.6	-2.2	-7.2
Dec 23	-7.7	-8	-7.5	-5.1	-3.1	-2.2	-0.9	0.2	0.4	0.2	0.1	0.4	0.5	0.7	0.7	0.1	-1.2	-2.3	-3.2	-4.5	-5.6	-6.9	-7.4	-8.2	-8.2	0.7	-2.9
Dec 24	-10.4	-13.1	-13.4	-14.3	-11.6	-13.7	-14.6	-15.2	-15.5	-15	-10.4	-6.1	-4.4	-0.8	-0.6	-1.7	-5.2	-5.2	-5.8	-6.3	-9.4	-11.2	-12.5	-13.2	-15.5	-0.6	-9.6
Dec 25	-14	-14.5	-14.9	-15.7	-16.5	-17.1	-17.5	-18.3	-18.2	-17.1	-13.1	-9.9	-7.6	-5.4	-4.2	-5.8	-8.7	-10.5	-12.4	-13.6	-14.4	-14.8	-14.6	-13.8	-18.3	-4.2	-13.0
Dec 26	-12.4	-13.8	-14.3	-13.7	-14.5	-14.7	-15.2	-15.1	-15.2	-13.4	-8.4	-3.9	-2.5	-1.1	-0.5	-1	-3.7	-5.6	-6.9	-7.8	-7.7	-8.6	-10.6	-11.3	-15.2	-0.5	-9.2
Dec 27	-11.2	-11.8	-12.6	-13.2	-13.9	-14.5	-14.6	-15.1	-15.3	-13.8	-9.5	-4.4	-0.6	-0.1	-0.2	-1.9	-3.7	-2.4	0.4	1	1.1	1.2	0.3	-0.3	-15.3	1.2	-6.5
Dec 28	-1.3	-1.2	-1.6	-2.2	-3.6	-5	-6.5	-7.1	-8	-7.3	-4	-1.6	-0.4	0.2	-0.1	0.1	-1.3	-2.4	-3.4	-4.2	-4.9	-5.7	-6.4	-7.8	-8.0	0.2	-3.6
Dec 29	-9.2	-9.3	-10.1	-10	-11.7	-12.6	-13.2	-13.9	-14	-13.1	-9.4	-6.8	-4.7	-3	-1.6	-3.1	-6.1	-8.3	-9.8	-10.9	-11.5	-12.3	-12.8	-12.9	-14.0	-1.6	-9.6
Dec 30	-13.2	-13.5	-13.8	-14.2	-14.4	-14.6	-14.5	-14.4	-14.5	-11.5	-6.4	-3.2	-1.9	-0.8	-0.9	0.1	-0.2	-0.4	-0.6	-0.6	-0.4	-2	-1.9	-2.4	-14.6	0.1	-6.7
Dec 31	-2.5	-3.4	-5	-6.4	-7.1	-7.7	-7.7	-8.8	-8.5	-6.2	-2.4	-2	-1	-1.1	-1	-1.1	-1.3	-2.1	-3.8	-4.3	-2.7	-2	-1.7	-8.8	-1.0	-4.1	
Diurnal Maximum	-0.6	-0.4	-0.5	0.2	0.9	1.4	1.6	1.3	1.3	1.9	4.1	6.4	7.6	7.4	3.6	2.8	1.2	1.3	1.0	1.1	1.2	0.3	-0.3				
Diurnal Average	-8.2	-8.6	-8.8	-8.8	-8.9	-9.2	-9.3	-9.3	-9.5	-8.4	-5.8	-3.6	-2.2	-1.3	-1.2	-2.1	-3.6	-4.6	-5.1	-5.6	-6.0	-6.6	-7.1	-7.4			

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.







Lakeland Industry & Community Association

Cold Lake South Station - December 2023

Summary of Hourly Averages

VECTOR WIND SPEED (VWS) in km/hr

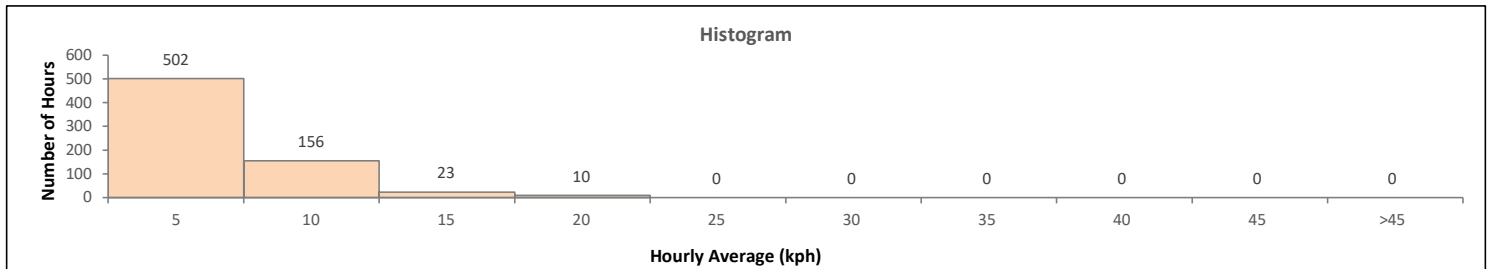
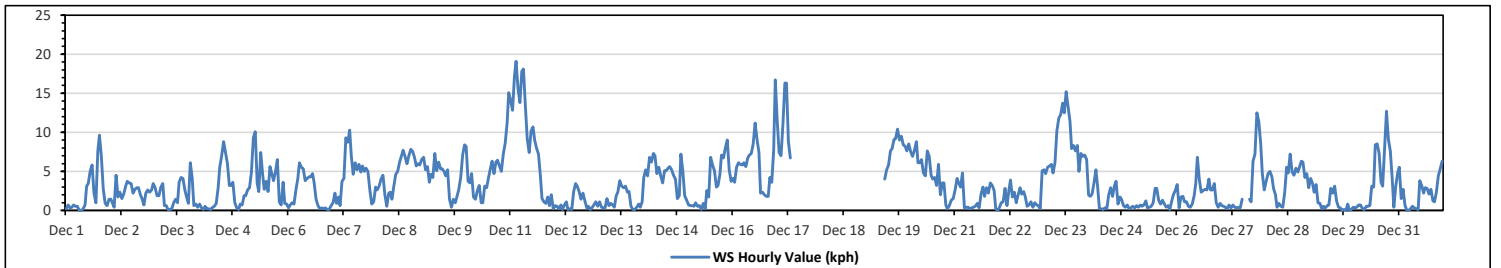
Maximum Hourly Value:	19.1 kph	on Dec 11 at hr 3	Hours in Service:	744
Maximum Daily Value:	9.0 kph	on Dec 11	Hours of Data:	691
Minimum Hourly Value:	0.0 kph	on Dec 1 at hr 7	Hours of Missing Data:	50
Minimum Daily Value:	1.0 kph	on Dec 25	Hours of Calibration:	3
Monthly Average:	1.4 kph		Operational Uptime:	93.3

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	0.2	0.7	0.3	0.4	0.7	0.5	0.5	0.0	0.0	0.2	0.7	3.1	3.4	5.0	5.8	2.2	1.0	7.6	9.6	6.9	2.7	0.9	0.6	1.4	0.0	9.6	2.3
Dec 2	1.4	0.9	0.4	4.5	1.7	2.3	1.5	2.1	3.1	3.7	3.5	3.4	2.2	2.7	2.9	2.9	2.0	1.5	0.7	2.2	2.6	2.3	2.6	3.4	0.4	4.5	2.4
Dec 3	2.9	1.9	1.9	3.0	3.4	0.6	0.6	0.1	0.1	0.2	1.0	1.4	1.0	3.6	4.2	4.1	2.6	1.6	0.9	6.1	4.1	0.6	0.8	0.4	0.1	6.1	2.0
Dec 4	0.8	0.3	0.1	0.5	0.2	0.2	0.1	0.4	0.5	0.9	2.9	5.5	7.0	8.8	7.4	6.0	3.2	3.2	3.6	1.0	0.3	0.1	0.8	0.7	0.1	8.8	2.3
Dec 5	1.9	1.9	2.6	2.9	4.9	9.3	10.1	3.4	2.4	7.4	4.6	2.7	3.7	2.4	5.6	4.6	3.8	4.9	6.5	1.1	0.7	3.6	0.9	0.8	0.7	10.1	3.9
Dec 6	0.3	0.7	1.0	0.8	2.6	4.1	6.1	5.5	5.3	3.8	4.1	4.3	4.3	4.7	3.5	1.4	0.6	0.2	0.3	0.2	0.3	0.1	0.1	0.6	0.1	6.1	2.3
Dec 7	1.0	2.2	0.9	1.7	0.6	3.7	4.1	9.3	8.7	10.3	7.0	4.6	6.1	5.2	5.9	4.9	5.7	5.0	5.4	5.0	2.6	0.8	1.1	3.0	0.6	10.3	4.4
Dec 8	2.6	3.1	4.0	4.5	2.0	0.5	2.2	2.3	1.4	3.1	4.6	5.0	6.2	7.0	7.7	6.9	6.0	7.0	7.8	7.5	6.7	5.7	6.0	5.8	0.5	7.8	4.8
Dec 9	6.5	6.8	5.2	5.6	3.6	4.6	4.2	7.3	5.1	6.2	5.3	5.3	5.0	4.4	5.2	1.4	0.4	1.4	1.0	1.7	2.7	4.2	7.1	8.4	0.4	8.4	4.5
Dec 10	8.2	3.7	3.5	4.7	1.7	1.4	2.5	3.2	1.0	1.0	3.1	2.9	4.2	5.4	6.3	4.7	6.2	6.4	5.7	5.0	7.2	8.6	11.2	15.1	1.0	15.1	5.1
Dec 11	14.1	12.8	17.2	19.1	15.6	13.8	17.8	18.1	13.4	9.1	7.4	10.2	10.7	9.0	8.0	7.2	4.4	1.5	1.1	0.9	1.7	0.6	2.0	0.2	0.2	19.1	9.0
Dec 12	0.6	0.5	0.2	0.7	0.1	0.7	1.1	0.1	0.2	0.1	2.4	3.4	3.1	2.4	1.4	2.2	1.2	0.3	0.5	0.1	0.3	0.7	1.1	0.5	0.1	3.4	1.0
Dec 13	1.1	0.4	0.3	0.3	1.5	0.6	0.9	0.7	0.4	1.9	2.3	3.8	3.1	2.9	3.1	2.3	2.4	0.5	0.1	0.1	0.4	0.8	0.4	1.1	0.1	3.8	1.3
Dec 14	4.2	5.2	4.4	6.8	6.2	7.3	7.0	4.7	5.5	4.4	3.5	5.1	5.1	5.4	5.6	5.2	4.5	4.0	1.5	1.9	7.2	5.1	1.9	1.3	1.3	7.3	4.7
Dec 15	0.7	0.6	0.6	0.5	1.0	0.5	0.6	0.1	0.9	0.2	2.5	1.7	6.8	5.8	5.1	3.0	3.2	4.6	7.1	6.7	8.0	9.0	5.2	3.7	0.1	9.0	3.3
Dec 16	4.1	3.6	5.5	6.1	5.9	5.8	6.1	5.6	6.7	7.1	7.3	8.5	11.2	9.1	7.4	2.2	2.3	2.0	1.8	1.8	4.2	3.6	7.7	16.7	1.8	16.7	5.9
Dec 17	11.5	7.4	7.0	11.1	16.3	16.3	8.8	6.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6.7	16.3	NA
Dec 18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-
Dec 19	X	X	X	X	X	X	X	X	X	X	4.0	5.2	5.8	7.6	7.9	9.1	9.2	10.4	9.0	9.5	8.4	8.2	7.6	8.5	4.0	10.4	NA
Dec 20	7.5	6.9	7.7	8.8	6.1	6.1	6.5	4.8	4.4	7.6	6.9	4.5	4.0	4.2	3.2	5.9	2.0	3.5	3.5	0.7	0.2	0.6	1.3	1.5	0.2	8.8	4.5
Dec 21	2.6	4.1	3.5	3.0	4.8	0.3	0.4	0.4	0.2	0.3	0.4	0.5	0.9	0.3	2.1	3.0	1.8	2.9	2.2	3.5	3.2	2.5	0.2	0.0	0.0	4.8	1.8
Dec 22	0.3	1.0	1.1	2.8	0.6	2.5	3.9	1.7	2.3	1.0	2.0	2.9	2.1	2.4	1.8	0.5	0.7	1.1	0.4	1.0	0.7	0.6	0.2	5.1	0.2	5.1	1.6
Dec 23	5.2	4.7	5.5	5.7	5.9	4.8	6.1	10.2	11.8	12.3	13.7	12.5	15.2	13.3	11.4	7.9	8.3	7.6	8.3	5.0	7.3	6.9	7.1	6.5	4.7	15.2	8.5
Dec 24	2.0	1.8	2.1	3.5	5.2	3.2	0.2	0.2	0.1	0.3	0.2	2.0	2.9	1.8	3.2	3.7	0.8	1.7	1.4	0.6	0.4	0.7	0.2	0.3	0.1	5.2	1.6
Dec 25	0.5	0.3	0.6	0.4	0.7	0.5	0.7	1.2	0.3	0.4	0.5	1.0	2.8	2.8	1.3	0.8	1.3	0.8	0.4	0.6	0.1	1.2	2.0	2.5	0.1	2.8	1.0
Dec 26	3.3	0.3	1.7	1.8	1.1	1.1	0.5	0.4	0.8	1.9	3.4	6.8	4.0	2.3	2.5	2.7	2.6	4.0	2.6	2.6	3.4	1.0	0.4	0.9	0.3	6.8	2.2
Dec 27	0.6	0.5	0.4	0.2	0.7	0.3	0.7	0.4	0.3	0.4	0.3	1.4	C	C	C	1.4	1.1	6.3	7.2	12.5	11.4	8.5	4.7	2.6	0.2	12.5	2.9
Dec 28	3.7	4.7	5.0	4.3	2.8	2.0	0.4	0.9	0.5	0.4	2.3	5.5	4.8	7.2	4.9	4.5	5.4	4.9	5.5	6.3	6.2	4.2	4.7	2.9	0.4	7.2	3.9
Dec 29	4.1	3.4	2.3	3.3	1.0	0.9	0.2	0.5	0.3	0.6	0.7	2.8	2.2	3.1	1.2	0.4	0.3	0.0	0.1	0.0	0.8	0.0	0.1	0.4	0.0	4.1	1.2
Dec 30	0.3	0.4	0.7	0.7	0.2	0.1	0.5	0.5	0.6	3.1	3.0	8.4	8.5	7.3	3.6	3.1	7.8	12.7	9.1	7.6	4.0	0.4	3.1	4.8	0.1	12.7	3.8
Dec 31	5.5	1.5	2.7	0.6	0.0	0.0	0.2	0.5	0.3	0.2	0.1	3.8	3.2	2.2	2.9	2.8	2.1	2.7	1.2	1.1	2.3	4.4	5.3	6.3	0.0	6.3	2.2
Diurnal Maximum	14.1	12.8	17.2	19.1	16.3	16.3	17.8	18.1	13.4	12.3	13.7	12.5	15.2	13.3	11.4	9.1	9.2	12.7	9.6	12.5	11.4	9.0	11.2	16.7			
Diurnal Average	3.4	2.8	3.0	3.7	3.3	3.2	3.3	3.1	2.7	3.1	3.4	4.4	5.0	4.9	4.7	3.7	3.2	3.8	3.6	3.4	3.5	3.0	3.0	3.6			

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	In/Valid Data (Equipment Malfunction/Recovery)	NRM	Unit/Maint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.

Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

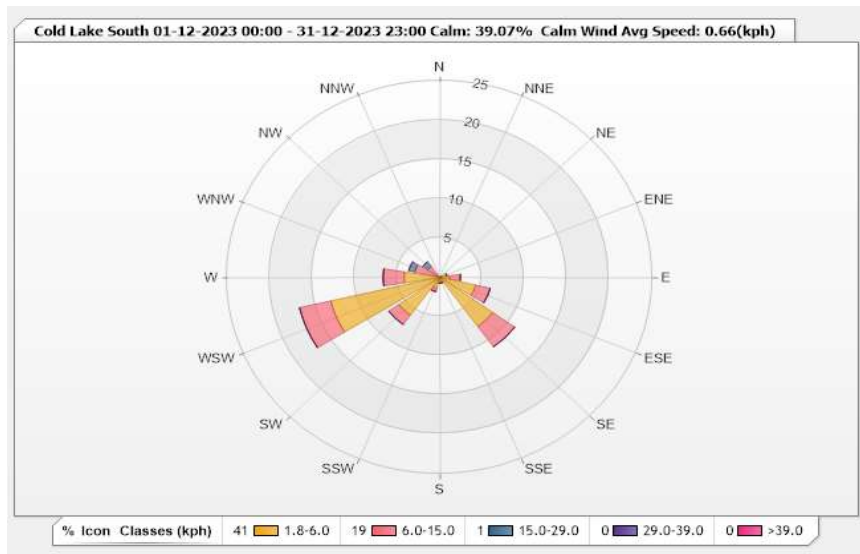


**Station: Cold Lake South Monitor: WDS [kph] Monthly: 12-2023**

Type: Wind Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm (WS<1.8kph): 39.07%      Valid Data: 92.88%

Direction	1.8-6.0	6.0-15.0	15.0-29.0	29.0-39.0	>39.0	Total
N	0	0	0	0	0	0
NNE	0	0	0	0	0	0
NE	0.14	0	0	0	0	0.14
ENE	0.87	0	0	0	0	0.87
E	1.16	1.3	0	0	0	2.46
ESE	4.34	1.74	0	0	0	6.08
SE	7.67	3.18	0	0	0	10.85
SSE	0.72	0	0	0	0	0.72
S	0.72	0	0	0	0	0.72
SSW	1.45	0.43	0	0	0	1.88
SW	5.93	1.45	0	0	0	7.38
WSW	13.17	3.76	0	0	0	16.93
W	4.2	2.46	0	0	0	6.66
WNW	0.43	2.6	0.72	0	0	3.75
NW	0.14	1.59	0.72	0	0	2.45
NNW	0	0	0	0	0	0
Summary	40.94	18.51	1.44	0	0	60.89



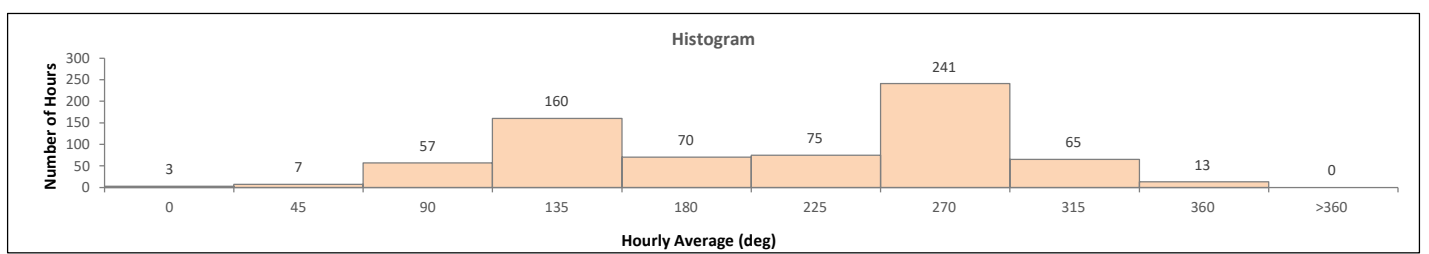
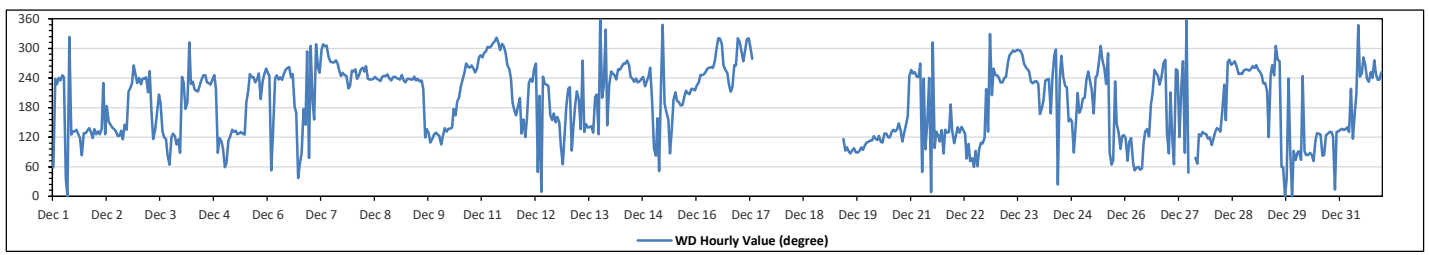
**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hourly Averages**  
**WIND DIRECTION (VWD) in sector**

Monthly Average: 231 (SW) degree	Hours in Service: 744
	Hours of Data: 691
	Hours of Missing Data: 50
	Hours of Calibration: 3
	Operational Uptime: 93.3

Day	Hourly Period Starting at (MST)																							Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Degree	Quadrant
Dec 1	ENE	SW	SW	WSW	SW	WSW	WSW	NE	N	NW	SE	SE	SE	SE	ESE	E	SE	SE	SE	SE	ESE	SE	SE	SE	132	SE
Dec 2	SE	SE	SE	SE	SW	SE	S	SSE	SE	SE	SE	SE	ESE	ESE	SE	ESE	SE	SE	SSW	SW	SW	W	WSW	SW	156	SSE
Dec 3	WSW	SW	WSW	SW	WSW	SSW	WSW	SSE	ESE	SE	SSE	SSW	S	SE	ESE	ESE	E	ENE	ESE	SE	ESE	ESE	E	152	SSE	
Dec 4	WSW	SW	S	S	NW	SW	SW	SSW	SSW	SW	SW	WSW	WSW	SW	SW	SW	WSW	SW	SW	WSW	SW	E	ESE	ESE	234	SW
Dec 5	ENE	ENE	ESE	ESE	SE	SE	SE	SE	SE	SE	SE	S	SSW	WSW	WSW	WSW	SW	SW	WSW	SSW	SW	WSW	WSW	166	SSE	
Dec 6	WSW	WSW	NE	SE	WSW	WSW	SW	WSW	WSW	WSW	WSW	W	WSW	WSW	S	SSE	NE	ENE	E	S	SE	WNW	ENE	243	WSW	
Dec 7	WNW	SSW	SSE	NW	WSW	WSW	WNW	NW	WNW	NW	W	W	W	W	W	WSW	WSW	WSW	WSW	WSW	SW	SW	WSW	275	W	
Dec 8	WSW	WSW	SW	WSW	WSW	W	WSW	W	SW	SW	SW	WSW	SW	SW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	242	WSW
Dec 9	WSW	SW	SW	WSW	SW	SW	SW	SW	SW	SW	WSW	SW	SW	SW	SW	ESE	SE	ESE	ESE	ESE	SE	SE	SE	218	SW	
Dec 10	ESE	ESE	ESE	SE	SE	SE	SE	S	SSE	S	SSW	SW	WSW	W	W	W	WSW	WSW	WSW	WSW	WSW	W	W	241	WSW	
Dec 11	W	WNW	WNW	WNW	WNW	WNW	NW	NW	NW	NW	WNW	NW	WNW	WNW	W	WSW	WSW	S	S	SSE	S	SSW	SE	SSE	298	WNW
Dec 12	ESE	SSE	SW	SW	SW	WSW	W	NE	SSW	N	WSW	SW	SW	SW	SSE	SSE	SSE	SSE	SSE	E	ENE	ESE	S	204	SSW	
Dec 13	SW	SW	E	SE	S	SSW	SSW	SE	W	SE	SE	SE	SE	SE	SSW	SSW	SE	N	SSW	SW	NNW	SE	SW	161	SSE	
Dec 14	WSW	WSW	WSW	SW	WSW	WSW	W	W	W	W	W	WSW	SW	SW	WSW	SW	SW	WSW	SW	WSW	SW	WSW	W	SSW	247	WSW
Dec 15	E	E	SSE	NE	SW	NNW	S	SSE	SSE	E	SE	SSW	SSW	S	S	S	SSW	SSW	SSW	SSW	SW	SW	SSW	202	SSW	
Dec 16	SW	SW	WSW	WSW	WSW	WSW	WSW	W	W	WSW	W	WNW	NW	NW	NW	W	WSW	WSW	WSW	WSW	SW	W	W	NW	276	W
Dec 17	NW	WNW	W	WNW	NW	NW	WNW	W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NA	NA
Dec 18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-
Dec 19	X	X	X	X	X	X	X	X	X	X	ESE	E	E	E	E	E	E	E	E	E	E	E	ESE	ESE	NA	NA
Dec 20	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	SE	SE	ESE	ESE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SSE	WSW	122	ESE
Dec 21	WSW	WSW	WSW	WSW	WSW	W	NE	WSW	E	SE	WSW	N	NW	E	SE	ESE	ESE	SE	E	SE	SE	S	SE	182	S	
Dec 22	ESE	ESE	SE	SE	SE	SE	SE	ENE	ESE	ENE	ENE	ENE	E	ENE	E	ESE	ESE	SW	SE	NNW	SSW	WSW	WSW	112	ESE	
Dec 23	WSW	WSW	SW	SW	WSW	WSW	W	WNW	WNW	WNW	WNW	WNW	WNW	WNW	W	W	WSW	WSW	SW	SW	SW	SW	SW	269	W	
Dec 24	SSE	S	SSW	SW	SW	SW	SSE	WSW	WNW	WNW	NNE	SW	WNW	WSW	SW	SSE	SSE	SSE	E	SE	SSW	SSE	S	219	SW	
Dec 25	SSW	SSW	SW	WSW	SW	SSW	SSE	WSW	WSW	W	WNW	W	SW	WNW	E	ENE	ENE	SW	SE	E	ESE	ESE	203	SSW		
Dec 26	ESE	ENE	ESE	ESE	ENE	NE	ENE	ENE	NE	NE	ESE	SE	SE	ESE	S	SSW	WSW	WSW	WSW	SW	WSW	W	SE	158	SSE	
Dec 27	E	SSW	SE	ENE	WSW	ESE	SW	W	E	N	NE	C	C	C	ENE	ENE	SE	ESE	SE	SE	SE	ESE	ESE	122	ESE	
Dec 28	ESE	ESE	SE	SE	SE	S	SW	SSE	W	W	W	W	W	W	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	W	242	WSW	
Dec 29	WSW	W	WSW	WSW	WSW	SW	SW	SSW	ESE	WSW	W	WSW	WNW	W	W	ENE	ENE	N	NE	WSW	E	N	E	ENE	262	W
Dec 30	E	E	ENE	WSW	E	E	E	E	ENE	ESE	SE	SE	SE	E	E	ESE	SE	SE	ESE	NNE	SE	SE	SE	121	ESE	
Dec 31	SE	SE	SE	SE	SE	SE	SW	ESE	SSE	SSW	NNW	WSW	WSW	W	W	WSW	WSW	WSW	W	WSW	SW	SW	WSW	231	SW	

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance      **P** Power Failure  
**X** InValid Data (Machine Malfunction/Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

Cold Lake South Station - December 2023

Summary of Hourly Averages

VECTOR WIND SPEED (VWS) in km/hr & WIND DIRECTION (VWD) in sector

WIND SPEED				
Maximum Hourly Value:	19.1 kph	on Dec 11 at hr 3	Hours in Service:	744
Maximum Daily Value:	9.0 kph	on Dec 11	Hours of Data:	691
Minimum Hourly Value:	0.0 kph	on Dec 1 at hr 7	Hours of Missing Data:	50
Minimum Daily Value:	1.0 kph	on Dec 25	Hours of Calibration:	3
Monthly Average:	1.4 kph		Operational Uptime:	93.3

WIND DIRECTION			
Monthly Average:	231 degree (SW)		

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	0.2	0.7	0.3	0.4	0.7	0.5	0.5	0.0	0.0	0.2	0.7	3.1	3.4	5.0	5.8	2.2	1.0	7.6	9.6	6.9	2.7	0.9	0.6	1.4	0.0	9.6	2.3
Dec 2	1.4	0.9	0.4	4.5	1.7	2.3	1.5	2.1	3.1	3.7	3.5	3.4	2.2	2.7	2.9	2.9	2.0	1.5	0.7	2.2	2.6	2.3	2.6	3.4	0.4	4.5	2.4
Dec 3	2.9	1.9	1.9	3.0	3.4	0.6	0.6	0.1	0.1	0.2	1.0	1.4	1.0	3.6	4.2	4.1	2.6	1.6	0.9	6.1	4.1	0.6	0.8	0.4	0.1	6.1	2.0
Dec 4	0.8	0.3	0.1	0.5	0.2	0.2	0.1	0.4	0.5	0.9	2.9	5.5	7.0	8.8	7.4	6.0	3.2	3.2	3.6	1.0	0.3	0.1	0.8	0.7	0.1	8.8	2.3
Dec 5	1.9	1.9	2.6	2.9	4.9	9.3	10.1	3.4	2.4	7.4	4.6	2.7	3.7	2.4	5.6	4.6	3.8	4.9	6.5	1.1	0.7	3.6	0.9	0.8	0.7	10.1	3.9
Dec 6	0.3	0.7	1.0	0.8	2.6	4.1	6.1	5.5	5.3	3.8	4.1	4.3	4.3	4.7	3.5	1.4	0.6	0.2	0.3	0.2	0.3	0.1	0.1	0.6	0.1	6.1	2.3
Dec 7	1.0	2.2	0.9	1.7	0.6	3.7	4.1	9.3	8.7	10.3	7.0	4.6	6.1	5.2	5.9	4.9	5.7	5.0	5.4	5.0	2.6	0.8	1.1	3.0	0.6	10.3	4.4
Dec 8	2.6	3.1	4.0	4.5	2.0	0.5	2.2	2.3	1.4	3.1	4.6	5.0	6.2	7.0	7.7	6.9	6.0	7.0	7.8	7.5	6.7	5.7	6.0	5.8	0.5	7.8	4.8
Dec 9	6.5	6.8	5.2	5.6	3.6	4.6	4.2	7.3	5.1	6.2	5.3	5.3	5.0	4.4	5.2	1.4	0.4	1.4	1.0	1.7	2.7	4.2	7.1	8.4	0.4	8.4	4.5
Dec 10	8.2	3.7	3.5	4.7	1.7	1.4	2.5	3.2	1.0	1.0	3.1	2.9	4.2	5.4	6.3	4.7	6.2	6.4	5.7	5.0	7.2	8.6	11.2	15.1	1.0	15.1	5.1
Dec 11	14.1	12.8	17.2	19.1	15.6	13.8	17.8	18.1	13.4	9.1	7.4	10.2	10.7	9.0	8.0	7.2	4.4	1.5	1.1	0.9	1.7	0.6	2.0	0.2	0.2	19.1	9.0
Dec 12	0.6	0.5	0.2	0.7	0.1	0.7	1.1	0.1	0.2	0.1	2.4	3.4	3.1	2.4	1.4	2.2	1.2	0.3	0.5	0.1	0.3	0.7	1.1	0.5	0.1	3.4	1.0
Dec 13	1.1	0.4	0.3	0.3	1.5	0.6	0.9	0.7	0.4	1.9	2.3	3.8	3.1	2.9	3.1	2.3	2.4	0.5	0.1	0.1	0.4	0.8	0.4	1.1	0.1	3.8	1.3
Dec 14	4.2	5.2	4.4	6.8	6.2	7.3	7.0	4.7	5.5	4.4	3.5	5.1	5.1	5.4	5.6	5.2	4.5	4.0	1.5	1.9	7.2	5.1	1.9	1.3	1.3	7.3	4.7
Dec 15	0.7	0.6	0.6	0.5	1.0	0.5	0.6	0.1	0.9	0.2	2.5	1.7	6.8	5.8	5.1	3.0	3.2	4.6	7.1	6.7	8.0	9.0	5.2	3.7	0.1	9.0	3.3
Dec 16	4.1	3.6	5.5	6.1	5.9	5.8	6.1	5.6	6.7	7.1	7.3	8.5	11.2	9.1	7.4	2.2	2.3	2.0	1.8	1.8	4.2	3.6	7.7	16.7	1.8	16.7	5.9
Dec 17	11.5	7.4	7.0	11.1	16.3	16.3	8.8	6.7	6.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6.7	16.3	NA
Dec 18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-
Dec 19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	4.0	10.4	NA
Dec 20	7.5	6.9	7.7	8.8	6.1	6.1	6.5	4.8	4.4	7.6	6.9	4.5	4.0	4.2	3.2	5.9	2.0	3.5	3.5	0.7	0.2	0.6	1.3	1.5	0.2	8.8	4.5
Dec 21	2.6	4.1	3.5	3.0	4.8	0.3	0.4	0.4	0.2	0.3	0.4	0.5	0.9	0.3	2.1	3.0	1.8	2.9	2.2	3.5	3.2	2.5	0.2	0.0	0.0	4.8	1.8
Dec 22	0.3	1.0	1.1	2.8	0.6	2.5	3.9	1.7	2.3	1.0	2.0	2.9	2.1	2.4	1.8	0.5	0.7	1.1	0.4	1.0	0.7	0.6	0.2	5.1	0.2	5.1	1.6
Dec 23	5.2	4.7	5.5	5.7	5.9	4.8	6.1	10.2	11.8	12.3	13.7	12.5	15.2	13.3	11.4	7.9	8.3	7.6	8.3	5.0	7.3	6.9	7.1	6.5	4.7	15.2	8.5
Dec 24	2.0	1.8	2.1	3.5	5.2	3.2	0.2	0.2	0.1	0.3	0.2	2.0	2.9	1.8	3.2	3.7	0.8	1.7	1.4	0.6	0.4	0.7	0.2	0.3	0.1	5.2	1.6
Dec 25	0.5	0.3	0.6	0.4	0.7	0.5	0.7	1.2	0.3	0.4	0.5	1.0	2.8	2.8	1.3	0.8	1.3	0.8	0.4	0.6	0.1	1.2	2.0	2.5	0.1	2.8	1.0
Dec 26	3.3	0.3	1.7	1.8	1.1	1.1	0.5	0.4	0.8	1.9	3.4	6.8	4.0	2.3	2.5	2.7	2.6	4.0	2.6	2.6	3.4	1.0	0.4	0.9	0.3	6.8	2.2
Dec 27	0.6	0.5	0.4	0.2	0.7	0.3	0.7	0.4	0.3	0.4	0.3	1.4	C	C	C	1.4	1.1	6.3	7.2	12.5	11.4	8.5	4.7	2.6	0.2	12.5	2.9
Dec 28	3.7	4.7	5.0	4.3	2.8	2.0	0.4	0.9	0.5	0.4	2.3	5.5	4.8	7.2	4.9	4.5	5.4	4.9	5.5	6.3	6.2	4.2	4.7	2.9	0.4	7.2	3.9
Dec 29	4.1	3.4	2.3	3.3	1.0	0.9	0.2	0.5	0.3	0.6	0.7	2.8	2.2	3.1	1.2	0.4	0.3	0.0	0.1	0.0	0.8	0.0	0.1	0.4	0.0	4.1	1.2
Dec 30	0.3	0.4	0.7	0.7	0.2	0.1	0.5	0.5	0.6	3.1	3.0	8.4	8.5	7.3	3.6	3.1	7.8	12.7	9.1	7.6	4.0	0.4	3.1	4.8	0.1	12.7	3.8
Dec 31	5.5	1.5	2.7	0.6	0.0	0.0	0.2	0.5	0.3	0.2	0.1	3.8	3.2	2.2	2.9	2.8	2.1	2.7	1.2	1.1	2.3	4.4	5.3	6.3	0.0	6.3	2.2
	SE	SE	SE	SE	SE	SE	SW	ESE	SSE	SSW	NNW	WSW	WSW	W	W	WSW	SW	WSW	WSW	W	WSW	SW	WSW	WSW			231(SW)

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	Invalid Data (Equipment Malfunction/Recovery)	NRM	Unit/Maint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

**Lakeland Industry & Community Association**  
**Cold Lake South Station - December 2023**  
**Summary of Hour Standard Deviations**

**STANDARD DEVIATION WIND DIRECTION (STDWD) in Degree**

Maximum Hourly Value: 77 degree on Dec 13 at hr 18		Hours in Service: 744	
Minimum Hourly Value: 0 degree on Dec 1 at hr 7		Hours of Data: 691	
		Hours of Missing Data: 50	
		Hours of Calibration: 3	
		Operational Uptime: 93.3	

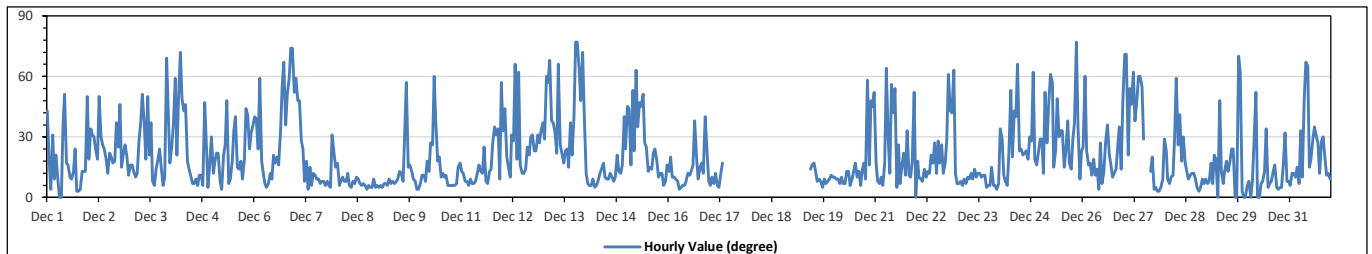
  

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
Dec 1	43	18	4	31	9	21	9	0	0	35	51	17	16	10	9	13	24	3	3	4	13	13	13	50	0	51
Dec 2	19	34	31	30	24	19	50	30	26	24	19	12	22	20	17	18	37	25	46	15	22	26	20	11	11	50
Dec 3	16	16	13	10	12	29	37	51	37	19	50	21	37	8	6	14	19	24	15	6	10	69	43	17	6	69
Dec 4	25	36	59	21	48	72	49	43	46	18	14	11	7	7	9	6	11	11	6	47	27	5	15	30	5	72
Dec 5	12	18	22	22	8	4	21	26	48	7	9	18	33	40	15	14	18	9	19	44	41	24	32	36	4	48
Dec 6	40	39	24	59	18	12	7	5	7	12	9	21	17	20	16	33	55	67	36	51	59	74	74	52	5	74
Dec 7	59	48	48	28	24	8	18	4	15	6	12	11	9	9	7	8	8	6	8	6	5	31	22	15	4	59
Dec 8	17	6	8	10	8	8	12	6	5	8	7	10	9	7	6	7	6	4	6	5	5	9	5	6	4	17
Dec 9	5	6	5	7	7	6	9	7	8	7	8	9	13	12	8	32	57	15	16	13	9	8	4	4	4	57
Dec 10	7	11	11	8	18	13	27	26	60	38	18	20	10	12	10	11	6	6	6	6	6	7	15	17	6	60
Dec 11	13	12	8	8	6	9	7	7	8	12	16	13	12	25	8	7	13	14	27	35	31	34	9	57	6	57
Dec 12	33	44	20	15	10	31	28	66	19	62	16	12	12	14	25	21	30	31	23	23	31	27	33	37	10	66
Dec 13	29	60	57	68	38	37	32	22	66	26	22	17	23	24	15	37	21	40	77	77	64	48	72	41	15	77
Dec 14	12	7	6	6	9	5	6	8	12	14	17	10	9	9	12	10	8	10	21	13	12	16	40	24	5	40
Dec 15	45	44	16	53	23	63	35	47	45	51	27	25	13	15	14	22	24	18	10	12	12	6	8	16	6	63
Dec 16	13	20	10	10	9	8	4	5	6	6	8	12	11	13	16	38	20	9	15	17	12	40	25	8	4	40
Dec 17	6	10	7	12	6	5	11	17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	5	17
Dec 18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	5	17
Dec 19	X	X	X	X	X	X	X	X	X	X	14	16	17	13	8	9	8	5	9	7	8	9	11	10	5	17
Dec 20	10	9	9	7	10	7	7	13	13	6	9	13	17	10	13	6	13	17	9	58	16	48	45	52	6	58
Dec 21	17	8	7	10	6	17	64	29	12	56	42	54	5	26	7	16	22	11	33	11	10	18	52	0	64	
Dec 22	18	10	9	8	14	10	13	12	21	17	27	12	28	17	26	12	17	29	61	43	42	63	12	7	63	
Dec 23	7	8	6	9	7	10	9	12	9	14	10	12	12	10	11	11	5	6	6	15	6	6	4	7	4	15
Dec 24	34	29	11	8	6	22	53	20	43	40	66	23	24	21	22	23	19	30	28	62	19	16	22	29	6	66
Dec 25	29	12	52	27	45	61	57	15	23	49	30	33	33	15	23	38	17	14	29	37	77	35	9	23	9	77
Dec 26	25	60	23	16	17	11	19	11	14	4	27	7	13	27	36	21	17	10	12	14	25	35	14	47	4	60
Dec 27	71	71	21	54	46	62	38	48	60	60	55	29	C	C	C	13	20	4	5	3	3	5	9	29	3	71
Dec 28	23	9	7	10	11	30	59	26	41	18	30	17	13	9	11	12	12	9	5	3	5	9	7	9	3	59
Dec 29	7	8	17	7	21	19	0	48	13	7	13	18	13	18	24	24	0	0	70	62	3	0	0	6	0	70
Dec 30	8	0	8	27	52	0	0	7	8	13	34	5	7	8	13	16	5	4	5	5	17	32	8	8	0	52
Dec 31	6	12	12	10	15	7	33	10	49	67	65	15	19	29	35	30	27	12	28	30	19	11	12	9	6	67
Diurnal Minimum	5	0	4	6	6	0	0	0	0	4	7	5	5	7	6	6	0	0	3	3	3	0	0	0	0	0
Diurnal Maximum	71	71	59	68	52	72	64	66	66	67	66	54	37	40	36	38	57	67	77	77	74	74	57	57	57	57

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance	
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance	<b>P</b> Power Failure
<b>X</b> InValid Data (Machine Malfunction/Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Non-Routine Maintenance)		

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



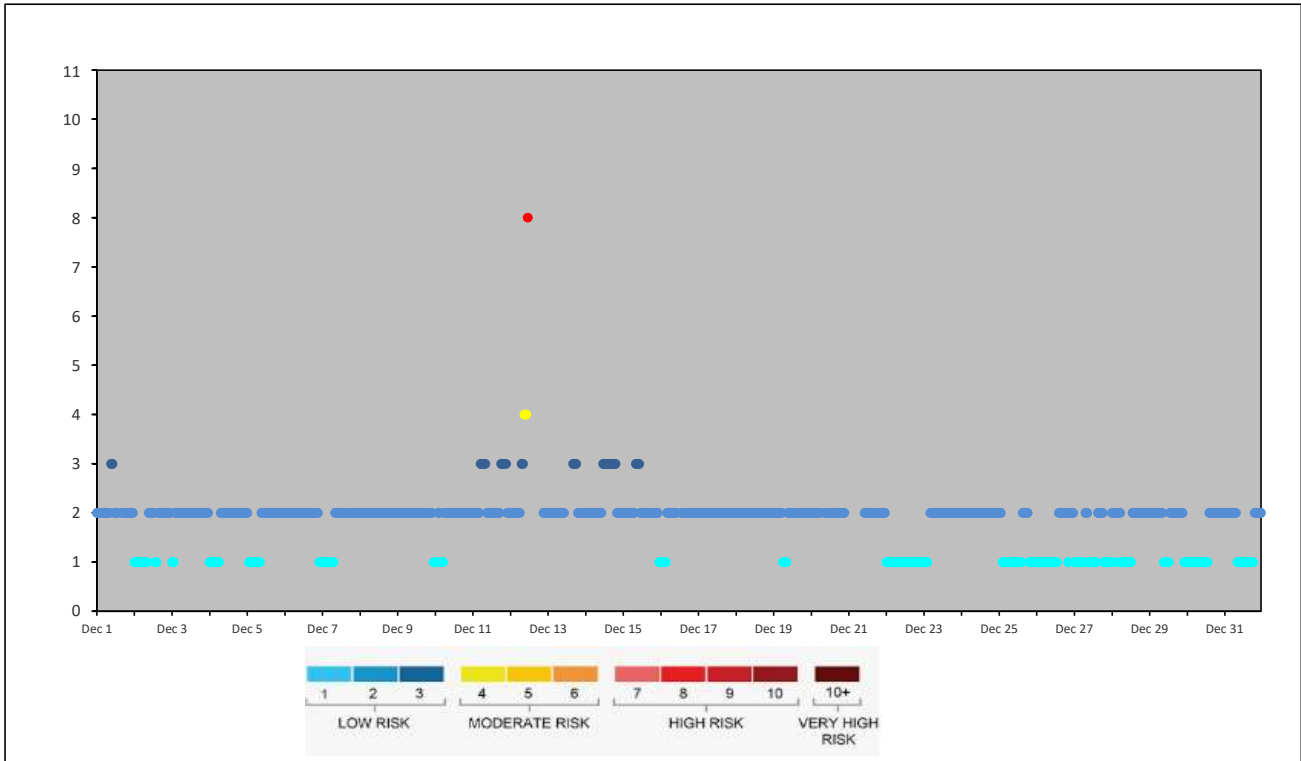
**TAMARACK STATION**

## LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

Tamarack Site - December 2023

### AIR QUALITY HEALTH INDEX

Day	Hourly Period Starting at (MST)																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Dec 1	2	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2
Dec 3	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 4	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 5	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
Dec 7	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 8	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 10	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 11	2	2	2	2	2	3	3	3	3	2	2	2	2	2	2	2	2	2	3	3	3	3	2	2
Dec 12	2	2	2	2	2	2	2	3	3	4	4	8												
Dec 13	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2
Dec 14	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2
Dec 15	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	1
Dec 16	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 17	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 18	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 19	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 20	2	2	2	2	2	2			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 21										2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dec 23	1	1	1		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 24	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 25	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1
Dec 26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	2	2	2
Dec 27	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1
Dec 28	2	2	2	1	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
Dec 29	2	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1
Dec 30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Dec 31	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2





Lakeland Industry & Community Association

Tamarack Site - December 2023

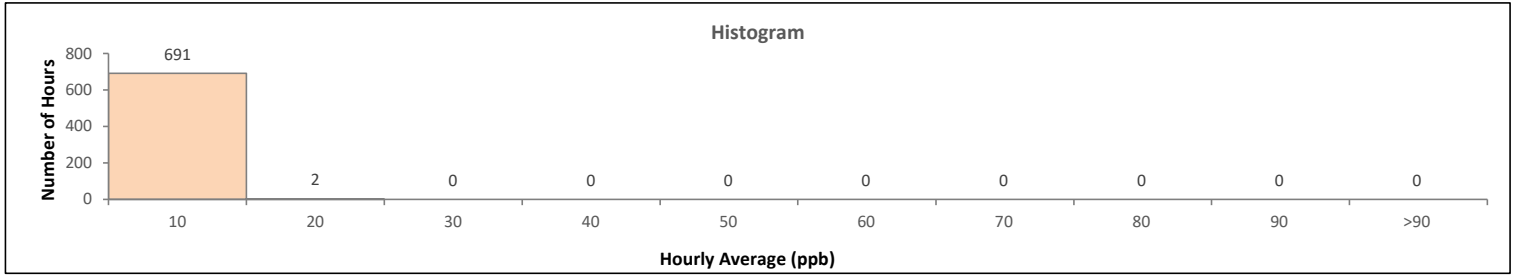
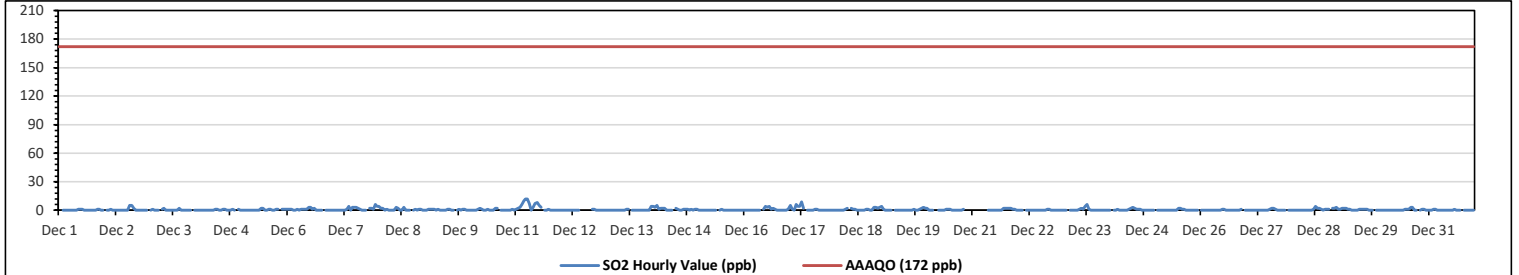
Summary of Hourly Averages

SULPHUR DIOXIDE (SO<sub>2</sub>) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 172 ppb, 24-Hour 48 ppb, 30-Day 11 ppb																																			
Number of 1-Hour Exceedances:						0						Number of 24-Hour Exceedances:						0						30-Day Exceedence:						0					
Maximum Hourly Value:						12 ppb on Dec 11 at hr 5						Hours in Service:						744																	
Maximum Daily Value:						3.5 ppb on Dec 11						Hours of Data:						693																	
Minimum Hourly Value:						0 ppb on Dec 1 at hr 0						Hours of Missing Data:						13																	
Minimum Daily Value:						0.0 ppb on Dec 15						Hours of Calibration:						38																	
Monthly Average:						0.6 ppb						Operational Uptime:						98.3																	
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average									
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23											
Dec 1	0	S	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0.2							
Dec 2	S	0	0	1	0	0	0	0	0	0	0	0	0	5	5	2	0	0	0	0	0	0	0	0	S	0	5	0.6							
Dec 3	0	1	0	0	0	0	K	1	2	0	0	0	0	0	0	2	0	0	0	0	0	0	S	0	0	2	0.3								
Dec 4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	1	0	S	1	0	0	1	0.3								
Dec 5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	1	1	0	0	1	1	S	1	1	1	0	2	0.5								
Dec 6	1	1	1	0	0	1	0	1	1	1	1	3	3	1	2	0	0	0	0	1	S	0	0	0	0	0	3	0.7							
Dec 7	0	0	0	0	0	0	0	1	4	0	3	3	3	2	1	0	0	0	S	2	2	1	6	4	0	6	1.4								
Dec 8	4	2	2	0	1	0	0	0	0	3	2	0	0	3	0	0	0	S	0	2	0	1	1	0	0	4	0.9								
Dec 9	0	0	1	1	1	1	0	1	0	0	0	0	1	1	0	0	S	0	1	0	1	1	0	0	0	1	0.4								
Dec 10	0	0	0	0	1	2	1	0	0	1	0	0	0	2	2	S	0	0	0	0	0	0	1	0	0	2	0.4								
Dec 11	1	2	3	6	10	12	12	7	0	3	7	8	5	3	S	0	0	1	0	0	0	0	0	0	0	0	12	3.5							
Dec 12	0	0	0	0	0	0	0	0	0	0	Q	Q	C	C	C	C	1	1	0	0	0	0	0	0	0	0	1	0.1							
Dec 13	0	0	0	0	0	0	0	0	0	0	1	1	S	0	0	0	0	0	0	0	0	0	0	4	0	4	0.3								
Dec 14	4	3	5	1	2	2	2	0	0	0	0	S	2	1	0	0	1	1	1	0	1	1	1	1	1	5	1.2								
Dec 15	0	0	0	0	0	0	0	0	0	0	S	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0							
Dec 16	0	0	0	0	0	0	0	0	0	S	1	4	3	4	1	2	1	0	0	0	0	0	0	1	0	4	0.7								
Dec 17	5	1	0	6	4	4	9	2	S	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	9	1.4								
Dec 18	0	0	0	0	0	1	2	S	2	1	1	0	0	0	0	0	1	1	0	0	3	3	2	3	0	3	0.9								
Dec 19	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	3	2	0	4	0.6								
Dec 20	2	0	0	0	K	S	0	0	0	0	1	1	1	0	0	0	0	0	0	1	K	K	K	K	0	2	0.3								
Dec 21	K	K	K	K	K	K	K	K	S	0	0	0	0	0	0	0	2	2	2	2	2	1	1	0	0	2	NA								
Dec 22	0	0	0	S	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0.1								
Dec 23	0	0	S	0	0	0	0	0	1	2	1	4	6	1	0	0	0	0	0	0	0	0	0	0	0	6	0.7								
Dec 24	0	S	0	0	1	0	0	0	0	0	1	2	3	2	1	1	1	0	0	0	0	0	0	0	0	3	0.5								
Dec 25	S	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	S	0	2	0.3							
Dec 26	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	S	0	0	1	0.1								
Dec 27	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	0	0	0	0	0	S	0	0	0	2	0.3								
Dec 28	0	0	0	0	0	0	0	0	0	0	1	4	2	2	1	0	1	1	1	S	2	2	3	0	0	4	0.9								
Dec 29	1	1	2	2	2	1	1	0	0	0	1	1	1	1	1	0	0	0	S	0	0	0	0	0	0	2	0.7								
Dec 30	0	0	0	0	0	0	0	0	0	0	1	1	1	3	3	0	0	S	0	1	1	0	0	0	0	3	0.5								
Dec 31	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	S	0	0	0	0	0	0	0	0	1	0.1								
Diurnal Maximum	5	3	5	6	10	12	12	7	4	3	7	8	6	5	5	3	2	2	2	2	3	3	6	4	0	0	0								
Diurnal Average	0.8	0.4	0.5	0.6	0.8	0.9	1.0	0.5	0.3	0.4	0.8	1.2	1.3	1.2	0.8	0.6	0.3	0.3	0.2	0.3	0.4	0.5	0.7	0.7	0	0	0								

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance  
**X** InValid Data (Equipment Malfunction /Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      **P** Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

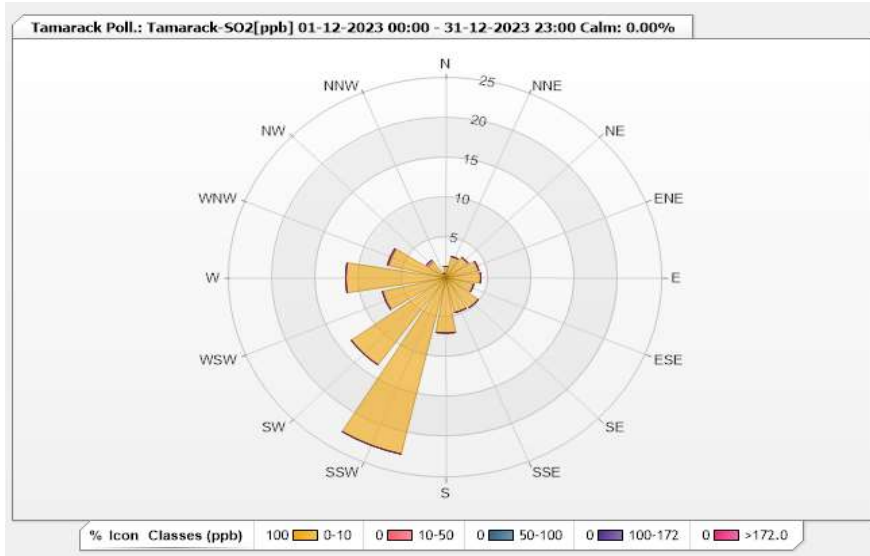


**Station: Tamarack Poll.: Tamarack-SO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppb]

Direction	0-10	10-50	50-100	100-172	>172.0	Total
N	1.44	0	0	0	0	1.44
NNE	2.74	0	0	0	0	2.74
NE	3.17	0	0	0	0	3.17
ENE	3.9	0	0	0	0	3.9
E	4.04	0	0	0	0	4.04
ESE	3.32	0	0	0	0	3.32
SE	4.62	0	0	0	0	4.62
SSE	4.47	0	0	0	0	4.47
S	6.93	0	0	0	0	6.93
SSW	22.66	0	0	0	0	22.66
SW	13.42	0	0	0	0	13.42
WSW	7.5	0	0	0	0	7.5
W	11.54	0	0	0	0	11.54
WNW	6.78	0.14	0	0	0	6.92
NW	2.45	0.29	0	0	0	2.74
NNW	0.58	0	0	0	0	0.58
Summary	100	0.43	0	0	0	100



Lakeland Industry & Community Association

Tamarack Site - December 2023

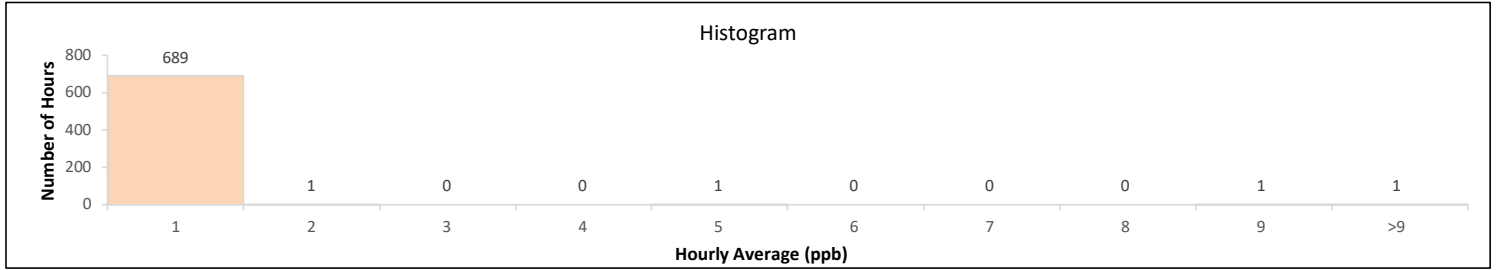
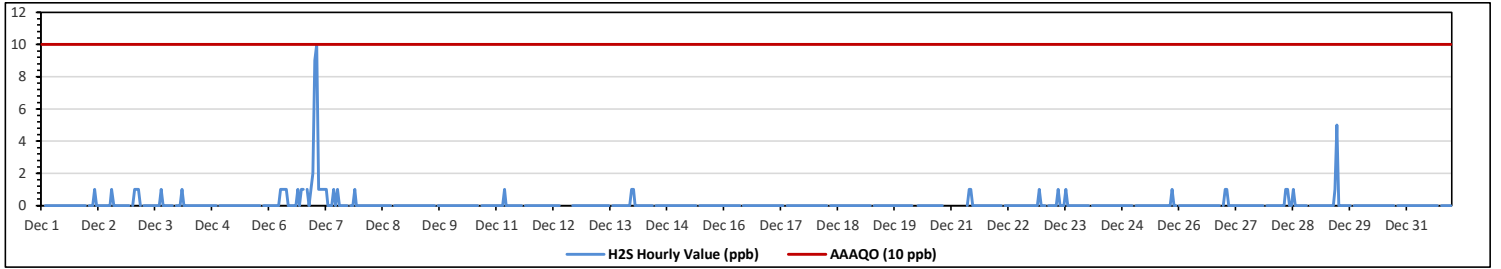
Summary of Hourly Averages

HYDROGEN SULPHIDE (H<sub>2</sub>S) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 10 ppb, 24-Hour 3 ppb																											
Number of 1-Hour Exceedances:												Number of 24-Hour Exceedances:															
Maximum Hourly Value:	10	ppb	on Dec 7 at hr 1																		Hours in Service:	744					
Maximum Daily Value:	1.0	ppb	on Dec 7																		Hours of Data:	693					
Minimum Hourly Value:	0	ppb	on Dec 1 at hr 0																		Hours of Missing Data:	13					
Minimum Daily Value:	0.0	ppb	on Dec 1																		Hours of Calibration:	38					
Monthly Average:	0.1	ppb																			Operational Uptime:	98.3					
Day	Hourly Period Starting at (MST)																							Daily	Daily	Daily	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Minimum	Maximum	Average
Dec 1	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 2	S	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 3	0	1	1	1	0	K	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	S	0	0	1	0.0
Dec 4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	1	0.0
Dec 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0.0
Dec 6	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	1	0	1	1	S	1	0	1	2	0	2	0.0
Dec 7	9	10	1	1	1	1	1	0	0	0	1	0	1	0	0	0	S	S	0	0	0	1	0	0	10	10	1.0
Dec 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0.0
Dec 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	S	0	0	0	0	0	0	0	0	0.0
Dec 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0.0
Dec 11	0	0	0	0	1	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 12	0	0	0	0	0	0	0	0	0	0	Q	Q	C	C	C	C	0	0	0	0	0	0	0	0	0	0	0.0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0
Dec 14	1	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 17	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 18	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 19	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 20	0	0	0	0	0	K	S	0	0	0	0	0	0	0	0	0	0	0	0	0	K	K	Y	K	0	0	0.0
Dec 21	K	K	K	K	K	K	K	S	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-
Dec 22	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.0
Dec 23	0	0	S	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 24	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 25	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	S	0	1	0.0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0.0
Dec 27	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	1	0.0
Dec 28	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	S	0	0	0	1	0.0
Dec 29	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	S	0	0	0	0	5	0.0
Dec 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0.0
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0.0
Diurnal Maximum	9	10	1	1	1	1	1	1	1	1	1	5	1	1	0	1	0	1	1	0	1	1	1	2			
Diurnal Average	0.4	0.4	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1			

C Monthly Calibration      S Daily Zero-Span Check      Q Quality Assurance  
K Collection Error              ND No Data (Machine Not in Service)      Y Routine Maintenance  
X InValid Data (Equipment Malfunction/Recovery)      NRM UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      P Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

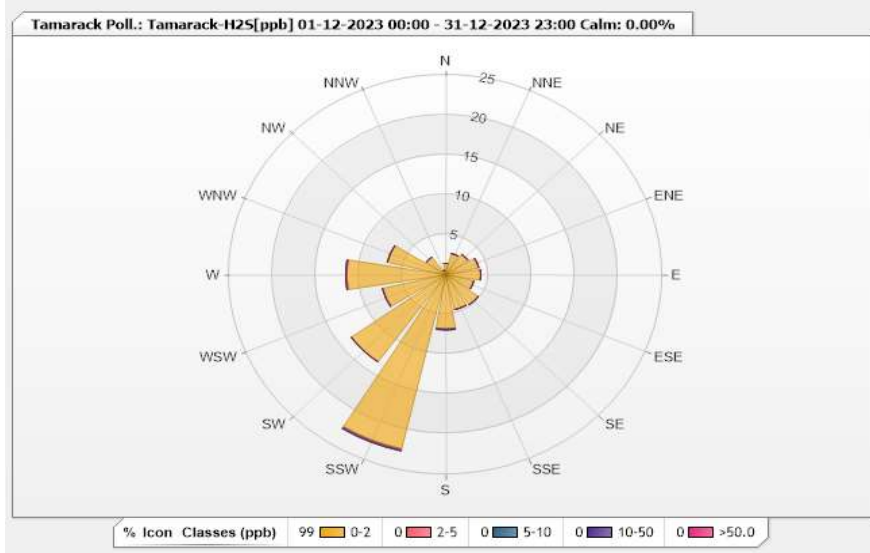


**Station: Tamarack Poll.: Tamarack-H2S[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppb]

Direction	0-2	2-5	5-10	10-50	>50.0	Total
N	1.44	0	0	0	0	1.44
NNE	2.74	0	0	0	0	2.74
NE	3.17	0	0	0	0	3.17
ENE	3.9	0	0	0	0	3.9
E	4.04	0	0	0	0	4.04
ESE	3.32	0	0	0	0	3.32
SE	4.62	0	0	0	0	4.62
SSE	4.47	0	0	0	0	4.47
S	6.78	0	0.14	0	0	6.92
SSW	22.37	0.14	0.14	0	0	22.65
SW	13.42	0	0	0	0	13.42
WSW	7.5	0	0	0	0	7.5
W	11.4	0.14	0	0	0	11.54
WNW	6.93	0	0	0	0	6.93
NW	2.74	0	0	0	0	2.74
NNW	0.58	0	0	0	0	0.58
Summary	99.42	0.28	0.28	0	0	100



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

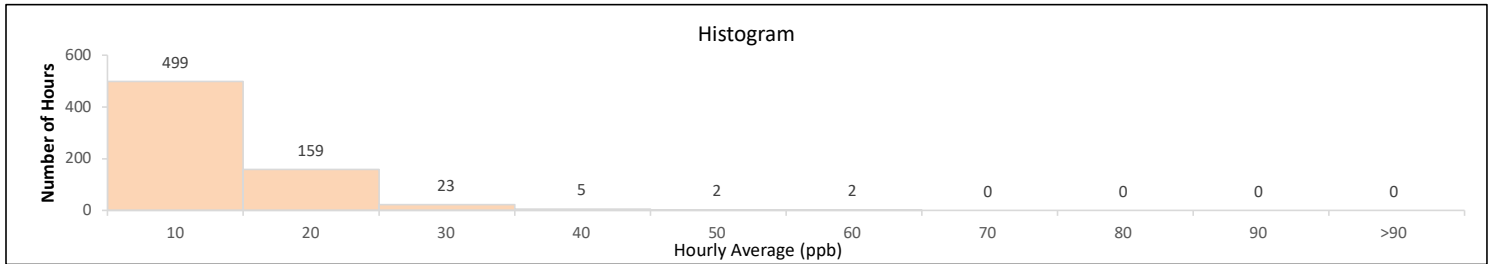
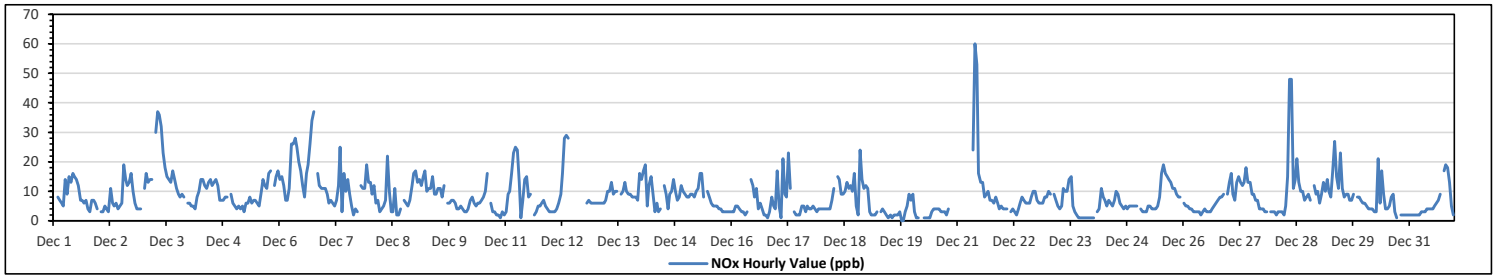
OXIDES OF NITROGEN (NOx) in ppb

Maximum Hourly Value:	60 ppb	on Dec 21 at hr 9	Hours in Service:	744
Maximum Daily Value:	17.8 ppb	on Dec 6	Hours of Data:	690
Minimum Hourly Value:	0 ppb	on Dec 19 at hr 18	Hours of Missing Data:	13
Minimum Daily Value:	2.9 ppb	on Dec 20	Hours of Calibration:	41
Monthly Average:	8.5 ppb		Operational Uptime:	98.3

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
Dec 1	8	S	8	7	6	5	14	9	15	13	16	15	14	12	7	7	6	7	4	3	7	7	6	4	3	16	8.7	
Dec 2	S	3	3	5	4	3	11	6	5	6	19	14	12	13	16	10	6	4	4	4	4	4	S	6	3	19	7.4	
Dec 3	11	16	13	14	14	K	30	37	36	32	23	18	15	14	13	17	14	11	9	8	9	8	S	6	6	37	16.7	
Dec 4	6	5	5	4	8	10	14	14	12	11	13	14	12	13	14	12	7	7	8	8	S	9	6	4	4	14	9.5	
Dec 5	5	4	5	4	5	3	6	6	8	6	7	7	6	5	10	14	12	11	16	17	S	12	15	17	3	17	8.7	
Dec 6	14	15	12	7	7	11	26	26	28	25	20	17	12	8	16	19	26	34	37	S	16	12	11	11	7	37	17.8	
Dec 7	11	9	6	7	6	5	7	12	25	3	16	10	14	9	5	2	4	3	S	12	11	11	19	13	2	25	9.6	
Dec 8	13	9	12	6	7	3	4	5	7	22	10	3	3	11	2	2	4	S	7	6	5	7	12	16	2	22	7.7	
Dec 9	17	13	14	12	15	17	10	11	11	15	9	9	11	11	8	12	S	6	6	7	7	6	4	4	4	17	10.2	
Dec 10	5	4	3	3	4	7	8	6	5	6	6	7	8	10	16	S	6	3	3	2	2	1	3	2	1	16	5.2	
Dec 11	3	9	10	16	23	25	24	13	1	7	14	15	8	9	S	2	3	5	5	6	7	5	4	3	1	25	9.4	
Dec 12	3	3	3	4	6	9	16	28	29	28	Q	Q	Q	Q	C	C	C	C	C	C	6	7	6	6	6	3	29	NA
Dec 13	6	6	6	6	7	10	10	13	9	10	10	S	9	10	13	10	9	9	8	8	8	7	16	6	6	16	9.0	
Dec 14	14	17	19	5	12	15	9	3	6	3	4	S	12	9	4	9	10	14	10	7	8	12	10	9	3	19	9.6	
Dec 15	8	8	9	9	8	10	11	16	16	8	S	10	8	6	5	5	4	4	3	3	3	3	3	3	3	16	7.2	
Dec 16	3	3	5	5	4	3	3	2	3	S	14	12	8	11	4	6	4	2	2	1	3	8	5	4	1	14	5.0	
Dec 17	17	5	1	21	9	8	23	11	S	3	2	2	2	5	5	3	5	4	4	5	4	3	4	4	1	23	6.5	
Dec 18	4	4	4	4	4	7	11	S	15	14	9	9	10	13	11	12	10	16	5	2	24	14	11	12	2	24	9.8	
Dec 19	11	3	2	2	2	3	S	3	4	3	2	1	2	1	2	2	2	3	0	0	3	5	9	7	0	11	3.1	
Dec 20	9	3	1	1	K	S	1	1	1	1	3	4	4	4	4	3	3	2	4	K	K	K	K	1	9	2.9		
Dec 21	K	K	K	K	K	K	K	S	24	60	53	16	13	13	8	9	10	7	7	6	8	6	4	5	4	60	NA	
Dec 22	4	4	4	S	3	4	3	2	4	6	8	7	6	6	6	8	10	10	7	6	6	6	8	8	2	10	5.9	
Dec 23	10	9	S	9	7	5	4	5	11	10	10	14	15	5	3	2	1	1	1	1	1	1	1	1	1	15	5.5	
Dec 24	1	S	3	4	11	8	7	5	7	6	5	7	10	9	6	5	4	5	4	5	5	5	5	5	1	11	5.7	
Dec 25	S	4	3	3	3	5	5	4	4	4	5	8	16	19	16	15	14	13	11	11	9	8	8	S	3	19	8.5	
Dec 26	6	5	5	4	4	3	3	3	3	2	3	4	3	3	3	4	5	6	7	8	8	9	S	9	2	9	4.8	
Dec 27	13	16	9	7	13	15	13	12	13	18	13	13	9	9	7	7	4	4	4	3	3	S	3	3	3	18	9.2	
Dec 28	3	2	3	3	3	2	5	15	48	48	11	14	21	13	10	10	7	8	9	7	S	12	9	10	2	48	11.9	
Dec 29	6	9	13	10	14	10	8	17	27	15	11	23	11	8	9	9	7	7	9	S	8	8	7	6	6	27	11.0	
Dec 30	6	5	4	4	4	3	3	21	6	17	9	4	4	5	8	9	3	1	S	2	2	2	2	2	1	21	5.5	
Dec 31	2	2	2	2	2	3	3	3	4	4	4	4	4	5	6	7	9	S	17	19	18	13	5	2	2	19	6.0	
Diurnal Maximum	17	17	19	21	23	25	30	37	48	60	53	23	21	19	16	19	26	34	37	19	24	14	19	17				
Diurnal Average	7.8	7.0	6.4	6.5	7.4	7.4	10.1	10.6	13.0	13.5	10.8	9.7	9.2	9.1	8.0	8.2	7.5	7.9	7.7	6.2	7.3	7.2	6.9	6.9				

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction/Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

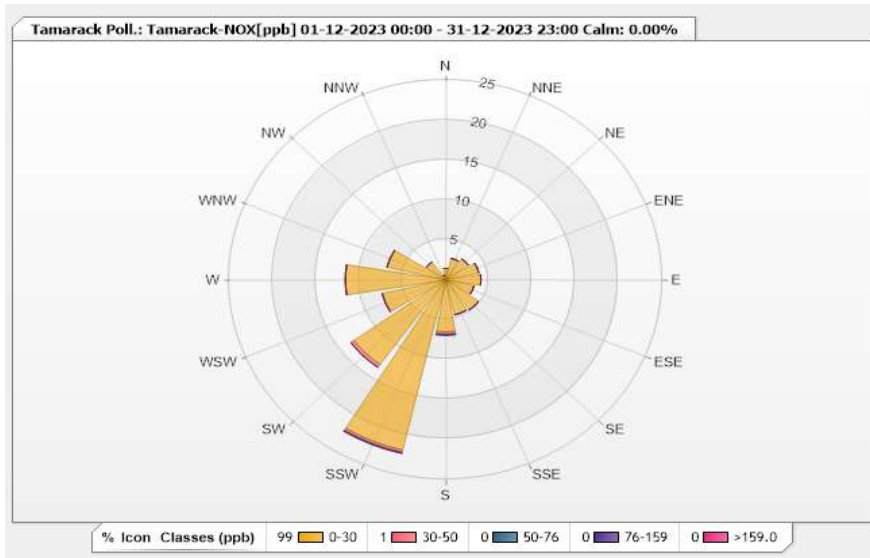


**Station: Tamarack Poll.: Tamarack-NOX[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.74%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.45	0	0	0	0	1.45
NNE	2.75	0	0	0	0	2.75
NE	3.19	0	0	0	0	3.19
ENE	3.91	0	0	0	0	3.91
E	4.06	0	0	0	0	4.06
ESE	3.33	0	0	0	0	3.33
SE	4.64	0	0	0	0	4.64
SSE	4.49	0	0	0	0	4.49
S	6.52	0.29	0.14	0	0	6.95
SSW	21.88	0.29	0.14	0	0	22.31
SW	13.04	0.43	0	0	0	13.47
WSW	7.54	0	0	0	0	7.54
W	11.59	0	0	0	0	11.59
WNW	6.96	0	0	0	0	6.96
NW	2.75	0	0	0	0	2.75
NNW	0.58	0	0	0	0	0.58
Summary	98.68	1.01	0.28	0	0	100



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

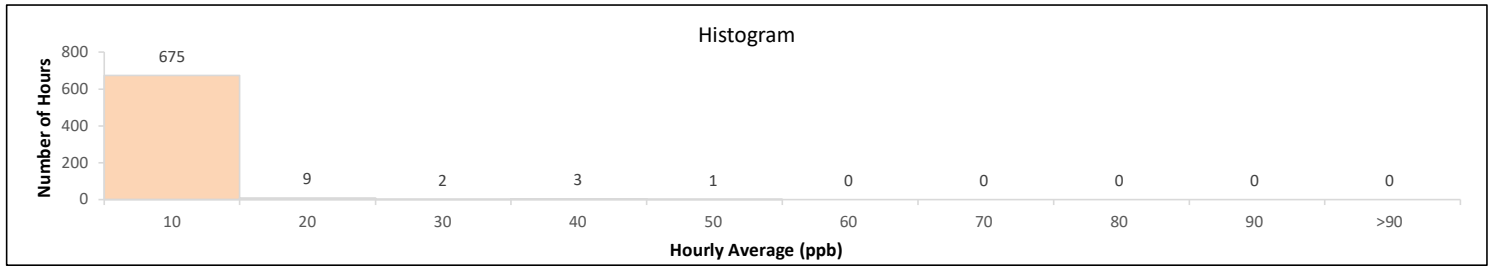
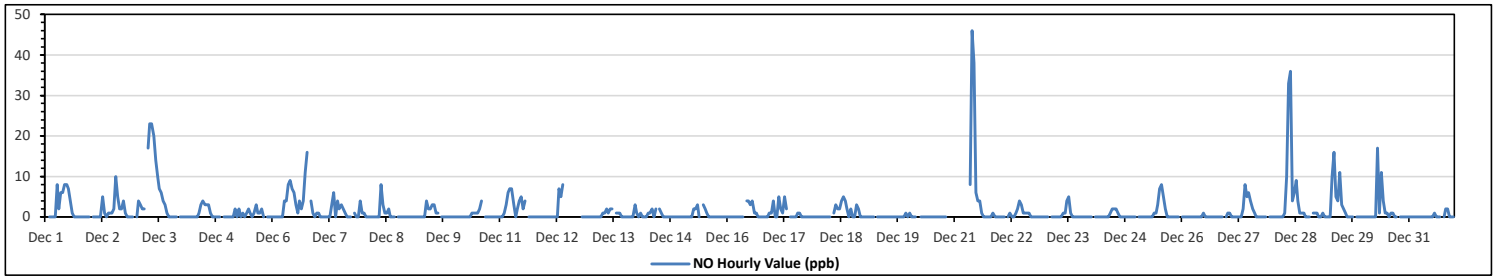
NITRIC OXIDE (NO) in ppb

Maximum Hourly Value:	46 ppb	on Dec 21 at hr 9	Hours in Service:	744
Maximum Daily Value:	6.3 ppb	on Dec 3	Hours of Data:	690
Minimum Hourly Value:	0 ppb	on Dec 1 at hr 0	Hours of Missing Data:	13
Minimum Daily Value:	0.0 ppb	on Dec 19	Hours of Calibration:	41
Monthly Average:	1.4 ppb		Operational Uptime:	98.3

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
Dec 1	0	S	0	0	0	0	8	2	6	6	8	7	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2.2
Dec 2	S	0	0	0	0	0	5	1	0	1	1	1	2	10	5	2	2	4	1	0	0	0	0	0	0	0	0	10	1.6
Dec 3	0	4	3	2	2	K	17	23	23	20	14	10	7	6	4	3	1	0	0	0	0	0	0	0	0	0	23	6.3	
Dec 4	0	0	0	0	0	0	0	0	0	1	3	4	3	3	3	1	0	0	0	0	0	0	0	S	0	0	4	0.8	
Dec 5	0	0	0	0	2	0	2	0	1	0	1	2	1	0	1	3	1	1	2	0	S	0	0	0	0	0	3	0.7	
Dec 6	0	0	0	0	0	0	4	4	8	9	7	6	3	1	4	2	4	11	16	S	4	1	0	1	0	1	16	3.7	
Dec 7	1	0	0	0	0	0	0	3	6	0	4	2	3	2	1	0	0	0	0	S	1	0	0	0	4	1	6	1.2	
Dec 8	1	0	0	0	0	0	0	0	0	8	3	1	1	2	0	0	0	S	0	0	0	0	0	0	0	0	8	0.7	
Dec 9	0	0	0	0	0	0	0	0	0	4	2	2	3	3	1	1	S	0	0	0	0	0	0	0	0	0	4	0.7	
Dec 10	0	0	0	0	0	0	0	0	0	1	1	1	1	2	4	S	0	0	0	0	0	0	0	0	0	0	4	0.4	
Dec 11	0	0	1	3	6	7	7	3	0	2	4	5	2	4	S	0	0	0	0	0	0	0	0	0	0	0	7	1.9	
Dec 12	0	0	0	0	0	0	0	7	5	8	Q	Q	Q	Q	C	C	C	C	C	C	0	0	0	0	0	0	8	NA	
Dec 13	0	0	0	0	0	0	1	1	2	1	2	2	S	1	1	1	0	0	0	0	0	0	0	0	0	3	0	3	0.7
Dec 14	1	0	1	0	0	0	1	1	2	0	2	S	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0.5	
Dec 15	0	0	0	0	0	0	2	2	3	0	S	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0.6	
Dec 16	0	0	0	0	0	0	0	0	0	0	S	4	4	3	4	1	1	0	0	0	0	0	0	0	1	1	4	0.8	
Dec 17	4	0	0	5	2	1	5	2	S	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	5	0.9	
Dec 18	0	0	0	0	0	0	0	S	1	3	2	2	4	5	4	2	0	2	0	0	0	3	2	0	0	0	5	1.3	
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0	
Dec 20	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1	
Dec 21	K	K	K	K	K	K	K	K	S	8	46	38	6	4	4	1	0	0	0	0	1	0	0	0	0	0	46	NA	
Dec 22	0	0	0	S	0	1	0	0	1	2	4	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	4	0.7	
Dec 23	0	0	S	0	0	0	0	0	0	1	1	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0.5	
Dec 24	0	S	0	0	0	0	0	0	0	0	1	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	2	0.3	
Dec 25	S	0	0	0	0	0	0	0	0	1	1	3	7	8	5	2	0	0	0	0	0	0	0	0	0	0	8	1.2	
Dec 26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	
Dec 27	1	1	0	0	0	0	0	0	2	8	5	6	4	2	1	0	0	0	0	0	0	0	S	0	0	0	8	1.3	
Dec 28	0	0	0	0	0	0	1	10	33	36	4	6	9	4	1	1	1	0	0	0	0	S	1	1	1	0	36	4.7	
Dec 29	0	0	1	0	0	0	0	10	16	5	4	11	3	2	1	0	0	0	0	0	S	0	0	0	0	0	16	2.3	
Dec 30	0	0	0	0	0	0	0	17	1	11	4	1	1	0	1	1	0	0	S	0	0	0	0	0	0	0	17	1.6	
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	S	0	2	2	0	0	0	0	2	0.2	
Diurnal Maximum	4	4	3	5	6	7	17	23	33	46	38	11	9	10	5	3	4	11	16	2	4	2	4	3					
Diurnal Average	0.3	0.2	0.2	0.3	0.4	0.3	1.8	3.0	3.9	5.8	4.1	3.3	2.8	2.5	1.5	0.7	0.3	0.6	0.7	0.1	0.4	0.1	0.3	0.3					

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction/Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

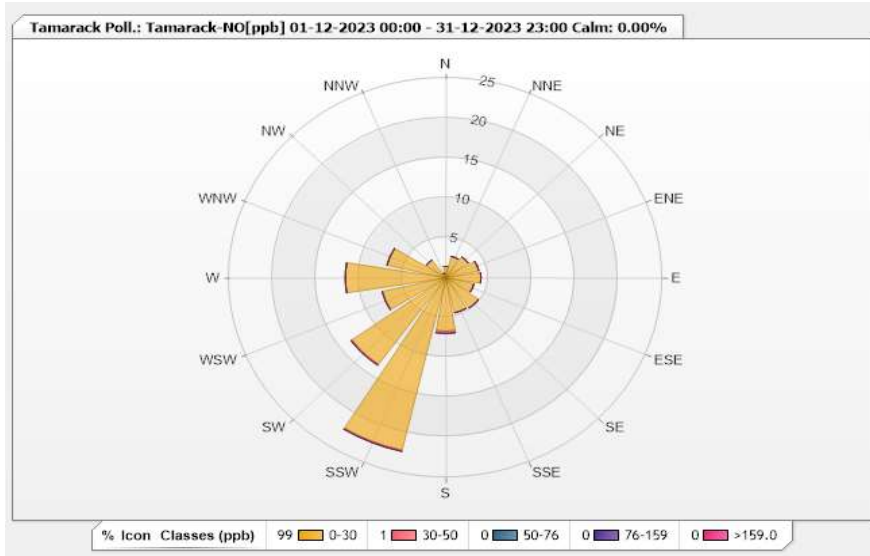


**Station: Tamarack Poll.: Tamarack-NO[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.74%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.45	0	0	0	0	1.45
NNE	2.75	0	0	0	0	2.75
NE	3.19	0	0	0	0	3.19
ENE	3.91	0	0	0	0	3.91
E	4.06	0	0	0	0	4.06
ESE	3.33	0	0	0	0	3.33
SE	4.64	0	0	0	0	4.64
SSE	4.49	0	0	0	0	4.49
S	6.67	0.29	0	0	0	6.96
SSW	22.17	0.14	0	0	0	22.31
SW	13.33	0.14	0	0	0	13.47
WSW	7.54	0	0	0	0	7.54
W	11.59	0	0	0	0	11.59
WNW	6.96	0	0	0	0	6.96
NW	2.75	0	0	0	0	2.75
NNW	0.58	0	0	0	0	0.58
Summary	99.41	0.57	0	0	0	100

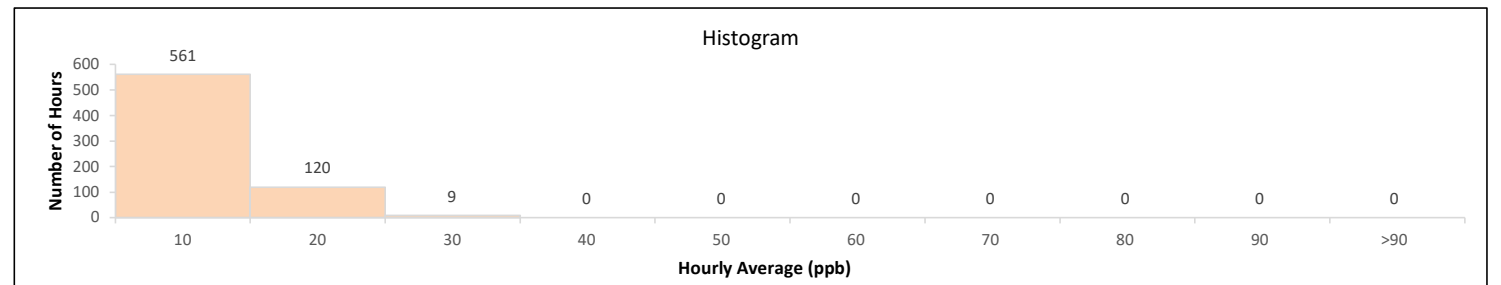
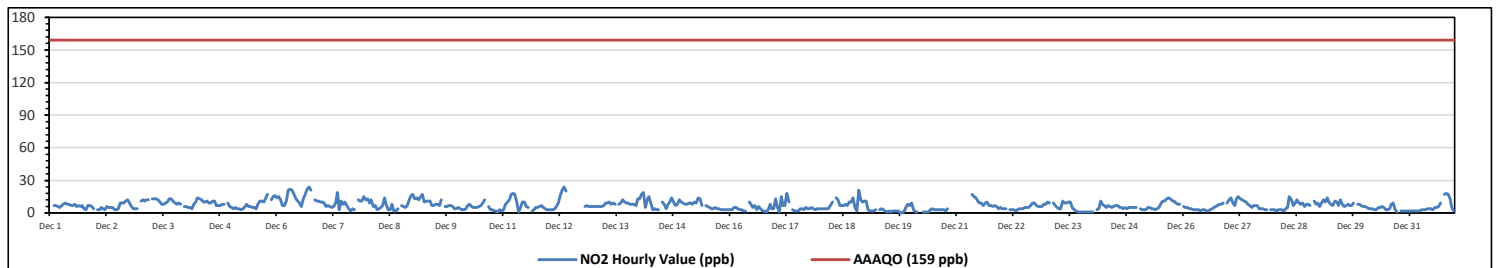




**Lakeland Industry & Community Association**  
**Tamarack Site - December 2023**  
**Summary of Hourly Averages**  
**NITROGEN DIOXIDE (NO<sub>2</sub>) in ppb**

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 159 ppb																																															
Number of 1-Hour Exceedances: 0																																															
Maximum Hourly Value: 24 ppb on Dec 6 at hr 17												Hours in Service: 744																																			
Maximum Daily Value: 14.2 ppb on Dec 6												Hours of Data: 690																																			
Minimum Hourly Value: 0 ppb on Dec 19 at hr 18												Hours of Missing Data: 13																																			
Minimum Daily Value: 2.7 ppb on Dec 20												Hours of Calibration: 41																																			
Monthly Average: 7.0 ppb												Operational Uptime: 98.3																																			
Day	Hourly Period Starting at (MST)																							Daily	Daily	Daily																					
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Minimum	Maximum	Average																				
Dec 1	8	S	7	7	6	5	7	8	9	8	8	7	7	8	6	7	6	7	4	3	7	7	6	4	3	9	6.6																				
Dec 2	S	3	3	5	4	3	6	5	5	5	3	3	4	9	9	9	11	12	9	6	4	4	4	S	3	12	5.7																				
Dec 3	11	12	11	12	12	K	13	13	13	12	10	8	8	9	10	13	13	11	9	8	9	8	S	6	6	13	10.5																				
Dec 4	6	5	5	4	8	10	14	13	12	10	10	11	9	9	11	11	7	7	7	8	8	S	9	6	4	14	8.7																				
Dec 5	5	4	5	4	4	3	4	6	8	6	6	5	5	4	8	11	11	10	14	17	S	12	15	16	3	17	8.0																				
Dec 6	14	15	12	7	7	11	21	22	21	17	13	11	9	6	13	17	22	24	21	S	12	11	11	10	6	24	14.2																				
Dec 7	10	9	6	7	6	5	6	9	19	3	11	8	10	7	4	2	4	3	S	12	11	11	15	12	2	19	8.3																				
Dec 8	13	9	12	6	7	3	4	5	7	14	7	3	3	8	2	2	4	S	7	6	5	7	12	16	2	16	7.0																				
Dec 9	17	13	14	12	15	17	10	11	11	11	7	7	8	8	7	12	S	6	6	7	7	6	4	4	4	17	9.6																				
Dec 10	5	4	3	3	4	7	8	6	5	5	6	7	9	12	S	6	3	3	2	2	1	3	2	1	1	12	4.8																				
Dec 11	3	8	10	12	17	18	17	10	1	5	10	10	6	5	S	2	3	S	5	5	6	7	5	4	3	1	18	7.5																			
Dec 12	3	3	3	4	6	9	16	21	24	20	Q	Q	Q	Q	C	C	C	C	C	6	7	6	6	6	3	24	NA																				
Dec 13	6	6	6	6	6	7	9	9	10	8	9	8	S	8	9	12	10	9	9	8	8	8	7	13	6	13	8.3																				
Dec 14	13	17	19	5	12	15	9	3	4	3	3	S	10	8	4	8	10	14	10	7	8	12	10	9	3	19	9.3																				
Dec 15	8	8	9	9	8	10	9	14	13	7	S	7	6	5	4	4	5	4	4	3	3	3	3	3	3	3	14	6.5																			
Dec 16	3	3	5	5	4	3	3	2	2	S	10	8	5	7	3	6	4	2	2	1	3	8	4	4	1	10	4.2																				
Dec 17	13	5	1	15	7	7	18	10	S	3	2	2	2	2	4	3	5	4	4	5	4	3	4	4	1	18	5.6																				
Dec 18	4	4	4	4	4	7	10	S	14	12	7	7	7	8	7	10	10	14	5	2	21	12	10	11	2	21	8.4																				
Dec 19	11	3	2	2	2	3	S	3	4	3	2	1	2	1	2	2	2	2	0	0	2	5	8	7	0	11	3.0																				
Dec 20	9	3	1	1	K	S	1	1	1	1	3	4	3	3	3	3	3	3	2	4	K	K	K	K	1	9	2.7																				
Dec 21	K	K	K	K	K	K	K	S	17	15	14	11	9	9	7	9	10	7	7	6	7	6	4	5	4	17	NA																				
Dec 22	4	4	4	S	3	3	3	2	3	4	4	4	5	5	5	7	9	9	7	6	6	6	8	8	2	9	5.2																				
Dec 23	10	9	S	9	7	5	4	4	11	9	9	10	10	5	3	2	1	1	1	1	1	1	1	1	1	11	5.0																				
Dec 24	1	S	3	4	11	8	7	5	7	6	5	6	7	7	5	5	4	5	4	5	5	5	5	5	1	11	5.4																				
Dec 25	S	4	3	3	3	5	5	4	4	3	4	5	9	11	11	13	14	13	11	11	9	8	8	S	3	14	7.3																				
Dec 26	6	5	5	4	4	3	3	3	3	2	3	2	2	2	3	4	5	6	7	8	8	9	S	9	2	9	4.7																				
Dec 27	12	14	9	7	13	15	13	12	11	10	8	7	5	7	7	7	4	4	4	3	3	S	3	3	3	15	7.9																				
Dec 28	3	2	3	3	3	2	4	5	15	12	7	9	12	9	8	9	6	8	8	7	S	11	8	9	2	15	7.1																				
Dec 29	6	9	12	10	14	10	8	7	11	10	7	12	8	6	7	8	7	8	7	9	S	8	8	7	6	6	14	8.6																			
Dec 30	6	5	4	4	4	3	3	5	5	6	5	3	3	4	8	9	3	1	S	2	2	2	2	2	1	9	4.0																				
Dec 31	2	2	2	2	2	2	3	3	3	4	4	4	3	5	5	6	9	3	S	17	18	17	13	5	2	2	18	5.8																			
Diurnal Maximum	17	17	19	15	17	18	21	22	24	20	14	12	12	11	13	17	22	24	21	18	21	13	15	16																							
Diurnal Average	7.6	6.7	6.3	6.1	7.0	7.1	8.2	7.6	9.1	7.8	6.8	6.6	6.3	6.5	6.4	7.3	7.2	7.2	7.0	6.1	6.9	7.1	6.6	6.6																							
C	Monthly Calibration											S	Daily Zero-Span Check											Q	Quality Assurance																						
K	Collection Error											ND	No Data (Machine Not in Service)											Y	Routine Maintenance											P	Power Failure										
X	InValid Data (Equipment Malfunction /Recovery)											NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																		

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

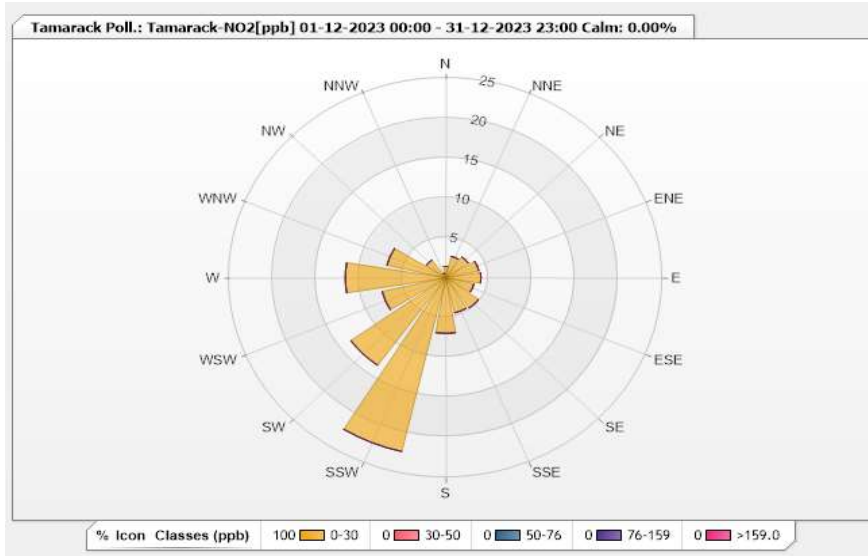


**Station: Tamarack Poll.: Tamarack-NO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.74%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.45	0	0	0	0	1.45
NNE	2.75	0	0	0	0	2.75
NE	3.19	0	0	0	0	3.19
ENE	3.91	0	0	0	0	3.91
E	4.06	0	0	0	0	4.06
ESE	3.33	0	0	0	0	3.33
SE	4.64	0	0	0	0	4.64
SSE	4.49	0	0	0	0	4.49
S	6.96	0	0	0	0	6.96
SSW	22.32	0	0	0	0	22.32
SW	13.48	0	0	0	0	13.48
WSW	7.54	0	0	0	0	7.54
W	11.59	0	0	0	0	11.59
WNW	6.96	0	0	0	0	6.96
NW	2.75	0	0	0	0	2.75
NNW	0.58	0	0	0	0	0.58
Summary	100	0	0	0	0	100



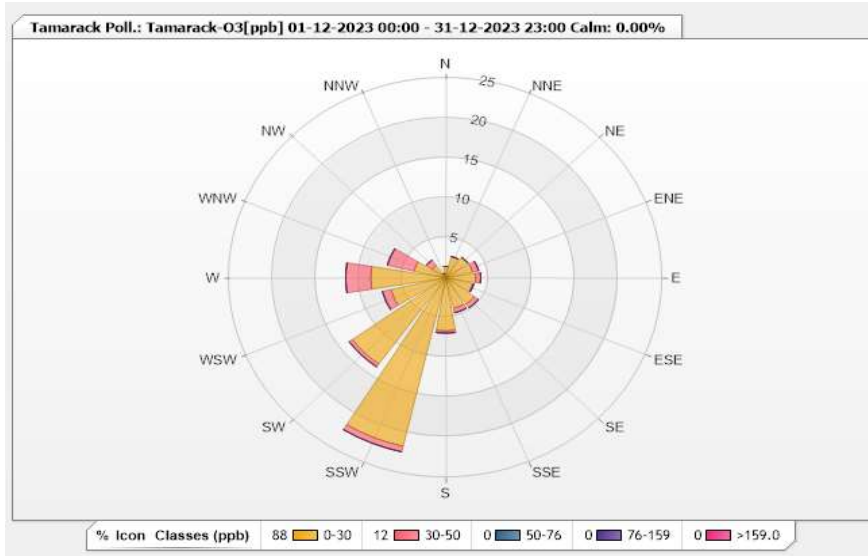


**Station: Tamarack Poll.: Tamarack-O3[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.44	0	0	0	0	1.44
NNE	2.74	0	0	0	0	2.74
NE	3.17	0	0	0	0	3.17
ENE	3.17	0.72	0	0	0	3.89
E	3.46	0.58	0	0	0	4.04
ESE	3.17	0.14	0	0	0	3.31
SE	4.04	0.58	0	0	0	4.62
SSE	3.9	0.58	0	0	0	4.48
S	6.64	0.29	0	0	0	6.93
SSW	21.65	0.72	0	0	0	22.37
SW	13.28	0.43	0	0	0	13.71
WSW	6.49	1.01	0	0	0	7.5
W	8.66	2.89	0	0	0	11.55
WNW	3.75	3.17	0	0	0	6.92
NW	1.88	0.87	0	0	0	2.75
NNW	0.43	0.14	0	0	0	0.57
Summary	87.87	12.12	0	0	0	100



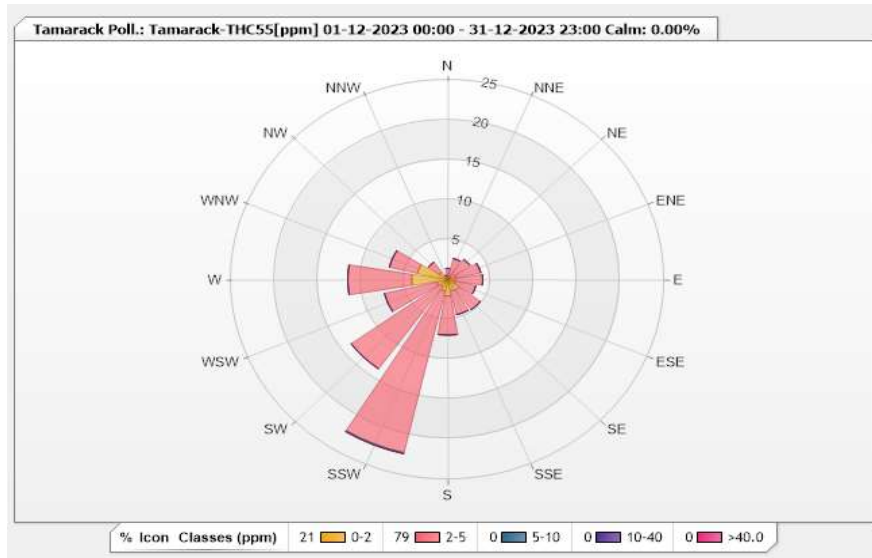


**Station: Tamarack Poll.: Tamarack-THC55[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-40	>40.0	Total
N	0	1.44	0	0	0	1.44
NNE	0.29	2.45	0	0	0	2.74
NE	0	3.17	0	0	0	3.17
ENE	1.01	2.89	0	0	0	3.9
E	0.72	3.32	0	0	0	4.04
ESE	0.87	2.45	0	0	0	3.32
SE	1.59	3.03	0	0	0	4.62
SSE	1.44	3.03	0	0	0	4.47
S	2.02	4.91	0	0	0	6.93
SSW	1.44	20.78	0.14	0	0	22.36
SW	1.01	12.7	0	0	0	13.71
WSW	1.3	6.2	0	0	0	7.5
W	4.18	7.36	0	0	0	11.54
WNW	3.61	3.32	0	0	0	6.93
NW	1.15	1.59	0	0	0	2.74
NNW	0	0.58	0	0	0	0.58
Summary	20.63	79.22	0.14	0	0	100



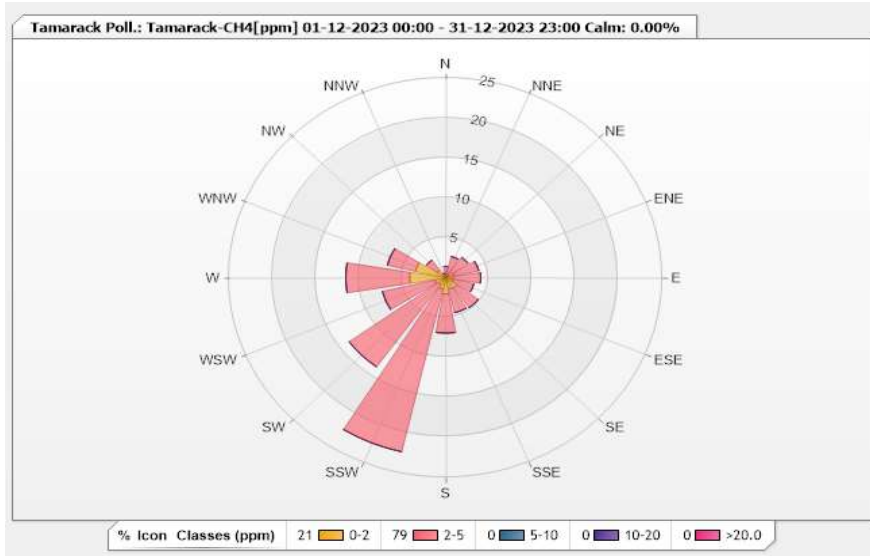


**Station: Tamarack Poll.: Tamarack-CH4[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-20	>20.0	Total
N	0	1.44	0	0	0	1.44
NNE	0.29	2.45	0	0	0	2.74
NE	0	3.17	0	0	0	3.17
ENE	1.01	2.89	0	0	0	3.9
E	0.72	3.32	0	0	0	4.04
ESE	0.87	2.45	0	0	0	3.32
SE	1.59	3.03	0	0	0	4.62
SSE	1.44	3.03	0	0	0	4.47
S	2.02	4.91	0	0	0	6.93
SSW	1.44	20.92	0	0	0	22.36
SW	1.01	12.7	0	0	0	13.71
WSW	1.3	6.2	0	0	0	7.5
W	4.18	7.36	0	0	0	11.54
WNW	3.61	3.32	0	0	0	6.93
NW	1.15	1.59	0	0	0	2.74
NNW	0	0.58	0	0	0	0.58
Summary	20.63	79.36	0	0	0	100





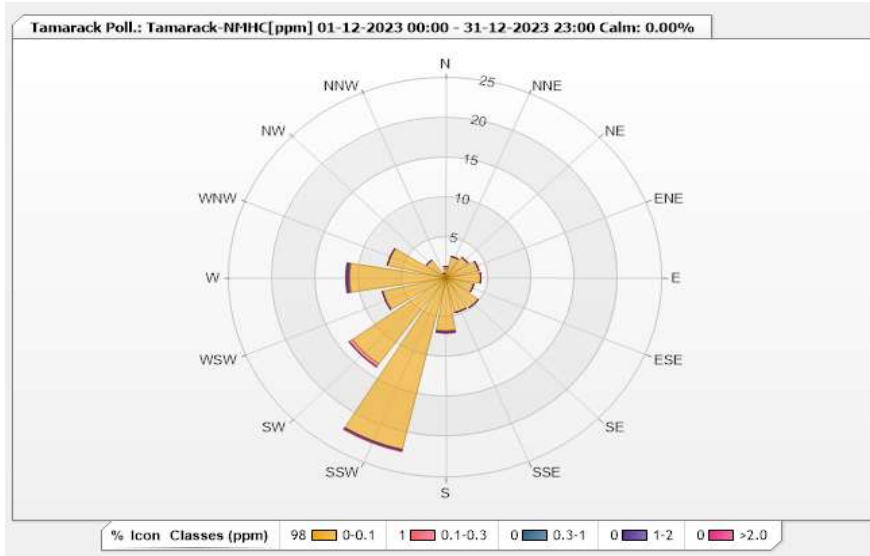


**Station: Tamarack Poll.: Tamarack-NMHC[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.15%      Calm Avg: 0.00 [ppm]

Direction	0-0.1	0.1-0.3	0.3-1	1-2	>2.0	Total
N	1.15	0.29	0	0	0	1.44
NNE	2.74	0	0	0	0	2.74
NE	3.17	0	0	0	0	3.17
ENE	3.9	0	0	0	0	3.9
E	4.04	0	0	0	0	4.04
ESE	3.32	0	0	0	0	3.32
SE	4.62	0	0	0	0	4.62
SSE	4.47	0	0	0	0	4.47
S	6.64	0.14	0	0.14	0	6.92
SSW	22.08	0	0.14	0	0.14	22.36
SW	13.28	0.43	0	0	0	13.71
WSW	7.5	0	0	0	0	7.5
W	11.11	0.14	0.14	0.14	0	11.53
WNW	6.93	0	0	0	0	6.93
NW	2.74	0	0	0	0	2.74
NNW	0.58	0	0	0	0	0.58
Summary	98.27	1	0.28	0.28	0.14	100

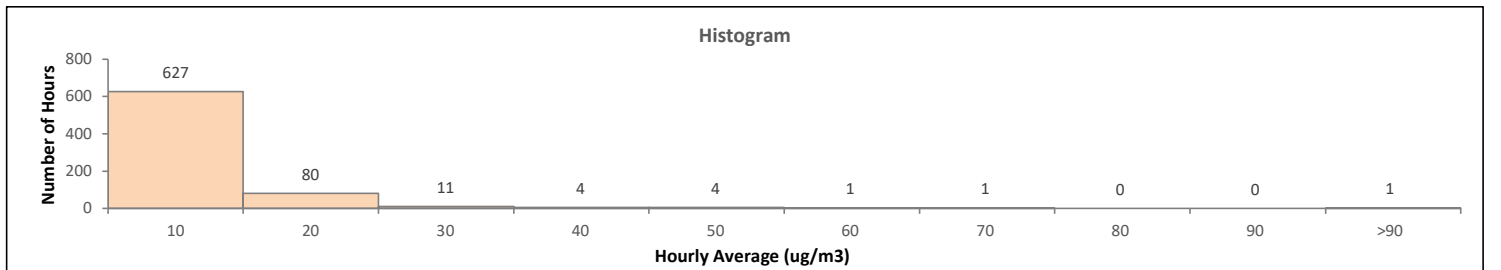
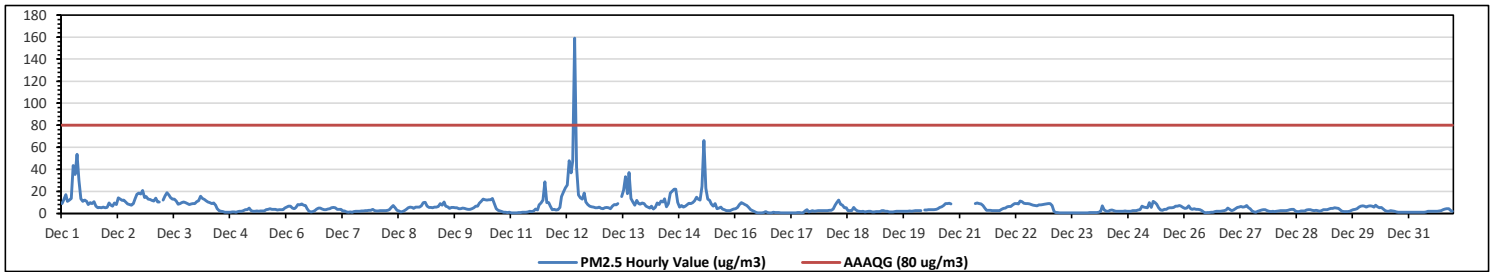


**Lakeland Industry & Community Association**  
**Tamarack Site - December 2023**  
**Summary of Hourly Averages**

**PARTICULATE MATTER 2.5 (PM<sub>2.5</sub>) in µg/m<sup>3</sup>**

Alberta Ambient Air Quality Guideline (AAAQG): 1-Hour 80 µg/m <sup>3</sup> , Alberta Ambient Air Quality Objective (AAAQO): 24-Hour 29 µg/m <sup>3</sup>																											
Number of 1-Hour Exceedances:	1	Number of 24-Hour Exceedances:	0																								
Maximum Hourly Value:	159 µg/m <sup>3</sup> on Dec 12 at hr 10	Hours in Service:	744																								
Maximum Daily Value:	22.7 µg/m <sup>3</sup> on Dec 12	Hours of Data:	729																								
Minimum Hourly Value:	1 µg/m <sup>3</sup> on Dec 17 at hr 1	Hours of Missing Data:	14																								
Minimum Daily Value:	1 µg/m <sup>3</sup> on Dec 23	Hours of Calibration:	1																								
Monthly Average:	6.0 µg/m <sup>3</sup>	Operational Uptime:	98.1																								
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
Dec 1	9	13	17	11	12	14	43	35	54	30	13	11	12	11	8	10	9	11	6	5	5	5	6	5	5	54	14.8
Dec 2	5	9	7	7	9	8	14	13	12	12	10	9	8	8	9	13	17	19	18	21	14	15	13	13	5	21	11.7
Dec 3	12	11	14	11	10	K	12	16	19	17	14	13	13	11	8	9	10	10	10	9	8	9	9	9	8	19	11.5
Dec 4	11	12	16	14	13	12	10	10	9	9	7	4	3	2	2	1	1	1	1	1	1	1	2	2	1	16	6.0
Dec 5	2	3	3	3	5	3	2	2	2	2	2	2	3	4	4	4	4	4	3	3	3	3	5	2	5	3.0	
Dec 6	6	7	6	5	4	5	8	8	9	7	7	4	2	1	2	3	4	5	4	5	4	3	4	4	1	9	4.8
Dec 7	5	5	5	4	4	4	2	2	1	1	1	1	2	2	2	2	2	2	3	3	3	3	4	3	1	5	2.7
Dec 8	2	2	3	3	2	3	3	4	5	7	5	3	2	1	2	2	4	5	6	6	5	6	6	6	1	7	3.8
Dec 9	7	10	10	6	5	5	5	6	6	6	9	8	10	7	6	5	5	5	5	5	4	4	5	5	4	10	6.2
Dec 10	4	4	4	4	5	7	7	9	11	13	12	12	13	12	13	9	4	3	2	2	1	1	1	1	1	13	6.4
Dec 11	1	1	1	1	1	1	1	1	1	1	2	2	2	4	3	8	9	12	29	10	10	7	3	4	1	29	4.7
Dec 12	3	3	6	15	19	23	26	48	37	48	159	42	17	14	13	18	10	8	7	6	6	5	6	3	3	159	22.7
Dec 13	5	4	5	5	5	4	7	8	8	9	C	15	21	33	18	37	14	11	7	12	9	8	10	9	4	37	11.5
Dec 14	7	6	5	7	4	5	10	8	11	10	13	6	9	19	20	22	22	10	6	7	6	7	8	9	4	22	9.8
Dec 15	9	10	12	15	13	12	25	66	23	13	12	9	7	9	4	5	6	4	3	3	2	3	3	4	2	66	11.2
Dec 16	4	6	8	10	9	8	7	5	3	2	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	10	3.1
Dec 17	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	1	2	3	2	2	3	3	2	3	1	3	1.4
Dec 18	2	3	3	3	4	7	10	12	8	8	5	5	3	3	3	6	4	2	2	2	2	1	2	2	1	12	4.1
Dec 19	2	1	1	2	2	2	3	3	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	3	1.8
Dec 20	3	3	3	3	K	3	3	3	3	4	3	4	4	5	6	7	9	9	9	9	K	K	K	K	3	9	4.8
Dec 21	K	K	K	K	K	K	K	K	9	10	9	9	7	5	3	3	3	3	2	3	3	3	4	5	2	10	NA
Dec 22	5	6	6	6	8	9	9	9	11	11	9	9	9	8	7	7	7	8	8	8	8	9	9	9	5	11	8.1
Dec 23	9	7	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	1.3
Dec 24	1	1	1	2	7	3	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	3	3	3	1	7	2.3
Dec 25	4	7	6	6	5	10	5	11	10	8	5	3	3	4	4	5	5	5	6	7	7	7	6	5	3	11	5.9
Dec 26	5	5	7	4	4	4	4	4	3	3	1	1	1	1	1	2	2	2	2	2	2	2	3	5	1	7	2.8
Dec 27	4	3	3	4	5	6	6	6	7	5	4	2	1	1	2	3	3	4	3	3	3	2	2	2	1	7	3.6
Dec 28	2	2	2	3	3	3	3	3	3	4	4	2	2	2	2	2	2	3	3	3	3	3	3	3	2	4	2.6
Dec 29	2	3	3	3	4	4	5	5	5	5	5	3	2	2	2	2	3	3	4	4	6	7	7	2	7	3.6	
Dec 30	6	6	7	7	7	6	8	6	5	6	4	3	2	2	2	2	2	1	1	1	1	1	1	1	1	8	3.6
Dec 31	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	4	4	4	3	2	1	1	4	1.9
Diurnal Maximum	12	13	17	15	19	23	43	66	54	48	159	42	21	33	20	37	22	19	29	21	14	15	13	13			
Diurnal Average	4.5	5.0	5.5	5.5	5.9	5.9	8.0	10.2	9.1	8.3	10.9	6.1	5.3	5.7	5.0	6.2	5.5	5.1	5.2	4.7	4.2	4.2	4.2	4.4			
C	Monthly Calibration						S	Daily Zero-Span Check						Q	Quality Assurance												
K	Collection Error						ND	No Data (Machine Not in Service)						Y	Routine Maintenance												
X	Invalid Data (Equipment Malfunction /Recovery)						NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)						P	Power Failure												

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

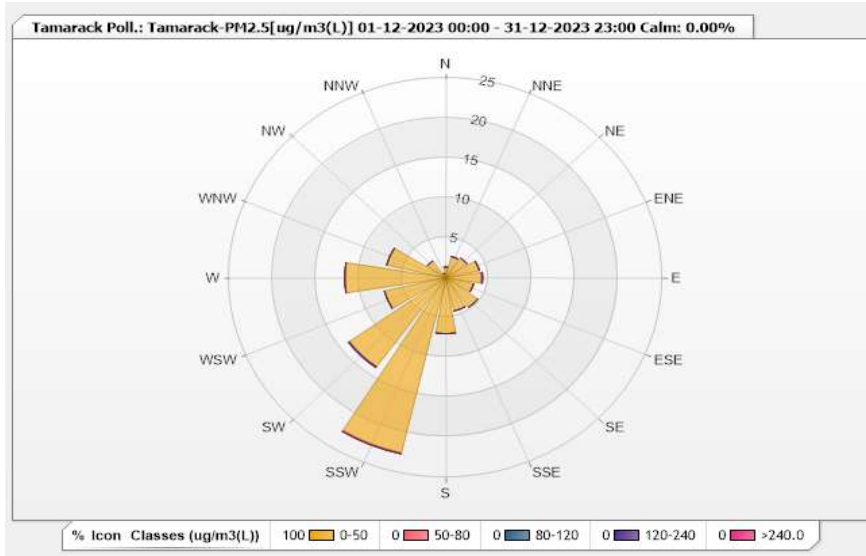


**Station: Tamarack Poll.: Tamarack-PM2.5[ug/m3(L)] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 97.98%      Calm Avg: 0.00 [ug/m3(L)]

Direction	0-50	50-80	80-120	120-240	>240.0	Total
N	1.37	0	0	0	0	1.37
NNE	2.74	0	0	0	0	2.74
NE	3.02	0	0	0	0	3.02
ENE	3.98	0	0	0	0	3.98
E	4.12	0.14	0	0	0	4.26
ESE	3.29	0	0	0	0	3.29
SE	4.53	0	0	0	0	4.53
SSE	4.25	0	0	0	0	4.25
S	7	0	0	0	0	7
SSW	22.5	0.14	0	0	0	22.64
SW	13.72	0	0	0.14	0	13.86
WSW	7.27	0	0	0	0	7.27
W	11.66	0	0	0	0	11.66
WNW	7	0	0	0	0	7
NW	2.61	0	0	0	0	2.61
NNW	0.55	0	0	0	0	0.55
Summary	100	0.28	0	0.14	0	100



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

RELATIVE HUMIDITY (RH) in %

Maximum Hourly Value:	100	%	on Dec 4 at hr 7	Hours in Service:	744
Maximum Daily Value:	98.5	%	on Dec 22	Hours of Data:	730
Minimum Hourly Value:	43	%	on Dec 11 at hr 1	Hours of Missing Data:	14
Minimum Daily Value:	58.8	%	on Dec 14	Hours of Calibration:	0
Monthly Average:	83.9	%		Operational Uptime:	98.1

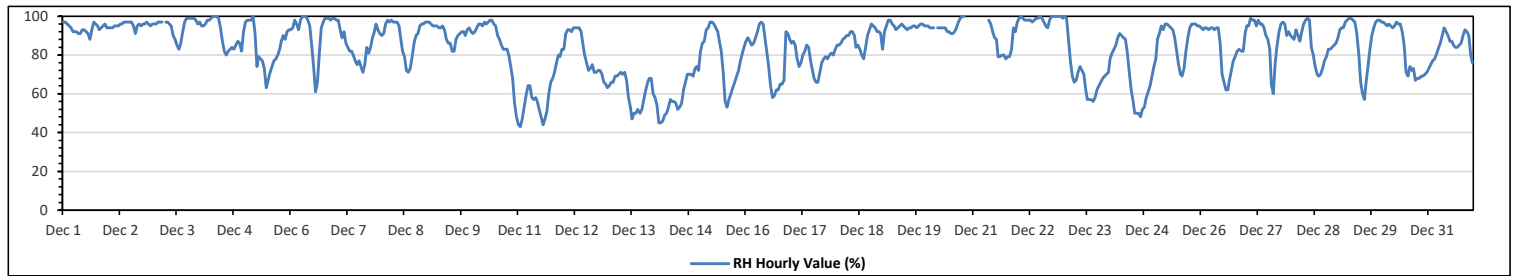
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	97	97	96	95	94	92	92	92	91	91	93	93	92	91	88	93	97	96	95	93	94	95	96	94	88	97	93.6
Dec 2	94	94	94	95	95	95	96	96	97	97	97	97	97	95	91	95	96	95	96	96	97	96	95	96	91	97	95.5
Dec 3	96	96	97	97	97	K	97	97	96	95	90	88	85	83	86	92	97	99	99	99	99	99	98	96	83	99	94.7
Dec 4	97	95	95	96	98	98	99	100	100	100	99	94	87	82	80	82	83	84	83	85	87	86	82	92	80	100	91.0
Dec 5	97	98	98	98	100	91	74	79	78	77	73	63	67	71	74	77	78	80	83	87	90	88	92	93	63	100	83.6
Dec 6	93	94	98	96	93	98	100	100	100	98	95	85	74	61	66	81	94	97	99	99	99	98	99	99	61	100	92.3
Dec 7	98	98	93	89	92	86	84	82	82	80	77	75	77	74	71	75	84	81	84	89	92	96	93	91	71	98	85.1
Dec 8	90	91	96	98	97	98	97	97	97	95	89	82	79	72	71	73	79	86	90	91	95	96	96	97	71	98	89.7
Dec 9	97	97	96	95	95	94	94	94	95	93	88	86	82	82	82	88	90	91	92	92	90	93	94	92	82	97	91.5
Dec 10	91	92	94	96	96	95	97	96	97	98	98	96	95	90	88	85	83	83	83	79	73	68	55	48	48	98	86.5
Dec 11	44	43	47	53	59	64	64	58	57	58	56	52	48	44	47	51	60	66	68	71	76	80	79	83	83	59.5	
Dec 12	83	91	93	93	92	94	94	94	94	92	85	80	76	72	73	75	71	71	72	72	70	66	65	63	63	94	80.5
Dec 13	64	66	66	69	69	70	71	70	71	67	58	53	47	50	50	52	50	52	57	62	66	68	68	60	47	71	61.5
Dec 14	58	54	45	45	46	49	50	53	57	56	56	55	52	53	55	62	66	70	70	69	73	74	72	45	74	58.8	
Dec 15	82	86	87	93	94	97	97	96	94	92	87	82	71	56	53	57	60	63	66	69	72	77	81	84	53	97	79.0
Dec 16	87	89	87	85	86	89	92	96	97	96	88	82	74	64	58	59	62	62	65	65	67	92	91	88	58	97	80.0
Dec 17	86	87	85	78	74	76	80	82	85	84	77	72	68	66	66	71	76	78	79	78	80	81	80	83	66	87	78.0
Dec 18	85	85	86	88	89	90	90	92	92	90	84	85	83	80	78	84	90	93	96	95	94	92	92	91	78	96	88.5
Dec 19	83	92	95	98	98	96	95	93	94	95	96	95	94	93	94	94	95	95	94	95	96	96	95	95	83	98	94.4
Dec 20	95	94	94	94	K	94	94	94	94	94	92	92	91	91	92	94	97	99	100	100	K	K	K	K	91	100	94.5
Dec 21	K	K	K	K	K	K	K	K	K	98	96	92	89	88	79	79	80	80	78	79	83	94	92	97	78	98	NA
Dec 22	99	100	99	98	98	98	98	97	98	99	99	100	99	99	97	95	94	98	100	100	100	100	100	99	94	100	98.5
Dec 23	100	99	88	77	69	66	67	71	74	72	70	62	57	57	57	56	58	62	64	66	68	69	70	71	56	100	69.6
Dec 24	78	81	83	85	89	91	90	89	88	81	71	62	56	50	50	48	52	53	58	61	64	69	74	48	91	69.7	
Dec 25	78	88	91	95	93	96	96	95	94	93	89	82	75	70	69	73	82	89	94	96	96	96	95	95	69	96	88.3
Dec 26	94	93	94	94	93	94	94	93	94	94	86	70	66	62	62	67	72	79	82	83	82	82	91	62	94	83.3	
Dec 27	95	95	99	98	98	95	98	96	96	94	90	88	83	65	60	76	85	92	96	97	96	90	92	90	60	99	90.2
Dec 28	89	88	93	90	87	92	96	98	99	98	84	80	74	70	69	70	73	77	79	83	83	84	85	86	69	99	84.5
Dec 29	89	93	94	94	97	98	99	99	98	97	91	81	66	60	57	66	74	83	90	94	97	98	98	97	57	99	87.9
Dec 30	97	96	95	96	95	94	95	97	96	96	92	85	71	69	74	72	73	67	68	68	69	69	70	71	67	97	82.3
Dec 31	73	75	77	78	80	83	86	90	94	92	90	87	87	85	84	85	86	90	93	92	90	80	76	73	94	84.9	
Diurnal Maximum	100	100	99	98	100	98	100	100	100	100	99	100	99	97	95	95	98	100	100	100	100	100	100	99			
Diurnal Average	87.0	88.2	88.5	88.4	88.8	89.2	89.5	90.2	89.0	84.9	80.4	76.3	72.1	71.6	75.1	78.6	80.8	82.7	84.0	84.5	85.9	85.3	85.5				

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

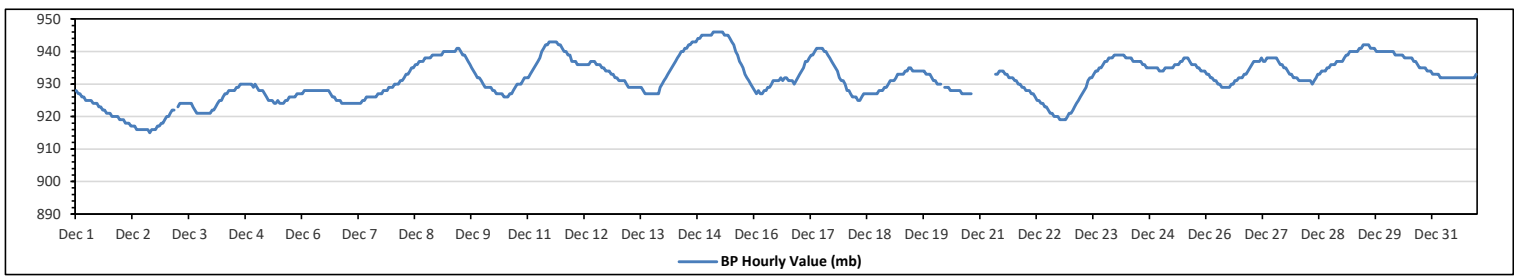
BAROMETRIC PRESSURE (BP) in millibar

Maximum Hourly Value:	946	mb	on Dec 15 at hr 2	Hours in Service:	744
Maximum Daily Value:	941	mb	on Dec 15	Hours of Data:	730
Minimum Hourly Value:	915	mb	on Dec 2 at hr 15	Hours of Missing Data:	14
Minimum Daily Value:	917	mb	on Dec 2	Hours of Calibration:	0
Monthly Average:	932	mb		Operational Uptime:	98.1

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	928	927	927	926	926	925	925	925	925	924	924	924	923	923	922	922	921	921	921	920	920	920	919	919	928	923		
Dec 2	919	919	918	918	918	917	917	917	916	916	916	916	916	916	916	915	916	916	916	917	917	918	918	919	915	917		
Dec 3	920	920	921	922	922	K	923	924	924	924	924	924	924	924	923	922	921	921	921	921	921	921	921	920	924	922		
Dec 4	922	922	923	924	925	925	926	927	927	928	928	928	929	929	929	930	930	930	930	930	930	930	929	930	922	930	928	
Dec 5	929	928	928	928	927	926	925	925	925	924	924	925	924	924	924	925	925	926	926	926	926	927	927	927	924	929	926	
Dec 6	927	928	928	928	928	928	928	928	928	928	928	928	928	928	928	927	926	926	926	925	925	925	924	924	924	928	927	
Dec 7	924	924	924	924	924	924	924	924	925	925	925	926	926	926	926	926	927	927	927	927	928	928	928	929	929	924	929	926
Dec 8	929	930	930	930	931	931	932	933	933	934	935	935	936	936	937	937	937	938	938	938	938	938	939	939	939	929	939	935
Dec 9	939	939	939	940	940	940	940	940	940	941	941	941	940	939	939	938	937	936	935	934	933	932	932	931	931	941	938	
Dec 10	930	929	929	929	929	928	928	927	927	927	927	926	926	926	927	927	928	929	930	930	930	931	932	932	926	932	929	
Dec 11	932	933	934	935	936	937	938	940	941	942	942	943	943	943	943	943	942	942	941	940	940	939	939	937	932	943	939	
Dec 12	937	937	936	936	936	936	936	936	937	937	937	936	936	936	936	935	935	934	934	934	933	933	932	932	932	937	935	
Dec 13	931	931	931	931	930	929	929	929	929	929	929	929	928	927	927	927	927	927	927	927	927	927	927	929	930	927	931	929
Dec 14	931	932	933	934	935	936	937	938	939	940	940	941	941	942	942	943	943	943	944	944	945	945	945	945	945	945	940	940
Dec 15	945	945	946	946	946	946	946	946	945	945	945	944	943	942	940	939	937	936	935	933	932	931	930	929	929	946	941	
Dec 16	928	927	928	927	927	928	928	929	929	930	931	931	931	931	932	931	932	932	931	931	931	930	931	932	927	932	930	
Dec 17	933	934	935	937	937	938	939	939	940	941	941	941	940	940	939	938	937	936	935	934	934	932	931	931	931	941	937	
Dec 18	930	928	928	927	926	926	926	925	925	926	927	927	927	927	927	927	927	927	928	928	928	929	929	930	925	930	927	
Dec 19	931	931	931	932	933	933	933	933	934	934	935	935	934	934	934	934	934	934	934	933	933	932	931	931	931	935	933	
Dec 20	931	930	930	930	K	929	929	929	928	928	928	928	928	927	927	927	927	927	927	927	927	K	K	K	K	927	931	928
Dec 21	K	K	K	K	K	K	K	K	933	933	934	934	934	933	933	932	932	932	931	931	930	930	929	929	929	934	NA	
Dec 22	928	928	928	927	927	926	925	925	924	924	923	923	922	921	921	920	920	920	919	919	919	919	920	921	919	928	923	
Dec 23	921	922	923	924	925	926	927	928	929	931	932	932	933	934	934	935	935	936	937	937	938	938	938	939	921	939	931	
Dec 24	939	939	939	939	939	938	938	938	938	937	937	937	937	937	936	936	935	935	935	935	935	935	934	934	934	939	937	
Dec 25	934	934	935	935	935	935	935	936	936	936	937	937	938	938	938	937	936	936	936	935	935	934	934	934	934	938	936	
Dec 26	933	933	932	932	931	931	930	930	929	929	929	929	930	930	931	931	932	932	932	933	933	933	934	935	929	935	931	
Dec 27	936	937	937	937	937	938	937	937	938	938	938	938	938	937	936	936	935	935	934	933	933	932	932	932	932	938	936	
Dec 28	932	931	931	931	931	931	931	930	931	932	933	933	934	934	934	935	935	936	936	936	937	937	937	937	930	937	933	
Dec 29	937	938	939	939	940	940	940	940	941	941	942	942	942	942	941	941	941	940	940	940	940	940	940	940	937	942	940	
Dec 30	940	940	940	940	939	939	939	939	939	938	938	938	938	937	937	936	935	935	935	935	934	934	934	934	934	940	937	
Dec 31	933	933	933	933	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	932	933	932	
Diurnal Maximum	945	945	946	946	946	946	946	946	945	945	945	944	943	943	943	943	943	943	944	944	945	945	945	945	945	945	945	
Diurnal Average	931	931	931	931	931	932	931	932	932	932	932	932	932	932	932	932	932	932	931	931	931	931	931	931	931	931	931	

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	Invalid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



**Lakeland Industry & Community Association**  
**Tamarack Site - December 2023**  
**Summary of Hourly Averages**  
**AMBIENT TEMPERATURE (AT) in Degree Celsius**

Maximum Hourly Value:	6.1 °C	on Dec 6 at hr 13	Hours in Service:	744
Maximum Daily Value:	0.2 °C	on Dec 14	Hours of Data:	730
Minimum Hourly Value:	-18.1 °C	on Dec 1 at hr 8	Hours of Missing Data:	14
Minimum Daily Value:	-12.4 °C	on Dec 25	Hours of Calibration:	0
Monthly Average:	-6.0 °C		Operational Uptime:	98.1

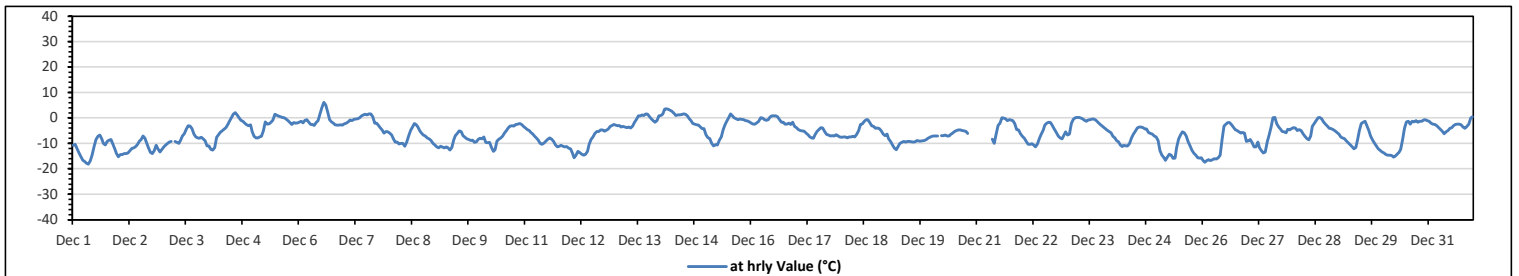
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	-10.8	-10.4	-12.1	-13.7	-15.3	-16.6	-17.2	-17.7	-18.1	-16.9	-14.5	-11.2	-8.5	-7.2	-6.8	-8.2	-10	-10.7	-9.2	-8.7	-8.4	-10.3	-12.2	-14	-18.1	-6.8	-12.0	
Dec 2	-15.2	-14.4	-14.4	-14	-14	-13.7	-12.8	-12	-11.8	-11.2	-10.3	-9.2	-8.4	-7.1	-8	-9.7	-11.8	-13.5	-14	-12.9	-10.8	-12.2	-13.4	-12.3	-15.2	-7.1	-12.0	
Dec 3	-11.3	-10.7	-10	-9.5	-9.2	K	-9.2	-9.6	-10	-8.8	-7	-6.2	-4.4	-3	-3.2	-4.2	-6.3	-7.5	-7.8	-8	-7.6	-8.2	-9	-10.9	-11.3	-3.0	-7.9	
Dec 4	-11	-12.3	-12.6	-11.6	-7.6	-6.6	-5.7	-5.1	-4.4	-3.9	-2.6	-1.4	0	1.4	2.1	1.2	0.1	-0.9	-1.4	-2	-2.7	-3	-2.7	-5.3	-12.6	2.1	-4.1	
Dec 5	-7.2	-7.9	-7.8	-7.5	-7.2	-5.1	-1.5	-2.4	-2.3	-1.6	-0.8	1.5	1.1	0.7	0.5	0.2	0	-0.4	-1	-1.8	-2.6	-1.8	-2.1	-1.9	-7.9	1.5	-2.5	
Dec 6	-1.7	-1.4	-1.9	-0.9	-0.6	-1.7	-2.6	-2.6	-2.9	-1.8	-1	1.6	4.1	6.1	5.2	2.4	-0.6	-1.5	-2.1	-2.7	-2.8	-2.8	-2.7	-2.8	-2.9	6.1	-0.7	
Dec 7	-2.3	-2	-1.5	-0.8	-1	-0.5	-0.4	-0.2	0.1	0.8	1.2	1.5	1.2	1.6	1.6	0.5	-2.1	-2	-2.8	-3.8	-4.7	-5.9	-5.4	-5.5	-5.9	1.6	-1.4	
Dec 8	-5.9	-6.7	-8.3	-9.5	-9.5	-10.2	-9.9	-10	-11.1	-9.5	-7.1	-4.9	-3.5	-2.2	-2.7	-3.6	-5.1	-6.1	-6.8	-7.1	-7.8	-8.2	-8.9	-9.9	-11.1	-2.2	-7.3	
Dec 9	-10.6	-11.3	-11.8	-11.1	-11.5	-11.8	-11.3	-11.7	-12.6	-11.6	-8.6	-6.9	-6.1	-5.1	-5.3	-6.9	-7.6	-8.2	-8.5	-8.9	-8.7	-9.6	-9.4	-8.5	-12.6	-5.1	-9.3	
Dec 10	-8	-8.2	-7.5	-9.6	-9.7	-9.6	-11.6	-13.1	-12.5	-9.1	-8.3	-7.8	-7	-5.8	-5.1	-4	-3.2	-3	-3.1	-2.6	-2.4	-2.2	-2.6	-3.3	-13.1	-2.2	-6.6	
Dec 11	-4	-4.5	-4.9	-5.7	-6.4	-7.2	-7.8	-8.7	-9.9	-10.3	-9.8	-9.1	-8.3	-7.9	-8.3	-9.2	-10.6	-11.4	-11.1	-10.8	-11.1	-11.4	-11.2	-11.9	-11.9	-4.0	-8.8	
Dec 12	-12.1	-13.9	-15.6	-14.7	-13.2	-13.6	-14.2	-14.6	-14.2	-13.1	-10.4	-8.4	-7.4	-6.1	-5.4	-5.3	-4.7	-4.7	-5.2	-4.8	-4.3	-3.3	-2.9	-2.6	-15.6	-2.6	-8.9	
Dec 13	-2.8	-3	-2.9	-3.5	-3.3	-3.5	-3.8	-3.6	-4	-3.1	-1.6	-0.5	0.8	0.8	1.2	1	1.6	1.4	0.5	-0.4	-1.1	-1.6	-1.1	0.8	-4.0	1.6	-1.3	
Dec 14	1	1.5	3.5	3.6	3.4	2.9	2.6	1.8	1	1.2	1.2	1.3	1.6	1.4	0.9	-0.2	-1.2	-2.2	-2.4	-2.7	-2.8	-3.6	-4.2	-4.2	-4.2	3.6	0.2	
Dec 15	-6.6	-7.7	-8.1	-10	-11	-10.5	-10.6	-8.7	-7.5	-4.5	-2.6	-1.4	0.1	1.6	1	0	-0.3	-0.6	-0.4	-0.5	-0.6	-1.1	-1.2	-1.5	-11.0	1.6	-3.9	
Dec 16	-2	-2.5	-2.5	-1.9	-1.3	0	-0.1	-0.7	-0.9	-0.7	0.3	0.8	0.8	0.9	0.4	-0.7	-1.6	-1.7	-2.5	-2.4	-2	-2.6	-1.6	-3.3	-3.3	0.9	-1.2	
Dec 17	-3.8	-4.6	-5	-5.1	-5.2	-5.9	-6.6	-7.3	-7.9	-8	-6.6	-5.3	-4.5	-3.9	-4	-5.4	-6.5	-6.7	-7	-6.9	-7	-6.6	-6.9	-7.5	-8.0	-3.8	-6.0	
Dec 18	-7.6	-7.4	-7.5	-7.8	-7.5	-7.5	-7.2	-7.4	-6.5	-5.1	-2.6	-2.3	-1.3	-0.7	-0.6	-1.8	-3	-3.3	-4.1	-4	-4.2	-5.1	-6.4	-6.9	-7.8	-0.6	-4.9	
Dec 19	-6.4	-8.2	-9.3	-10.6	-11.9	-12.5	-11.3	-10	-9.6	-9.2	-9.5	-9.2	-9.4	-9.5	-9.4	-8.8	-9.1	-9.1	-9	-8.8	-8.4	-8	-7.6	-12.5	-6.4	-9.3	-9.3	
Dec 20	-7.2	-7.1	-7.1	-7.1	K	-6.9	-6.9	-6.8	-7.1	-7	-6.5	-6	-5.4	-5	-4.7	-4.7	-4.9	-5.1	-5.3	-6.1	K	K	K	K	-7.2	-4.7	-6.2	
Dec 21	K	K	K	K	K	K	K	K	K	-8.3	-9.9	-6.4	-2.9	-2	0.1	-0.1	-0.3	-1	-0.7	-0.8	-1.1	-2.2	-4.5	-4.7	-6.2	-9.9	0.1	NA
Dec 22	-7.2	-8	-9.3	-10.3	-10.4	-10.1	-10.6	-11.4	-10.2	-8.1	-6.3	-4.8	-2.8	-2	-1.7	-1.8	-3	-4.4	-5.7	-7	-7.8	-8.2	-6.9	-5.5	-11.4	-1.7	-6.8	
Dec 23	-6.7	-6.4	-2.2	-0.5	0.1	0.2	0.2	-0.1	-0.4	-0.9	-1.3	-0.8	-0.6	-0.4	-0.4	-0.8	-1.5	-2.3	-2.9	-3.5	-4.2	-4.8	-5.3	-5.8	-6.7	0.2	-2.1	
Dec 24	-7.2	-7.9	-8.8	-9.4	-10.6	-11.2	-10.8	-11	-11	-9.9	-7.9	-6.4	-5.2	-4	-3.5	-3.6	-3.8	-4.3	-4.3	-5.7	-6.1	-6.4	-7.1	-7.5	-11.2	-3.5	-7.2	
Dec 25	-8.9	-12.8	-14.6	-15.4	-16.6	-15.4	-14.3	-14.7	-15.9	-15.8	-11.6	-8.3	-6.8	-5.5	-5.8	-7	-9.4	-11	-12.7	-13.8	-14.7	-15.6	-15.8	-15.7	-16.6	-5.5	-12.4	
Dec 26	-16.8	-17.4	-16.8	-16.4	-16.7	-16.4	-16	-16.2	-15.6	-14.7	-8.4	-3.2	-2.5	-1.8	-1.8	-2.6	-3.6	-4.5	-5	-5.5	-5.9	-5.7	-5.9	-9.2	-17.4	-1.8	-9.5	
Dec 27	-9	-8.4	-9.7	-11.4	-11.3	-9.5	-11.8	-12.9	-13.7	-13.4	-9.5	-6.7	-3.7	0	0.2	-2.3	-3.5	-4.4	-5.3	-5.5	-5.8	-4.4	-4.7	-4.2	-13.7	0.2	-7.1	
Dec 28	-3.9	-4	-5	-4.5	-4.9	-6.2	-7.2	-8.1	-8.6	-7.1	-3.3	-2.2	-1.1	0	0.2	-0.3	-1.5	-2.4	-3.2	-4.1	-4.2	-4.6	-5.1	-5.7	-8.6	0.2	-4.0	
Dec 29	-6.4	-7.5	-7.9	-8.1	-9	-9.7	-10.5	-11.2	-12.1	-11.6	-8.2	-5	-2.2	-1.6	-1.3	-3.1	-5.1	-7	-8.6	-9.8	-11	-12.1	-12.7	-13.4	-13.4	-1.3	-8.1	
Dec 30	-13.7	-14.4	-14.6	-14.6	-14.8	-15.4	-15	-14.2	-13.5	-12.3	-8.6	-4.1	-1.5	-1.4	-2.5	-1.4	-1.5	-1	-1.6	-1.3	-1.3	-0.8	-0.7	-1	-15.4	-0.7	-7.1	
Dec 31	-1.4	-2	-2.5	-2.6	-3	-3.7	-4.4	-5.2	-6.2	-5.5	-4.9	-4.1	-3.8	-3	-2.6	-2.4	-2.4	-2.7	-3.5	-4.1	-3.3	-2.5	-0.1	0.4	-6.2	0.4	-3.1	
Diurnal Maximum	1.0	1.5	3.5	3.6	3.4	2.9	2.6	1.8	1.0	1.2	1.2	1.6	4.1	6.1	5.2	2.4	1.6	1.4	0.5	-0.4	-0.6	-0.8	-0.1	0.8				
Diurnal Average	-7.2	-7.7	-8.0	-8.1	-8.2	-8.2	-8.3	-8.5	-8.6	-7.8	-5.9	-4.2	-3.1	-2.2	-2.3	-3.0	-4.0	-4.6	-5.1	-5.4	-5.6	-5.9	-6.0	-6.4				

<b>C</b>	Monthly Calibration	<b>S</b>	Daily Zero-Span Check	<b>Q</b>	Quality Assurance
<b>K</b>	Collection Error	<b>ND</b>	No Data (Machine Not in Service)	<b>Y</b>	Routine Maintenance
<b>X</b>	InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b>	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b>	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



**Lakeland Industry & Community Association**  
**Tamarack Site - December 2023**  
**Summary of Hourly Averages**  
**STATION TEMPERATURE (ST) in Degree Celsius**

Maximum Hourly Value:	24.3	°C	on Dec 12 at hr 17	Hours in Service:	744
Maximum Daily Value:	21.5	°C	on Dec 12	Hours of Data:	730
Minimum Hourly Value:	19.0	°C	on Dec 26 at hr 8	Hours of Missing Data:	14
Minimum Daily Value:	19.9	°C	on Dec 26	Hours of Calibration:	0
Monthly Average:	20.6	°C		Operational Uptime:	98.1

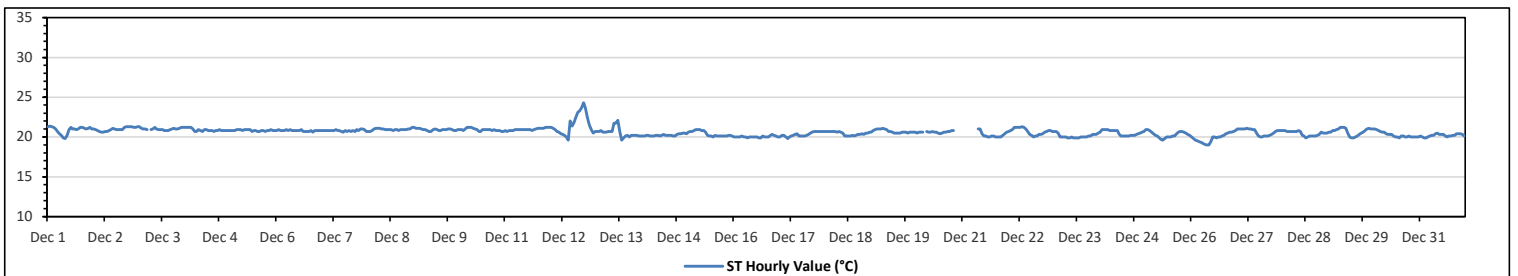
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	21.3	21.4	21.3	21.2	21.0	20.7	20.4	20.2	19.9	19.8	20.2	20.9	21.2	21.0	21.0	20.9	21.0	21.2	21.2	21.1	21.0	21.1	21.2	21.0	19.8	21.4	20.9	
Dec 2	21.0	20.9	20.8	20.7	20.6	20.6	20.7	20.7	20.8	20.9	21.1	21.0	20.9	20.9	20.9	20.9	21.2	21.3	21.3	21.3	21.2	21.2	21.3	20.6	21.3	21.0		
Dec 3	21.3	21.1	21.0	21.0	20.9	K	20.9	21.0	21.2	21.0	20.9	20.9	20.9	20.8	20.8	20.8	20.9	21.0	21.1	21.0	21.1	21.2	21.2	20.8	21.3	21.0		
Dec 4	21.2	21.2	21.2	21.2	21.0	20.7	20.7	20.9	20.8	20.7	20.9	20.9	20.8	20.8	20.8	20.7	20.8	20.8	20.9	20.8	20.8	20.8	20.8	20.7	21.2	20.9		
Dec 5	20.8	20.8	20.8	20.9	20.9	20.9	20.8	20.9	20.9	20.9	20.9	20.7	20.8	20.8	20.8	20.7	20.7	20.8	20.8	20.7	20.8	20.8	20.9	20.7	20.9	20.8		
Dec 6	20.8	20.9	20.8	20.8	20.8	20.9	20.8	20.9	20.8	20.8	20.8	20.8	20.8	20.9	20.7	20.7	20.7	20.7	20.8	20.6	20.8	20.8	20.8	20.6	20.9	20.8		
Dec 7	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.9	20.8	20.8	20.7	20.6	20.8	20.7	20.8	20.7	20.8	20.7	20.9	20.8	21.0	21.0	20.9	20.7	20.6	21.0	20.8	
Dec 8	20.7	20.7	20.8	21.0	21.1	21.1	21.0	21.0	21.0	20.9	20.9	20.9	20.9	20.8	20.9	20.9	20.8	20.9	20.9	20.9	21.0	21.0	21.2	20.7	21.2	20.9		
Dec 9	21.2	21.1	21.1	21.1	21.0	20.9	20.9	20.8	20.7	20.7	20.9	21.0	20.9	20.8	20.8	20.9	20.9	20.9	21.0	21.0	20.9	20.8	20.8	20.9	20.7	21.2	20.9	
Dec 10	20.9	20.9	20.8	21.0	21.2	21.2	21.2	21.1	21.0	20.9	20.7	20.7	20.9	20.9	20.9	20.9	20.9	20.9	20.8	20.9	20.8	20.8	20.7	20.7	20.7	21.2	20.9	
Dec 11	20.8	20.7	20.8	20.8	20.8	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.8	20.9	21.0	21.1	21.1	21.1	21.2	21.2	21.2	20.7	21.2	20.9		
Dec 12	21.2	21.1	20.9	20.7	20.6	20.4	20.3	20.2	20.0	19.6	22.0	21.4	21.8	22.5	23.1	23.3	23.7	24.3	23.6	22.4	21.5	20.9	20.5	19.6	24.3	21.5		
Dec 13	20.7	20.7	20.8	20.6	20.6	20.6	20.7	20.7	20.7	21.7	21.7	22.1	20.7	19.6	19.9	20.1	20.2	20.0	20.2	20.2	20.2	20.1	20.1	19.6	22.1	20.5		
Dec 14	20.1	20.1	20.2	20.2	20.1	20.1	20.1	20.2	20.2	20.1	20.2	20.3	20.2	20.2	20.2	20.2	20.1	20.1	20.3	20.4	20.4	20.5	20.5	20.4	20.1	20.5	20.2	
Dec 15	20.6	20.7	20.7	20.8	20.9	20.9	20.9	20.8	20.8	20.6	20.2	20.1	20.1	20.0	20.2	20.1	20.1	20.1	20.1	20.1	20.1	20.2	20.2	20.0	20.9	20.4		
Dec 16	20.0	20.0	20.0	20.0	20.1	20.0	20.0	19.9	20.0	20.0	20.0	20.0	19.9	19.9	20.1	20.0	20.0	20.0	20.0	20.2	20.3	20.2	20.1	20.0	19.9	20.3	20.0	
Dec 17	20.0	20.2	20.2	20.0	19.8	20.0	20.1	20.2	20.3	20.4	20.1	20.1	20.1	20.1	20.2	20.3	20.5	20.6	20.7	20.7	20.7	20.7	20.7	19.8	20.7	20.3		
Dec 18	20.7	20.7	20.7	20.7	20.7	20.7	20.6	20.7	20.6	20.5	20.1	20.1	20.1	20.1	20.2	20.1	20.2	20.3	20.3	20.4	20.3	20.5	20.5	20.6	20.1	20.7	20.4	
Dec 19	20.6	20.8	20.9	21.0	21.0	21.0	21.1	21.0	20.9	20.7	20.7	20.6	20.5	20.5	20.5	20.5	20.6	20.6	20.6	20.5	20.6	20.6	20.6	20.5	20.1	21.1	20.7	
Dec 20	20.5	20.6	20.6	20.6	K	20.7	20.6	20.6	20.7	20.6	20.6	20.5	20.4	20.5	20.6	20.6	20.7	20.7	20.8	20.8	K	K	K	K	20.4	20.8	20.6	
Dec 21	K	K	K	K	K	K	K	K	21.0	21.0	20.4	20.1	20.1	20.0	20.0	20.1	20.1	20.0	20.0	20.0	20.0	20.0	20.2	20.4	20.6	20.0	21.0	NA
Dec 22	20.7	20.8	20.9	21.2	21.2	21.2	21.2	21.3	21.2	21.0	20.7	20.3	20.2	20.0	20.1	20.1	20.3	20.3	20.4	20.6	20.7	20.8	20.8	20.7	20.0	21.3	20.7	
Dec 23	20.7	20.7	20.5	20.0	20.0	20.0	20.0	19.9	19.9	20.0	19.9	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.1	20.1	20.3	20.3	20.3	20.5	19.9	20.7	20.1	
Dec 24	20.6	20.9	20.9	20.9	20.9	20.8	20.8	20.8	20.8	20.8	20.3	20.1	20.1	20.1	20.1	20.1	20.2	20.2	20.2	20.3	20.4	20.5	20.6	20.7	20.1	20.9	20.5	
Dec 25	20.9	20.9	20.8	20.6	20.4	20.2	20.1	19.9	19.7	19.6	19.8	20.0	20.0	20.0	20.1	20.1	20.4	20.6	20.7	20.7	20.6	20.5	20.3	20.2	19.6	20.9	20.3	
Dec 26	20.0	19.8	19.6	19.5	19.4	19.3	19.2	19.1	19.0	19.0	19.4	20.0	20.0	19.9	20.0	20.0	20.1	20.2	20.4	20.5	20.6	20.6	20.7	20.8	19.0	20.8	19.9	
Dec 27	21.0	21.0	21.0	21.0	21.1	21.0	21.0	20.9	20.9	20.5	20.5	20.1	20.0	20.0	20.1	20.1	20.1	20.2	20.3	20.5	20.7	20.8	20.8	20.0	21.1	20.6		
Dec 28	20.8	20.8	20.7	20.7	20.7	20.7	20.7	20.7	20.8	20.7	20.2	20.1	19.9	20.0	20.1	20.1	20.1	20.1	20.2	20.3	20.6	20.5	20.5	19.9	20.8	20.4		
Dec 29	20.6	20.6	20.8	20.8	20.9	21.0	21.2	21.2	21.2	21.1	20.5	20.0	19.9	19.9	20.0	20.1	20.3	20.5	20.6	20.8	21.0	21.1	21.0	19.9	21.2	20.7		
Dec 30	21.0	20.9	20.8	20.7	20.6	20.6	20.4	20.3	20.3	20.3	20.1	20.0	20.0	19.9	20.1	20.1	20.0	20.0	20.1	20.0	20.0	20.0	20.0	19.9	21.0	20.3		
Dec 31	20.1	20.0	19.9	19.9	20.0	20.1	20.2	20.2	20.4	20.5	20.3	20.3	20.3	20.1	20.0	20.1	20.1	20.2	20.2	20.4	20.4	20.4	20.3	20.1	19.9	20.5	20.2	
Diurnal Maximum	21.3	21.4	21.3	21.2	21.2	21.2	21.2	21.3	21.2	21.7	22.0	22.1	21.8	22.5	23.1	23.3	23.7	24.3	23.6	22.4	21.5	21.2	21.2	21.3				
Diurnal Average	20.7	20.7	20.7	20.7	20.6	20.6	20.6	20.6	20.6	20.6	20.5	20.5	20.5	20.4	20.5	20.5	20.6	20.6	20.7	20.6	20.7	20.7	20.7					

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.





Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

PRECIPITATION in mm

Maximum Hourly Value:	0.5 mm on Dec 19 at hr 18	Hours in Service:	744
Maximum Daily Value:	0.7 mm on Dec 19	Hours of Data:	730
Minimum Hourly Value:	0.0 mm on Dec 1 at hr 0	Hours of Missing Data:	14
Minimum Daily Value:	0.0 mm on Dec 1	Hours of Calibration:	0
Monthly Total:	0.8 mm	Operational Uptime:	98.1

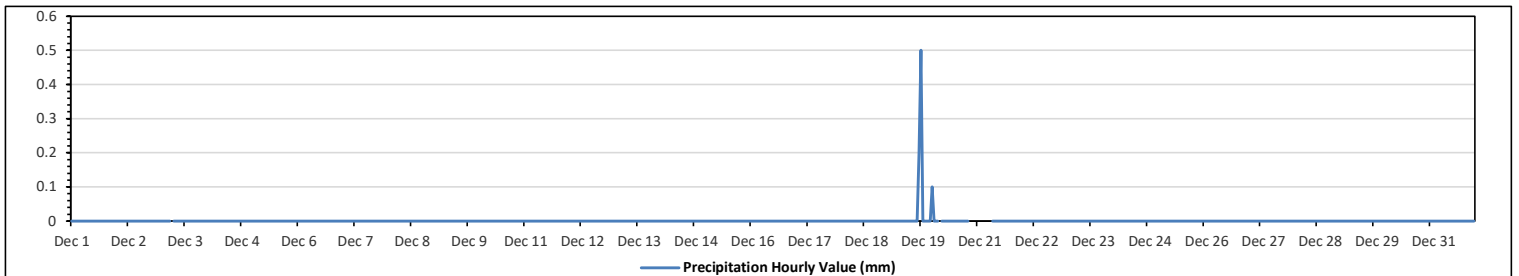
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Total	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5	0	0	0	0	0.0	0.5	0.7
Dec 20	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.1	0.1
Dec 21	K	K	K	K	K	K	K	K	K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	NA
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Diurnal Maximum	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

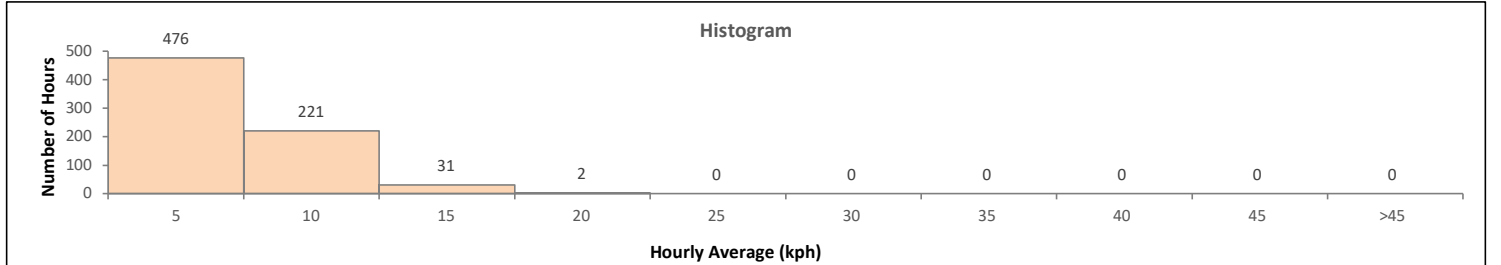
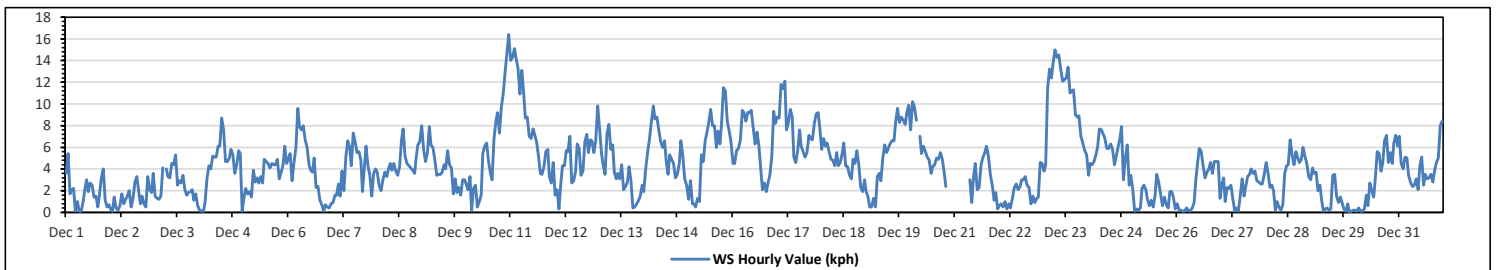
VECTOR WIND SPEED (VWS) in km/hr

Maximum Hourly Value:	16.4	kph	on Dec 10 at hr 23	Hours in Service:	744
Maximum Daily Value:	10.4	kph	on Dec 23	Hours of Data:	730
Minimum Hourly Value:	0.0	kph	on Dec 29 at hr 21	Hours of Missing Data:	14
Minimum Daily Value:	1.3	kph	on Dec 25	Hours of Calibration:	0
Monthly Average:	2.4	kph		Operational Uptime:	98.1

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	3.6	5.4	1.7	2.1	2.2	0.1	1.0	0.1	0.1	1.0	2.2	3.0	1.9	2.7	2.5	1.4	1.5	0.5	1.6	3.2	4.0	1.1	0.5	0.7	0.1	5.4	1.8	
Dec 2	0.2	0.1	1.4	0.4	0.2	0.6	1.7	0.8	1.2	1.5	2.0	0.5	1.3	2.8	3.3	2.1	0.8	1.5	0.8	0.5	3.3	2.1	1.8	3.6	0.1	3.6	1.4	
Dec 3	1.5	1.3	1.2	1.5	4.1	K	4.0	3.3	3.2	4.5	4.4	5.3	2.5	2.9	2.7	3.4	2.1	1.6	1.8	1.9	2.1	1.1	1.7	0.6	0.6	5.3	2.6	
Dec 4	0.2	0.1	0.1	0.9	3.1	4.3	4.0	5.2	5.1	5.1	6.1	6.1	8.7	7.6	4.7	4.7	5.0	5.8	5.3	3.6	4.4	5.7	5.4	0.1	0.1	8.7	4.2	
Dec 5	1.4	2.2	1.7	1.9	1.4	3.9	2.8	3.2	2.7	3.3	2.7	4.9	4.7	4.5	4.1	4.5	4.4	4.4	4.9	3.1	3.7	4.4	6.1	4.5	1.4	6.1	3.6	
Dec 6	5.0	5.4	2.9	4.6	6.0	9.6	7.9	7.6	8.0	6.7	6.0	4.4	3.9	3.7	5.0	2.3	2.4	1.1	0.7	0.1	0.7	0.5	0.4	0.8	0.1	9.6	4.0	
Dec 7	0.9	1.6	1.6	2.6	1.5	3.8	2.0	5.1	6.6	6.0	4.3	7.3	6.5	5.5	5.6	4.8	1.9	4.2	6.1	4.3	3.4	1.5	3.6	4.0	0.9	7.3	3.9	
Dec 8	3.7	2.5	2.0	3.0	3.7	3.3	4.1	4.5	3.9	4.5	3.8	3.4	4.2	6.7	7.7	5.2	4.5	4.3	4.1	3.9	3.6	5.1	6.2	6.5	2.0	7.7	4.4	
Dec 9	8.0	5.8	4.7	5.5	7.9	6.2	6.0	4.9	3.4	3.5	3.5	3.7	4.4	4.0	5.7	4.4	4.1	1.7	3.1	1.8	2.3	1.6	3.0	3.0	1.6	8.0	4.3	
Dec 10	2.6	2.1	3.3	0.2	2.2	2.5	0.5	1.0	1.6	5.4	6.1	6.4	4.7	3.6	3.0	6.8	8.4	9.2	7.3	9.7	11.0	13.0	14.9	16.4	0.2	16.4	5.9	
Dec 11	14.0	14.3	15.1	14.2	13.3	10.9	13.1	11.3	8.7	8.8	7.0	6.8	7.7	7.2	6.5	5.2	3.6	3.5	4.2	5.6	5.8	3.3	2.7	4.6	2.7	15.1	8.2	
Dec 12	1.6	2.1	0.3	2.7	4.3	4.3	5.7	5.6	7.0	2.7	2.9	3.8	6.3	5.9	3.4	3.8	6.5	7.2	5.5	6.7	6.6	5.5	6.6	9.8	0.3	9.8	4.9	
Dec 13	7.7	5.4	4.4	3.5	7.2	8.1	5.8	6.2	3.7	3.1	3.6	3.1	4.4	2.1	2.4	2.8	4.2	2.9	0.4	0.5	0.8	1.1	1.5	2.5	0.4	8.1	3.6	
Dec 14	1.9	4.0	5.5	6.8	8.4	9.8	8.6	8.8	7.6	6.5	6.0	6.6	4.8	3.5	5.3	4.9	4.5	3.2	3.5	4.5	6.6	5.2	3.1	2.5	1.9	9.8	5.5	
Dec 15	1.2	2.9	0.8	0.8	0.5	1.3	1.0	5.3	4.7	6.6	7.3	8.3	9.5	8.0	8.0	6.0	7.5	6.3	8.1	11.5	11.2	8.4	7.5	6.4	0.5	11.5	5.8	
Dec 16	4.5	4.5	5.7	5.9	6.7	9.4	9.2	8.4	9.2	9.2	9.4	7.8	6.3	7.4	6.1	4.2	2.1	2.7	1.9	2.8	3.4	5.1	9.3	8.2	1.9	9.4	6.2	
Dec 17	8.8	8.7	11.8	11.4	12.1	7.6	8.3	9.5	8.8	5.1	4.6	5.7	7.6	6.1	5.6	5.1	5.5	7.1	6.8	6.7	8.2	9.1	9.2	7.8	4.6	12.1	7.8	
Dec 18	5.8	6.8	6.1	6.4	5.6	4.9	4.8	4.3	5.5	4.3	4.6	5.4	6.4	4.3	4.2	3.4	3.1	4.9	4.5	5.7	4.4	2.3	1.9	3.0	1.9	6.8	4.7	
Dec 19	1.9	1.4	0.5	0.5	1.3	0.5	3.3	3.6	2.9	5.0	6.2	5.5	6.0	6.4	6.6	6.6	8.3	9.6	8.3	8.8	8.5	8.1	9.2	9.9	0.5	9.9	5.4	
Dec 20	7.6	10.2	9.7	8.5	K	7.0	5.4	6.1	5.6	5.1	4.8	3.6	4.2	4.4	5.0	4.9	5.5	4.9	3.9	2.4	K	K	K	K	2.4	10.2	5.7	
Dec 21	K	K	K	K	K	K	K	K	K	3.0	0.9	3.1	4.5	2.1	2.3	4.4	5.1	5.4	6.1	5.2	3.5	2.5	1.1	1.8	0.3	0.3	6.1	NA
Dec 22	0.6	0.8	0.5	1.0	0.3	0.8	0.4	1.3	2.3	2.6	2.1	2.4	3.0	3.0	3.3	2.5	2.3	0.8	1.5	0.9	1.3	1.4	4.6	4.5	0.3	4.6	1.8	
Dec 23	3.8	4.4	11.4	13.2	12.4	13.7	15.0	14.3	14.5	13.2	12.1	12.2	12.4	13.4	11.0	11.2	11.3	9.0	8.8	8.9	7.0	6.4	5.7	5.3	3.8	15.0	10.4	
Dec 24	3.4	4.5	4.4	4.7	5.3	6.0	7.7	7.6	7.2	6.8	5.9	5.9	6.3	5.8	4.4	5.1	6.0	6.8	7.9	3.0	5.0	6.2	2.5	3.4	2.5	7.9	5.5	
Dec 25	2.2	0.1	0.3	0.2	0.4	2.2	2.5	2.1	1.2	0.6	1.1	0.5	1.6	3.5	2.8	1.7	0.6	1.4	0.7	0.4	1.9	1.9	1.4	0.3	0.1	3.5	1.3	
Dec 26	0.8	0.2	0.2	0.1	0.1	0.4	0.2	0.1	0.4	0.9	2.9	4.4	5.9	5.6	4.3	3.2	3.7	4.0	4.6	3.6	4.7	4.7	4.7	1.3	0.1	5.9	2.5	
Dec 27	2.5	3.2	1.0	2.3	2.2	2.5	1.2	0.1	0.4	0.1	1.5	3.1	1.5	2.5	3.3	3.5	4.0	3.6	3.8	2.9	2.8	2.6	2.6	3.5	0.1	4.0	2.4	
Dec 28	4.6	3.6	2.3	2.5	2.0	0.2	1.0	0.5	0.2	0.7	3.6	4.3	4.4	6.7	5.3	4.4	5.6	5.0	4.6	4.9	6.0	5.2	4.5	3.3	0.2	6.7	3.6	
Dec 29	3.0	4.1	3.6	3.7	2.0	2.5	1.0	0.1	0.3	0.4	0.2	0.3	3.4	3.5	1.5	0.9	1.4	0.9	0.3	0.1	0.8	0.0	0.1	0.2	0.0	4.1	1.4	
Dec 30	0.2	0.1	0.4	0.1	0.1	0.3	1.6	0.6	2.7	2.0	1.4	3.1	5.6	5.4	3.8	4.5	6.6	7.1	4.6	5.5	4.5	6.4	7.1	6.1	0.1	7.1	3.3	
Dec 31	7.0	4.5	4.0	5.1	5.0	3.4	2.8	2.4	2.5	3.1	2.1	4.2	5.1	2.5	3.5	3.1	3.2	3.5	2.8	3.8	4.6	5.0	8.0	8.4	2.1	8.4	4.2	
Diurnal Maximum	14.0	14.3	15.1	14.2	13.3	13.7	15.0	14.3	14.5	13.2	12.1	12.2	12.4	13.4	11.0	11.2	11.3	9.6	8.8	11.5	11.2	13.0	14.9	16.4				
Diurnal Average	3.7	3.7	3.6	3.9	4.2	4.5	4.4	4.5	4.3	4.2	4.3	4.7	5.1	5.0	4.7	4.2	4.4	4.3	4.1	4.0	4.5	4.2	4.6	4.4				

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

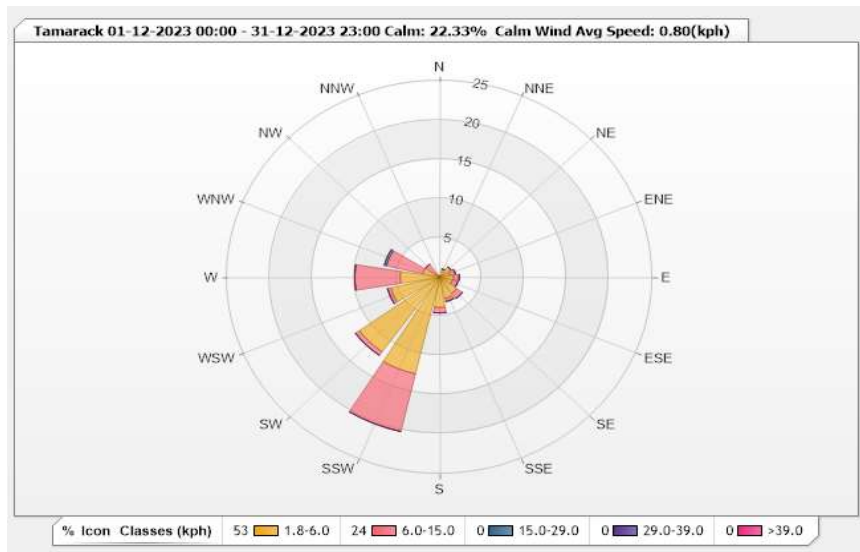


**Station: Tamarack Monitor: WDS [kph] Monthly: 12-2023**

Type: Wind Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm (WS<1.8kph): 22.33%      Valid Data: 98.12%

Direction	1.8-6.0	6.0-15.0	15.0-29.0	29.0-39.0	>39.0	Total
N	0	0	0	0	0	0
NNE	1.1	0	0	0	0	1.1
NE	1.64	0	0	0	0	1.64
ENE	1.23	0.68	0	0	0	1.91
E	1.64	0.68	0	0	0	2.32
ESE	1.51	0.68	0	0	0	2.19
SE	2.47	0.82	0	0	0	3.29
SSE	2.74	0.41	0	0	0	3.15
S	3.84	0.68	0	0	0	4.52
SSW	12.6	7.53	0	0	0	20.13
SW	11.64	0.55	0	0	0	12.19
WSW	5.89	0.41	0	0	0	6.3
W	4.66	5.34	0	0	0	10
WNW	2.05	4.38	0.27	0	0	6.7
NW	0.41	1.64	0	0	0	2.05
NNW	0	0.14	0	0	0	0.14
Summary	53.42	23.94	0.27	0	0	77.63



Lakeland Industry & Community Association

Tamarack Site - December 2023

Summary of Hourly Averages

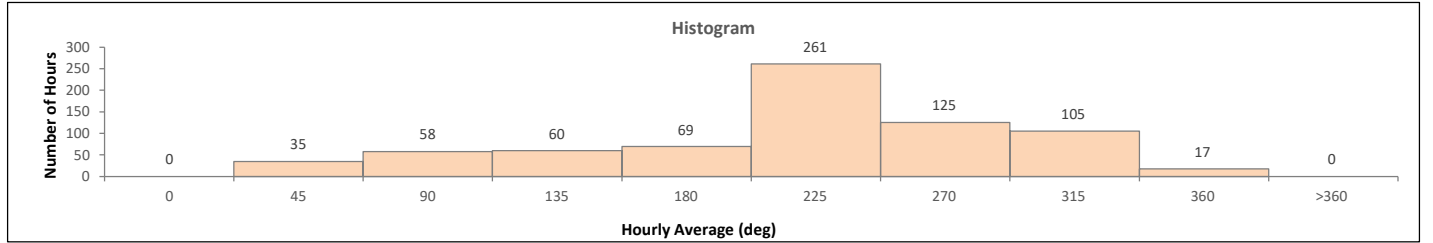
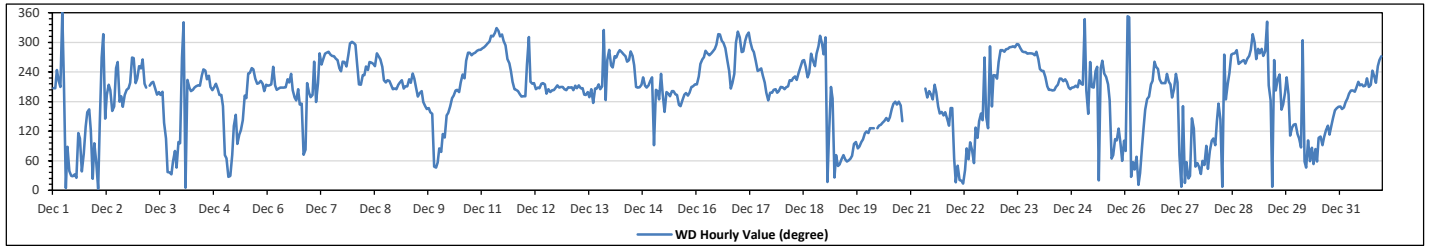
WIND DIRECTION (VWD) in sector

Monthly Average:	231 (SW) degree	Hours in Service:	744
		Hours of Data:	730
		Hours of Missing Data:	14
		Hours of Calibration:	0
		Operational Uptime:	98.1

Day	Hourly Period Starting at (MST)																							Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Degree	Quadrant
Dec 1	SSW	SSW	WSW	SW	SSW	N	SW	N	E	NE	NNE	NNE	NNE	NNE	ESE	ESE	NE	ENE	SE	SSE	SSE	ESE	NNE	E	147	SE
Dec 2	ENE	N	SE	W	NW	SE	S	SSW	SSW	SSE	SSE	WSW	WSW	S	S	SSE	S	SSW	SSW	SW	W	W	SW	SW	207	SSW
Dec 3	WSW	WSW	W	SW	SSW	K	SSW	SW	SW	SSW	SSW	SSW	SSW	S	SSW	SE	ESE	NE	NE	NNE	ENE	E	NE	E	188	S
Dec 4	W	NNW	N	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	WSW	WSW	SW	SW	SSW	SSW	SSW	SSW	S	S	S	216	SW
Dec 5	ENE	ENE	NNE	NNE	ENE	SE	SSE	E	ESE	ESE	SE	S	S	SW	SW	WSW	WSW	SW	SW	SW	SW	SW	SW	SSW	196	SSW
Dec 6	SSW	SSW	SSW	WSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SW	SW	SSW	S	S	SSW	S	ENE	E	SW	SSW	211	SSW
Dec 7	S	S	W	S	SW	W	WSW	W	W	W	W	W	W	W	W	W	WSW	WSW	W	WSW	WSW	W	WNW	WNW	266	W
Dec 8	WNW	WNW	WSW	SSW	SSW	SW	SW	WSW	WSW	WSW	WSW	WSW	WSW	W	W	WSW	SW	SW	SW	SW	SW	SW	SSW	SSW	243	WSW
Dec 9	SSW	SSW	SW	SW	SSW	SSW	SSW	SW	SW	SW	SW	SSW	S	SSW	SSW	S	SSE	SSE	SSE	SSE	NE	NE	NE	NE	202	SSW
Dec 10	E	ENE	ESE	ESE	SSE	SSE	SSE	S	S	SSW	SSW	SSW	SSW	SW	SW	W	W	W	W	W	W	W	WNW	WNW	261	W
Dec 11	WNW	WNW	WNW	WNW	WNW	NW	NW	NW	NNW	NW	NW	NW	WNW	WNW	W	WSW	WSW	SW	SSW	SSW	SSW	SSW	S	S	290	WNW
Dec 12	S	WSW	NW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	208	SSW
Dec 13	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	S	SSW	S	SSW	S	SSW	SSW	SSW	SSW	SSW	NW	S	W	WNW	208	SSW
Dec 14	WSW	WSW	W	W	W	WNW	W	W	W	W	W	W	W	WSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	254	WSW
Dec 15	E	SSW	SSW	S	SW	SSW	SSE	SSW	SSW	S	SSW	SSW	SSW	S	S	S	SSW	S	SSW	S	SSW	SSW	SSW	SSW	195	SSW
Dec 16	SSW	SW	WSW	W	W	W	W	W	W	W	WNW	WNW	NW	NW	WNW	WNW	WNW	W	WSW	SSW	SW	SW	WNW	NW	280	W
Dec 17	NW	W	W	WNW	NW	NW	WNW	WNW	W	WSW	WSW	WSW	WSW	SW	SW	SSW	S	SSW	SSW	SSW	SSW	SSW	SSW	SSW	253	WSW
Dec 18	SSW	SSW	SSW	SSW	SW	SW	SW	SW	SW	WSW	W	W	WSW	SW	SW	W	W	WSW	W	WNW	WNW	W	WNW	W	242	WSW
Dec 19	NW	NNE	ESE	SSW	S	NNE	ENE	NE	NE	ENE	ENE	ENE	ENE	ENE	ENE	E	E	E	E	E	E	E	ESE	ESE	84	E
Dec 20	ESE	SE	SE	SE	K	SE	SE	SE	SE	SE	SE	SE	SE	SSE	S	S	S	S	S	S	S	S	S	S	142	SE
Dec 21	K	K	K	K	K	K	K	K	SSW	S	SSW	SSW	S	SSW	SSW	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	NA	NA
Dec 22	ENE	NNE	NE	NNE	NNE	NNE	NE	E	ENE	E	E	NE	SE	ESE	SE	SSE	SE	W	SSE	SE	WNW	SSE	SSW	SSW	128	SE
Dec 23	SW	WSW	WNW	WNW	W	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	W	W	W	W	W	W	W	W	W	W	284	WNW
Dec 24	WSW	WSW	WSW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	215	SSW
Dec 25	SSW	NNW	SSW	SSE	WSW	SSW	SSW	WSW	WSW	NNE	WSW	W	SW	SSW	S	ENE	ENE	ESE	E	SE	E	ENE	E	203	SSW	
Dec 26	E	N	N	NNE	ENE	NE	ENE	NNE	NE	E	SE	SSE	S	S	SSW	SW	W	WSW	WSW	SW	SW	SW	SW	SW	211	SSW
Dec 27	SW	SSW	S	SSW	SW	SW	ENE	N	S	NNE	ENE	NNE	NNE	SE	SE	NE	NE	NE	NNE	ENE	NE	E	NE	E	75	ENE
Dec 28	E	ESE	E	SE	S	SE	N	W	S	SW	SW	W	W	WNW	WSW	WSW	W	W	WSW	W	W	WNW	NW	264	W	
Dec 29	WNW	W	WNW	W	WNW	W	W	NNW	SSW	S	N	W	SSW	SW	SW	SSE	S	SSW	SSW	SSW	ESE	SE	SE	SE	254	WSW
Dec 30	ESE	ESE	E	WNW	ENE	NE	E	ENE	E	NE	E	ENE	ESE	ESE	E	ESE	ESE	ESE	ESE	SE	SE	SSE	SSE	124	ESE	
Dec 31	SSE	SSE	SSE	S	S	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	214	SSW

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance      **P** Power Failure  
**X** InValid Data (Machine Malfunction/Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



## Lakeland Industry & Community Association

### Tamarack Site - December 2023

#### Summary of Hourly Averages

#### VECTOR WIND SPEED (VWS) in km/hr & WIND DIRECTION (VWD) in sector

WIND SPEED																												
Maximum Hourly Value:	16.4	kph	on Dec 10 at hr 23																		Hours in Service:	744						
Maximum Daily Value:	10.4	kph	on Dec 23																		Hours of Data:	730						
Minimum Hourly Value:	0.0	kph	on Dec 29 at hr 21																		Hours of Missing Data:	14						
Minimum Daily Value:	1.3	kph	on Dec 25																		Hours of Calibration:	0						
Monthly Average:	2.4	kph																			Operational Uptime:	98.1						
WIND DIRECTION																												
Monthly Average:	231	degree	(SW)																		Daily Minimum	Daily Maximum	Daily Average					
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Daily Minimum	Daily Maximum	Daily Average	
Dec 1	3.6	5.4	1.7	2.1	2.2	0.1	1.0	0.1	0.1	1.0	2.2	3.0	1.9	2.7	2.5	1.4	1.5	0.5	1.6	3.2	4.0	1.1	0.5	0.7	0.1	5.4	1.8	
Dec 2	0.2	0.1	1.4	0.4	0.2	0.6	1.7	0.8	1.2	1.5	2.0	0.5	1.3	2.8	3.3	2.1	0.8	1.5	0.8	0.5	3.3	2.1	1.8	3.6	0.1	3.6	1.4	
Dec 3	1.5	1.3	1.2	1.5	4.1	K	4.0	3.3	3.2	4.5	4.4	5.3	2.5	2.9	2.7	3.4	2.1	1.6	1.8	1.9	2.1	1.1	1.7	0.6	0.6	5.3	2.6	
Dec 4	0.2	0.1	0.1	0.9	3.1	4.3	4.0	5.2	5.1	5.1	6.1	6.1	8.7	7.6	4.7	4.7	5.0	5.8	5.3	3.6	4.4	5.7	5.4	0.1	0.1	8.7	4.2	
Dec 5	1.4	2.2	1.7	1.9	1.4	3.9	2.8	3.2	2.7	3.3	2.7	4.9	4.7	4.5	4.1	4.5	4.4	4.4	4.9	3.1	3.7	4.4	6.1	4.5	1.4	6.1	3.6	
Dec 6	5.0	5.4	2.9	4.6	6.0	9.6	7.9	7.6	8.0	6.7	6.0	4.4	3.9	3.7	5.0	2.3	2.4	1.1	0.7	0.1	0.7	0.5	0.4	0.8	0.1	9.6	4.0	
Dec 7	0.9	1.6	1.6	2.6	1.5	3.8	2.0	5.1	6.6	6.0	4.3	7.3	6.5	5.5	5.6	4.8	1.9	4.2	6.1	4.3	3.4	1.5	3.6	4.0	0.9	7.3	3.9	
Dec 8	3.7	2.5	2.0	3.0	3.7	3.3	4.1	4.5	3.9	4.5	3.8	3.4	4.2	6.7	7.7	5.2	4.5	4.3	4.1	3.9	3.6	5.1	6.2	6.5	2.0	7.7	4.4	
Dec 9	8.0	5.8	4.7	5.5	7.9	6.2	6.0	4.9	3.4	3.5	3.5	3.7	4.4	4.0	5.7	4.4	4.1	1.7	3.1	1.8	2.3	1.6	3.0	3.0	1.6	8.0	4.3	
Dec 10	2.6	2.1	3.3	0.2	2.2	2.5	0.5	1.0	1.6	5.4	6.1	6.4	4.7	3.6	3.0	6.8	8.4	9.2	7.3	9.7	11.0	13.0	14.9	16.4	0.2	16.4	5.9	
Dec 11	14.0	14.3	15.1	14.2	13.3	10.9	13.1	11.3	8.7	8.8	7.0	6.8	7.7	7.2	6.5	5.2	3.6	3.5	4.2	5.6	5.8	3.3	2.7	4.6	2.7	15.1	8.2	
Dec 12	1.6	2.1	0.3	2.7	4.3	4.3	5.7	5.6	7.0	2.7	2.9	3.8	6.3	5.9	3.4	3.8	6.5	7.2	5.5	6.7	6.6	5.5	6.6	9.8	0.3	9.8	4.9	
Dec 13	7.7	5.4	4.4	3.5	7.2	8.1	5.8	6.2	3.7	3.1	3.6	3.1	4.4	2.1	2.4	2.8	4.2	2.9	0.4	0.5	0.8	1.1	1.5	2.5	0.4	8.1	3.6	
Dec 14	1.9	4.0	5.5	6.8	8.4	9.8	8.6	8.8	7.6	6.5	6.0	6.6	4.8	3.5	5.3	4.9	4.5	3.2	3.5	4.5	6.6	5.2	3.1	2.5	1.9	9.8	5.5	
Dec 15	1.2	2.9	0.8	0.8	0.5	1.3	1.0	5.3	4.7	6.6	7.3	8.3	9.5	8.0	8.0	6.0	7.5	6.3	8.1	11.5	11.2	8.4	7.5	6.4	0.5	11.5	5.8	
Dec 16	4.5	4.5	5.7	5.9	6.7	9.4	9.2	8.4	9.2	9.2	9.4	7.8	6.3	7.4	6.1	4.2	2.1	2.7	1.9	2.8	3.4	5.1	9.3	8.2	1.9	9.4	6.2	
Dec 17	8.8	8.7	11.8	11.4	12.1	7.6	8.3	9.5	8.8	5.1	4.6	5.7	7.6	6.1	5.6	5.1	5.5	7.1	6.8	6.7	8.2	9.1	9.2	7.8	4.6	12.1	7.8	
Dec 18	5.8	6.8	6.1	6.4	5.6	4.9	4.8	4.3	5.5	4.3	4.6	5.4	6.4	4.3	4.2	3.4	3.1	4.9	4.5	5.7	4.4	2.3	1.9	3.0	1.9	6.8	4.7	
Dec 19	1.9	1.4	0.5	0.5	1.3	0.5	3.3	3.6	2.9	5.0	6.2	5.5	6.0	6.4	6.6	8.3	9.6	8.3	8.8	8.5	8.1	9.2	9.9	9.9	0.5	9.9	5.4	
Dec 20	7.6	10.2	9.7	8.5	K	7.0	5.4	6.1	5.6	5.1	4.8	3.6	4.2	4.4	5.0	4.9	5.5	4.9	3.9	2.4	K	K	K	K	2.4	10.2	5.7	
Dec 21	K	K	K	K	K	K	K	K	K	3.0	0.9	3.1	4.5	2.1	2.3	4.4	5.1	5.4	6.1	5.2	3.5	2.5	1.1	1.8	0.3	0.3	6.1	NA
Dec 22	0.6	0.8	0.5	1.0	0.3	0.8	0.4	1.3	2.3	2.6	2.1	2.4	3.0	3.0	3.3	2.5	2.3	0.8	1.5	0.9	1.3	1.4	4.6	4.5	0.3	4.6	1.8	
Dec 23	3.8	4.4	11.4	13.2	12.4	13.7	15.0	14.3	14.5	13.2	12.1	12.2	12.4	13.4	11.0	11.2	11.3	9.0	8.8	8.9	7.0	6.4	5.7	5.3	3.8	15.0	10.4	
Dec 24	3.4	4.5	4.4	4.7	5.3	6.0	7.7	7.6	7.2	6.8	5.9	5.9	6.3	5.8	4.4	5.1	6.0	6.8	7.9	3.0	5.0	6.2	2.5	3.4	2.5	7.9	5.5	
Dec 25	2.2	0.1	0.3	0.2	0.4	2.2	2.5	2.1	1.2	0.6	1.1	0.5	1.6	3.5	2.8	1.7	0.6	1.4	0.7	0.4	1.9	1.9	1.4	0.3	0.1	3.5	1.3	
Dec 26	0.8	0.2	0.2	0.1	0.1	0.4	0.2	0.1	0.4	0.9	2.9	4.4	5.9	5.6	4.3	3.2	3.7	4.0	4.6	3.6	4.7	4.7	4.7	1.3	0.1	5.9	2.5	
Dec 27	2.5	3.2	1.0	2.3	2.2	2.5	1.2	0.1	0.4	0.1	1.5	3.1	1.5	2.5	3.3	3.5	4.0	3.6	3.8	2.9	2.8	2.6	2.6	3.5	0.1	4.0	2.4	
Dec 28	4.6	3.6	2.3	2.5	2.0	0.2	1.0	0.5	0.2	0.7	3.6	4.3	4.4	6.7	5.3	4.4	5.6	5.0	4.6	4.9	6.0	5.2	4.5	3.3	0.2	6.7	3.6	
Dec 29	3.0	4.1	3.6	3.7	2.0	2.5	1.0	0.1	0.3	0.4	0.2	0.3	3.4	3.5	1.5	0.9	1.4	0.9	0.3	0.1	0.8	0.0	0.1	0.2	0.0	4.1	1.4	
Dec 30	0.2	0.1	0.4	0.1	0.1	0.3	1.6	0.6	2.7	2.0	1.4	3.1	5.6	5.4	3.8	4.5	6.6	7.1	4.6	5.5	4.5	6.4	7.1	6.1	0.1	7.1	3.3	
Dec 31	7.0	4.5	4.0	5.1	5.0	3.4	2.8	2.4	2.5	3.1	2.1	4.2	5.1	2.5	3.5	3.1	3.2	3.5	2.8	3.8	4.6	5.0	8.0	8.4	2.1	8.4	4.2	
C	Monthly Calibration		S		Daily Zero-Span Check		Q		Quality Assurance																			
K	Collection Error		ND		No Data (Machine Not in Service)		Y		Routine Maintenance																			
X	InValid Data (Equipment Malfunction /Recovery)		NRM		UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																							
Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.																												
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.																												

**Lakeland Industry & Community Association**  
**Tamarack Site - December 2023**  
**Summary of Hour Standard Deviations**

**STANDARD DEVIATION WIND DIRECTION (STDWD) in Degree**

Maximum Hourly Value: 76 degree on Dec 10 at hr 3		Hours in Service: 744	
Minimum Hourly Value: 3 degree on Dec 6 at hr 5		Hours of Data: 730	
		Hours of Missing Data: 14	
		Hours of Calibration: 0	
		Operational Uptime: 98.1	

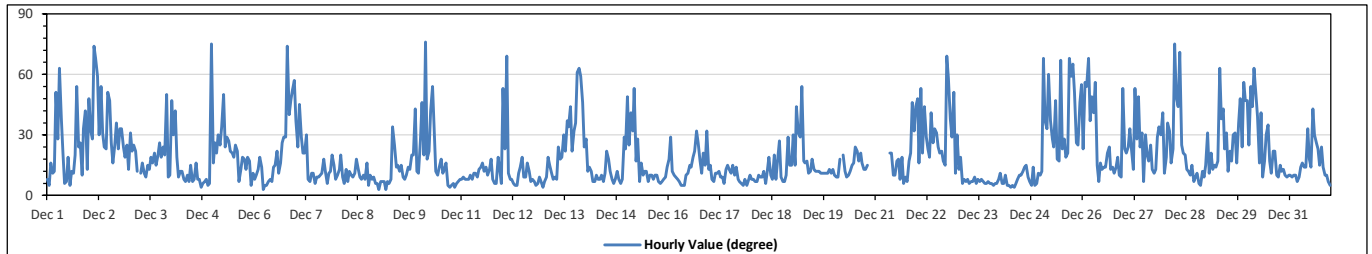
  

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
Dec 1	8	5	16	11	12	51	28	63	38	21	6	7	19	5	12	11	20	54	24	26	10	33	42	13	5	63	
Dec 2	48	32	28	74	68	59	30	54	31	24	23	51	47	26	16	25	36	23	33	33	24	19	25	13	13	74	
Dec 3	31	22	25	22	12	K	11	16	11	9	15	13	19	16	21	15	20	26	19	24	20	50	9	10	9	50	
Dec 4	47	30	42	19	9	12	12	8	7	10	7	15	7	8	16	8	8	4	6	7	8	5	6	75	4	75	
Dec 5	16	26	21	30	25	34	50	24	29	27	22	21	19	25	22	7	13	19	18	13	19	17	5	11	5	50	
Dec 6	8	10	13	19	14	3	5	5	7	8	7	14	15	22	11	16	26	29	29	74	40	47	52	57	3	74	
Dec 7	37	24	45	29	21	21	30	8	7	11	11	6	9	9	10	11	18	12	6	11	12	20	15	8	6	45	
Dec 8	10	13	20	9	6	13	7	12	10	9	11	18	13	9	8	10	8	16	5	10	8	9	6	6	5	20	
Dec 9	3	7	7	7	3	7	6	8	34	25	14	15	12	15	9	8	10	14	13	20	20	43	12	11	3	43	
Dec 10	27	46	20	76	18	22	42	54	33	12	10	14	18	11	13	16	5	4	5	6	4	6	7	8	4	76	
Dec 11	8	9	8	8	8	10	8	11	11	9	13	14	16	12	14	10	13	18	8	6	6	19	13	6	6	19	
Dec 12	53	23	69	11	8	8	6	5	5	11	14	19	9	9	16	12	7	8	7	5	6	9	7	4	4	69	
Dec 13	7	9	19	15	11	8	9	8	24	18	19	30	22	37	34	44	22	32	36	61	63	59	46	24	7	63	
Dec 14	28	12	14	12	7	7	10	8	8	10	7	11	22	18	12	8	6	8	12	8	6	8	29	23	6	29	
Dec 15	49	25	41	32	53	17	28	7	16	10	12	12	7	10	10	8	10	10	7	6	7	8	9	14	6	53	
Dec 16	18	29	12	10	9	8	7	5	5	5	10	11	15	14	19	22	32	26	17	11	21	15	32	13	5	32	
Dec 17	15	8	7	11	11	12	9	9	6	13	15	13	11	15	10	14	8	7	6	5	8	5	7	10	5	15	
Dec 18	8	8	7	7	10	9	9	12	6	12	19	10	8	20	8	17	27	9	7	7	10	29	15	15	6	29	
Dec 19	30	15	44	31	29	54	17	16	17	11	12	18	13	12	12	12	11	11	11	11	11	13	11	13	11	54	
Dec 20	10	9	9	18	K	20	12	9	10	12	15	16	24	22	17	21	16	13	13	15	K	K	K	K	9	24	
Dec 21	K	K	K	K	K	K	K	K	K	21	21	10	10	17	18	8	19	6	9	7	17	21	46	32	44	6	46
Dec 22	48	16	53	21	44	29	23	19	41	26	33	31	24	21	22	17	15	69	58	38	29	51	11	30	11	69	
Dec 23	13	19	6	8	7	8	6	7	7	9	6	8	7	8	7	6	6	7	6	6	5	6	6	8	5	19	
Dec 24	11	6	6	10	5	5	4	5	4	6	8	10	10	12	14	15	9	7	5	14	5	6	11	10	4	15	
Dec 25	12	68	37	33	60	37	28	24	47	18	17	67	23	28	19	21	68	59	65	51	26	25	46	55	12	68	
Dec 26	23	56	54	68	37	49	41	56	15	7	16	13	14	14	21	24	13	14	11	14	19	10	9	53	7	68	
Dec 27	23	21	24	33	23	13	53	28	49	24	31	7	30	20	17	25	13	11	13	29	34	30	41	11	7	53	
Dec 28	19	36	32	16	23	75	49	44	71	25	21	20	13	12	10	15	7	9	11	6	5	12	9	15	5	75	
Dec 29	31	11	21	13	15	14	17	63	38	43	23	31	12	22	17	30	31	16	36	48	24	56	47	47	11	63	
Dec 30	25	54	44	63	50	39	16	41	9	17	30	35	17	11	22	22	10	9	15	12	13	10	9	10	9	63	
Dec 31	10	9	10	10	7	9	14	16	14	14	33	18	14	43	30	26	23	15	24	14	10	10	7	5	5	43	
Diurnal Minimum	3	5	6	7	3	3	4	5	4	5	6	6	7	5	7	6	5	4	5	5	4	5	5	4	4	4	
Diurnal Maximum	53	68	69	76	68	75	53	63	71	43	33	67	47	43	34	44	68	69	65	74	63	59	52	75	75	75	

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Machine Malfunction/Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



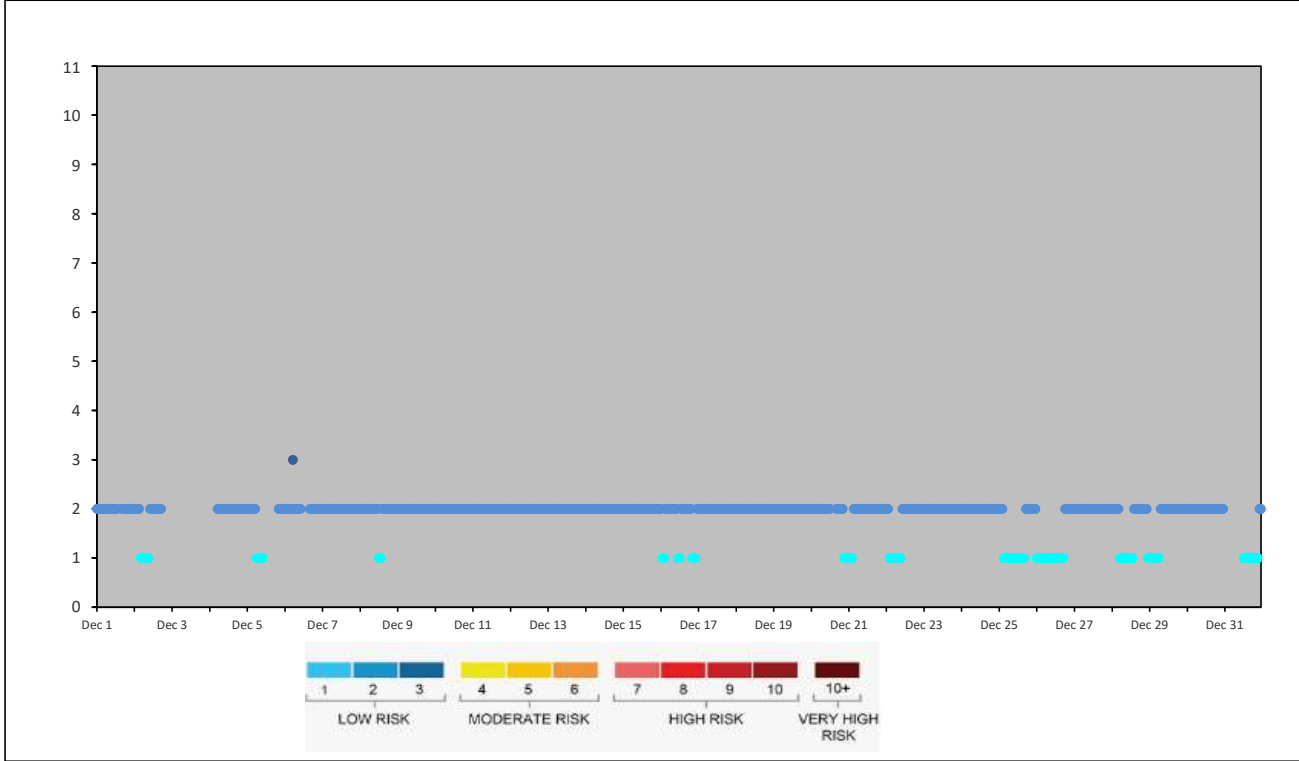
**ST. LINA STATION**

# LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

St. Lina Site - December 2023

## AIR QUALITY HEALTH INDEX

Day	Hourly Period Starting at (MST)																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Dec 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 3																								
Dec 4						2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 5	2	2	2	2	2	2	1	1	1	1	1										2	2	2	2
Dec 6	2	2	2	2	2	3	2	2	2	2	2							2	2	2	2	2	2	1
Dec 7	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 8	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2
Dec 9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 10	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 12	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 13	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 14	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 15	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 16	2	1	1	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	1	1	1	2
Dec 17	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 18	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 19	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 20	2	2	2	2	2	2	2	2	2	2	2	2										1	1	1
Dec 21	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 22	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 23	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 24	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 25	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Dec 26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Dec 27	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 28	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1
Dec 29	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 30	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dec 31												1	1	1	1	1	1	1	1	1	1	1	1	2





### Lakeland Industry & Community Association

#### St. Lina Site - December 2023

#### Summary of Hourly Averages

#### SULPHUR DIOXIDE (SO<sub>2</sub>) in ppb

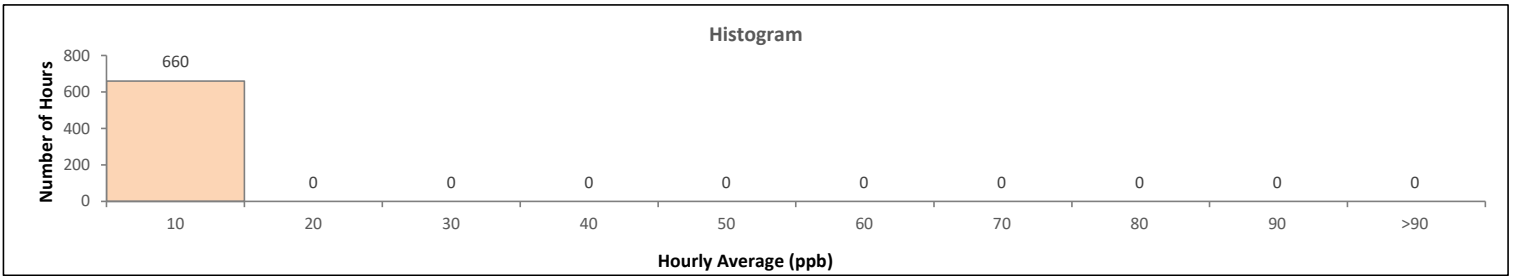
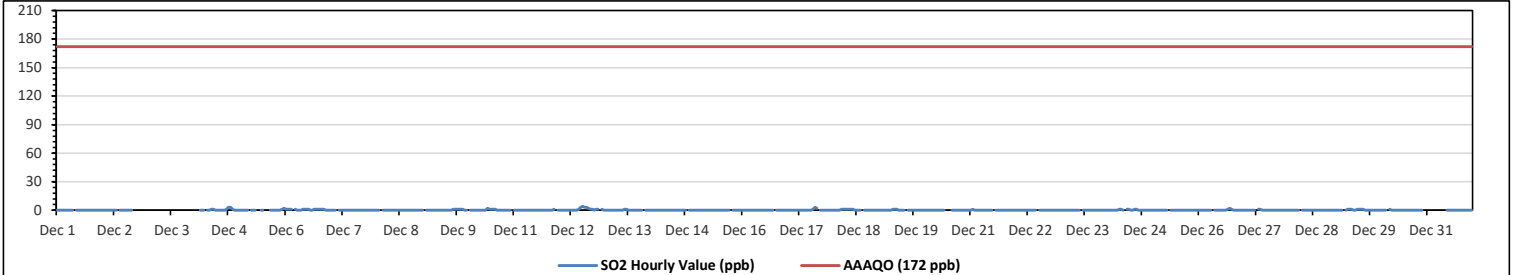
Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 172 ppb, 24-Hour 48 ppb, 30-Day 11 ppb

Number of 1-Hour Exceedances:	0	Number of 24-Hour Exceedances:	0	30-Day Exceedance:	0
Maximum Hourly Value:	4 ppb on Dec 12 at hr 12	Hours in Service:	744		
Maximum Daily Value:	0.9 ppb on Dec 12	Hours of Data:	660		
Minimum Hourly Value:	0 ppb on Dec 1 at hr 0	Hours of Missing Data:	48		
Minimum Daily Value:	0.0 ppb on Dec 1	Hours of Calibration:	36		
Monthly Average:	0.2 ppb	Operational Uptime:	93.5		

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum	Daily Average
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
Dec 1	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 2	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	K	K	K	K	K	K	K	K		
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
Dec 4	K	K	K	0	0	0	S	0	0	0	1	1	0	0	0	0	0	1	3	3	1	0	0	0	0		
Dec 5	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0		
Dec 6	1	1	1	1	S	1	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	0	0	0	0		
Dec 7	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 8	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 9	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0		
Dec 10	S	0	0	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	0	S	0		
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	S	0		
Dec 12	0	0	0	0	0	0	0	0	0	0	1	3	4	3	3	2	1	1	1	0	1	1	S	1	0		
Dec 13	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	S	0	0	0		
Dec 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0		
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0		
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0		
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	S	0	0	0	0	0	0	0	0		
Dec 18	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 19	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 21	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 24	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0		
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0		
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 29	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0		
Dec 30	0	0	0	0	S	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dec 31	K	K	K	K	K	K	K	K	K	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Diurnal Maximum	1	1	1	1	1	1	1	1	1	1	2	3	4	3	3	2	2	1	3	3	1	1	1	1	2		
Diurnal Average	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1		

C Monthly Calibration      S Daily Zero-Span Check      Q Quality Assurance  
 K Collection Error            ND No Data (Machine Not in Service)      Y Routine Maintenance  
 X InValid Data (Equipment Malfunction/Recovery)      NRM UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      P Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

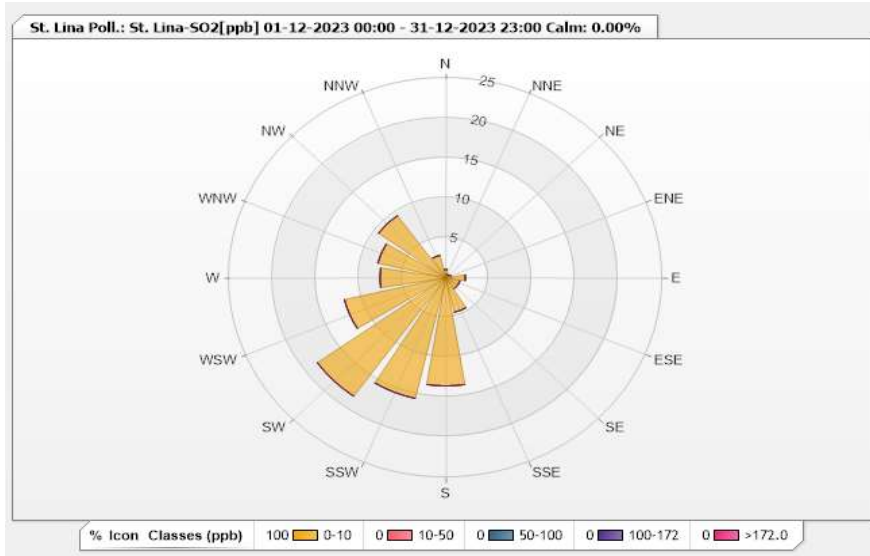


**Station: St. Lina Poll.: St. Lina-SO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 88.44%      Calm Avg: 0.00 [ppm]

Direction	0-10	10-50	50-100	100-172	>172.0	Total
N	1.06	0	0	0	0	1.06
NNE	0.46	0	0	0	0	0.46
NE	0.46	0	0	0	0	0.46
ENE	0.61	0	0	0	0	0.61
E	2.28	0	0	0	0	2.28
ESE	1.67	0	0	0	0	1.67
SE	1.67	0	0	0	0	1.67
SSE	4.41	0	0	0	0	4.41
S	13.53	0	0	0	0	13.53
SSW	15.5	0	0	0	0	15.5
SW	18.24	0	0	0	0	18.24
WSW	12.01	0	0	0	0	12.01
W	7.6	0	0	0	0	7.6
WNW	8.05	0	0	0	0	8.05
NW	9.57	0	0	0	0	9.57
NNW	2.89	0	0	0	0	2.89
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

St. Lina Site - December 2023

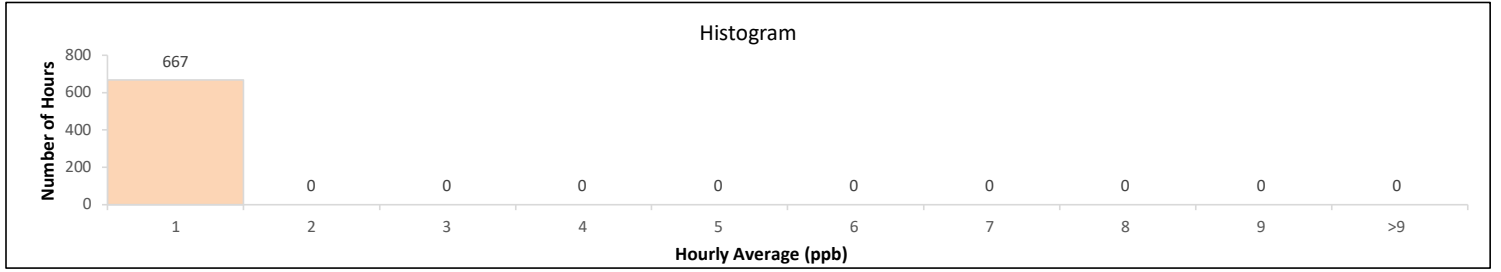
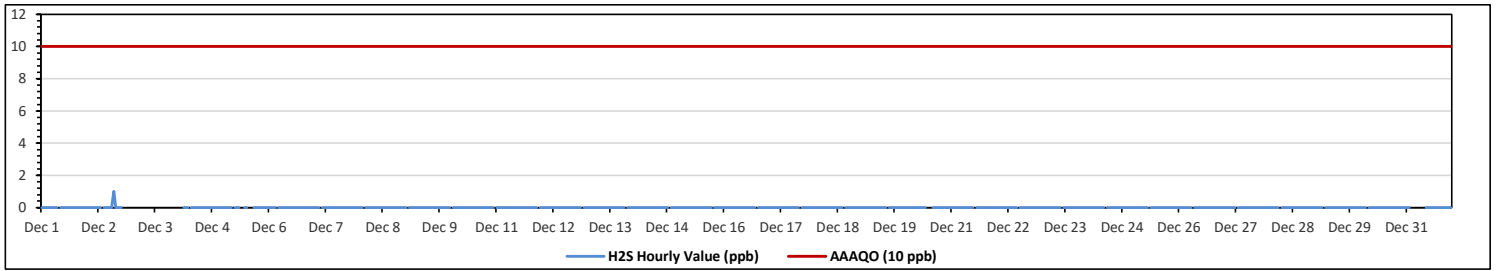
Summary of Hourly Averages

HYDROGEN SULPHIDE (H<sub>2</sub>S) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 10 ppb, 24-Hour 3 ppb																												
Number of 1-Hour Exceedances: 0												Number of 24-Hour Exceedances: 0																
Maximum Hourly Value: 1 ppb on Dec 2 at hr 14												Hours in Service: 744																
Maximum Daily Value: 0.0 ppb on Dec 1												Hours of Data: 667																
Minimum Hourly Value: 0 ppb on Dec 1 at hr 0												Hours of Missing Data: 41																
Minimum Daily Value: 0.0 ppb on Dec 1												Hours of Calibration: 36																
Monthly Average: 0.0 ppb												Operational Uptime: 94.5																
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
Dec 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
Dec 4	K	K	K	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 5	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 6	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 7	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 8	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 9	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 10	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diurnal Maximum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Diurnal Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance  
**X** InValid Data (Equipment Malfunction /Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      **P** Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

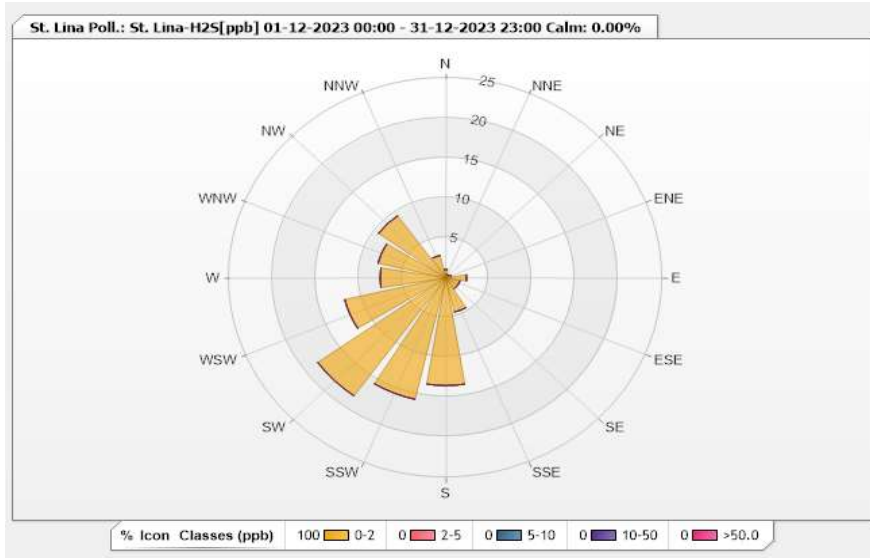


**Station: St. Lina Poll.: St. Lina-H2S[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 88.71%      Calm Avg: 0.00 [ppb]

Direction	0-2	2-5	5-10	10-50	>50.0	Total
N	1.06	0	0	0	0	1.06
NNE	0.45	0	0	0	0	0.45
NE	0.45	0	0	0	0	0.45
ENE	0.61	0	0	0	0	0.61
E	2.42	0	0	0	0	2.42
ESE	1.67	0	0	0	0	1.67
SE	1.67	0	0	0	0	1.67
SSE	4.39	0	0	0	0	4.39
S	13.48	0	0	0	0	13.48
SSW	15.61	0	0	0	0	15.61
SW	18.18	0	0	0	0	18.18
WSW	11.97	0	0	0	0	11.97
W	7.58	0	0	0	0	7.58
WNW	8.03	0	0	0	0	8.03
NW	9.55	0	0	0	0	9.55
NNW	2.88	0	0	0	0	2.88
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

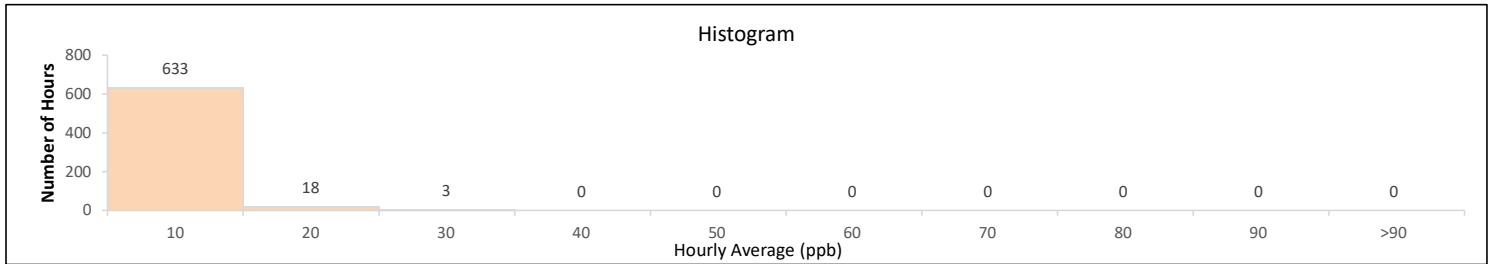
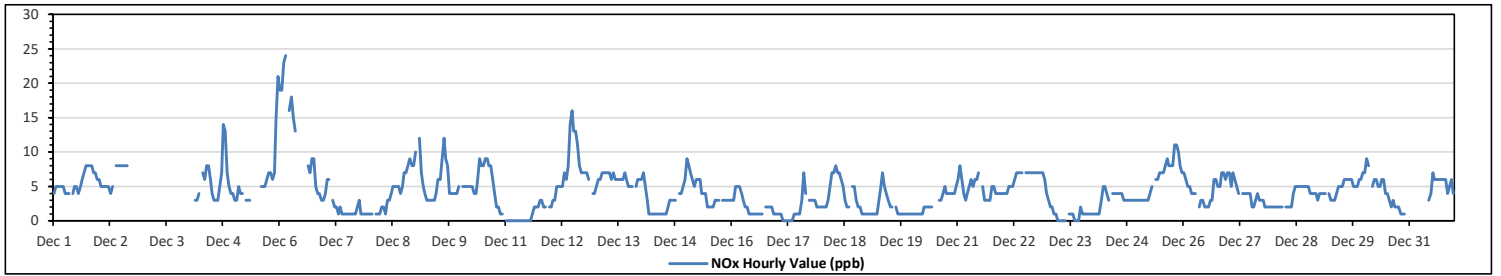
OXIDES OF NITROGEN (NOx) in ppb

Maximum Hourly Value:	24	ppb	on Dec 6 at hr 3	Hours in Service:	744
Maximum Daily Value:	7.2	ppb	on Dec 12	Hours of Data:	654
Minimum Hourly Value:	0	ppb	on Dec 11 at hr 0	Hours of Missing Data:	48
Minimum Daily Value:	0.8	ppb	on Dec 11	Hours of Calibration:	42
Monthly Average:	4.3	ppb		Operational Uptime:	93.5

Day	Hourly Period Starting at (MST)																								Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
Dec 1	4	5	5	5	5	5	4	4	4	S	4	5	5	4	5	6	7	8	8	8	7	7	6	4	8	5.6		
Dec 2	6	5	5	5	5	5	4	5	S	8	8	8	8	8	8	8	K	K	K	K	K	K	K	K	4	8	NA	
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-	
Dec 4	K	K	K	3	3	4	S	7	6	8	8	6	4	3	3	3	5	7	14	13	7	5	4	4	3	14	5.9	
Dec 5	3	3	5	4	4	S	3	3	3	Q	Q	Q	Q	Q	Q	5	5	5	6	7	7	6	7	15	21	6.2		
Dec 6	19	19	23	24	S	16	18	15	13	C	C	C	C	C	C	8	7	9	9	5	4	4	3	3	24	NA		
Dec 7	4	6	6	S	3	2	2	1	2	1	1	1	1	1	1	1	1	2	3	1	1	1	1	1	1	6	1.9	
Dec 8	1	1	S	1	1	1	2	2	1	3	3	4	5	5	5	5	4	5	7	7	8	9	8	8	1	9	4.2	
Dec 9	10	S	12	7	5	4	3	3	3	3	4	6	6	9	12	9	8	4	4	4	4	4	4	5	3	12	5.7	
Dec 10	S	5	5	5	5	5	5	4	4	6	9	8	8	8	9	9	8	6	4	2	2	1	1	S	1	9	5.4	
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	3	3	2	2	S	2	0	3	0.8
Dec 12	2	3	3	5	5	5	5	7	6	8	14	16	13	13	11	8	7	7	7	7	6	S	4	4	4	2	16	7.2
Dec 13	5	6	6	7	7	7	7	7	6	7	6	6	6	6	6	7	6	5	5	5	S	5	6	6	5	7	6.1	
Dec 14	6	7	5	3	1	1	1	1	1	1	1	1	1	1	1	2	3	3	3	S	4	4	5	6	1	7	2.8	
Dec 15	9	8	7	6	5	6	6	6	4	4	4	2	2	2	2	2	3	3	3	S	3	3	3	3	2	9	4.2	
Dec 16	3	3	5	5	5	4	3	2	2	1	1	1	1	1	1	1	1	S	2	2	2	2	1	1	1	5	2.2	
Dec 17	1	1	1	0	0	0	0	0	0	1	1	1	1	3	7	4	S	3	3	3	3	3	2	2	2	0	7	1.7
Dec 18	2	2	2	3	5	7	7	8	7	7	6	5	3	2	2	S	5	5	3	2	2	1	1	1	1	1	8	3.8
Dec 19	1	1	1	1	1	1	3	5	7	5	4	3	2	2	S	2	1	1	1	1	1	1	1	1	1	1	7	2.0
Dec 20	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	4	5	4	4	4	4	5	1	5	2.7	
Dec 21	6	8	6	4	3	4	5	6	5	6	6	7	S	5	3	3	3	3	5	5	4	4	4	4	3	8	4.7	
Dec 22	4	4	4	5	5	5	6	7	7	7	7	S	7	7	7	7	7	7	7	7	7	7	6	4	4	7	6.1	
Dec 23	3	2	2	1	1	0	0	0	0	0	0	S	1	1	1	0	0	0	2	1	1	1	1	1	0	3	0.9	
Dec 24	1	1	1	1	3	5	5	4	3	S	4	4	4	4	4	4	3	3	3	3	3	3	3	3	1	5	3.1	
Dec 25	3	3	3	3	3	3	4	5	S	6	6	7	7	7	7	8	9	8	8	8	11	11	10	8	3	11	6.4	
Dec 26	7	6	5	5	4	4	4	S	2	3	3	2	2	2	3	3	6	6	5	5	7	7	6	7	2	7	4.5	
Dec 27	7	5	7	6	5	4	S	4	4	4	4	4	2	2	3	4	3	3	3	2	2	2	2	2	2	7	3.7	
Dec 28	2	2	2	2	2	S	2	2	2	2	4	5	5	5	5	5	5	5	5	4	4	4	4	3	2	5	3.5	
Dec 29	4	4	4	4	S	4	3	3	3	3	4	5	5	5	6	6	6	6	6	5	5	6	6	7	3	7	4.9	
Dec 30	7	9	8	S	5	6	6	5	5	6	6	4	4	3	2	3	2	2	2	1	1	1	1	K	1	9	4.2	
Dec 31	K	K	K	K	K	K	K	K	K	S	3	4	7	6	6	6	6	6	6	6	6	4	5	6	4	7	NA	
Diurnal Maximum	19	19	23	24	7	16	18	15	13	8	14	16	13	13	11	12	9	9	14	13	11	10	15	21				
Diurnal Average	4.5	4.4	5.0	4.3	3.4	4.0	4.1	4.2	3.8	4.1	4.6	4.4	4.2	4.2	4.5	4.8	4.5	4.9	4.9	4.9	4.5	4.1	4.0	4.3	4.5			

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction/Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

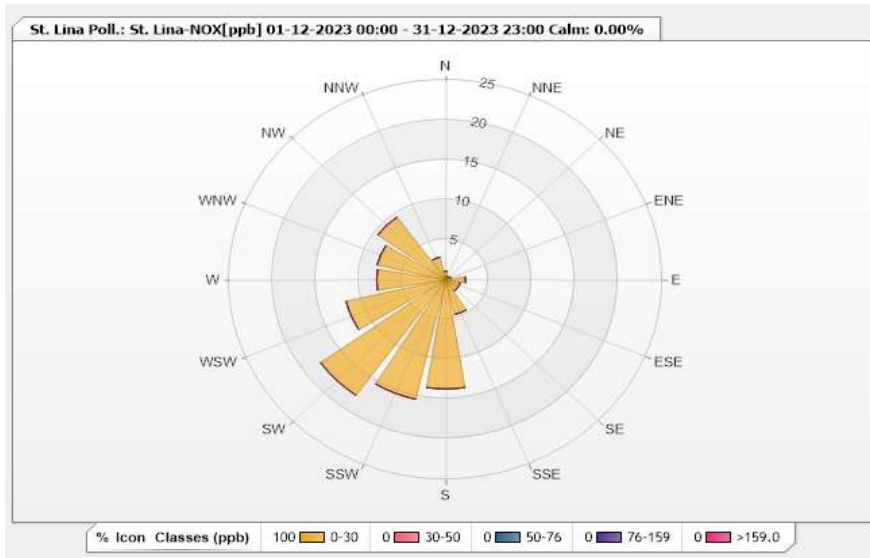


**Station: St. Lina Poll.: St. Lina-NOX[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.63%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.46	0	0	0	0	0.46
NE	0.46	0	0	0	0	0.46
ENE	0.61	0	0	0	0	0.61
E	2.3	0	0	0	0	2.3
ESE	1.69	0	0	0	0	1.69
SE	1.69	0	0	0	0	1.69
SSE	4.45	0	0	0	0	4.45
S	13.65	0	0	0	0	13.65
SSW	15.34	0	0	0	0	15.34
SW	17.79	0	0	0	0	17.79
WSW	11.81	0	0	0	0	11.81
W	7.98	0	0	0	0	7.98
WNW	8.13	0	0	0	0	8.13
NW	9.66	0	0	0	0	9.66
NNW	2.91	0	0	0	0	2.91
Summary	100	0	0	0	0	100



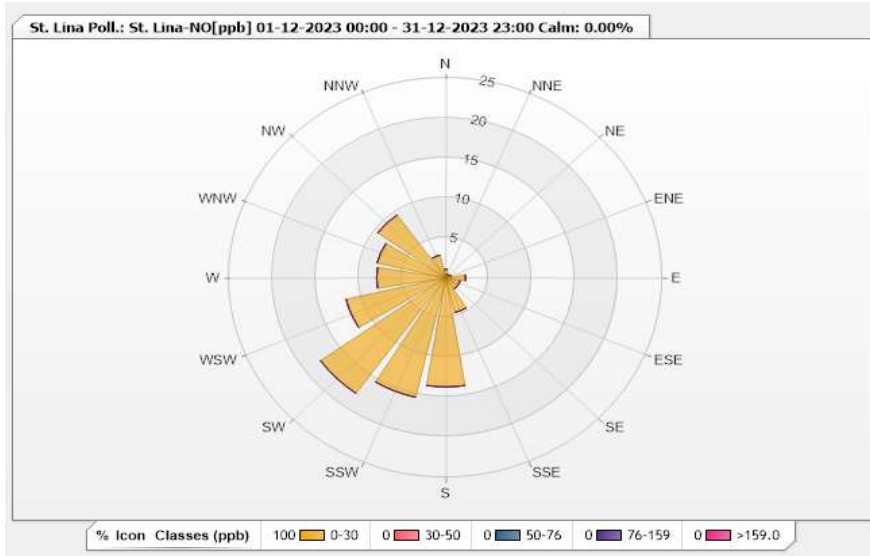


**Station: St. Lina Poll.: St. Lina-NO[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.63%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.46	0	0	0	0	0.46
NE	0.46	0	0	0	0	0.46
ENE	0.61	0	0	0	0	0.61
E	2.3	0	0	0	0	2.3
ESE	1.69	0	0	0	0	1.69
SE	1.69	0	0	0	0	1.69
SSE	4.45	0	0	0	0	4.45
S	13.65	0	0	0	0	13.65
SSW	15.34	0	0	0	0	15.34
SW	17.79	0	0	0	0	17.79
WSW	11.81	0	0	0	0	11.81
W	7.98	0	0	0	0	7.98
WNW	8.13	0	0	0	0	8.13
NW	9.66	0	0	0	0	9.66
NNW	2.91	0	0	0	0	2.91
Summary	100	0	0	0	0	100





Lakeland Industry & Community Association

St. Lina Site - December 2023

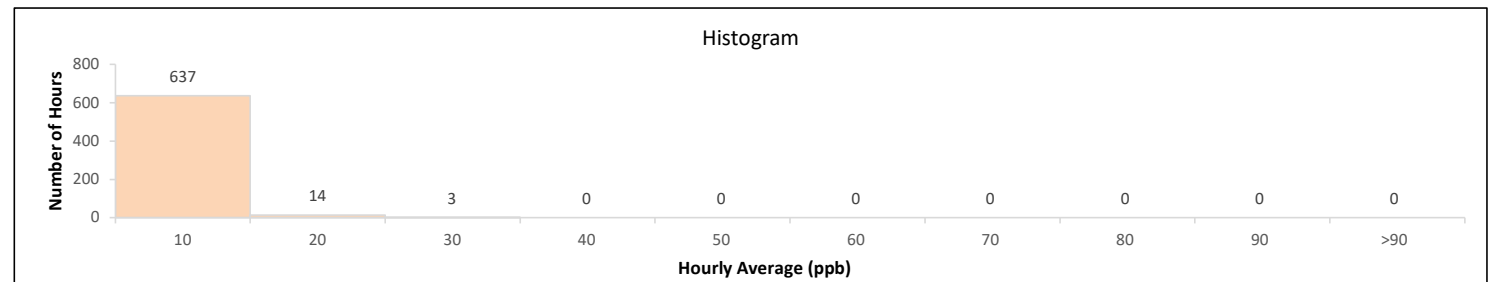
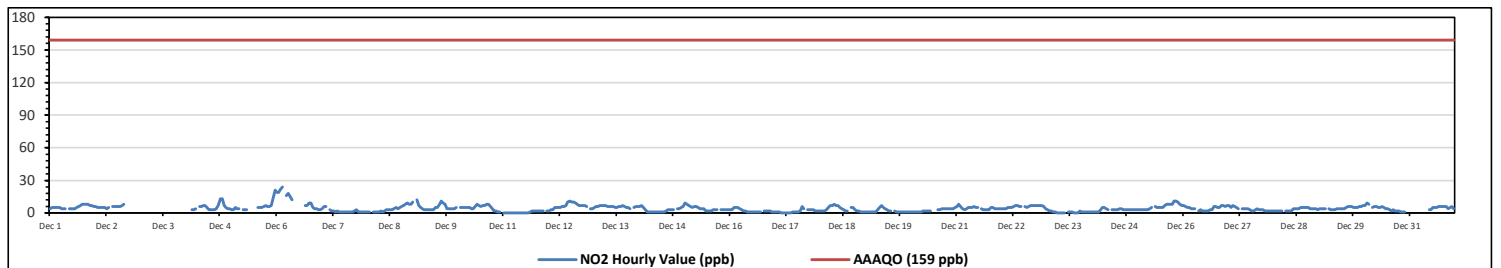
Summary of Hourly Averages

NITROGEN DIOXIDE (NO<sub>2</sub>) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 159 ppb																												
Number of 1-Hour Exceedances: 0																												
Maximum Hourly Value: 24 ppb on Dec 6 at hr 3										Hours in Service: 744																		
Maximum Daily Value: 6.4 ppb on Dec 12										Hours of Data: 654																		
Minimum Hourly Value: 0 ppb on Dec 11 at hr 0										Hours of Missing Data: 48																		
Minimum Daily Value: 0.7 ppb on Dec 11										Hours of Calibration: 42																		
Monthly Average: 4.2 ppb										Operational Uptime: 93.5																		
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
Dec 1	4	5	5	5	5	5	4	4	4	S	4	4	4	4	5	6	7	8	8	8	8	7	7	6	4	8	5.5	
Dec 2	6	5	5	5	5	4	5	S	6	6	6	6	6	7	8	K	K	K	K	K	K	K	K	K	4	8	NA	
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-	
Dec 4	K	K	K	3	3	4	S	6	6	7	7	5	3	3	3	3	4	7	13	13	7	5	4	4	3	13	5.5	
Dec 5	3	3	5	4	4	S	3	3	3	Q	Q	Q	Q	Q	5	5	5	6	7	6	6	7	14	21	3	21	6.1	
Dec 6	19	19	22	24	S	16	18	15	12	C	C	C	C	C	C	7	7	9	9	5	4	4	3	3	3	24	NA	
Dec 7	4	6	6	S	3	2	2	1	2	1	1	1	1	1	1	1	2	3	1	1	1	1	1	1	1	6	1.9	
Dec 8	1	1	S	1	1	1	1	2	1	2	3	3	3	3	4	5	4	5	6	7	8	9	8	8	1	9	3.8	
Dec 9	10	S	12	7	5	4	3	3	3	3	3	3	5	5	8	11	9	8	4	4	4	4	4	5	3	12	5.5	
Dec 10	S	5	5	5	5	5	5	4	4	6	8	7	6	7	7	8	8	6	4	2	2	1	1	S	1	8	5.0	
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	S	S	0	2	0.7	
Dec 12	2	3	3	5	5	5	5	6	6	7	10	11	10	10	9	8	7	7	7	7	6	S	4	4	2	11	6.4	
Dec 13	5	6	6	7	7	7	7	6	6	6	6	5	5	6	6	7	6	5	5	4	S	5	6	6	4	7	5.9	
Dec 14	6	7	5	3	1	1	1	1	1	1	1	1	1	1	2	3	3	3	3	S	4	4	5	6	1	7	2.8	
Dec 15	9	8	7	6	5	6	6	5	4	4	2	2	2	2	2	3	3	3	S	3	3	3	3	3	2	9	4.2	
Dec 16	3	3	5	5	5	4	3	2	2	1	1	1	1	1	1	1	1	S	2	2	2	2	1	1	1	5	2.2	
Dec 17	1	1	1	0	0	0	0	0	0	1	1	1	1	1	2	6	4	S	3	3	3	2	2	2	0	6	1.6	
Dec 18	2	2	2	3	5	7	7	8	7	7	5	4	3	2	2	S	5	5	3	2	2	1	1	1	1	8	3.7	
Dec 19	1	1	1	1	1	1	3	5	7	5	4	3	2	2	S	2	1	1	1	1	1	1	1	1	1	7	2.0	
Dec 20	1	1	1	1	1	1	2	2	2	2	2	K	K	S	3	3	4	4	4	4	4	4	4	5	1	5	2.6	
Dec 21	6	8	6	4	3	4	5	5	5	6	5	S	S	4	3	3	3	3	5	5	4	4	4	4	3	8	4.5	
Dec 22	4	4	4	5	5	6	7	7	7	6	6	S	S	6	5	6	7	7	7	7	7	7	6	4	4	7	5.9	
Dec 23	3	2	2	1	1	0	0	0	0	0	S	1	1	1	0	0	0	2	1	1	1	1	1	1	0	3	0.9	
Dec 24	1	1	1	1	3	5	5	4	3	S	3	3	3	3	4	4	3	3	3	3	3	3	3	3	1	5	3.0	
Dec 25	3	3	3	3	3	3	4	5	S	6	5	5	5	5	7	8	8	8	8	8	11	11	10	8	7	3	11	6.0
Dec 26	7	6	5	5	4	4	4	S	2	3	2	2	2	2	3	3	6	6	5	5	7	7	6	7	2	7	4.5	
Dec 27	7	5	7	6	5	4	S	4	4	4	4	3	2	2	3	4	3	3	3	2	2	2	2	2	2	7	3.6	
Dec 28	2	2	2	2	2	S	2	2	2	2	4	4	4	4	4	5	5	5	5	4	4	4	4	3	2	5	3.4	
Dec 29	4	4	4	4	S	4	3	3	3	4	4	4	4	4	5	6	6	6	5	5	5	6	6	7	3	7	4.6	
Dec 30	7	9	8	S	5	6	6	5	5	6	5	4	4	3	2	3	2	2	2	1	1	1	K	K	1	9	4.1	
Dec 31	K	K	K	K	K	K	K	K	K	S	3	3	5	5	6	6	6	6	6	6	4	5	6	4	3	6	NA	
Diurnal Maximum	19	19	22	24	7	16	18	15	12	7	10	11	10	10	9	11	9	9	13	13	11	10	14	21				
Diurnal Average	4.5	4.4	4.9	4.3	3.4	4.0	4.0	4.0	3.7	3.8	4.0	3.5	3.4	3.4	4.1	4.7	4.5	4.8	4.8	4.4	4.1	4.0	4.3	4.5				
C	Monthly Calibration										S										Daily Zero-Span Check							
K	Collection Error										ND										No Data (Machine Not in Service)							
X	Invalid Data (Equipment Malfunction/Recovery)										NRM										UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)							
Q											Y										Quality Assurance							
Y																					Routine Maintenance							
P																					Power Failure							

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.

Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

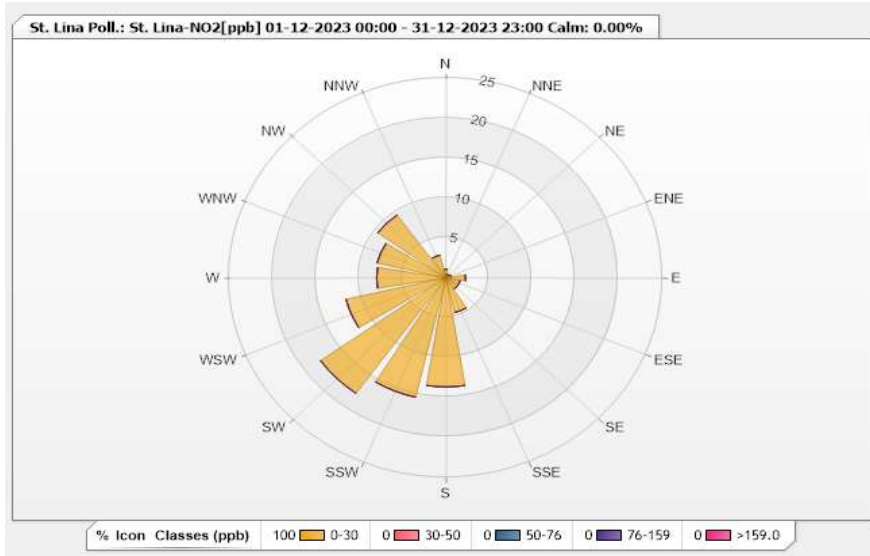


**Station: St. Lina Poll.: St. Lina-NO2[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 87.63%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.07	0	0	0	0	1.07
NNE	0.46	0	0	0	0	0.46
NE	0.46	0	0	0	0	0.46
ENE	0.61	0	0	0	0	0.61
E	2.3	0	0	0	0	2.3
ESE	1.69	0	0	0	0	1.69
SE	1.69	0	0	0	0	1.69
SSE	4.45	0	0	0	0	4.45
S	13.65	0	0	0	0	13.65
SSW	15.34	0	0	0	0	15.34
SW	17.79	0	0	0	0	17.79
WSW	11.81	0	0	0	0	11.81
W	7.98	0	0	0	0	7.98
WNW	8.13	0	0	0	0	8.13
NW	9.66	0	0	0	0	9.66
NNW	2.91	0	0	0	0	2.91
Summary	100	0	0	0	0	100



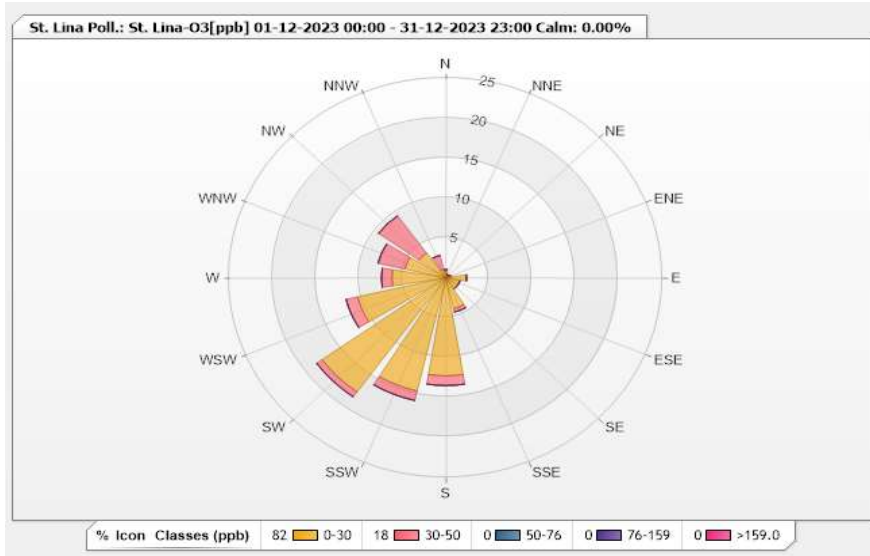


**Station: St. Lina Poll.: St. Lina-O3[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 88.71%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	0.76	0.3	0	0	0	1.06
NNE	0.45	0	0	0	0	0.45
NE	0	0.45	0	0	0	0.45
ENE	0.15	0.45	0	0	0	0.6
E	2.42	0	0	0	0	2.42
ESE	1.67	0	0	0	0	1.67
SE	1.67	0	0	0	0	1.67
SSE	3.94	0.45	0	0	0	4.39
S	12.27	1.21	0	0	0	13.48
SSW	14.55	1.21	0	0	0	15.76
SW	17.58	0.76	0	0	0	18.34
WSW	10.45	1.36	0	0	0	11.81
W	6.21	1.21	0	0	0	7.42
WNW	4.85	3.18	0	0	0	8.03
NW	3.79	5.76	0	0	0	9.55
NNW	1.06	1.82	0	0	0	2.88
Summary	81.82	18.16	0	0	0	100



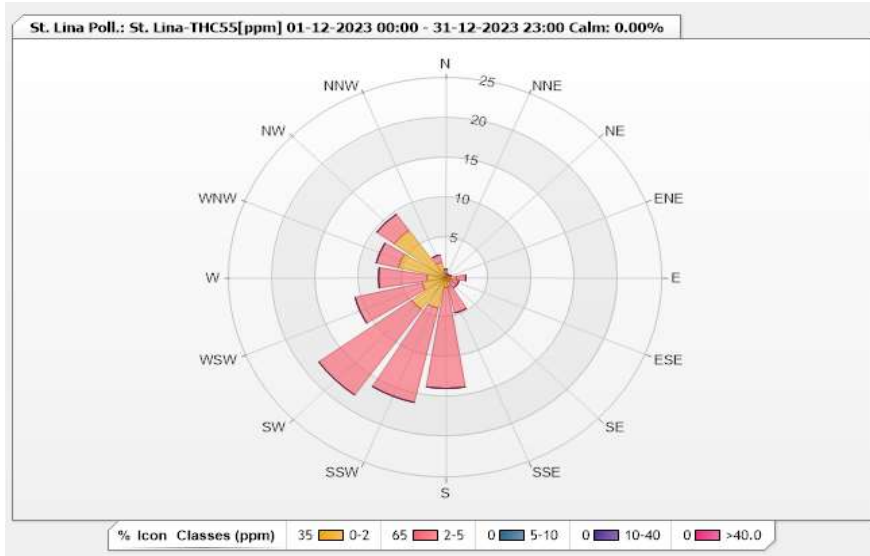


**Station: St. Lina Poll.: St. Lina-THC55[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 86.42%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-40	>40.0	Total
N	0.62	0.47	0	0	0	1.09
NNE	0	0.47	0	0	0	0.47
NE	0.47	0	0	0	0	0.47
ENE	0.47	0.16	0	0	0	0.63
E	1.24	1.09	0	0	0	2.33
ESE	0.47	1.09	0	0	0	1.56
SE	0.62	0.93	0	0	0	1.55
SSE	1.09	3.42	0	0	0	4.51
S	1.24	12.6	0	0	0	13.84
SSW	3.89	12.13	0	0	0	16.02
SW	4.82	13.22	0	0	0	18.04
WSW	2.8	7.93	0	0	0	10.73
W	2.18	5.6	0	0	0	7.78
WNW	5.6	2.64	0	0	0	8.24
NW	7.31	2.49	0	0	0	9.8
NNW	2.02	0.93	0	0	0	2.95
Summary	34.84	65.17	0	0	0	100



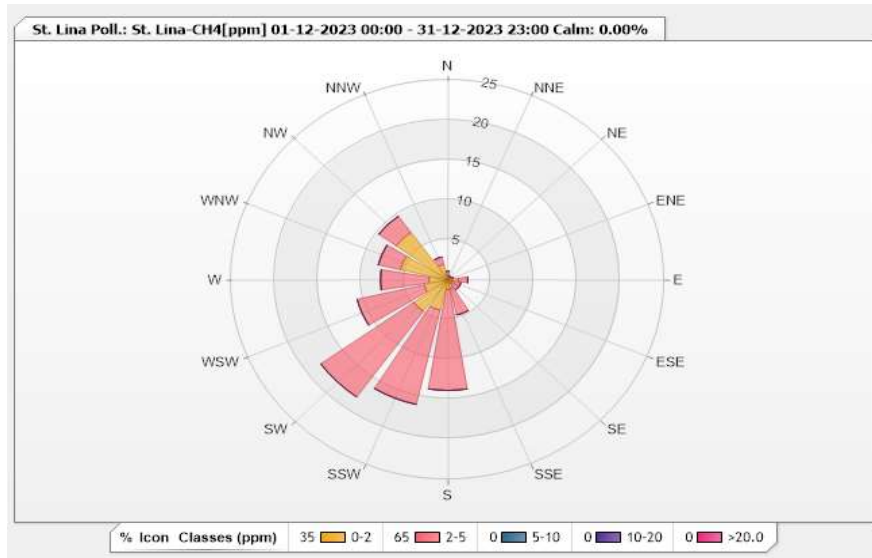


**Station: St. Lina Poll.: St. Lina-CH4[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 86.42%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-20	>20.0	Total
N	0.62	0.47	0	0	0	1.09
NNE	0	0.47	0	0	0	0.47
NE	0.47	0	0	0	0	0.47
ENE	0.47	0.16	0	0	0	0.63
E	1.24	1.09	0	0	0	2.33
ESE	0.47	1.09	0	0	0	1.56
SE	0.62	0.93	0	0	0	1.55
SSE	1.09	3.42	0	0	0	4.51
S	1.24	12.6	0	0	0	13.84
SSW	3.89	12.13	0	0	0	16.02
SW	4.82	13.22	0	0	0	18.04
WSW	2.8	7.93	0	0	0	10.73
W	2.18	5.6	0	0	0	7.78
WNW	5.6	2.64	0	0	0	8.24
NW	7.31	2.49	0	0	0	9.8
NNW	2.02	0.93	0	0	0	2.95
Summary	34.84	65.17	0	0	0	100





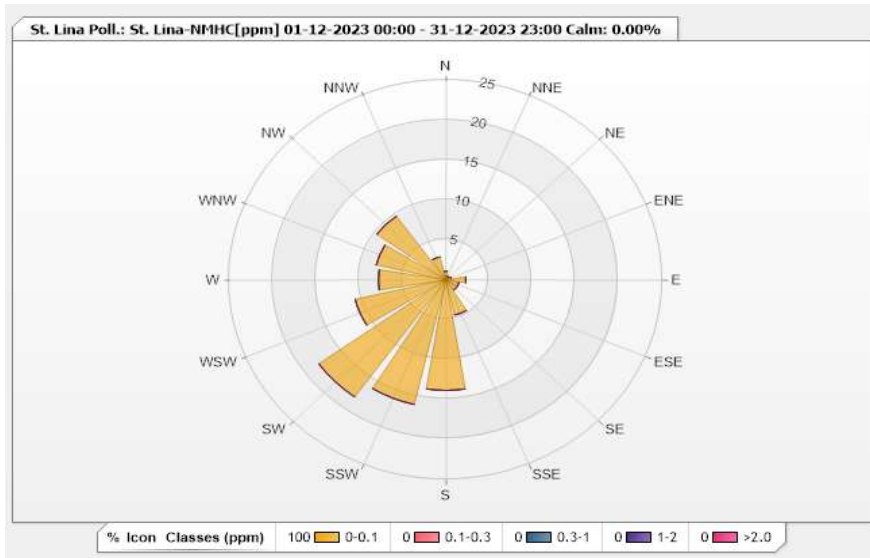


**Station: St. Lina Poll.: St. Lina-NMHC[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 86.42%      Calm Avg: 0.00 [ppm]

Direction	0-0.1	0.1-0.3	0.3-1	1-2	>2.0	Total
N	1.09	0	0	0	0	1.09
NNE	0.47	0	0	0	0	0.47
NE	0.47	0	0	0	0	0.47
ENE	0.62	0	0	0	0	0.62
E	2.33	0	0	0	0	2.33
ESE	1.56	0	0	0	0	1.56
SE	1.56	0	0	0	0	1.56
SSE	4.51	0	0	0	0	4.51
S	13.84	0	0	0	0	13.84
SSW	16.02	0	0	0	0	16.02
SW	18.04	0	0	0	0	18.04
WSW	10.73	0	0	0	0	10.73
W	7.78	0	0	0	0	7.78
WNW	8.24	0	0	0	0	8.24
NW	9.8	0	0	0	0	9.8
NNW	2.95	0	0	0	0	2.95
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

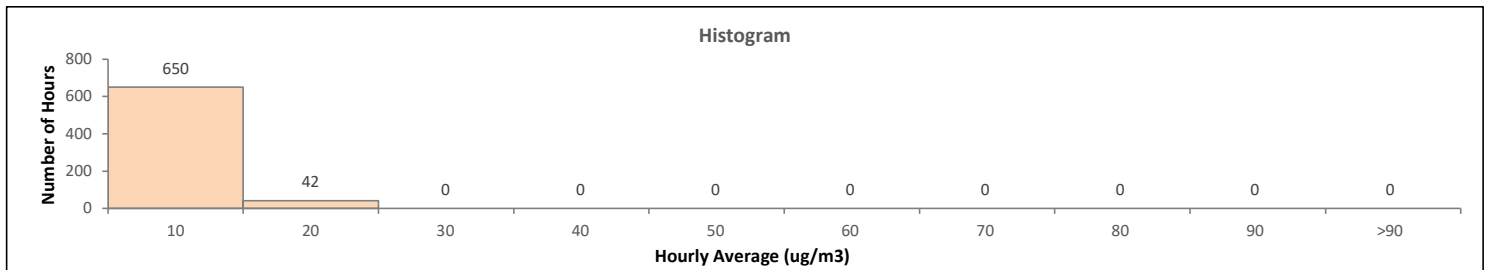
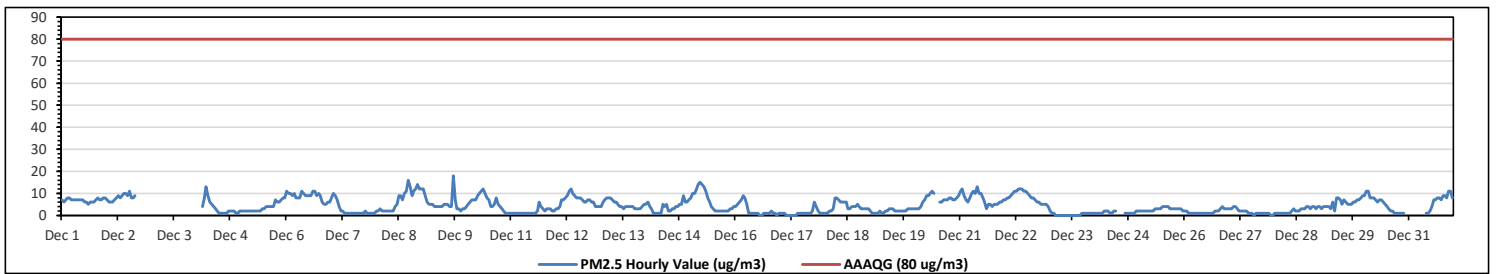
St. Lina Site - December 2023

Summary of Hourly Averages

PARTICULATE MATTER 2.5 (PM<sub>2.5</sub>) in µg/m<sup>3</sup>

Alberta Ambient Air Quality Guideline (AAAQG): 1-Hour 80 µg/m <sup>3</sup> , Alberta Ambient Air Quality Objective (AAAQO): 24-Hour 29 µg/m <sup>3</sup>																																															
Number of 1-Hour Exceedances: 0												Number of 24-Hour Exceedances: 0																																			
Maximum Hourly Value: 18 µg/m <sup>3</sup> on Dec 9 at hr 17												Hours in Service: 744																																			
Maximum Daily Value: 8.7 µg/m <sup>3</sup> on Dec 6												Hours of Data: 692																																			
Minimum Hourly Value: 0 µg/m <sup>3</sup> on Dec 16 at hr 13												Hours of Missing Data: 48																																			
Minimum Daily Value: 0 µg/m <sup>3</sup> on Dec 23												Hours of Calibration: 4																																			
Monthly Average: 4.5 µg/m <sup>3</sup>												Operational Uptime: 93.5																																			
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average																					
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23																				
Dec 1	7	6	7	8	8	7	7	7	7	7	7	6	6	5	6	6	6	7	8	7	7	8	8	5	8	6.9																					
Dec 2	7	6	6	6	7	8	9	8	9	10	10	9	11	8	8	9	K	K	K	K	K	K	K	K	6	11	NA																				
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-																				
Dec 4	K	K	K	4	8	13	9	6	5	4	3	2	1	1	1	1	2	2	2	2	1	1	2	1	1	1	13	3.4																			
Dec 5	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4	4	4	4	7	6	6	7	8	8	2	8	3.8																				
Dec 6	11	10	10	9	10	8	8	8	11	10	9	9	9	9	11	11	9	10	9	6	5	5	6	6	5	11	8.7																				
Dec 7	8	10	9	7	4	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	10	2.5																				
Dec 8	2	2	3	2	2	2	2	2	2	2	4	5	9	9	7	10	11	16	13	9	11	12	14	12	2	16	6.8																				
Dec 9	12	12	9	6	5	5	5	4	4	4	4	4	5	5	5	4	4	18	7	3	3	2	3	3	2	18	5.7																				
Dec 10	4	5	6	7	7	7	9	10	11	12	10	8	7	4	4	5	8	5	4	3	2	1	1	2	1	12	5.9																				
Dec 11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	6	4	3	2	3	3	3	2	2	1	6	1.8																				
Dec 12	3	3	4	7	7	8	9	11	12	10	9	8	8	8	7	6	6	7	7	6	6	4	4	4	3	12	6.8																				
Dec 13	4	6	7	8	8	8	7	6	6	5	4	4	3	4	4	4	4	3	3	3	3	3	4	5	3	8	4.9																				
Dec 14	5	6	4	3	1	1	1	1	1	5	4	5	2	2	3	4	4	5	5	5	9	6	6	7	1	9	3.9																				
Dec 15	8	10	10	12	14	15	14	13	11	8	6	4	3	2	2	2	2	2	2	2	2	3	3	4	2	15	6.4																				
Dec 16	4	5	6	7	9	8	5	1	1	1	1	1	1	0	0	1	1	1	1	2	1	1	0	1	0	9	2.5																				
Dec 17	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	2	6	4	2	1	1	1	1	0	6	1.2																				
Dec 18	1	1	2	2	3	8	8	7	6	6	6	6	3	3	4	4	4	5	4	3	3	3	3	3	1	8	4.1																				
Dec 19	2	1	1	1	1	2	1	1	2	2	3	3	2	2	2	2	2	2	2	3	3	3	3	3	1	3	2.0																				
Dec 20	3	3	3	4	6	7	9	9	10	11	10	K	K	6	6	7	7	7	8	8	7	7	8	9	3	11	7.0																				
Dec 21	11	12	9	7	6	8	10	11	10	13	10	10	8	6	3	5	5	4	5	5	5	6	6	7	3	13	7.6																				
Dec 22	7	8	8	9	10	11	11	12	12	12	11	11	10	9	8	8	7	6	6	5	5	5	4	4	4	12	8.3																				
Dec 23	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	2	0.5																				
Dec 24	1	1	1	1	1	2	2	2	2	1	2	2	C	C	C	C	1	1	1	1	1	2	2	1	2	1	1.4																				
Dec 25	2	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	3	3	3	3	3	3	2	2	2	4	2.8																				
Dec 26	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	4	3	3	3	1	4	1.7																					
Dec 27	3	3	4	4	3	2	2	2	2	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	4	1.6																				
Dec 28	1	1	1	1	1	1	1	1	1	2	3	2	2	2	3	3	4	4	3	4	4	3	4	1	4	2.3																					
Dec 29	4	3	4	4	4	4	3	6	2	8	8	7	5	7	6	5	5	6	6	7	7	8	9	2	9	5.5																					
Dec 30	9	11	11	8	8	8	7	6	7	7	6	5	4	3	2	2	1	1	1	1	1	1	1	1	11	5.0																					
Dec 31	K	K	K	K	K	K	K	K	K	1	1	2	4	7	7	8	8	7	9	9	8	11	11	8	1	11	NA																				
Diurnal Maximum	12	12	11	12	14	15	14	13	12	13	11	11	11	9	11	11	11	18	13	9	11	12	14	12																							
Diurnal Average	4.5	4.8	4.8	4.6	4.8	5.2	5.1	4.9	4.9	5.1	4.7	4.3	4.1	4.0	3.9	4.3	4.0	4.6	4.5	3.9	4.0	3.9	4.2	4.3																							
C	Monthly Calibration											S	Daily Zero-Span Check											Q	Quality Assurance																						
K	Collection Error											ND	No Data (Machine Not in Service)											Y	Routine Maintenance											P	Power Failure										
X	Invalid Data (Equipment Malfunction /Recovery)											NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																		

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



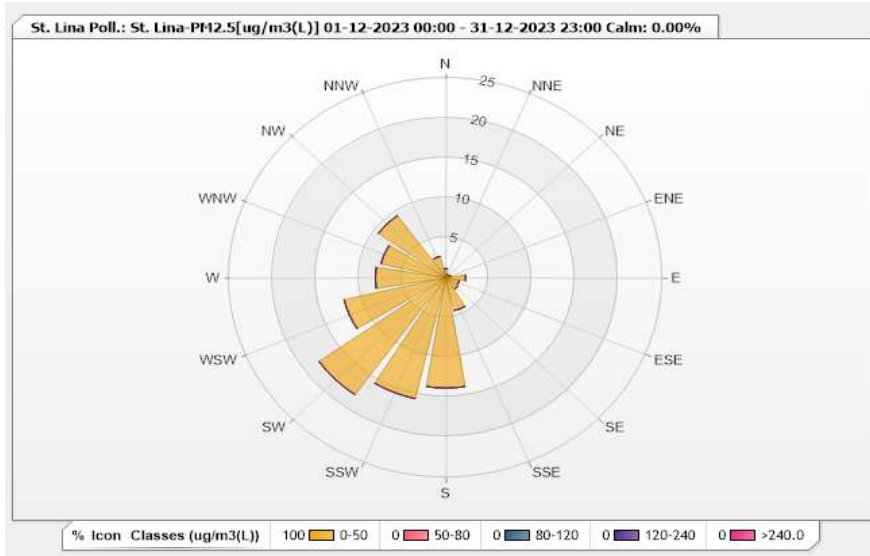
Station: St. Lina Poll.: St. Lina-PM2.5[ug/m3(L)] Monthly: 12-2023

)

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.61%      Calm Avg: 0.00 [ug/m3(L)]

Direction	0-50	50-80	80-120	120-240	>240.0	Total
N	1.16	0	0	0	0	1.16
NNE	0.44	0	0	0	0	0.44
NE	0.44	0	0	0	0	0.44
ENE	0.58	0	0	0	0	0.58
E	2.32	0	0	0	0	2.32
ESE	1.6	0	0	0	0	1.6
SE	1.74	0	0	0	0	1.74
SSE	4.21	0	0	0	0	4.21
S	13.79	0	0	0	0	13.79
SSW	15.53	0	0	0	0	15.53
SW	18	0	0	0	0	18
WSW	12.05	0	0	0	0	12.05
W	8.13	0	0	0	0	8.13
WNW	7.69	0	0	0	0	7.69
NW	9.58	0	0	0	0	9.58
NNW	2.76	0	0	0	0	2.76
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

RELATIVE HUMIDITY (RH) in %

Maximum Hourly Value:	98	%	on Dec 4 at hr 5	Hours in Service:	744
Maximum Daily Value:	89.7	%	on Dec 8	Hours of Data:	698
Minimum Hourly Value:	42	%	on Dec 11 at hr 0	Hours of Missing Data:	46
Minimum Daily Value:	53.8	%	on Dec 14	Hours of Calibration:	0
Monthly Average:	76.1	%		Operational Uptime:	93.8

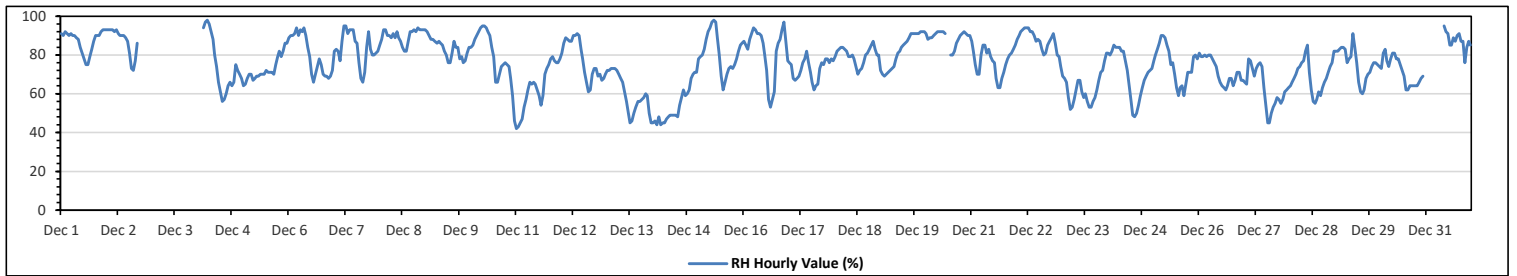
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	91	90	92	91	90	91	90	90	89	88	84	81	78	75	75	79	83	87	90	90	92	93	93	75	93	87.2		
Dec 2	93	93	93	93	92	93	91	90	90	90	89	87	81	73	72	77	86	K	K	K	K	K	K	72	93	NA		
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-		
Dec 4	K	K	K	94	97	98	96	92	88	80	74	66	61	56	57	60	64	66	64	66	75	72	70	68	56	98	74.5	
Dec 5	64	65	68	70	70	67	68	69	69	70	70	72	71	71	70	75	79	82	79	82	86	86	86	64	86	72.7		
Dec 6	89	90	90	91	94	90	93	92	94	90	84	79	70	66	70	74	78	75	70	69	69	68	69	72	66	94	80.3	
Dec 7	82	83	82	77	87	95	95	91	93	93	87	86	76	68	66	71	84	92	83	80	80	81	82	66	95	83.6		
Dec 8	85	88	93	93	90	90	89	91	89	92	89	87	84	82	82	87	92	92	93	92	94	93	93	82	94	89.7		
Dec 9	93	92	90	88	88	87	86	87	86	85	82	80	76	76	81	87	84	84	84	78	79	76	77	81	84	76	93	83.6
Dec 10	84	85	88	90	92	94	95	95	94	92	90	84	79	66	66	70	74	75	76	75	74	68	59	46	46	95	79.6	
Dec 11	42	43	45	47	53	57	62	66	65	66	65	62	59	54	59	70	73	75	78	79	77	76	76	78	42	79	63.6	
Dec 12	81	86	89	88	87	87	90	90	91	90	83	78	71	66	61	62	70	73	73	69	70	67	68	70	61	91	77.5	
Dec 13	72	72	73	73	73	72	70	68	66	61	56	50	45	46	50	53	56	56	57	58	60	59	50	45	45	73	60.0	
Dec 14	45	46	44	48	44	45	45	47	48	49	49	49	49	48	54	58	62	59	60	62	68	70	71	71	44	71	53.8	
Dec 15	78	79	80	83	88	92	94	97	98	97	89	80	69	62	66	70	73	74	73	75	78	82	85	86	62	98	81.2	
Dec 16	87	85	83	88	91	94	93	91	91	90	86	80	72	57	53	57	61	82	86	88	93	97	87	77	53	97	82.0	
Dec 17	76	75	68	67	68	69	72	76	78	82	76	71	66	62	64	65	73	76	75	78	78	76	78	77	62	82	72.8	
Dec 18	79	82	83	84	84	83	82	79	79	80	78	74	70	72	73	76	80	81	83	85	87	83	80	80	70	87	79.9	
Dec 19	72	70	69	70	71	72	73	74	78	81	82	84	85	86	87	89	91	91	91	91	92	92	92	69	92	82.3		
Dec 20	91	88	89	89	90	91	92	92	92	92	91	K	K	80	80	82	86	88	90	91	92	91	90	90	80	92	89.0	
Dec 21	87	82	75	70	70	80	85	85	81	83	79	77	76	68	63	63	68	71	75	78	80	81	83	85	63	87	76.9	
Dec 22	88	90	92	93	94	94	94	92	92	90	87	88	87	83	80	81	85	87	89	91	86	80	79	74	74	94	87.3	
Dec 23	69	68	66	58	52	53	57	62	67	67	61	58	60	56	53	53	56	58	62	67	71	72	77	81	52	81	62.7	
Dec 24	81	80	82	85	84	84	84	82	82	77	72	64	56	49	48	50	54	59	63	67	69	71	72	73	48	85	70.3	
Dec 25	77	80	83	86	90	90	89	85	82	75	76	70	63	59	63	64	59	65	71	71	71	79	80	78	59	90	75.3	
Dec 26	81	79	79	80	79	80	80	78	76	74	69	66	64	63	62	64	68	68	64	67	71	71	67	67	62	81	71.5	
Dec 27	66	65	78	77	73	69	73	75	76	74	63	54	45	45	50	53	55	58	57	55	57	61	62	63	45	78	62.7	
Dec 28	64	66	68	70	73	74	76	77	82	85	71	62	56	55	57	61	59	63	66	68	71	74	76	82	55	85	69.0	
Dec 29	82	82	83	84	84	83	76	78	79	91	84	76	66	61	60	62	68	70	71	74	76	76	75	74	60	91	75.6	
Dec 30	73	81	83	77	74	78	81	81	78	78	75	72	69	62	64	64	64	64	64	64	66	68	69	K	62	83	71.6	
Dec 31	K	K	K	K	K	K	K	K	K	K	95	92	91	85	85	89	87	90	91	87	87	76	84	87	85	76	95	NA
Diurnal Maximum	93	93	93	94	97	98	96	97	98	97	93	91	87	86	89	89	92	92	93	92	94	97	93	93				
Diurnal Average	77.6	78.0	78.9	79.4	80.1	81.1	81.8	81.8	81.8	81.9	78.0	73.3	69.0	65.3	65.9	68.5	71.8	74.0	81.8	75.1	75.9	76.7	77.3	77.1	76.9			

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

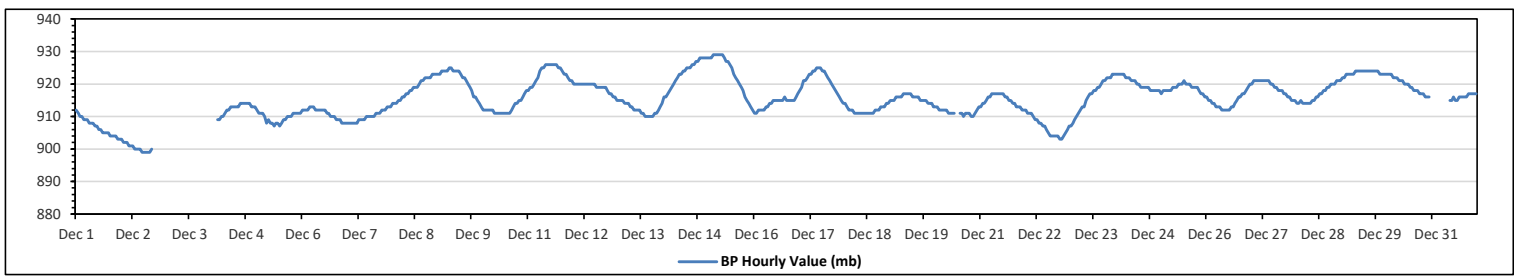
BAROMETRIC PRESSURE (BP) in millibar

Maximum Hourly Value:	929	mb	on Dec 15 at hr 2	Hours in Service:	744
Maximum Daily Value:	924	mb	on Dec 14	Hours of Data:	698
Minimum Hourly Value:	899	mb	on Dec 2 at hr 11	Hours of Missing Data:	46
Minimum Daily Value:	907	mb	on Dec 1	Hours of Calibration:	0
Monthly Average:	916	mb		Operational Uptime:	93.8

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average																																																																					
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23																																																																				
Dec 1	912	911	910	910	909	909	909	908	908	908	907	907	906	906	905	905	905	905	904	904	904	904	903	903	903	912	907																																																																				
Dec 2	903	902	902	902	901	901	901	900	900	900	900	899	899	899	899	899	900	K	K	K	K	K	K	K	K	899	903	NA																																																																			
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-																																																																			
Dec 4	K	K	K	909	909	910	910	911	912	912	913	913	913	913	913	914	914	914	914	914	914	913	913	913	913	909	914	912																																																																			
Dec 5	912	911	911	911	910	908	909	908	908	907	908	908	907	908	909	909	910	910	910	910	911	911	911	911	911	907	912	910																																																																			
Dec 6	912	912	912	912	913	913	913	912	912	912	912	912	912	911	911	910	910	910	909	909	909	908	908	908	908	908	913	911																																																																			
Dec 7	908	908	908	908	908	908	909	909	909	909	910	910	910	910	910	911	911	911	911	912	912	912	913	913	913	908	913	910																																																																			
Dec 8	914	914	914	915	915	916	916	917	917	918	918	919	919	919	920	921	921	922	922	922	922	923	923	923	923	914	923	919																																																																			
Dec 9	923	923	924	924	924	924	925	925	924	924	924	924	923	922	922	921	920	919	918	916	916	915	914	913	913	913	925	921																																																																			
Dec 10	912	912	912	912	912	912	911	911	911	911	911	911	911	911	911	912	913	914	914	915	915	916	917	918	911	918	913																																																																				
Dec 11	918	919	919	920	921	922	924	925	925	926	926	926	926	926	926	926	925	925	924	923	923	922	921	921	918	926	923																																																																				
Dec 12	920	920	920	920	920	920	920	920	920	920	920	920	919	919	919	919	919	919	918	917	917	916	915	915	915	920	919																																																																				
Dec 13	915	915	915	914	914	914	913	913	912	912	912	912	911	911	910	910	910	910	911	911	912	913	914	914	910	918	912																																																																				
Dec 14	916	916	917	918	919	920	921	922	923	923	924	924	925	925	925	926	926	927	927	928	928	928	928	928	916	925	924																																																																				
Dec 15	928	928	929	929	929	929	929	929	928	927	927	926	925	923	922	921	920	919	918	916	915	914	913	912	912	929	923																																																																				
Dec 16	911	911	912	912	912	912	913	913	914	914	914	915	915	915	915	916	916	915	915	915	915	915	916	917	911	917	914																																																																				
Dec 17	918	919	921	921	922	923	923	924	924	925	925	925	924	924	923	922	921	920	919	918	917	916	915	914	914	925	921																																																																				
Dec 18	914	913	912	912	912	911	911	911	911	911	911	911	911	911	911	912	912	912	913	913	913	914	914	914	911	914	912																																																																				
Dec 19	915	915	915	916	916	916	916	917	917	917	917	917	916	916	916	915	915	915	915	914	914	914	914	913	913	917	916																																																																				
Dec 20	913	913	912	912	912	912	912	911	911	911	911	K	K	911	911	910	911	911	911	910	910	911	912	913	910	913	911																																																																				
Dec 21	913	914	914	915	916	916	917	917	917	917	917	917	917	916	916	915	915	914	914	913	913	913	912	912	912	917	915																																																																				
Dec 22	912	911	911	911	910	909	909	908	908	907	907	906	905	904	904	904	904	903	903	904	905	906	907	907	903	912	907																																																																				
Dec 23	907	908	909	910	911	912	913	913	915	916	917	917	918	918	919	919	920	921	921	922	922	923	923	923	907	923	917																																																																				
Dec 24	923	923	923	923	923	922	922	922	921	921	921	920	920	919	919	919	919	918	918	918	918	918	918	918	918	918	923	920																																																																			
Dec 25	917	918	918	918	918	918	919	919	919	920	920	920	921	920	920	920	919	919	919	919	918	917	917	916	916	921	919																																																																				
Dec 26	916	915	915	914	914	913	913	913	912	912	912	912	913	913	914	915	916	916	916	917	917	917	919	920	916	920	915																																																																				
Dec 27	920	921	921	921	921	921	921	921	921	921	920	920	919	919	918	918	918	917	917	916	916	915	915	915	915	921	919																																																																				
Dec 28	914	914	915	914	914	914	914	914	915	915	916	916	917	917	918	918	919	920	920	920	921	921	921	921	914	921	917																																																																				
Dec 29	922	922	923	923	923	923	923	924	924	924	924	924	924	924	924	924	924	924	924	924	923	923	923	923	922	924	923																																																																				
Dec 30	923	923	923	922	922	922	921	921	921	920	920	920	919	919	918	918	917	917	917	916	916	916	916	K	916	923	920																																																																				
Dec 31	K	K	K	K	K	K	K	K	K	K	915	915	916	915	915	916	916	916	916	916	917	917	917	917	915	917	NA																																																																				
Diurnal Maximum	928	928	929	929	929	929	929	928	927	927	926	926	926	926	926	926	926	927	927	928	928	928	928	928	915	917	NA																																																																				
Diurnal Average	915	915	916	916	916	916	916	916	916	916	916	916	916	915	915	915	916	916	916	916	916	915	916	916	915	917	NA																																																																				
C	Monthly Calibration																							S	Daily Zero-Span Check																							Q	Quality Assurance																																														
K	Collection Error																							ND	No Data (Machine Not in Service)																							Y	Routine Maintenance																							P	Power Failure																						
X	InValid Data (Equipment Malfunction /Recovery)																							NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																																																						

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

AMBIENT TEMPERATURE (AT) in Degree Celsius

Maximum Hourly Value:	5.7	°C	on Dec 6 at hr 13	Hours in Service:	744
Maximum Daily Value:	1.6	°C	on Dec 6	Hours of Data:	698
Minimum Hourly Value:	-13.4	°C	on Dec 2 at hr 7	Hours of Missing Data:	46
Minimum Daily Value:	-9.2	°C	on Dec 1	Hours of Calibration:	0
Monthly Average:	-3.9	°C		Operational Uptime:	93.8

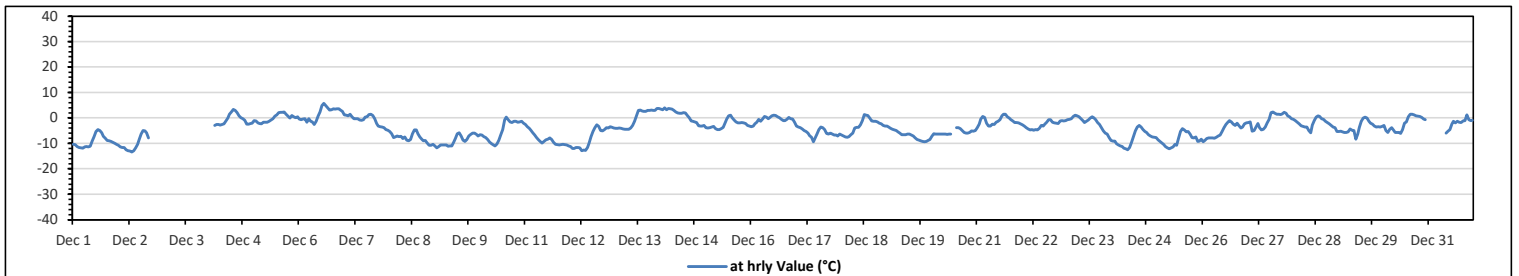
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23	
Dec 1	-10.4	-10.5	-11.2	-11.6	-11.7	-11.9	-11.3	-11.2	-11.4	-11.1	-9.1	-7.3	-5.3	-4.5	-4.9	-5.8	-7.2	-8	-8.8	-9	-9.2	-9.6	-10	-10.4	-11.9	-4.5	-9.2	
Dec 2	-10.8	-11.3	-11.6	-11.6	-12.4	-12.8	-13	-13.4	-12.8	-11.8	-10.3	-8.5	-6.4	-4.9	-5.1	-5.8	-7.9	K	K	K	K	K	K	K	-13.4	-4.9	NA	
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-
Dec 4	K	K	K	-2.9	-2.6	-2.6	-2.8	-2.6	-2.3	-1.2	-0.1	1.4	2.4	3.3	3	2.1	0.9	0	-0.3	-0.9	-2.4	-2.4	-2.2	-2.1	-2.9	3	-0.7	
Dec 5	-1.1	-1.2	-1.9	-2.2	-2.3	-1.6	-1.6	-1.7	-1.3	-0.8	-0.2	0.7	1.2	2.1	2.2	2.2	2.4	1.5	0.7	-0.1	1	0.5	0.1	0.4	-2.3	2.4	0.0	
Dec 6	-0.4	-0.6	-0.4	-0.3	-1.7	-0.2	-1.4	-1.5	-2.6	-1.4	0.7	2.4	4.9	5.7	4.9	3.9	3.1	3.2	3.6	3.5	3.6	3.6	3.1	2.6	-2.6	5.7	1.6	
Dec 7	1.2	1.1	0.9	1.5	0.5	-0.3	-0.3	-0.3	-0.8	-0.9	-0.7	0.3	0.4	1.3	1.5	1	-0.2	-2.2	-3.2	-3.4	-3.5	-3.9	-4.5	-4.8	-4.8	1.5	-0.8	
Dec 8	-5.4	-6.2	-7.7	-7.4	-7.1	-7.3	-7.2	-8.1	-7.5	-8.7	-9	-8.5	-6.2	-4.7	-4.7	-6.2	-7.4	-8.3	-9	-8.9	-9.8	-10.8	-10.8	-10.4	-10.8	-4.7	-7.8	
Dec 9	-10.9	-11.7	-11.2	-10.7	-10.7	-10.7	-11.1	-11	-10.9	-9.5	-8.1	-6.2	-5.8	-7	-8.7	-9.3	-8.5	-7.1	-6.5	-5.9	-6	-6.5	-7	-11.7	-5.8	-8.8		
Dec 10	-6.6	-6.8	-7.3	-7.7	-8.5	-9.5	-10.1	-10.6	-10.9	-10.2	-8.7	-6.6	-4.5	-0.8	0.3	-0.7	-1.5	-1.8	-1.4	-1.4	-1.7	-1.5	-1.4	-2	-10.9	0.3	-5.1	
Dec 11	-2.6	-3.4	-4.1	-4.8	-5.8	-6.7	-7.6	-8.5	-9.3	-9.8	-9.2	-8.6	-8.3	-7.9	-8.5	-9.6	-10.3	-10.5	-10.6	-10.5	-10.4	-10.5	-10.7	-11	-11.0	-2.6	-8.3	
Dec 12	-11.2	-12	-12	-11.6	-11.8	-12.8	-12.6	-12.7	-11.6	-9.8	-7.3	-5.3	-3.8	-2.7	-3.3	-5	-5.1	-4.5	-3.9	-4	-3.4	-3.7	-4	-12.8	-2.7	-7.7		
Dec 13	-4.1	-4.1	-4	-4.1	-4.3	-4.4	-4.4	-4.4	-4	-2.9	-1.4	0.8	3	3.1	2.7	2.6	2.6	2.9	3	3.1	2.9	3	3.8	3.8	-4.4	3.8	-0.2	
Dec 14	3.5	3.2	4	3.2	3.8	3.7	3.5	2.9	2.4	2	1.8	1.9	2.1	2	1	0	-1.2	-1.3	-1.5	-1.8	-3	-3.1	-3.2	-2.9	-3.2	4.0	1.0	
Dec 15	-3.8	-4	-3.9	-3.5	-3.3	-4.2	-4.6	-4.6	-4.2	-3.7	-1.9	-0.4	0.8	1.1	0	-0.8	-1.5	-1.9	-1.9	-1.8	-1.9	-2.2	-2.9	-3.2	-4.6	1.1	-2.4	
Dec 16	-3.4	-3.1	-2.3	-1.7	-0.5	-1.3	-0.4	0.6	0.3	-0.2	0.2	0.8	1.1	1	0.5	0	-0.5	-1	-1.1	-0.5	0.2	-0.2	-0.4	-1.6	-3.4	1.1	-0.6	
Dec 17	-3.2	-3.5	-3.8	-4.3	-4.9	-5.4	-6	-6.9	-7.6	-9.4	-8	-6.4	-4.6	-3.5	-3.8	-4.5	-6.1	-6.3	-6	-6.4	-6.7	-6.7	-7.1	-6.4	-9.4	-3.2	-5.7	
Dec 18	-6.7	-7.1	-7.4	-7.6	-7.3	-6.6	-5.9	-4	-3.7	-3.7	-2.7	-1.1	1.3	1.1	1	-0.1	-1.2	-1.4	-1.3	-1.5	-2	-2.3	-2.9	-3.1	-7.6	1.3	-3.2	
Dec 19	-3.1	-3.5	-4.1	-4.4	-4.7	-5	-5.5	-5.9	-6.6	-6.6	-6.6	-6.4	-6.4	-6.7	-7.1	-7.9	-8.4	-8.7	-9	-9.3	-9.4	-9.3	-8.9	-8.4	-9.4	-3.1	-6.7	
Dec 20	-7.2	-6.2	-6.4	-6.4	-6.4	-6.3	-6.3	-6.4	-6.5	-6.3	-6.4	K	K	-3.8	-3.9	-4.2	-5	-5.7	-6	-5.9	-5.6	-5.1	-5.2	-4.9	-7.2	-3.8	-5.7	
Dec 21	-3.9	-2.4	-0.4	0.6	0.2	-2.1	-3.2	-3.1	-2.5	-2.6	-1.6	-1.3	-0.6	0.8	1.5	1.4	0.5	-0.1	-0.7	-1.2	-1.8	-1.8	-1.9	-2.3	-3.9	1.5	-1.2	
Dec 22	-2.7	-3.1	-3.8	-4.3	-4.7	-4.6	-4.8	-4.5	-4.7	-4.1	-2.9	-3.2	-2.5	-1.6	-0.7	-1.6	-1.9	-2	-2.2	-1.2	-1	-1.2	-1	-4.8	-0.7	-2.7		
Dec 23	-0.6	-0.5	-0.2	0.6	1.1	0.9	0.4	-0.2	-1.1	-1.8	-1.3	-0.8	-0.1	0.4	0.1	-0.6	-1.8	-2.6	-3.9	-5.1	-6	-6.4	-7.7	-8.9	-8.9	1.1	-1.9	
Dec 24	-9.1	-9.1	-10.1	-10.7	-11	-11.2	-11.9	-12.1	-12.4	-11.6	-9.6	-7.3	-5.1	-3.5	-2.9	-3.5	-4.6	-5.4	-5.6	-6.6	-7.1	-7.5	-7.6	-7.7	-12.4	-2.9	-8.1	
Dec 25	-8.6	-9.2	-9.8	-10.4	-11.2	-11.7	-12.1	-11.8	-11.4	-10.3	-10.8	-8	-5.3	-4.2	-4.7	-5.5	-5.3	-6.3	-7.7	-7.8	-7.4	-9.3	-9.1	-8.3	-12.1	-4.2	-8.6	
Dec 26	-9.4	-8.8	-8.1	-7.9	-7.8	-7.9	-8	-7.6	-7.1	-6.7	-5.3	-3.8	-2.6	-1.7	-1.1	-1.5	-2.4	-2.9	-2.1	-3	-4	-3.5	-2.3	-1.9	-9.4	-1.1	-4.9	
Dec 27	-1.8	-1.5	-5.2	-5	-3.5	-2.2	-3.9	-4.7	-4.4	-3.6	-1.9	-0.5	2.1	2.4	1.9	1.5	1.5	1.3	1.6	2.2	1.8	0.9	0.4	-0.2	-5.2	2.4	-0.9	
Dec 28	-0.5	-1.1	-1.7	-2.3	-3	-3.3	-3.5	-3.6	-4.9	-5.8	-2.8	-1.1	0.3	0.8	0.6	-0.2	-0.5	-1.3	-1.8	-2.3	-2.9	-3.6	-3.9	-5.4	-5.8	0.8	-2.2	
Dec 29	-5.4	-5.2	-5.5	-5.7	-5.7	-5.5	-4.3	-4.8	-5	-8.3	-6.3	-3.7	-1.4	-0.1	0.3	-0.1	-1.4	-2	-2.4	-3.2	-3.6	-3.4	-3.5	-3.3	-8.3	0.3	-3.7	
Dec 30	-2.9	-4.9	-5.7	-4.4	-3.9	-4.8	-5.7	-5.7	-6.1	-4.5	-2.1	-1.5	0.5	1.5	1.5	1.2	0.9	0.7	0.6	0.2	-0.4	-0.7	K	-6.1	1.5	-2.3		
Dec 31	K	K	K	K	K	K	K	K	K	-5.9	-5.2	-4.6	-2.4	-1.3	-1.9	-1.4	-1.6	-1.8	-1.2	-1	1.2	-0.7	-1.1	-0.9	-5.9	1.2	NA	
Diurnal Maximum	3.5	3.2	4.0	3.2	3.8	3.7	3.5	2.9	2.4	2.0	1.8	2.4	4.9	5.7	4.9	3.9	3.1	3.2	3.6	3.5	3.6	3.6	3.8	3.8				
Diurnal Average	-4.7	-4.9	-5.2	-5.1	-5.2	-5.4	-5.7	-5.8	-5.9	-5.9	-4.8	-3.4	-1.9	-1.1	-1.2	-1.8	-2.7	-2.9	-3.1	-3.3	-3.4	-3.7	-3.9	-4.1				

<b>C</b>	Monthly Calibration	<b>S</b>	Daily Zero-Span Check	<b>Q</b>	Quality Assurance
<b>K</b>	Collection Error	<b>ND</b>	No Data (Machine Not in Service)	<b>Y</b>	Routine Maintenance
<b>X</b>	InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b>	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b>	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.







Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

PRECIPITATION in mm

Maximum Hourly Value:	0.6 mm on Dec 16 at hr 21	Hours in Service:	744
Maximum Daily Value:	0.7 mm on Dec 16	Hours of Data:	698
Minimum Hourly Value:	0.0 mm on Dec 1 at hr 0	Hours of Missing Data:	46
Minimum Daily Value:	0.0 mm on Dec 1	Hours of Calibration:	0
Monthly Total:	1.3 mm	Operational Uptime:	93.8

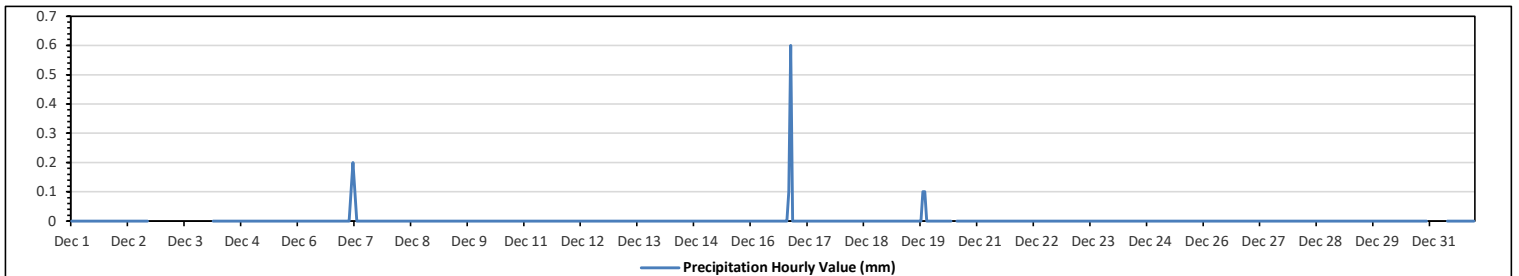
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Total	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	NA
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	-
Dec 4	K	K	K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 7	0	0	0	0	0.1	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.2	0.4
Dec 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.6	0.7
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0.0	0.1	0.2
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
Dec 31	K	K	K	K	K	K	K	K	K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	NA
Diurnal Maximum	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.0	0.0			
Diurnal Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



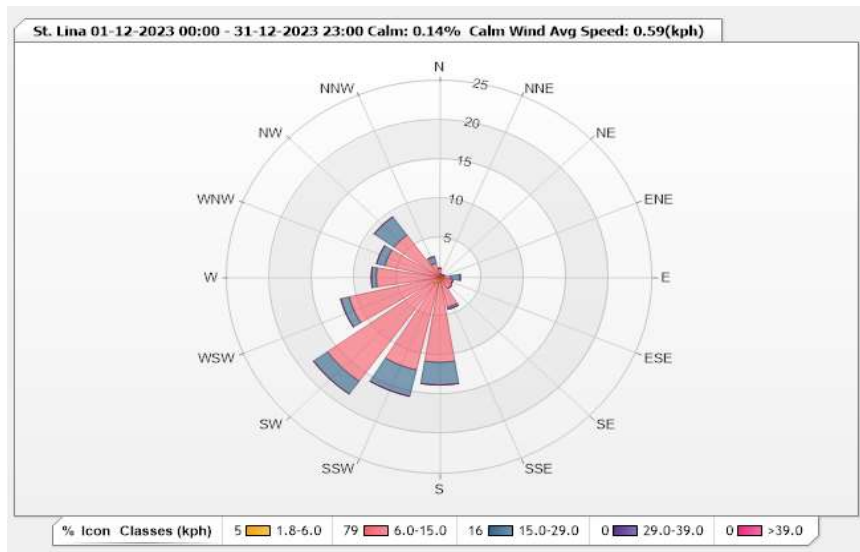


**Station: St. Lina Monitor: WDS [kph] Monthly: 12-2023**

Type: Wind Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm (WS<1.8kph): 0.14%      Valid Data: 93.41%

Direction	1.8-6.0	6.0-15.0	15.0-29.0	29.0-39.0	>39.0	Total
N	0.29	0.86	0	0	0	1.15
NNE	0.29	0.14	0	0	0	0.43
NE	0	0.43	0	0	0	0.43
ENE	0.14	0.43	0	0	0	0.57
E	0.14	1.15	1.15	0	0	2.44
ESE	0.43	1.15	0	0	0	1.58
SE	0.29	1.44	0	0	0	1.73
SSE	0.14	3.74	0.29	0	0	4.17
S	0.58	10.22	2.88	0	0	13.68
SSW	0.72	11.37	3.45	0	0	15.54
SW	1.01	15.25	2.01	0	0	18.27
WSW	0.29	10.65	1.01	0	0	11.95
W	0.29	7.19	0.58	0	0	8.06
WNW	0	6.62	1.01	0	0	7.63
NW	0	6.62	2.88	0	0	9.5
NNW	0.29	1.58	0.86	0	0	2.73
Summary	4.9	78.84	16.12	0	0	100



Lakeland Industry & Community Association

St. Lina Site - December 2023

Summary of Hourly Averages

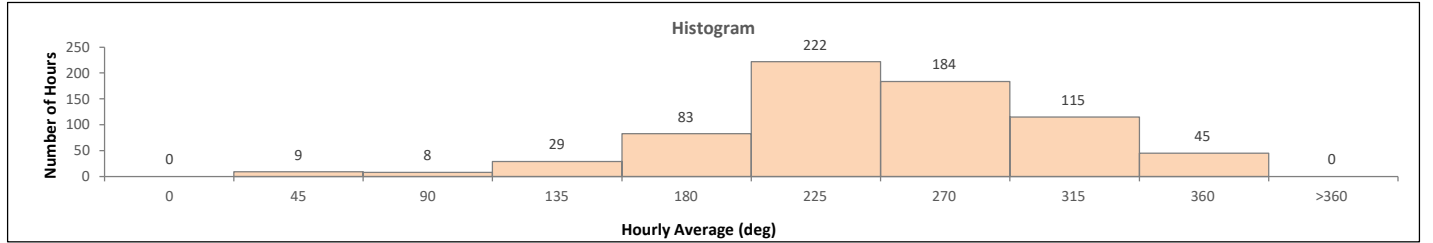
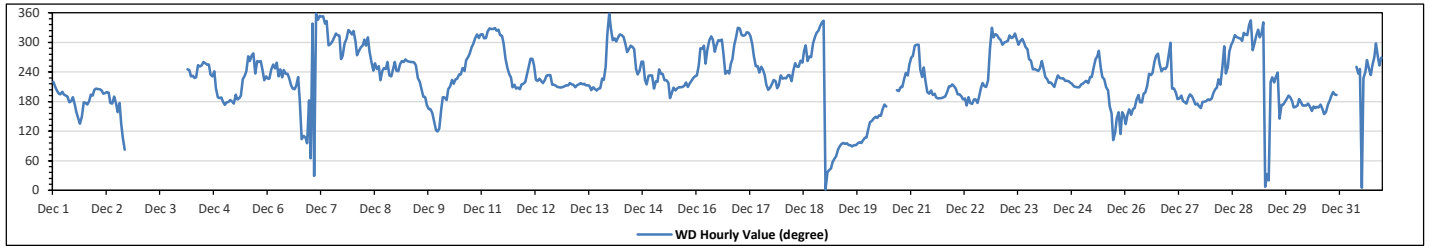
WIND DIRECTION (VWD) in sector

Monthly Average:	229 (SW)	degree	Hours in Service:	744
			Hours of Data:	695
			Hours of Missing Data:	45
			Hours of Calibration:	4
			Operational Uptime:	94.0

Day	Hourly Period Starting at (MST)																							Daily Average			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Degree	Quadrant	
Dec 1	SW	SSW	SSW	SSW	SSW	SSW	SSW	S	S	S	S	S	S	SSE	SE	SE	SSE	S	S	S	SSW	S	SSW	184	S		
Dec 2	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	S	S	S	S	SSE	S	SE	ESE	E	K	K	K	K	K	K	K	NA	NA	
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
Dec 4	K	K	K	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	233	SW	
Dec 5	S	S	S	S	S	S	SSW	S	S	S	SW	SW	WSW	W	W	W	W	SW	W	WSW	W	WSW	SW	SW	215	SSW	
Dec 6	SW	SW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	SSW	SSW	SSW	SSW	SSW	SSW	S	ESE	ESE	ESE	E	S	226	SW	
Dec 7	ENE	NNW	NNE	N	NNW	N	N	N	NNW	NNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	W	W	WNW	NW	NW	NW	NW	322	NW	
Dec 8	NW	WNW	W	W	WNW	WNW	NW	WNW	NW	W	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	WSW	266	W	
Dec 9	WSW	WSW	WSW	W	WSW	W	W	W	WSW	WSW	WSW	WSW	WSW	WSW	S	S	S	SSE	SSE	SSE	SE	ESE	ESE	ESE	225	SW	
Dec 10	SE	SSE	S	S	S	SSW	SSW	SW	SW	SW	SW	SW	SW	SW	SW	SW	W	W	WNW	WNW	NW	NW	NW	NW	246	WSW	
Dec 11	NW	NW	NW	NW	NNW	NW	NW	NNW	NW	NW	NW	NW	WNW	W	WSW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	290	WNW	
Dec 12	SW	SW	WSW	W	W	WSW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	226	SW	
Dec 13	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	NW	N	216	SW
Dec 14	NW	WNW	NW	WNW	NW	NW	NW	WNW	W	WNW	WNW	WNW	WNW	WSW	SW	WSW	W	W	SSW	SSW	SSW	SSW	SSW	SSW	281	W	
Dec 15	SSW	SW	SW	WSW	SW	SW	SW	SW	SW	S	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	216	SW	
Dec 16	SW	WSW	WNW	WNW	WNW	WSW	WNW	WNW	NW	W	WNW	WNW	WNW	NW	W	SW	WSW	SW	WSW	W	WNW	NW	WNW	NW	284	WNW	
Dec 17	NNW	NW	NW	NW	NW	NW	NW	WNW	W	WSW	WSW	WSW	WSW	WSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	256	WSW	
Dec 18	SW	SW	SW	SW	SW	SW	WSW	WSW	WSW	WSW	WSW	W	WNW	W	W	WNW	NW	NW	NW	NW	NNW	NNW	NNW	NNW	262	W	
Dec 19	N	NE	NE	ENE	ENE	ENE	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	87	E	
Dec 20	SE	SE	SE	SE	SSE	SE	SSE	SSE	SSE	S	SSE	K	C	C	C	C	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	181	S	
Dec 21	W	W	WNW	WNW	WNW	WSW	WSW	WSW	WSW	SSW	SSW	S	SSW	S	S	S	S	S	S	SSW	SSW	SSW	SSW	SSW	216	SW	
Dec 22	SSW	SSW	SSW	SSW	S	S	S	S	S	S	S	S	S	S	S	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	209	SSW	
Dec 23	NW	NW	WNW	WNW	WNW	WNW	WNW	NW	NW	NW	NW	WNW	WNW	NW	WNW	WNW	WNW	WNW	W	W	WSW	WSW	WSW	WSW	296	WNW	
Dec 24	WSW	W	WSW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	222	SW	
Dec 25	SW	SW	SW	SW	SW	SW	WSW	W	W	W	WSW	SW	SSW	SSW	S	SSE	E	ESE	SE	SSE	ESE	SSE	SSE	SSE	205	SSW	
Dec 26	SE	SSE	SSE	SSE	SSE	SSE	S	S	S	S	SSW	SSW	SSW	SW	SW	SW	W	W	W	WSW	WSW	WSW	WSW	WSW	212	SSW	
Dec 27	W	WNW	SSW	SSW	SSW	S	S	S	S	S	S	S	S	S	S	S	S	SSE	S	S	S	S	S	S	188	S	
Dec 28	S	SSW	SSW	SSW	SSW	SSW	SSW	WNW	N	NNE	NNE	SW	SW	SW	SW	SSW	NW	NW	NW	WNW	NW	NW	NNW	NNW	271	W	
Dec 29	WNW	NW	NW	NW	NNW	N	NNE	NNE	SW	SW	SW	SW	SSW	SE	S	S	S	S	S	S	S	S	SSE	SSE	218	SW	
Dec 30	S	S	S	S	S	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	K	176	S	
Dec 31	K	K	K	K	K	K	K	K	K	WSW	SW	WSW	N	SW	WSW	W	WSW	SW	WSW	W	WNW	W	WSW	W	NA	NA	

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance      **P** Power Failure  
**X** InValid Data (Machine Malfunction/Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)

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 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.





Lakeland Industry & Community Association

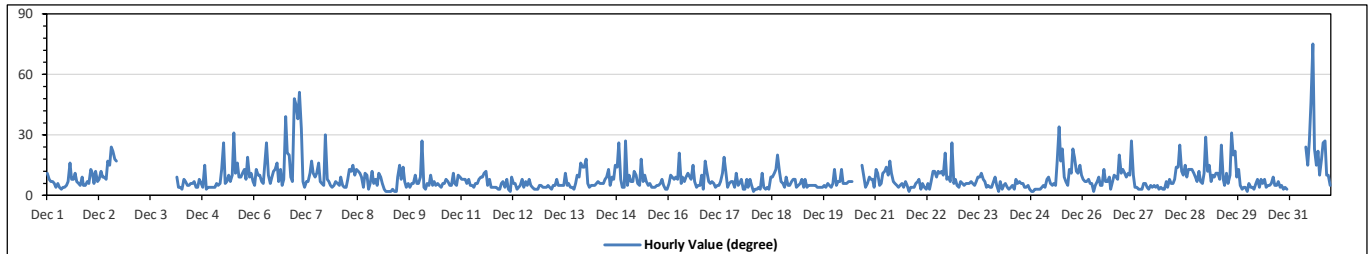
St. Lina Site - December 2023

Summary of Hour Standard Deviations

STANDARD DEVIATION WIND DIRECTION (STDWD) in Degree

Maximum Hourly Value:		75 degree on Dec 31 at hr 13										Hours in Service:		744																										
Minimum Hourly Value:		2 degree on Dec 9 at hr 4										Hours of Data:		695																										
												Hours of Missing Data:		45																										
												Hours of Calibration:		4																										
												Operational Uptime:		94.0																										
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			23														
Dec 1	11	8	7	7	6	4	6	4	3	4	4	5	7	16	8	8	11	7	6	5	9	5	5	7	3	16														
Dec 2	6	13	11	6	12	7	8	12	9	9	8	17	15	24	22	18	17	K	K	K	K	K	K	K	6	24														
Dec 3	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K																	
Dec 4	K	K	K	9	4	4	3	8	7	5	5	6	6	7	4	4	8	6	4	15	3	4	4	4	3	15														
Dec 5	4	4	6	5	6	13	26	6	7	10	7	10	31	11	16	9	9	11	13	8	19	9	11	7	4	31														
Dec 6	5	13	10	10	7	6	16	26	10	6	9	12	13	16	7	13	5	8	39	21	20	9	7	48	5	48														
Dec 7	45	38	51	33	7	4	7	7	11	17	11	9	11	16	7	6	5	30	8	7	5	4	5	7	4	51														
Dec 8	6	5	9	5	4	4	8	13	12	15	10	13	12	11	9	4	11	10	3	6	12	6	8	5	3	15														
Dec 9	11	9	6	3	2	2	2	2	3	2	2	9	15	8	14	7	4	6	4	6	6	10	6	6	2	15														
Dec 10	9	27	4	3	6	5	10	5	7	5	6	5	4	6	6	8	7	5	5	11	6	5	10	9	3	27														
Dec 11	8	8	8	6	8	5	5	4	6	6	8	9	9	11	12	5	8	4	4	4	4	3	6	3	3	12														
Dec 12	7	4	8	3	2	9	6	6	3	4	5	8	4	7	5	8	5	4	3	3	5	5	4	2	9	9														
Dec 13	4	4	5	4	3	5	5	8	5	5	5	5	11	5	6	4	4	3	6	10	9	16	14	14	3	16														
Dec 14	18	6	4	5	5	5	6	7	6	6	6	8	9	13	5	9	8	15	14	26	8	4	4	27	4	27														
Dec 15	5	10	7	7	12	10	6	5	18	7	10	7	5	6	4	4	4	5	5	6	8	5	3	3	3	18														
Dec 16	6	10	9	8	9	8	21	6	9	7	9	11	9	8	15	7	4	5	5	10	3	17	12	7	3	21														
Dec 17	6	7	6	4	5	5	7	11	19	11	4	6	7	7	4	11	5	6	8	3	3	8	4	8	3	19														
Dec 18	5	2	3	3	4	3	11	4	3	4	3	9	9	11	13	20	12	7	6	4	9	5	5	7	2	20														
Dec 19	8	8	4	5	6	8	4	8	4	5	5	5	5	4	4	4	4	4	5	4	6	5	4	6	4	8														
Dec 20	13	5	7	7	13	6	6	6	7	7	7	K	C	C	C	C	15	9	4	6	9	8	8	4	4	15														
Dec 21	13	11	5	6	11	12	14	10	17	11	7	6	5	4	5	6	4	7	5	2	4	4	4	6	2	17														
Dec 22	7	8	3	6	4	3	6	3	7	12	12	9	12	11	12	10	21	8	9	7	26	6	8	5	3	26														
Dec 23	4	7	6	5	6	6	7	6	5	7	9	9	11	8	7	4	5	4	4	7	9	5	2	2	11	11														
Dec 24	7	3	5	6	4	3	4	5	3	8	6	7	6	6	4	4	5	3	2	2	3	3	3	3	2	8														
Dec 25	4	5	4	8	9	6	5	6	5	17	34	17	23	9	7	5	13	11	23	19	12	11	15	10	4	34														
Dec 26	8	7	7	8	6	6	2	5	7	9	5	5	13	7	7	9	3	7	10	9	8	20	11	13	2	20														
Dec 27	11	9	11	10	27	10	4	4	3	3	6	6	4	3	5	4	5	4	5	3	4	3	3	3	3	27														
Dec 28	7	4	8	6	6	8	14	14	25	12	10	15	9	13	13	13	11	9	7	12	7	6	11	29	4	29														
Dec 29	12	15	7	10	9	11	11	8	25	8	5	11	6	10	31	20	22	9	13	5	3	4	4	2	2	31														
Dec 30	6	4	4	3	6	8	4	8	6	8	4	5	5	6	9	5	5	7	4	5	3	4	3	K	3	9														
Dec 31	K	K	K	K	K	K	K	K	K	24	15	27	46	75	23	15	22	10	18	26	27	10	10	5	5	75														
Diurnal Minimum	4	2	3	3	2	2	2	2	3	2	2	5	4	4	3	4	3	3	2	2	3	3	3	2																
Diurnal Maximum	45	38	51	33	27	13	26	26	25	24	34	27	46	75	31	20	22	30	39	26	27	20	15	48																
C	Monthly Calibration										S					Daily Zero-Span Check					Q					Quality Assurance														
K	Collection Error										ND					No Data (Machine Not in Service)					Y					Routine Maintenance					P					Power Failure				
X	InValid Data (Machine Malfunction/Recovery)										NRM					UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																								

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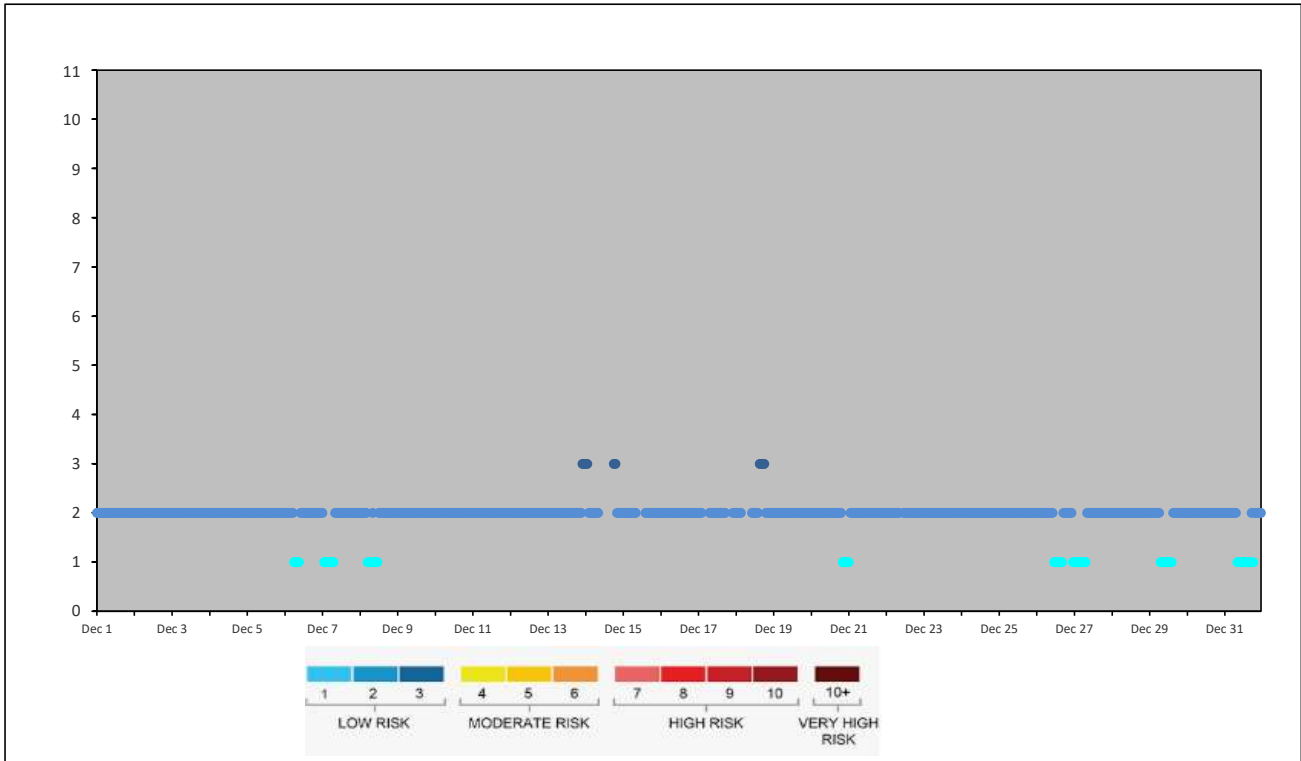
**LAC LA BICHE STATION**

## LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

*Lac La Biche Station - December 2023*

### AIR QUALITY HEALTH INDEX

Day	Hourly Period Starting at (MST)																													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
Dec 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 6	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 7	2	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 8	2	2	2	2	2	1	1	1	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 10	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 11	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 12	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 13	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 14	3	3	2	2	2	2	2	2	2											3	3	2	2	2	2	2	2	2	2	
Dec 15	2	2	2	2	2	2	2	2	2											2	2	2	2	2	2	2	2	2	2	2
Dec 16	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Dec 17	2	2	2						2	2	2	2	2	2	2	2	2	2	2						2	2	2			
Dec 18	2	2	2						2	2	2	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2				
Dec 19	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Dec 20	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1					
Dec 21	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 22	2	2	2	2	2	2	2	2	2						2	2	2	2	2	2	2	2	2	2	2					
Dec 23	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 24	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 25	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 26	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	1						
Dec 27	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 28	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 29	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2						
Dec 30	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2						
Dec 31	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2						





Lakeland Industry & Community Association

Lac La Biche Station - December 2023

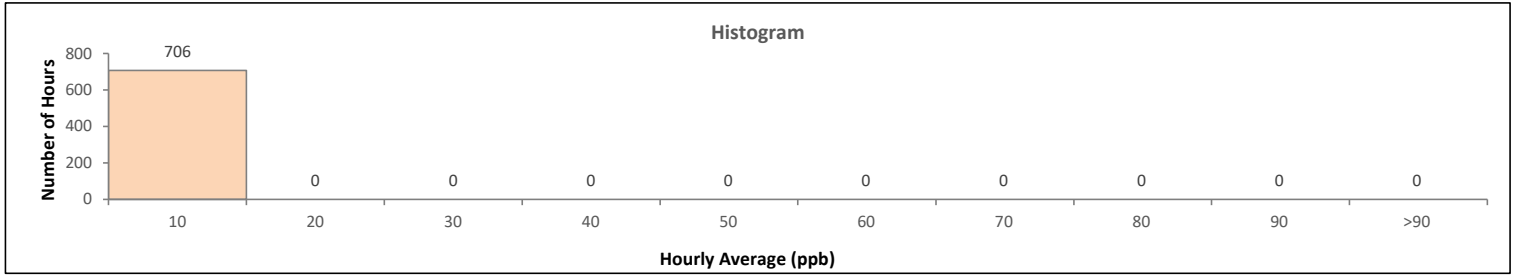
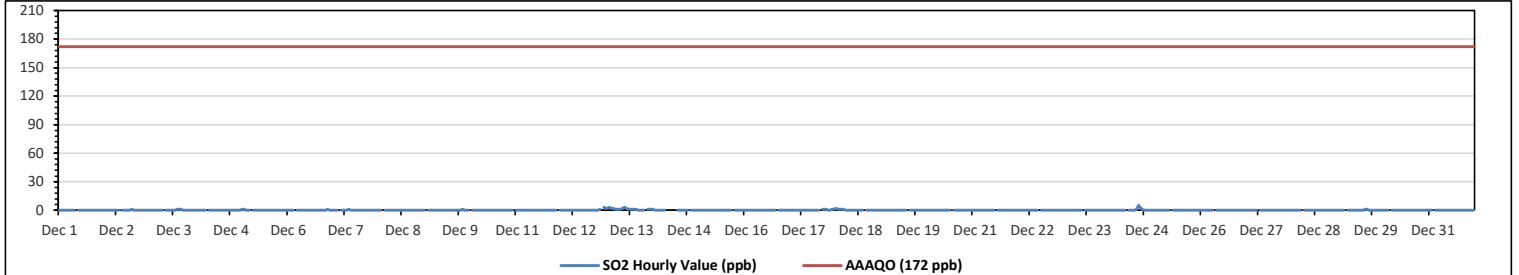
Summary of Hourly Averages

SULPHUR DIOXIDE (SO<sub>2</sub>) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 172 ppb, 24-Hour 48 ppb, 30-Day 11 ppb																												
Number of 1-Hour Exceedances: 0						Number of 24-Hour Exceedances: 0						30-Day Exceedance: 0																
Maximum Hourly Value: 5 ppb on Dec 24 at hr 15												Hours in Service: 744																
Maximum Daily Value: 1.2 ppb on Dec 13												Hours of Data: 706																
Minimum Hourly Value: 0 ppb on Dec 1 at hr 0												Hours of Missing Data: 0																
Minimum Daily Value: 0.0 ppb on Dec 1												Hours of Calibration: 38																
Monthly Average: 0.1 ppb												Operational Uptime: 100.0																
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
Dec 1	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 2	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 3	0	0	0	0	0	0	0	0	S	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Dec 4	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 5	1	1	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 6	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 7	0	0	0	S	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 8	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 9	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 10	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 13	2	3	2	2	1	1	1	1	2	3	2	1	1	1	1	1	0	0	0	0	1	S	3	2	0	3	0	3
Dec 14	1	0	0	0	0	0	0	0	Q	Q	Q	C	C	C	0	0	0	0	0	0	S	0	0	0	0	0	0	0
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	1	1	1	0	0	0	0
Dec 18	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	3	1	0	0	0	0	0	0	0	0	0	0
Dec 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Dec 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec 31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diurnal Maximum	2	3	2	2	1	1	1	1	2	3	2	1	1	1	5	3	1	1	1	1	1	1	3	2	0	0	0	0
Diurnal Average	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance  
**X** InValid Data (Equipment Malfunction /Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      **P** Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

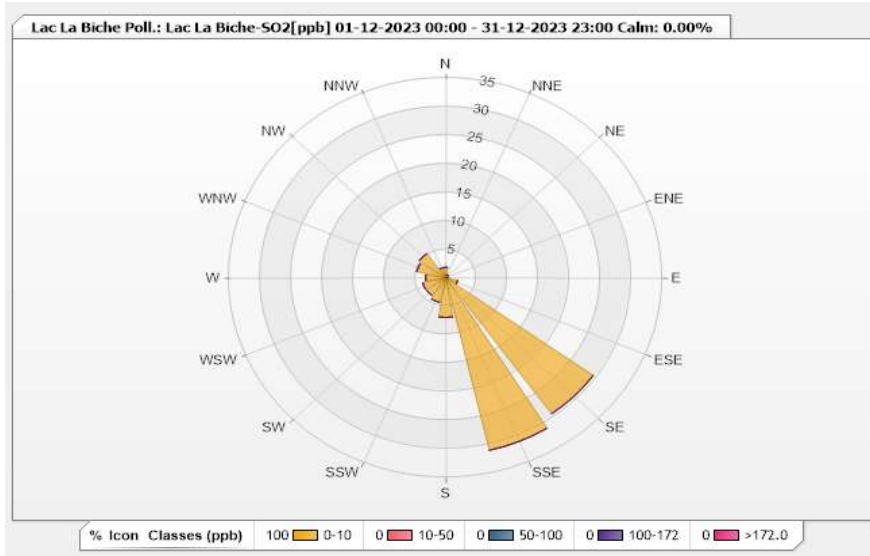


Station: Lac La Biche Poll.: Lac La Biche-SO2[ppb] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 94.89%      Calm Avg: 0.00 [ppb]

Direction	0-10	10-50	50-100	100-172	>172.0	Total
N	1.84	0	0	0	0	1.84
NNE	0.57	0	0	0	0	0.57
NE	0.57	0	0	0	0	0.57
ENE	0.28	0	0	0	0	0.28
E	0.28	0	0	0	0	0.28
ESE	1.98	0	0	0	0	1.98
SE	29.32	0	0	0	0	29.32
SSE	31.02	0	0	0	0	31.02
S	6.94	0	0	0	0	6.94
SSW	4.39	0	0	0	0	4.39
SW	3.82	0	0	0	0	3.82
WSW	3.82	0	0	0	0	3.82
W	3.26	0	0	0	0	3.26
WNW	4.82	0	0	0	0	4.82
NW	5.24	0	0	0	0	5.24
NNW	1.84	0	0	0	0	1.84
Summary	100	0	0	0	0	100



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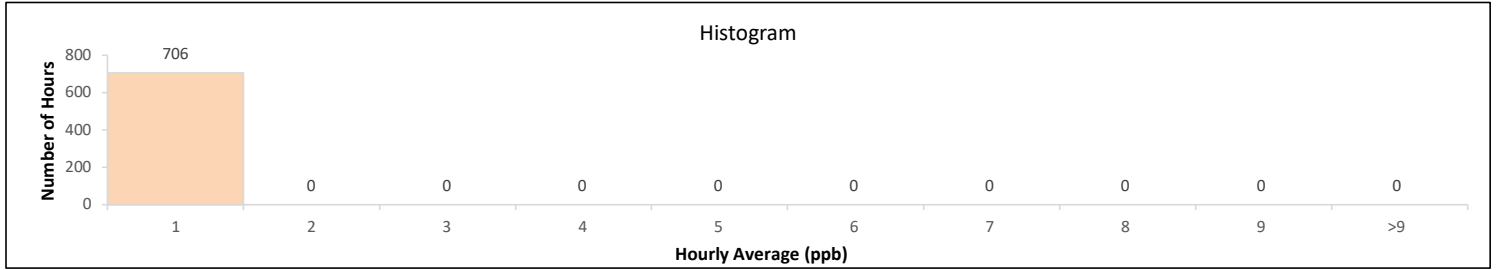
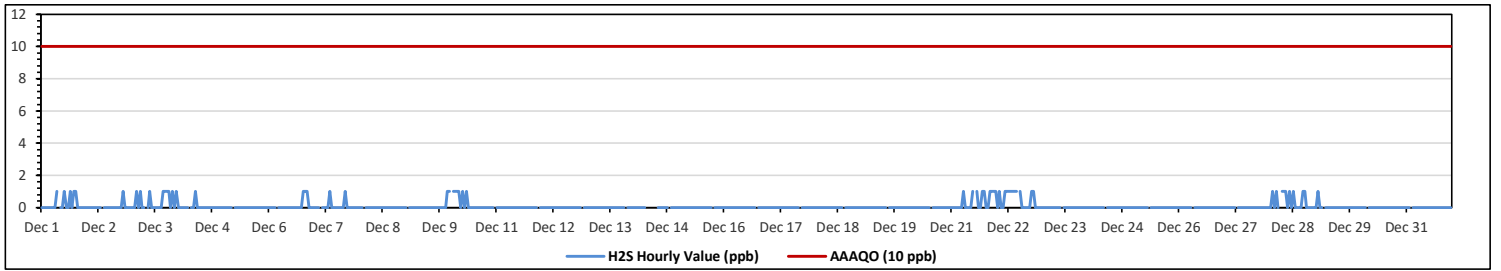
Lac La Biche Station - December 2023

Summary of Hourly Averages

HYDROGEN SULPHIDE (H<sub>2</sub>S) in ppb

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 10 ppb, 24-Hour 3 ppb																											
Number of 1-Hour Exceedances:												Number of 24-Hour Exceedances:															
Maximum Hourly Value:												Hours in Service:															
Maximum Daily Value:												Hours of Data:															
Minimum Hourly Value:												Hours of Missing Data:															
Minimum Daily Value:												Hours of Calibration:															
Monthly Average:												Operational Uptime:															
0												0															
1 ppb on Dec 1 at hr 8												744															
0.0 ppb on Dec 1												706															
0 ppb on Dec 1 at hr 0												0															
0.0 ppb on Dec 1												38															
0.1 ppb												100.0															
Day	Hourly Period Starting at (MST)																							Daily	Daily	Daily	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Minimum	Maximum	Average
Dec 1	0	0	0	0	0	0	0	0	1	S	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	1	0.0
Dec 2	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.0
Dec 3	0	0	1	0	1	0	0	S	0	1	0	0	0	0	0	0	1	1	1	0	1	0	1	0	0	1	0.0
Dec 4	0	0	0	0	0	0	S	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 5	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 6	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0.0
Dec 7	0	0	0	S	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0.0
Dec 8	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 9	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0.0
Dec 10	S	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	S	S	0	1	0.0
Dec 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	S	0	0	0.0
Dec 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	S	0	0	0	0.0
Dec 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	S	0	0	0	0	0.0
Dec 14	0	0	0	0	0	0	0	Q	Q	Q	C	C	C	0	0	0	0	0	0	0	S	0	0	0	0	0	-
Dec 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0.0
Dec 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0.0
Dec 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0.0
Dec 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0.0
Dec 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0.0
Dec 20	0	0	0	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 21	0	0	0	0	0	1	0	0	0	1	S	1	0	0	0	1	1	0	0	1	1	1	1	1	0	1	0.0
Dec 22	0	1	0	0	1	1	1	1	1	1	S	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0.0
Dec 23	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 24	0	0	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 25	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 26	0	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 27	0	0	0	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 28	0	1	0	1	0	S	1	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0.0
Dec 29	0	1	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0
Dec 30	0	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Dec 31	0	0	S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Diurnal Maximum	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1			
Diurnal Average	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1				
<b>C</b>	Monthly Calibration												<b>S</b> Daily Zero-Span Check						<b>Q</b> Quality Assurance								
<b>K</b>	Collection Error												<b>ND</b> No Data (Machine Not in Service)						<b>Y</b> Routine Maintenance								
<b>X</b>	Invalid Data (Equipment Malfunction/Recovery)												<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)						<b>P</b> Power Failure								

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

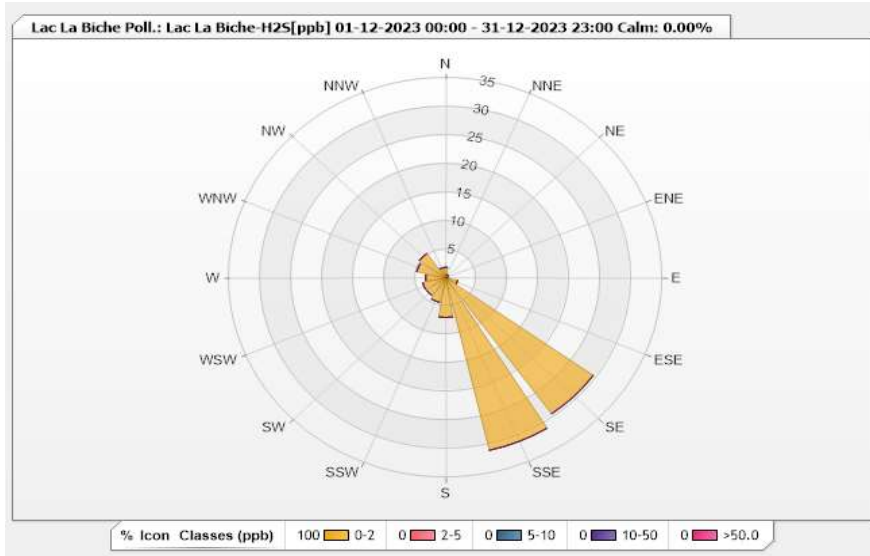


**Station: Lac La Biche Poll.: Lac La Biche-H2S[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 94.89%      Calm Avg: 0.00 [ppb]

Direction	0-2	2-5	5-10	10-50	>50.0	Total
N	1.84	0	0	0	0	1.84
NNE	0.57	0	0	0	0	0.57
NE	0.57	0	0	0	0	0.57
ENE	0.28	0	0	0	0	0.28
E	0.28	0	0	0	0	0.28
ESE	1.98	0	0	0	0	1.98
SE	29.32	0	0	0	0	29.32
SSE	31.02	0	0	0	0	31.02
S	6.94	0	0	0	0	6.94
SSW	4.39	0	0	0	0	4.39
SW	3.82	0	0	0	0	3.82
WSW	3.82	0	0	0	0	3.82
W	3.26	0	0	0	0	3.26
WNW	4.82	0	0	0	0	4.82
NW	5.24	0	0	0	0	5.24
NNW	1.84	0	0	0	0	1.84
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

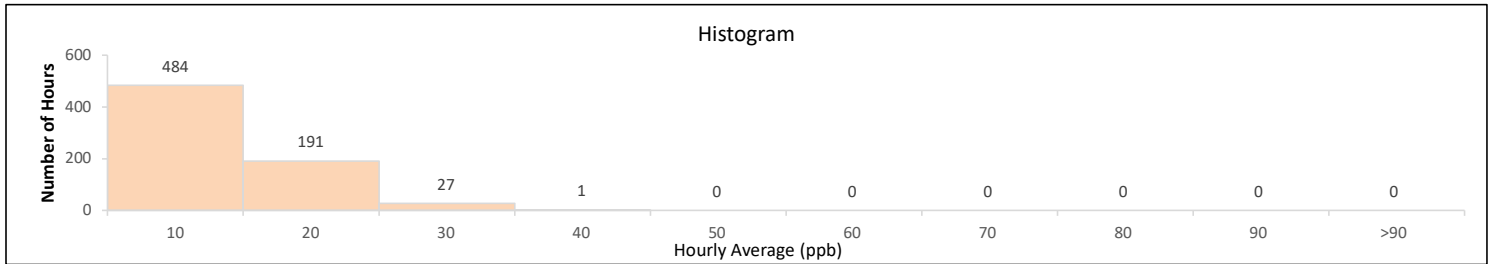
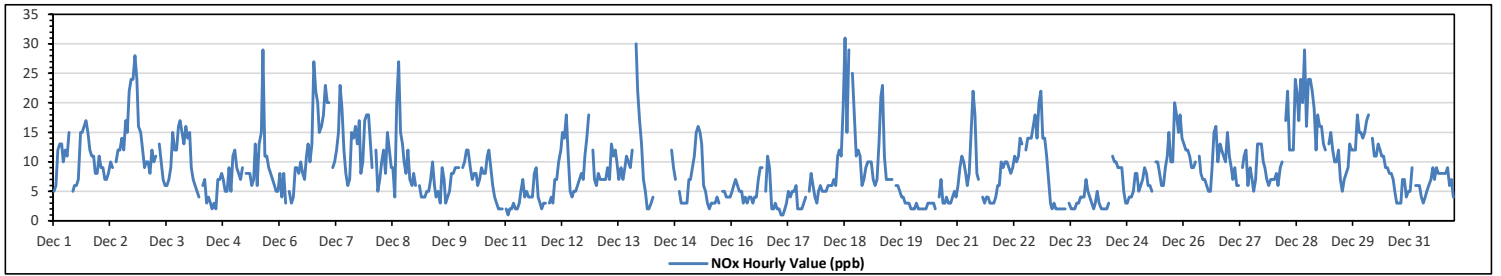
OXIDES OF NITROGEN (NOx) in ppb

Maximum Hourly Value:	31 ppb	on Dec 18 at hr 12	Hours in Service:	744
Maximum Daily Value:	16.8 ppb	on Dec 28	Hours of Data:	703
Minimum Hourly Value:	1 ppb	on Dec 11 at hr 1	Hours of Missing Data:	0
Minimum Daily Value:	3.1 ppb	on Dec 20	Hours of Calibration:	41
Monthly Average:	8.8 ppb		Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	5	6	12	13	13	10	12	11	15	S	5	6	6	7	15	15	16	17	15	12	11	11	8	8	5	17	10.8
Dec 2	11	9	9	7	7	8	10	9	S	10	12	12	14	12	17	15	22	24	24	28	24	16	15	12	7	28	14.2
Dec 3	9	10	10	8	12	10	11	S	13	10	7	6	6	7	9	15	12	12	16	17	15	13	16	14	6	17	11.2
Dec 4	15	9	7	6	5	4	S	6	7	3	4	3	2	3	2	7	7	8	7	5	9	5	11	2	15	6.1	
Dec 5	12	9	8	7	9	S	8	8	8	6	7	13	6	13	15	29	11	11	9	8	7	6	5	5	5	29	9.6
Dec 6	8	4	8	3	S	5	3	4	9	9	8	10	8	7	11	13	10	13	27	22	20	15	16	18	3	27	10.9
Dec 7	23	20	20	S	9	10	12	15	23	19	12	8	6	7	15	14	16	13	17	8	10	17	18	18	6	23	14.3
Dec 8	13	9	S	12	5	7	10	12	8	15	12	9	9	4	20	27	15	13	10	8	12	7	6	8	4	27	10.9
Dec 9	6	S	6	4	4	4	5	5	7	10	6	4	5	3	9	7	3	4	5	8	8	9	9	9	3	10	6.1
Dec 10	S	9	10	12	12	9	7	8	8	6	7	9	8	8	11	12	9	6	4	3	2	2	2	S	2	12	7.5
Dec 11	2	1	2	2	3	2	2	3	5	7	4	5	4	4	8	9	4	3	2	3	3	S	3	1	9	3.7	
Dec 12	4	3	7	7	10	12	15	14	18	11	5	4	5	5	6	7	8	7	11	14	18	S	12	7	3	18	9.1
Dec 13	6	8	7	7	7	7	9	7	13	11	12	10	7	9	7	9	11	10	9	12	S	30	22	17	6	30	10.7
Dec 14	13	7	5	2	2	3	4	Q	Q	Q	Q	C	C	C	C	C	12	9	7	S	5	3	3	3	2	13	NA
Dec 15	3	7	7	9	11	15	16	15	13	6	5	3	2	3	3	4	3	4	3	S	5	5	4	4	2	16	6.5
Dec 16	5	6	7	6	5	5	3	4	3	4	4	3	4	4	7	9	9	S	5	11	9	2	2	3	2	11	5.2
Dec 17	2	2	1	1	2	3	5	4	5	5	6	2	2	2	3	4	S	5	8	6	4	3	5	6	1	8	3.7
Dec 18	5	5	5	6	6	6	7	6	11	12	11	19	31	15	29	S	25	18	11	12	11	6	7	9	5	31	11.9
Dec 19	10	10	10	7	6	7	13	21	23	11	7	7	7	7	S	6	6	5	4	4	3	3	3	2	2	23	7.9
Dec 20	2	2	3	2	2	2	2	2	3	3	3	3	2	S	4	7	3	3	4	3	3	4	5	4	2	7	3.1
Dec 21	6	9	11	10	8	6	8	15	22	18	8	7	S	4	3	4	4	3	3	3	4	6	6	10	3	22	7.7
Dec 22	9	10	10	9	8	9	11	10	11	14	13	S	12	14	14	14	16	18	14	20	22	14	14	11	8	22	12.9
Dec 23	7	3	2	3	2	2	2	2	2	2	S	3	2	2	2	3	3	4	4	4	7	5	4	3	2	7	3.2
Dec 24	2	3	5	3	2	2	2	2	3	S	11	10	10	9	9	9	5	3	3	4	4	5	8	8	2	11	5.3
Dec 25	5	6	7	9	8	6	6	5	S	10	10	8	6	6	9	11	15	10	10	20	18	15	18	14	5	20	10.1
Dec 26	13	12	12	11	9	9	10	S	11	8	7	7	6	5	5	9	15	16	10	13	12	11	10	15	5	16	10.3
Dec 27	11	9	7	9	6	6	S	9	11	12	6	9	7	5	7	13	13	13	10	9	7	6	7	7	5	13	8.7
Dec 28	7	8	6	9	10	S	17	22	12	12	12	24	22	17	24	20	29	16	24	24	22	19	12	18	6	29	16.8
Dec 29	16	16	13	12	S	13	15	12	10	10	12	7	5	7	8	9	13	12	12	12	18	15	15	14	5	18	12.0
Dec 30	15	17	18	S	14	11	11	13	12	11	11	9	9	8	8	7	5	3	3	7	7	7	4	5	3	18	9.2
Dec 31	5	9	S	6	6	6	4	3	4	5	6	7	9	7	9	8	8	8	8	8	9	6	7	4	3	9	6.6
Diurnal Maximum	23	20	20	13	14	15	17	22	23	19	13	24	31	17	29	29	24	27	28	24	30	22	18				
Diurnal Average	8.3	7.9	8.1	7.0	7.0	6.9	8.3	8.8	10.4	9.3	8.0	7.8	7.7	7.0	9.8	10.8	11.1	9.7	9.9	10.3	10.2	9.1	8.9	9.0			

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	In/Valid Data (Equipment Malfunction/Recovery)	NRM	Unit/Maint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

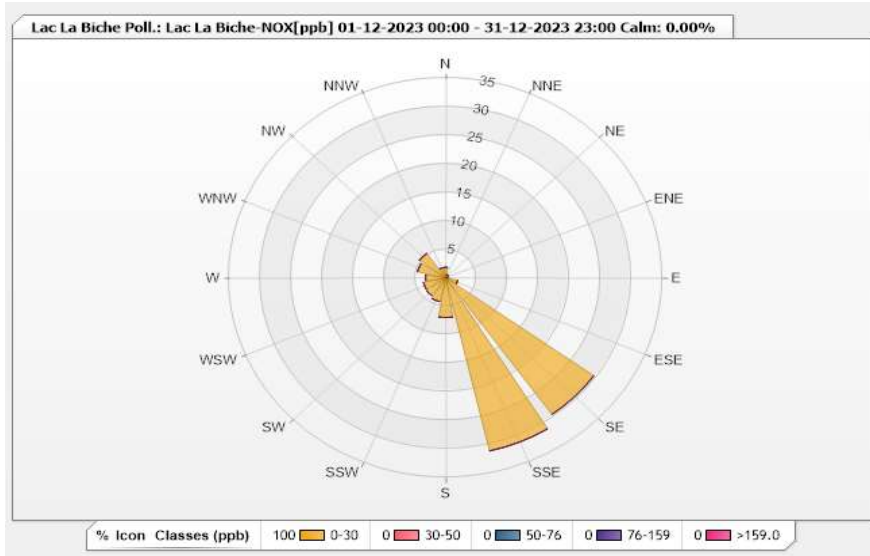


**Station: Lac La Biche Poll.: Lac La Biche-NOX[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 94.49%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.85	0	0	0	0	1.85
NNE	0.57	0	0	0	0	0.57
NE	0.43	0.14	0	0	0	0.57
ENE	0.28	0	0	0	0	0.28
E	0.28	0	0	0	0	0.28
ESE	1.99	0	0	0	0	1.99
SE	29.45	0	0	0	0	29.45
SSE	31.15	0	0	0	0	31.15
S	6.97	0	0	0	0	6.97
SSW	4.27	0	0	0	0	4.27
SW	3.84	0	0	0	0	3.84
WSW	3.7	0	0	0	0	3.7
W	3.27	0	0	0	0	3.27
WNW	4.69	0	0	0	0	4.69
NW	5.26	0	0	0	0	5.26
NNW	1.85	0	0	0	0	1.85
Summary	100	0.14	0	0	0	100



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

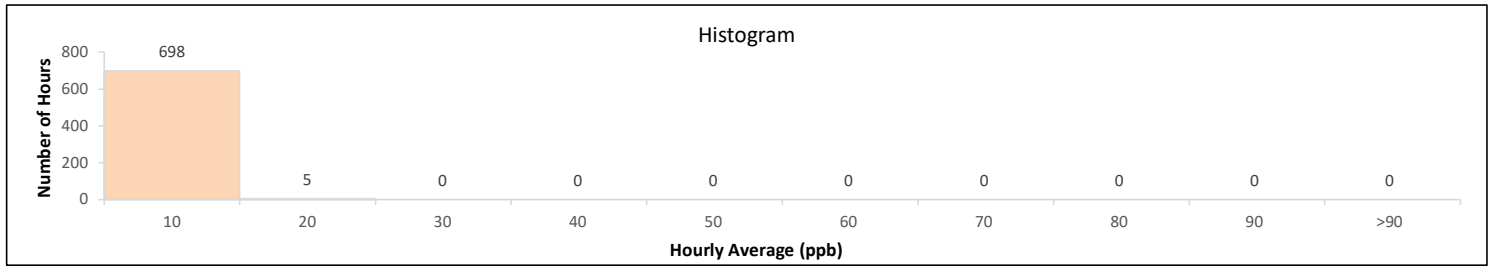
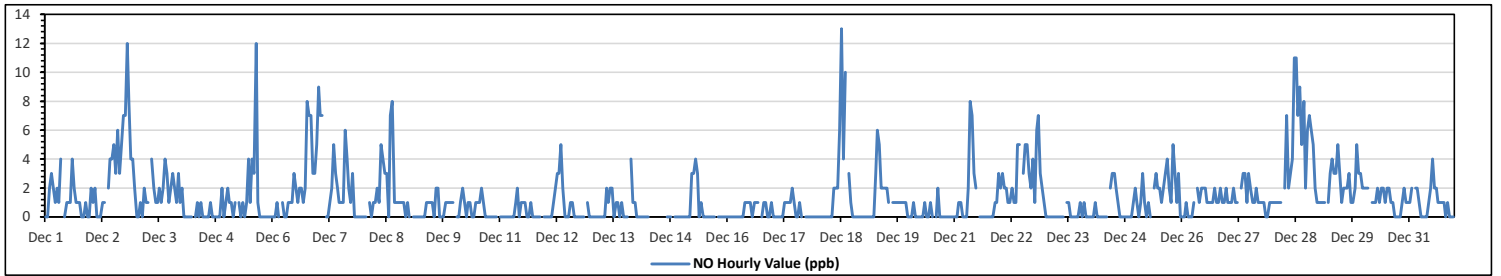
NITRIC OXIDE (NO) in ppb

Maximum Hourly Value:	13	ppb	on Dec 18 at hr 12	Hours in Service:	744
Maximum Daily Value:	4.5	ppb	on Dec 28	Hours of Data:	703
Minimum Hourly Value:	0	ppb	on Dec 1 at hr 0	Hours of Missing Data:	0
Minimum Daily Value:	0.2	ppb	on Dec 23	Hours of Calibration:	41
Monthly Average:	1.3	ppb		Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23		
Dec 1	0	0	2	3	2	1	2	1	4	S	0	1	1	1	4	2	1	1	1	0	0	1	0	0	0	0	4	12	1.2
Dec 2	2	1	2	0	0	0	1	1	S	2	4	4	5	3	6	3	5	7	7	12	8	4	4	4	2	0	12	3.6	
Dec 3	0	0	1	0	2	1	1	S	4	2	1	1	2	1	2	4	3	1	2	3	2	1	3	1	0	4	4	1.7	
Dec 4	2	0	0	0	0	0	S	0	1	0	1	0	0	0	0	1	0	0	0	0	0	2	0	1	0	2	2	0.3	
Dec 5	2	1	1	0	1	S	1	0	1	0	1	4	1	4	3	12	1	0	0	0	0	0	0	0	0	0	12	1.4	
Dec 6	0	0	1	0	S	1	0	0	1	1	1	3	2	1	2	2	1	2	8	7	7	3	3	5	0	8	2.2		
Dec 7	9	7	7	S	0	0	1	2	5	3	2	1	1	1	6	4	2	1	3	0	0	0	0	0	0	0	9	2.4	
Dec 8	0	0	S	1	0	1	2	1	5	4	3	3	0	7	8	1	1	1	1	1	1	1	0	1	0	8	1.9		
Dec 9	0	S	0	0	0	0	0	0	0	1	1	1	1	0	2	2	0	0	0	0	1	1	1	1	0	2	0.6		
Dec 10	S	0	0	1	2	1	0	1	1	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0	S	0	2	0.5	
Dec 11	0	0	0	0	0	0	0	0	1	2	0	1	1	1	0	0	1	0	0	0	0	0	0	S	0	0	2	0.3	
Dec 12	0	0	0	0	1	2	3	3	5	2	0	0	0	1	1	0	0	0	0	0	0	0	S	1	0	0	5	0.8	
Dec 13	0	0	0	0	0	0	0	0	2	1	2	2	0	1	1	0	1	0	0	0	0	S	4	1	1	0	4	0.7	
Dec 14	0	0	0	0	0	0	0	0	Q	Q	Q	Q	C	C	C	C	C	0	0	0	0	0	0	0	0	0	0	NA	
Dec 15	0	0	0	0	0	3	3	4	3	0	1	0	0	0	0	0	0	0	0	S	0	0	0	0	0	0	4	0.6	
Dec 16	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	S	0	1	1	0	0	1	0	1	1	0.4	
Dec 17	0	0	0	0	0	0	1	1	1	1	2	1	0	0	1	0	S	0	0	0	0	0	0	0	0	0	2	0.3	
Dec 18	0	0	0	0	0	0	0	0	2	2	2	6	13	4	10	S	3	1	0	0	0	0	0	0	0	0	13	1.9	
Dec 19	0	0	0	0	0	0	3	6	5	2	2	2	2	2	1	S	1	1	1	1	1	1	1	1	0	6	1.3		
Dec 20	0	0	1	0	0	0	0	0	1	0	0	1	0	S	0	2	0	0	0	0	0	0	0	0	0	0	2	0.2	
Dec 21	0	0	1	1	0	0	0	2	8	7	3	2	S	0	0	0	0	0	0	0	0	1	1	3	0	8	1.3		
Dec 22	2	3	2	2	1	1	2	1	1	5	5	S	3	5	5	3	2	4	1	6	7	3	2	1	1	7	2.9		
Dec 23	0	0	0	0	0	0	0	0	0	0	S	1	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0.2		
Dec 24	0	0	1	0	0	0	0	0	0	S	2	3	3	2	1	0	0	0	0	0	0	0	1	2	0	3	0.7		
Dec 25	1	0	1	3	1	0	1	0	S	2	3	2	2	1	2	3	4	2	1	5	3	1	3	0	0	5	1.8		
Dec 26	0	0	1	0	0	0	1	S	2	1	2	2	2	1	1	1	1	1	2	1	1	2	1	2	0	2	1.1		
Dec 27	1	1	1	2	1	1	S	2	3	3	1	3	2	1	1	2	1	1	1	1	0	0	1	1	0	3	1.3		
Dec 28	1	1	1	1	1	S	2	7	2	3	4	11	11	7	9	5	8	2	6	7	6	5	2	1	1	11	4.5		
Dec 29	1	1	1	1	S	1	3	4	3	3	5	3	1	2	2	2	3	1	1	2	5	3	3	2	1	5	2.3		
Dec 30	2	2	2	S	1	1	1	2	1	2	2	1	2	2	1	1	0	0	0	1	2	1	1	0	2	2	1.2		
Dec 31	1	2	S	2	2	1	0	0	0	0	1	2	4	2	2	1	1	1	1	0	1	0	0	0	0	4	1.0		
Diurnal Maximum	9	7	7	3	2	3	3	7	8	7	5	11	13	7	10	8	7	8	12	8	12	8	5	4	5				
Diurnal Average	0.8	0.6	0.9	0.6	0.5	0.5	0.9	1.4	2.1	1.8	1.8	2.2	2.2	1.5	2.5	2.1	1.4	0.9	1.2	1.6	1.6	1.1	1.0	0.9					

C	Monthly Calibration	S	Daily Zero-Span Check	Q	Quality Assurance
K	Collection Error	ND	No Data (Machine Not in Service)	Y	Routine Maintenance
X	InValid Data (Equipment Malfunction /Recovery)	NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	P	Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

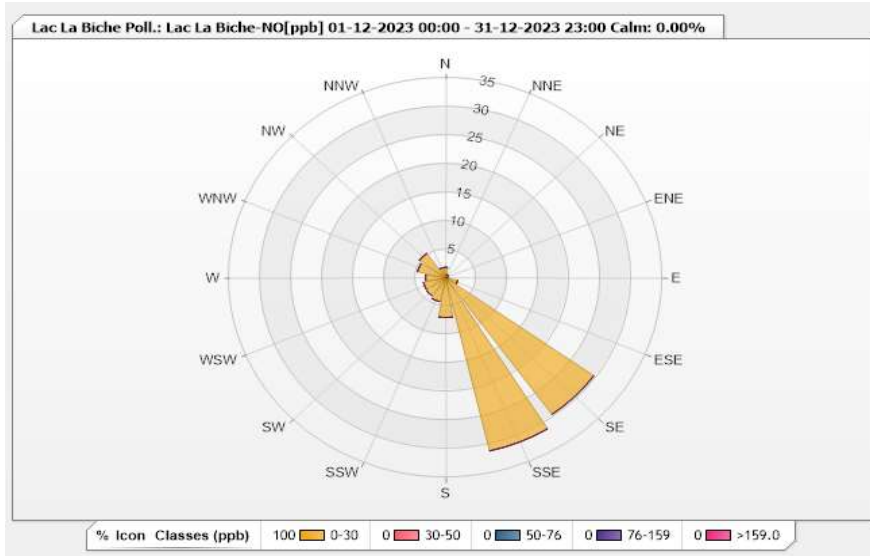


**Station: Lac La Biche Poll.: Lac La Biche-NO[ppb] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 94.49%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.85	0	0	0	0	1.85
NNE	0.57	0	0	0	0	0.57
NE	0.57	0	0	0	0	0.57
ENE	0.28	0	0	0	0	0.28
E	0.28	0	0	0	0	0.28
ESE	1.99	0	0	0	0	1.99
SE	29.45	0	0	0	0	29.45
SSE	31.15	0	0	0	0	31.15
S	6.97	0	0	0	0	6.97
SSW	4.27	0	0	0	0	4.27
SW	3.84	0	0	0	0	3.84
WSW	3.7	0	0	0	0	3.7
W	3.27	0	0	0	0	3.27
WNW	4.69	0	0	0	0	4.69
NW	5.26	0	0	0	0	5.26
NNW	1.85	0	0	0	0	1.85
Summary	100	0	0	0	0	100



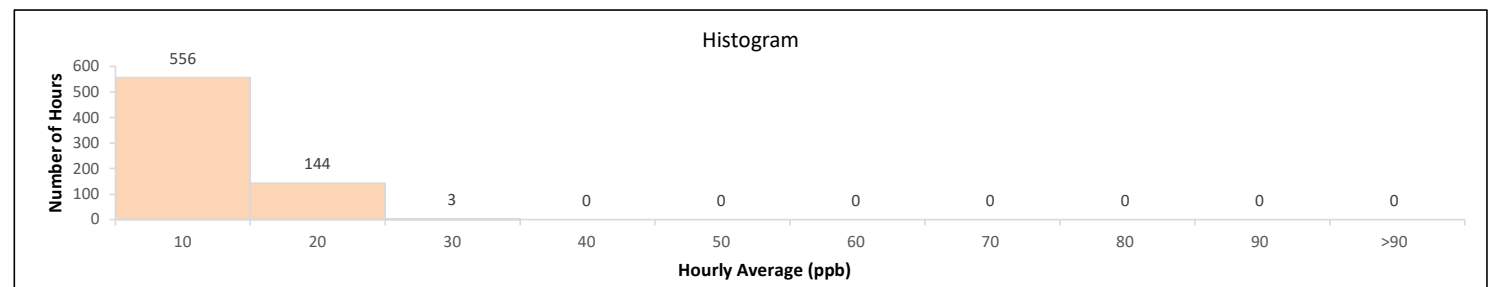
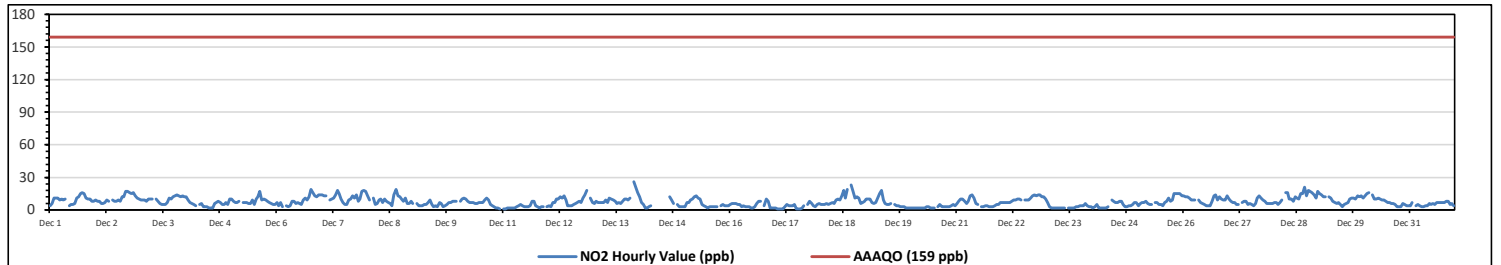


**Lakeland Industry & Community Association**  
**Lac La Biche Station - December 2023**  
**Summary of Hourly Averages**  
**NITROGEN DIOXIDE (NO<sub>2</sub>) in ppb**

Alberta Ambient Air Quality Objectives (AAAQO): 1-Hour 159 ppb																											
Number of 1-Hour Exceedances: 0																											
Maximum Hourly Value: 26 ppb on Dec 13 at hr 21												Hours in Service: 744															
Maximum Daily Value: 12.4 ppb on Dec 28												Hours of Data: 703															
Minimum Hourly Value: 1 ppb on Dec 10 at hr 22												Hours of Missing Data: 0															
Minimum Daily Value: 2.8 ppb on Dec 20												Hours of Calibration: 41															
Monthly Average: 7.4 ppb												Operational Uptime: 100.0															
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	4	6	11	11	11	9	10	9	10	S	4	5	5	6	11	12	15	16	15	11	10	10	8	8	4	16	9.4
Dec 2	9	8	8	6	6	7	9	8	S	9	8	8	9	8	12	12	17	17	16	15	16	13	11	10	6	17	10.5
Dec 3	9	9	9	8	10	10	10	S	10	8	6	5	5	5	7	11	10	12	13	14	13	12	13	12	5	14	9.6
Dec 4	12	9	7	6	5	4	S	5	6	3	3	3	2	2	2	6	7	8	7	5	5	7	5	10	2	12	5.6
Dec 5	10	8	7	7	8	S	7	7	7	6	6	9	5	10	12	17	9	10	9	8	7	6	5	5	5	17	8.0
Dec 6	7	4	7	3	S	4	3	4	8	8	6	7	6	5	9	11	9	12	19	16	13	12	14	14	3	19	8.7
Dec 7	14	13	13	S	9	10	11	14	18	15	10	7	5	5	9	10	13	11	14	8	10	17	18	17	5	18	11.8
Dec 8	13	9	S	11	5	6	9	10	7	10	8	7	6	4	14	19	13	12	10	8	11	6	6	8	4	19	9.2
Dec 9	6	S	6	4	4	4	5	5	7	9	5	3	4	3	7	6	3	4	5	7	7	8	8	8	3	9	5.6
Dec 10	S	8	10	11	10	8	7	7	7	6	6	7	7	7	9	11	9	5	4	3	2	2	1	S	1	11	6.7
Dec 11	1	1	2	2	2	2	2	3	4	5	4	3	3	3	4	8	8	4	3	2	3	S	S	3	1	8	3.3
Dec 12	4	3	7	7	10	10	12	11	13	9	4	4	4	5	6	7	8	7	11	14	18	S	11	7	3	18	8.3
Dec 13	6	8	7	7	7	7	9	7	11	10	9	8	6	7	6	8	10	10	9	11	S	26	20	16	6	26	9.8
Dec 14	12	7	5	2	2	3	4	Q	Q	Q	Q	C	C	C	C	C	12	9	6	S	5	3	3	3	2	12	NA
Dec 15	3	7	7	9	10	12	13	11	10	5	4	3	2	3	3	3	3	3	S	4	5	4	4	4	2	13	5.7
Dec 16	5	6	6	6	5	5	3	4	3	3	3	2	2	3	6	8	8	S	4	10	8	2	2	2	2	10	4.6
Dec 17	2	1	1	1	1	3	5	4	4	4	5	1	1	1	2	4	S	5	8	6	4	3	5	6	1	8	3.3
Dec 18	5	5	5	6	5	6	7	6	9	10	9	13	18	11	19	S	23	17	11	12	11	6	7	8	5	23	10.0
Dec 19	10	10	10	7	6	7	11	15	18	9	6	5	5	6	S	5	4	4	3	3	3	2	2	2	2	18	6.7
Dec 20	2	2	2	2	2	2	2	2	3	3	2	2	2	S	3	5	3	3	3	3	3	4	5	4	2	5	2.8
Dec 21	6	8	10	10	8	6	8	13	14	11	6	5	S	3	3	4	4	3	3	3	4	5	5	7	3	14	6.5
Dec 22	7	7	7	7	7	8	9	9	10	10	9	S	9	9	9	11	13	14	13	14	14	12	12	10	7	14	10.0
Dec 23	7	3	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4	4	6	4	3	3	2	7	3.0
Dec 24	2	3	5	2	2	2	2	2	3	S	9	8	7	7	8	8	5	3	3	4	4	5	7	7	2	9	4.7
Dec 25	4	6	7	7	8	6	5	S	S	7	7	5	5	4	7	8	11	8	9	15	15	15	15	13	4	15	8.3
Dec 26	13	12	12	11	9	9	9	S	9	7	6	5	4	4	4	8	13	14	9	12	10	9	9	13	4	14	9.2
Dec 27	10	8	7	7	5	5	S	7	8	8	5	6	5	4	6	11	13	11	9	8	6	6	6	6	4	13	7.3
Dec 28	7	7	5	7	9	S	16	16	10	10	8	12	11	10	15	15	21	13	18	17	16	14	11	17	5	21	12.4
Dec 29	15	14	12	12	S	12	11	8	7	6	7	5	3	5	6	7	10	11	11	10	13	12	13	11	3	15	9.6
Dec 30	13	15	16	S	14	10	10	11	10	9	9	8	7	7	6	6	5	3	3	3	6	5	4	4	3	16	8.0
Dec 31	4	7	S	4	5	4	3	3	4	4	6	5	6	5	7	7	7	7	7	8	8	5	6	4	3	8	5.5
Diurnal Maximum	15	15	16	12	14	12	16	16	18	15	10	13	18	11	19	19	23	17	19	17	18	26	20	17			
Diurnal Average	7.4	7.1	7.3	6.4	6.4	6.3	7.4	7.4	8.3	7.4	6.2	5.6	5.4	5.3	7.4	8.7	9.6	8.7	8.6	8.6	8.5	7.9	8.0	8.1			

**C** Monthly Calibration      **S** Daily Zero-Span Check      **Q** Quality Assurance  
**K** Collection Error      **ND** No Data (Machine Not in Service)      **Y** Routine Maintenance  
**X** InValid Data (Equipment Malfunction/Recovery)      **NRM** UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)      **P** Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.

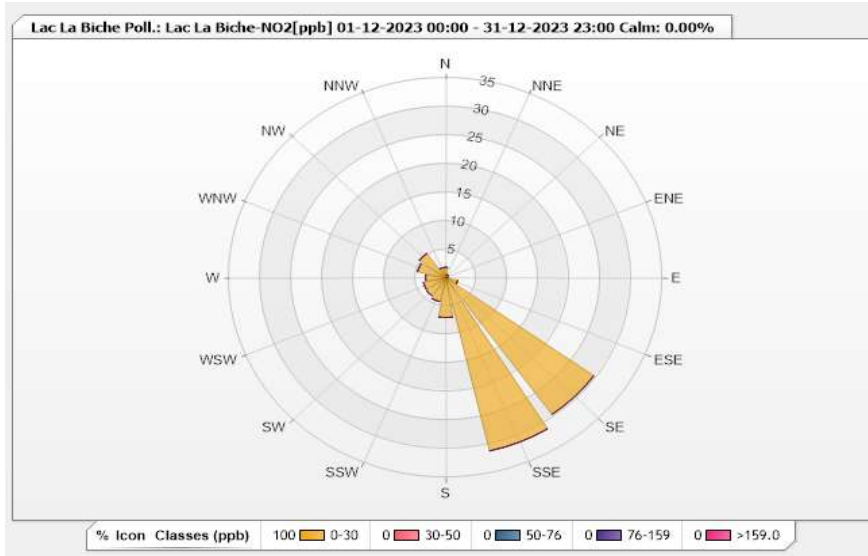


Station: Lac La Biche Poll.: Lac La Biche-NO2[ppb] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 94.49%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.85	0	0	0	0	1.85
NNE	0.57	0	0	0	0	0.57
NE	0.57	0	0	0	0	0.57
ENE	0.28	0	0	0	0	0.28
E	0.28	0	0	0	0	0.28
ESE	1.99	0	0	0	0	1.99
SE	29.45	0	0	0	0	29.45
SSE	31.15	0	0	0	0	31.15
S	6.97	0	0	0	0	6.97
SSW	4.27	0	0	0	0	4.27
SW	3.84	0	0	0	0	3.84
WSW	3.7	0	0	0	0	3.7
W	3.27	0	0	0	0	3.27
WNW	4.69	0	0	0	0	4.69
NW	5.26	0	0	0	0	5.26
NNW	1.85	0	0	0	0	1.85
Summary	100	0	0	0	0	100



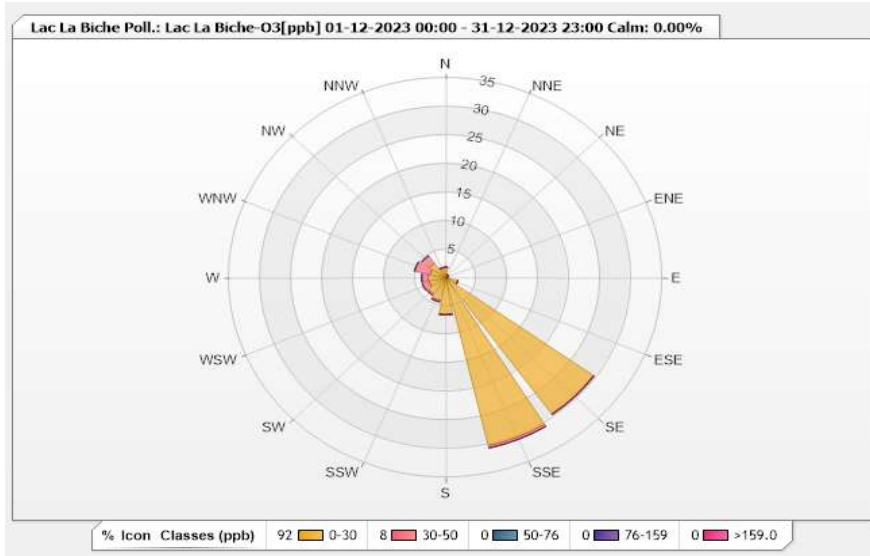


Station: Lac La Biche Poll.: Lac La Biche-O3[ppb] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 93.01%      Calm Avg: 0.00 [ppb]

Direction	0-30	30-50	50-76	76-159	>159.0	Total
N	1.88	0	0	0	0	1.88
NNE	0.58	0	0	0	0	0.58
NE	0.58	0	0	0	0	0.58
ENE	0.29	0	0	0	0	0.29
E	0.29	0	0	0	0	0.29
ESE	2.02	0	0	0	0	2.02
SE	29.34	0.14	0	0	0	29.48
SSE	30.2	0.43	0	0	0	30.63
S	6.36	0.14	0	0	0	6.5
SSW	4.05	0.29	0	0	0	4.34
SW	3.47	0.29	0	0	0	3.76
WSW	2.75	1.16	0	0	0	3.91
W	2.89	1.01	0	0	0	3.9
WNW	2.6	2.6	0	0	0	5.2
NW	3.18	1.59	0	0	0	4.77
NNW	1.73	0.14	0	0	0	1.87
Summary	92.21	7.79	0	0	0	100



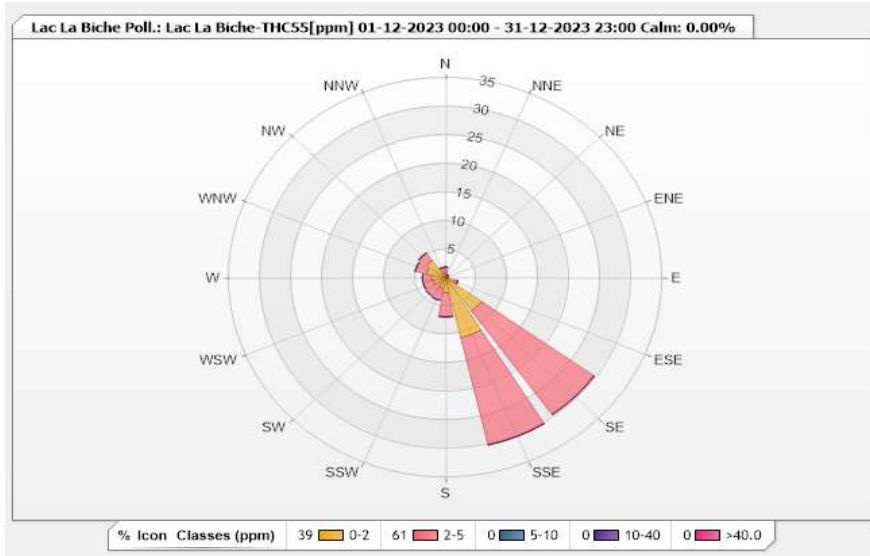


Station: Lac La Biche Poll.: Lac La Biche-THC55[ppm] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.47%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-40	>40.0	Total
N	0.87	1.02	0	0	0	1.89
NNE	0.29	0.29	0	0	0	0.58
NE	0.44	0.15	0	0	0	0.59
ENE	0.15	0.15	0	0	0	0.3
E	0.15	0.15	0	0	0	0.3
ESE	1.45	0.58	0	0	0	2.03
SE	7.12	22.38	0	0	0	29.5
SSE	10.76	19.33	0	0	0	30.09
S	2.62	4.22	0	0	0	6.84
SSW	1.89	2.18	0	0	0	4.07
SW	1.16	2.76	0	0	0	3.92
WSW	2.03	1.74	0	0	0	3.77
W	2.33	1.45	0	0	0	3.78
WNW	3.2	1.89	0	0	0	5.09
NW	3.78	1.6	0	0	0	5.38
NNW	0.44	1.45	0	0	0	1.89
Summary	38.68	61.34	0	0	0	100



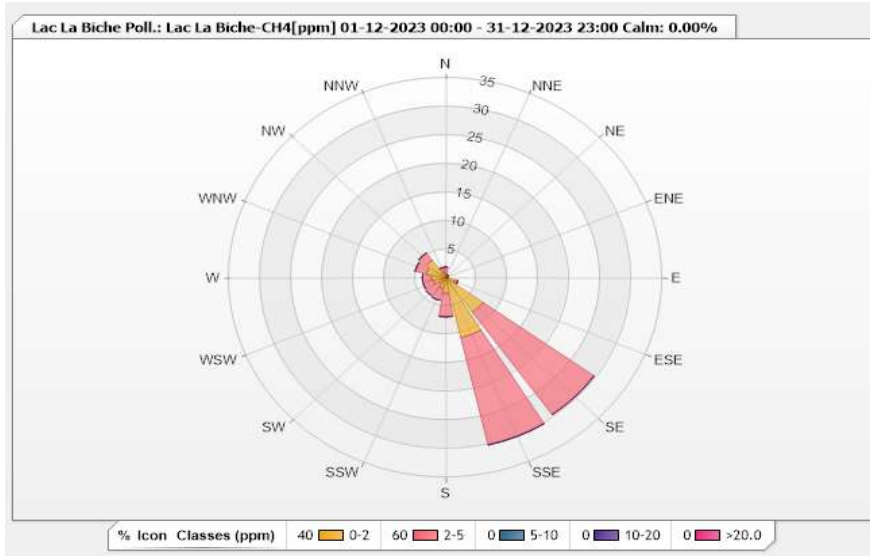


**Station: Lac La Biche Poll.: Lac La Biche-CH4[ppm] Monthly: 12-2023**

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.47%      Calm Avg: 0.00 [ppm]

Direction	0-2	2-5	5-10	10-20	>20.0	Total
N	0.87	1.02	0	0	0	1.89
NNE	0.29	0.29	0	0	0	0.58
NE	0.44	0.15	0	0	0	0.59
ENE	0.15	0.15	0	0	0	0.3
E	0.15	0.15	0	0	0	0.3
ESE	1.45	0.58	0	0	0	2.03
SE	7.41	22.09	0	0	0	29.5
SSE	10.76	19.33	0	0	0	30.09
S	2.76	4.07	0	0	0	6.83
SSW	1.89	2.18	0	0	0	4.07
SW	1.16	2.76	0	0	0	3.92
WSW	2.03	1.74	0	0	0	3.77
W	2.33	1.45	0	0	0	3.78
WNW	3.2	1.89	0	0	0	5.09
NW	3.78	1.6	0	0	0	5.38
NNW	0.87	1.02	0	0	0	1.89
Summary	39.54	60.47	0	0	0	100





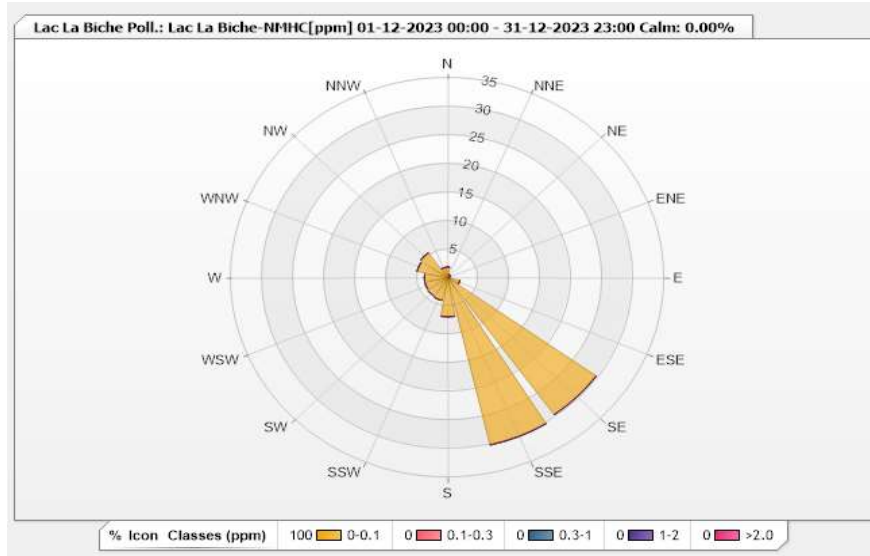


Station: Lac La Biche Poll.: Lac La Biche-NMHC[ppm] Monthly: 12-2023

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 92.47%      Calm Avg: 0.00 [ppm]

Direction	0-0.1	0.1-0.3	0.3-1	1-2	>2.0	Total
N	1.89	0	0	0	0	1.89
NNE	0.58	0	0	0	0	0.58
NE	0.58	0	0	0	0	0.58
ENE	0.29	0	0	0	0	0.29
E	0.29	0	0	0	0	0.29
ESE	2.03	0	0	0	0	2.03
SE	29.51	0	0	0	0	29.51
SSE	30.09	0	0	0	0	30.09
S	6.83	0	0	0	0	6.83
SSW	4.07	0	0	0	0	4.07
SW	3.92	0	0	0	0	3.92
WSW	3.78	0	0	0	0	3.78
W	3.78	0	0	0	0	3.78
WNW	5.09	0	0	0	0	5.09
NW	5.38	0	0	0	0	5.38
NNW	1.89	0	0	0	0	1.89
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

PARTICULATE MATTER 2.5 (PM<sub>2.5</sub>) in µg/m<sup>3</sup>

Alberta Ambient Air Quality Guideline (AAAQG): 1-Hour 80 µg/m <sup>3</sup> , Alberta Ambient Air Quality Objective (AAAQO): 24-Hour 29 µg/m <sup>3</sup>			
Number of 1-Hour Exceedances:	0	Number of 24-Hour Exceedances:	0
Maximum Hourly Value:	19 µg/m <sup>3</sup> on Dec 6 at hr 21	Hours in Service:	744
Maximum Daily Value:	12.2 µg/m <sup>3</sup> on Dec 22	Hours of Data:	743
Minimum Hourly Value:	0 µg/m <sup>3</sup> on Dec 17 at hr 14	Hours of Missing Data:	0
Minimum Daily Value:	1 µg/m <sup>3</sup> on Dec 23	Hours of Calibration:	1
Monthly Average:	4.9 µg/m <sup>3</sup>	Operational Uptime:	100.0

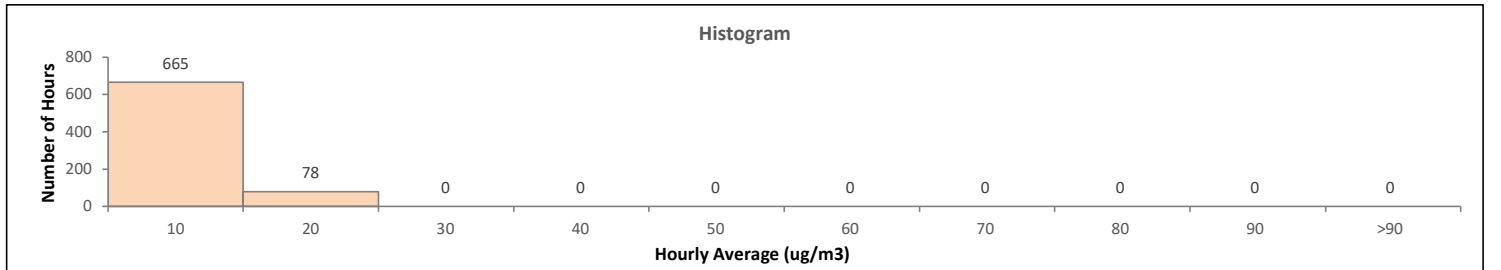
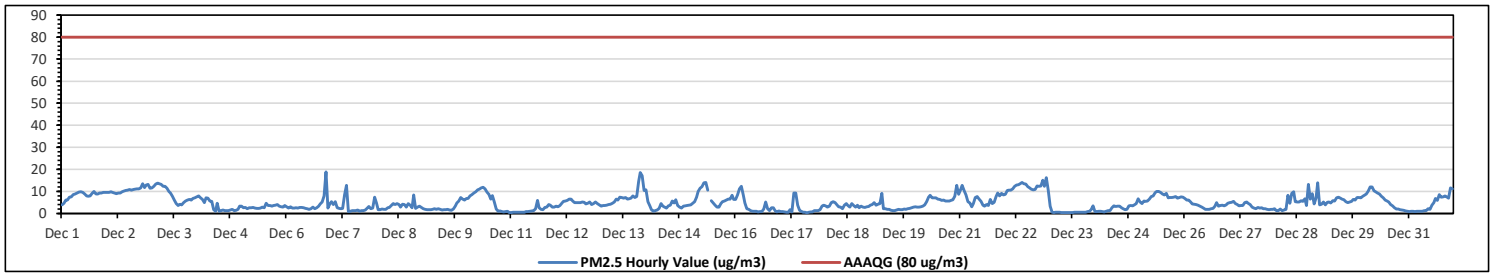
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23		
Dec 1	4	5	6	6	7	8	9	9	9	10	10	10	9	8	8	9	10	9	9	9	9	10	10	10	4	10	8.2		
Dec 2	10	10	10	10	9	9	9	9	10	10	10	11	11	11	11	11	11	11	12	13	12	13	13	11	9	13	10.7		
Dec 3	12	12	13	14	14	13	12	12	11	10	9	8	6	5	4	4	5	6	6	6	6	7	7	7	4	14	8.6		
Dec 4	8	8	7	6	5	7	7	6	6	2	1	5	1	1	2	1	1	1	2	2	1	1	2	3	1	8	3.5		
Dec 5	3	3	3	2	3	3	3	2	2	2	2	3	3	5	4	4	3	4	4	4	3	3	3	4	2	5	3.0		
Dec 6	3	2	3	2	2	3	2	3	3	3	2	2	2	2	3	2	3	3	4	4	5	8	19	2	4	2	19	3.7	
Dec 7	5	4	5	3	2	2	2	8	13	1	1	1	1	1	2	1	1	1	2	2	3	2	2	7	1	13	3.1		
Dec 8	5	2	2	2	2	2	3	3	4	5	4	4	4	3	4	4	3	5	4	3	8	2	3	3	2	8	3.4		
Dec 9	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	3	5	6	7	6	6	1	7	2.8		
Dec 10	7	7	8	9	9	10	11	11	12	12	11	10	9	7	8	5	2	1	1	1	1	1	1	0	0	12	6.3		
Dec 11	0	1	1	1	1	1	1	1	1	1	1	1	1	2	6	3	2	2	3	3	4	4	3	3	0	6	1.8		
Dec 12	3	3	4	5	6	6	6	6	6	5	5	5	5	5	5	4	5	5	4	5	5	5	4	3	6	4.8	4.8		
Dec 13	3	4	4	4	4	4	5	5	6	6	7	7	7	7	7	7	7	8	7	8	15	19	17	10	3	19	7.4		
Dec 14	11	5	3	2	1	1	2	2	4	3	3	2	3	4	6	5	6	4	3	2	3	3	4	4	1	11	3.6		
Dec 15	4	5	5	7	10	11	12	14	14	11	C	6	5	4	3	5	5	6	6	7	7	8	6	3	14	7.1	7.1		
Dec 16	6	8	11	12	8	5	2	2	1	1	1	1	1	1	2	5	2	1	3	3	1	1	1	1	1	12	3.3	3.3	
Dec 17	1	1	1	1	1	2	1	9	9	4	1	1	1	1	0	1	1	1	1	1	1	2	3	4	0	9	1.9	1.9	
Dec 18	3	3	3	5	5	4	3	3	2	4	4	4	3	4	4	3	4	3	3	3	3	3	3	3	2	5	3.5	3.5	
Dec 19	4	4	5	4	4	5	9	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	3	3	1	9	2.8	2.8	
Dec 20	3	3	3	3	3	4	5	7	8	7	7	7	7	6	6	6	6	6	6	6	6	8	13	9	3	13	6.0	6.0	
Dec 21	11	13	10	8	5	5	3	4	7	8	6	6	4	3	4	4	6	5	5	8	9	8	9	8	3	13	6.6	6.6	
Dec 22	9	10	11	11	12	13	13	13	14	14	13	12	12	11	11	11	13	12	13	15	12	16	11	9	16	12.2	12.2	12.2	
Dec 23	3	1	0	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	2	3	0	3	0.8	0.8	0.8	
Dec 24	1	1	1	1	1	1	1	1	1	3	3	3	3	3	2	2	2	3	4	3	4	5	7	1	7	2.4	2.4	2.4	
Dec 25	5	4	6	6	6	6	8	8	9	10	10	10	9	8	9	7	7	7	8	7	8	7	8	7	4	10	7.5	7.5	
Dec 26	7	6	6	5	4	4	4	4	3	3	2	2	2	2	2	3	5	3	4	4	3	4	5	2	7	3.7	3.7	3.7	
Dec 27	5	5	6	4	4	3	4	4	5	5	5	4	3	2	2	3	2	3	2	2	2	2	2	2	2	6	3.3	3.3	3.3
Dec 28	2	1	1	2	1	2	2	8	5	9	10	5	5	5	6	6	7	4	13	7	9	4	7	14	1	14	5.6	5.6	
Dec 29	4	4	5	4	5	5	5	6	6	7	7	7	6	5	5	5	6	6	6	6	7	7	8	4	8	5.8	5.8	5.8	
Dec 30	8	9	10	12	12	10	10	9	9	8	7	6	6	5	4	3	3	2	2	2	2	1	1	1	1	12	5.9	5.9	5.9
Dec 31	1	1	1	1	1	1	1	1	1	1	2	2	4	5	7	6	9	7	8	8	8	7	12	11	1	12	4.3	4.3	4.3
Diurnal Maximum	12	13	13	14	14	13	13	14	14	14	13	12	12	11	11	11	13	13	13	15	19	17	14						
Diurnal Average	4.9	4.7	5.0	4.9	4.8	4.8	5.0	5.7	6.0	5.3	5.0	4.8	4.3	4.2	4.5	4.1	4.3	4.7	4.8	5.5	5.6	5.8	5.8						

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



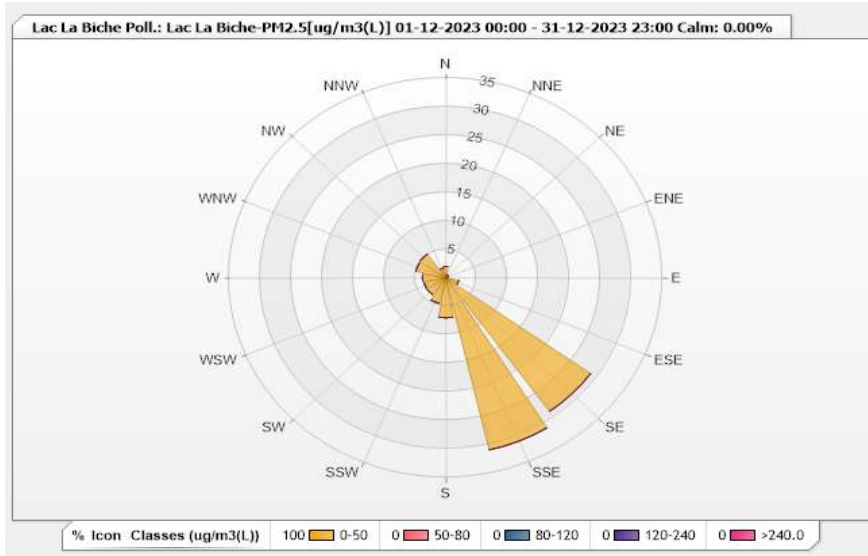
Station: Lac La Biche Poll.: Lac La Biche-PM2.5[ug/m3(L)] Monthly: 12-2023

)

Type: Pollution Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm: 0.00%      Valid Data: 99.87%      Calm Avg: 0.00 [ug/m3(L)]

Direction	0-50	50-80	80-120	120-240	>240.0	Total
N	2.02	0	0	0	0	2.02
NNE	0.54	0	0	0	0	0.54
NE	0.54	0	0	0	0	0.54
ENE	0.27	0	0	0	0	0.27
E	0.27	0	0	0	0	0.27
ESE	2.15	0	0	0	0	2.15
SE	28.8	0	0	0	0	28.8
SSE	30.96	0	0	0	0	30.96
S	7	0	0	0	0	7
SSW	4.58	0	0	0	0	4.58
SW	3.63	0	0	0	0	3.63
WSW	3.63	0	0	0	0	3.63
W	3.77	0	0	0	0	3.77
WNW	4.98	0	0	0	0	4.98
NW	5.11	0	0	0	0	5.11
NNW	1.75	0	0	0	0	1.75
Summary	100	0	0	0	0	100



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

RELATIVE HUMIDITY (RH) in %

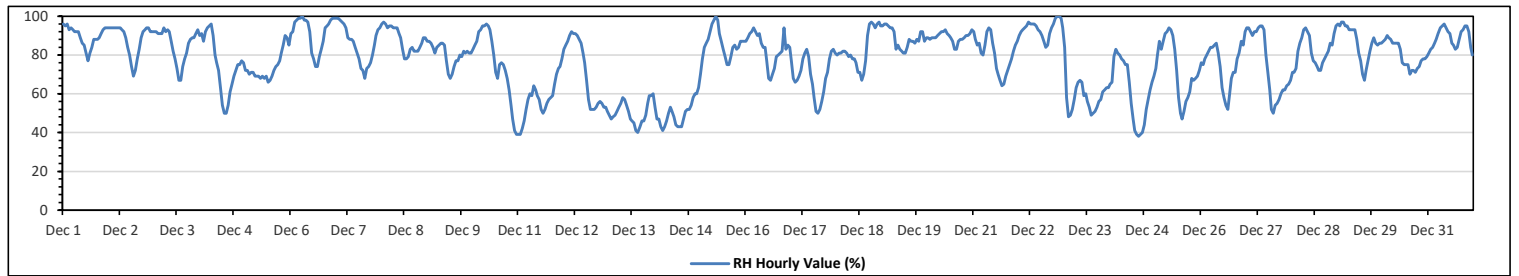
Maximum Hourly Value:	100	%	on Dec 6 at hr 6	Hours in Service:	744
Maximum Daily Value:	93.7	%	on Dec 22	Hours of Data:	744
Minimum Hourly Value:	38	%	on Dec 24 at hr 15	Hours of Missing Data:	0
Minimum Daily Value:	49.7	%	on Dec 14	Hours of Calibration:	0
Monthly Average:	77.9	%		Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average																																																																					
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23																																																																				
Dec 1	96	95	96	93	94	93	92	92	92	89	86	85	81	77	81	84	88	88	88	89	91	93	94	94	77	96	89.6																																																																				
Dec 2	94	94	94	94	94	94	94	93	92	89	84	80	74	69	72	78	83	89	92	93	94	94	92	92	69	94	88.3																																																																				
Dec 3	92	92	91	91	91	94	92	93	92	87	82	78	73	67	67	74	78	81	86	88	89	89	91	93	67	94	85.5																																																																				
Dec 4	90	91	87	92	94	95	96	90	80	76	72	63	54	50	50	54	61	65	69	72	75	75	77	76	50	96	75.2																																																																				
Dec 5	72	72	70	71	71	69	69	69	68	69	68	69	66	67	69	72	74	75	77	81	85	90	89	85	66	90	73.6																																																																				
Dec 6	91	92	97	98	99	99	100	98	98	97	92	81	78	74	74	79	83	87	94	95	96	98	99	99	74	100	91.6																																																																				
Dec 7	99	99	98	97	96	94	89	88	88	87	84	81	78	73	72	68	73	74	76	80	85	90	93	94	68	99	85.7																																																																				
Dec 8	96	97	96	94	95	95	94	94	94	91	89	83	78	78	79	83	84	82	82	84	86	89	89	89	78	97	88.1																																																																				
Dec 9	87	87	86	84	81	84	85	86	86	85	77	70	68	70	74	77	77	80	79	82	81	82	81	81	68	87	80.4																																																																				
Dec 10	83	85	87	92	93	95	95	96	95	93	87	80	71	68	75	76	75	72	68	62	54	47	41	39	39	96	76.2																																																																				
Dec 11	39	39	42	46	52	57	60	59	64	62	59	57	52	50	52	55	57	58	59	65	70	73	74	78	39	78	57.5																																																																				
Dec 12	83	85	87	90	92	91	91	90	88	86	81	76	67	57	52	52	52	53	55	56	55	53	53	51	51	92	70.7																																																																				
Dec 13	49	47	48	49	51	53	55	58	57	54	51	47	46	45	41	40	43	46	46	49	55	59	59	60	40	60	50.3																																																																				
Dec 14	53	47	47	43	41	43	46	50	53	51	48	44	43	43	43	47	51	52	52	54	58	60	60	63	41	63	49.7																																																																				
Dec 15	70	78	84	86	88	92	96	98	100	98	91	87	83	79	75	75	79	84	85	83	84	87	87	87	70	100	85.7																																																																				
Dec 16	87	89	91	92	94	92	90	91	86	84	84	77	68	67	70	73	79	80	81	82	94	83	85	84	67	94	83.5																																																																				
Dec 17	77	68	66	67	69	72	78	81	83	79	70	65	58	51	50	52	56	61	68	71	78	82	83	81	50	83	69.4																																																																				
Dec 18	80	81	81	82	82	81	79	80	78	78	76	71	71	67	70	77	90	96	97	96	94	96	97	95	67	97	83.1																																																																				
Dec 19	95	96	96	95	94	94	92	83	85	83	82	81	81	84	88	87	87	86	88	87	92	92	87	89	81	96	88.5																																																																				
Dec 20	89	88	89	89	89	90	91	92	92	93	91	90	89	87	83	83	87	88	88	89	90	90	91	93	83	93	89.2																																																																				
Dec 21	92	88	85	86	81	80	85	92	94	93	86	81	73	70	67	64	65	69	72	75	78	82	85	87	64	94	80.4																																																																				
Dec 22	90	92	93	94	95	97	96	96	96	95	93	92	90	87	84	85	91	94	96	99	100	100	99	94	84	100	93.7																																																																				
Dec 23	84	58	48	49	52	57	63	66	67	66	59	60	56	53	49	50	51	53	56	57	61	62	63	63	48	84	58.5																																																																				
Dec 24	65	66	79	83	81	80	78	77	75	75	66	55	47	41	39	38	39	40	44	52	57	62	66	69	38	83	61.4																																																																				
Dec 25	73	80	87	83	87	91	92	94	93	90	83	72	58	50	47	51	56	58	61	68	67	68	69	72	47	94	72.9																																																																				
Dec 26	76	75	78	80	82	84	84	85	86	81	74	63	58	54	52	59	68	71	71	78	81	87	85	92	52	92	75.2																																																																				
Dec 27	94	94	92	90	92	92	94	95	95	93	80	71	62	52	50	54	55	57	60	62	62	64	65	67	50	95	74.7																																																																				
Dec 28	71	71	73	82	86	89	93	94	92	90	81	77	76	74	72	72	76	78	80	82	86	85	91	95	71	95	81.9																																																																				
Dec 29	96	95	97	97	95	95	93	93	93	88	81	77	70	67	72	77	82	86	89	86	85	86	86	86	67	97	88.6																																																																				
Dec 30	87	88	90	89	88	86	86	86	86	83	76	75	75	75	70	72	72	71	73	74	77	78	78	79	70	90	79.8																																																																				
Dec 31	81	83	84	86	88	91	94	95	96	94	92	91	86	85	83	84	88	92	93	95	95	92	84	80	80	96	88.8																																																																				
Diurnal Maximum	99	99	98	98	99	99	100	98	100	98	93	92	90	87	88	87	91	96	97	99	100	100	99	99																																																																							
Diurnal Average	81.6	81.0	81.9	82.7	83.5	84.5	85.2	85.6	85.3	83.4	78.5	73.6	68.9	65.6	65.1	67.3	70.8	73.0	74.9	77.0	79.2	80.1	80.4	80.9																																																																							
C	Monthly Calibration																							S	Daily Zero-Span Check																							Q	Quality Assurance																																														
K	Collection Error																							ND	No Data (Machine Not in Service)																							Y	Routine Maintenance																							P	Power Failure																						
X	Invalid Data (Equipment Malfunction /Recovery)																							NRM	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																																																						

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.

Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.





**Lakeland Industry & Community Association**  
**Lac La Biche Station - December 2023**  
**Summary of Hourly Averages**  
**AMBIENT TEMPERATURE (AT) in Degree Celsius**

Maximum Hourly Value:	4.9 °C	on Dec 4 at hr 13	Hours in Service:	744
Maximum Daily Value:	0.8 °C	on Dec 14	Hours of Data:	744
Minimum Hourly Value:	-13.4 °C	on Dec 1 at hr 7	Hours of Missing Data:	0
Minimum Daily Value:	-9.7 °C	on Dec 2	Hours of Calibration:	0
Monthly Average:	-4.3 °C		Operational Uptime:	100.0

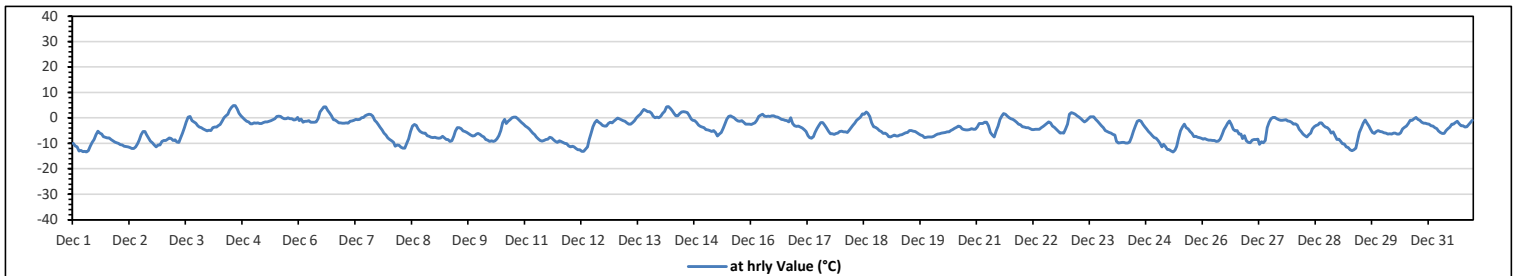
  

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	-9.9	-10.9	-11.4	-13	-12.7	-13.3	-13.1	-13.4	-12.8	-11.1	-9.6	-8.5	-6.6	-5.2	-5.9	-6.4	-7.3	-7.6	-7.8	-7.8	-8.5	-9	-9.5	-9.7	-13.4	-5.2	-9.6
Dec 2	-9.9	-10.5	-10.7	-11.1	-11.2	-11.4	-11.6	-12	-12	-11.3	-10.1	-8.7	-6.6	-5.3	-5.4	-6.6	-7.8	-9.1	-9.7	-10.7	-11.3	-10.6	-10.6	-9.2	-12.0	-5.3	-9.7
Dec 3	-8.9	-8.8	-8.3	-7.9	-8.1	-8.8	-8.6	-9.5	-9.6	-8	-6.1	-4	-1.5	0.3	0.6	-1.1	-1.5	-2.1	-3	-3.6	-3.9	-4.3	-4.7	-5.1	-9.6	0.6	-5.3
Dec 4	-4.8	-4.9	-3.9	-3.5	-3.5	-2.9	-2.6	-1.3	0.1	0.8	1.5	3	4.1	4.9	4.9	3.6	1.8	0.9	0	-0.7	-1.4	-1.5	-2.3	-2.3	-4.9	4.9	-0.4
Dec 5	-1.9	-2	-1.9	-2.2	-2.2	-1.8	-1.5	-1.5	-1.3	-1.1	-0.7	-0.2	0.6	0.7	0.6	0.1	-0.3	-0.3	0	-0.2	-0.3	-0.8	-0.6	0.2	-2.2	0.7	-0.8
Dec 6	-1	-0.4	-1.7	-1.3	-1.3	-1.1	-1.7	-1.7	-1.7	-1.5	-0.3	2.4	3.3	4.4	4.4	3	2	0.9	-0.6	-0.8	-1.3	-1.9	-1.9	-2	-2.0	4.4	-0.1
Dec 7	-2.1	-1.9	-2	-1.3	-1.2	-0.9	-0.5	-0.6	-0.5	0	0.2	0.9	1.2	1.5	1.3	0.7	-0.9	-1.7	-2.6	-3.7	-4.7	-5.9	-6.8	-7.8	-7.8	1.5	-1.6
Dec 8	-8.5	-9	-9.6	-11.1	-10.7	-10.8	-11.5	-11.9	-11.9	-9.9	-8.2	-5.3	-3.1	-2.6	-2.9	-4.2	-5.2	-5.6	-5.9	-6	-6.9	-7.2	-7.6	-7.7	-11.9	-2.6	-7.6
Dec 9	-7.6	-7.9	-8	-7.9	-7.2	-7.9	-8.4	-8.5	-9.2	-9	-7.2	-5.2	-3.9	-3.8	-4.2	-5.1	-5.3	-5.7	-6.2	-6.8	-7.1	-6.9	-6.4	-6.1	-9.2	-3.8	-6.7
Dec 10	-6.5	-7	-7.4	-8.5	-8.7	-9.2	-9	-9.3	-9	-8.2	-6.9	-4.9	-1.8	-0.5	-2.2	-1.4	-0.6	0	0.3	0.3	-0.2	-1	-1.8	-2.4	-9.3	0.3	-4.4
Dec 11	-3.1	-3.7	-4.3	-5.1	-5.9	-6.6	-7.4	-8.2	-8.8	-9.1	-8.8	-8.5	-8.3	-7.6	-7.8	-8.6	-9.2	-9.6	-9	-9.2	-9.6	-10	-10.1	-10.9	-10.9	-3.1	-7.9
Dec 12	-11.4	-11.1	-11.4	-12	-12.5	-12.5	-13.2	-13.1	-12.2	-11.4	-8.6	-6.1	-3.4	-1.8	-0.9	-1.6	-2.2	-2.9	-3.2	-3.2	-2.2	-1.7	-1.9	-1.4	-13.2	-0.9	-6.7
Dec 13	-0.7	-0.1	-0.2	-0.6	-1	-1.4	-1.9	-2.4	-2.5	-1.8	-1	0	0.9	1.5	2.6	3.4	3	2.5	2.5	1.9	0.7	0.1	0.3	0.1	-2.5	3.4	0.2
Dec 14	0.7	1.9	2.6	4.3	4.5	3.8	3	1.8	0.8	0.9	1.7	2.4	2.5	2.4	2.1	1	-0.4	-0.9	-1.1	-1.8	-2.8	-3.3	-3.6	-3.9	-3.9	4.5	0.8
Dec 15	-4.6	-4.7	-5	-5.4	-5	-5.7	-7	-6.3	-5.7	-4.1	-2.2	-0.5	0.6	0.8	0.4	0	-0.6	-1.2	-1.3	-1.1	-1.7	-2.5	-2.5	-2.5	-7.0	0.8	-2.8
Dec 16	-2.6	-2.2	-1.9	-0.9	0.6	1.1	1.5	0.7	0.6	0.7	0.6	0.9	0.8	0.5	0.3	-0.1	-0.5	-0.7	-0.9	-1.1	-1.5	0	-2.2	-3	-3.0	1.5	-0.4
Dec 17	-3.3	-3.1	-3.5	-4	-4.6	-5.4	-6.9	-7.7	-8	-7.3	-5.6	-4.2	-2.9	-1.8	-1.8	-2.8	-4	-5.2	-6.2	-6.2	-6.5	-6.1	-5.9	-5.3	-8.0	-1.8	-4.9
Dec 18	-5.2	-5.5	-5.5	-5.6	-4.9	-4	-2.9	-2	-0.9	-0.2	0.3	1.6	1.4	2.4	1.9	0.6	-1.9	-3.4	-3.7	-4.2	-5	-5.3	-6.1	-5.9	-6.1	2.4	-2.7
Dec 19	-6.5	-7.3	-7.5	-7	-6.8	-7	-7.1	-6.7	-6.6	-6.2	-5.8	-5.6	-5	-5	-5.2	-5.4	-5.8	-6.4	-6.7	-6.9	-7.7	-7.6	-7.4	-7.5	-7.7	-5.0	-6.5
Dec 20	-7.4	-7.2	-6.8	-6.4	-6.2	-6	-5.8	-5.6	-5.5	-5.5	-5	-4.5	-4.1	-3.7	-3.1	-3.4	-4.3	-4.6	-4.7	-4.7	-4.6	-4.2	-4.4	-4.4	-7.4	-3.1	-5.1
Dec 21	-3.6	-2.2	-2.2	-2.2	-1.7	-1.7	-3	-5.7	-6.8	-7.5	-5.1	-3.2	-0.5	0.9	1.7	1.4	0.7	0.1	-0.3	-0.5	-1	-1.7	-2.4	-2.7	-7.5	1.7	-2.1
Dec 22	-3.4	-3.6	-3.8	-3.9	-4.2	-4.6	-4.5	-4.4	-4.4	-4.4	-3.9	-3.3	-2.8	-2.2	-1.5	-1.9	-3.1	-3.7	-4.4	-5.2	-6	-5.8	-5.9	-4.3	-6.0	-1.5	-4.0
Dec 23	-2.4	1.5	2.1	1.9	1.5	0.9	0.3	-0.3	-1	-1.5	-1	-0.3	0.4	0.5	0.4	-0.5	-1.3	-2.2	-3	-3.9	-5	-5.4	-5.7	-6	-6.0	2.1	-1.3
Dec 24	-6.5	-6.7	-9.2	-9.8	-9.7	-9.6	-9.6	-9.8	-9.8	-9.5	-7.6	-5.2	-3.2	-1.4	-0.9	-1.3	-2.6	-3.5	-4.3	-5.3	-6.1	-6.9	-7.7	-8	-9.8	-0.9	-6.4
Dec 25	-8.9	-10	-11.3	-10.4	-11.2	-12.3	-12.5	-13	-13.4	-12.6	-11.2	-8	-5.1	-3.6	-2.5	-3.9	-4.3	-5.3	-6.1	-7.3	-7.2	-7.6	-7.7	-8	-13.4	-2.5	-8.5
Dec 26	-8.3	-8.1	-8.4	-8.7	-8.7	-8.9	-8.9	-9.2	-9.1	-8.3	-6.6	-4.6	-3.3	-1.9	-1.2	-2.6	-4.4	-5.1	-4.9	-6.3	-6.4	-8.1	-6.9	-9	-9.2	-1.2	-6.6
Dec 27	-9.6	-9.7	-8.7	-8.5	-8.5	-8.3	-10.4	-9.4	-9.7	-8.9	-3.9	-1.7	-0.2	0.2	0.2	-0.3	-0.7	-0.9	-0.9	-0.8	-0.7	-1.2	-1.4	-1.7	-10.4	0.2	-4.4
Dec 28	-2.4	-2.3	-2.8	-4.4	-5.4	-6.3	-6.9	-7.4	-6.6	-6	-4.3	-3.4	-2.9	-2.7	-1.9	-1.9	-2.9	-3.6	-3.9	-4.6	-5.9	-5.5	-6.9	-8.5	-8.5	-1.9	-4.6
Dec 29	-8.3	-9.3	-10.1	-10.2	-11.3	-11.6	-12.4	-12.9	-12.4	-11.9	-8.4	-5.7	-4	-2	-0.8	-2.1	-3.1	-4.4	-5.6	-6.1	-5.3	-5	-5.4	-5.5	-12.9	-0.8	-7.2
Dec 30	-5.8	-6	-6.4	-6.2	-6.3	-5.9	-6	-6.3	-6.4	-5.8	-4.3	-3.7	-3.1	-2.2	-0.9	-0.9	-0.3	0.2	-0.5	-0.9	-1.7	-2	-2.1	-2.3	-6.4	0.2	-3.6
Dec 31	-2.5	-3	-3.2	-3.8	-4.2	-5.1	-5.6	-6.1	-6.1	-4.9	-4.2	-3.6	-2.5	-2.4	-1.8	-1.4	-2.3	-3	-3	-3.5	-3.4	-2.6	-1.7	-0.9	-6.1	-0.9	-3.4
Diurnal Maximum	0.7	1.9	2.6	4.3	4.5	3.8	3.0	1.8	0.8	0.9	1.7	3.0	4.1	4.9	4.9	3.6	3.0	2.5	2.5	1.9	0.7	0.1	0.3	0.2			
Diurnal Average	-5.4	-5.3	-5.6	-5.7	-5.8	-6.0	-6.3	-6.6	-6.5	-6.0	-4.6	-3.2	-1.9	-1.1	-1.0	-1.6	-2.4	-3.0	-3.4	-3.9	-4.4	-4.6	-4.8	-5.0			

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> InValid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



# Lakeland Industry & Community Association

## Lac La Biche Station - December 2023

### Summary of Hourly Averages

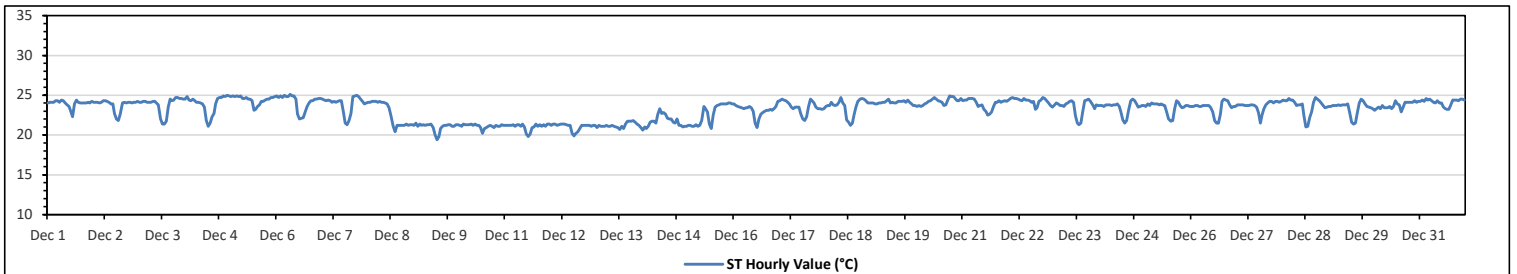
#### STATION TEMPERATURE (ST) in Degree Celsius

Maximum Hourly Value:	25.1 °C on Dec 6 at hr 7	Hours in Service:	744
Maximum Daily Value:	24.4 °C on Dec 5	Hours of Data:	744
Minimum Hourly Value:	19.4 °C on Dec 9 at hr 12	Hours of Missing Data:	0
Minimum Daily Value:	21.0 °C on Dec 9	Hours of Calibration:	0
Monthly Average:	23.2 °C	Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum	Daily Average	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				23
Dec 1	24.0	24.1	24.1	24.1	24.3	24.3	24.1	24.4	24.3	24.0	23.8	23.6	22.9	22.3	23.9	24.4	24.1	24.0	24.0	24.0	24.1	24.0	24.1	24.2	22.3	24.4	24.0
Dec 2	24.1	24.1	24.1	24.0	24.1	24.3	24.3	24.2	24.1	23.9	23.9	22.7	22.0	21.8	22.6	24.0	24.1	24.0	24.1	24.1	24.0	24.1	24.1	24.1	21.8	24.3	23.8
Dec 3	24.1	24.1	24.2	24.2	24.1	24.1	24.1	24.2	24.2	24.0	23.8	22.0	21.4	21.4	21.7	23.5	24.5	24.3	24.4	24.7	24.7	24.6	24.6	24.5	21.4	24.7	23.8
Dec 4	24.5	24.8	24.4	24.3	24.5	24.3	24.1	24.1	24.0	23.9	23.5	21.8	21.1	21.5	22.3	22.7	23.9	24.6	24.7	24.7	24.9	24.8	25.0	24.9	21.1	25.0	23.9
Dec 5	24.8	24.9	24.8	24.9	24.8	24.9	24.6	24.6	24.7	24.5	24.5	24.3	23.1	23.2	23.6	23.8	24.2	24.2	24.4	24.5	24.5	24.7	24.7	24.8	23.1	24.9	24.4
Dec 6	24.9	24.7	24.9	24.7	25.0	24.8	24.8	25.1	24.9	24.9	24.5	22.6	22.0	22.1	22.2	22.9	23.6	24.0	24.3	24.3	24.5	24.5	24.6	24.6	22.0	25.1	24.1
Dec 7	24.5	24.4	24.3	24.4	24.3	24.1	24.2	24.1	24.2	24.3	24.3	23.0	21.5	21.3	21.8	22.7	24.8	24.9	25.0	24.8	24.5	24.2	23.9	24.0	21.3	25.0	23.9
Dec 8	24.1	24.1	24.2	24.2	24.2	24.1	24.2	24.1	24.1	24.0	23.9	23.4	22.4	21.1	20.4	21.2	21.2	21.2	21.2	21.2	21.2	21.4	21.2	21.3	20.4	24.2	22.7
Dec 9	21.2	21.5	21.1	21.4	21.2	21.3	21.2	21.3	21.3	21.4	20.9	20.0	19.4	19.8	20.8	21.1	21.2	21.2	21.3	21.3	21.1	21.1	21.3	21.3	19.4	21.5	21.0
Dec 10	21.2	21.1	21.4	21.3	21.3	21.4	21.2	21.4	21.2	21.2	20.9	20.2	20.8	20.9	21.1	21.2	21.1	20.9	21.2	21.1	21.1	21.1	21.3	21.2	20.2	21.4	21.1
Dec 11	21.2	21.2	21.2	21.2	21.3	21.1	21.3	21.3	21.1	21.4	21.0	20.1	19.8	20.1	20.9	21.0	21.4	21.1	21.3	21.1	21.3	21.1	21.4	21.4	19.8	21.4	21.1
Dec 12	21.2	21.4	21.4	21.2	21.3	21.4	21.4	21.4	21.3	21.2	21.2	20.2	19.9	20.2	20.4	20.8	21.2	21.2	21.2	21.2	21.1	21.2	21.2	21.2	19.9	21.4	21.1
Dec 13	20.9	21.2	21.1	21.1	21.1	21.2	21.1	21.1	21.2	21.1	21.0	20.9	20.7	21.1	20.8	21.4	21.7	21.7	21.7	21.8	21.6	21.4	21.2	20.9	20.7	21.8	21.2
Dec 14	20.6	21.0	20.8	21.1	21.6	21.7	21.7	21.5	22.6	23.3	22.7	22.8	22.6	22.1	22.0	22.0	21.6	21.5	22.0	21.2	21.0	21.1	21.1	20.6	23.3	21.7	21.0
Dec 15	21.2	21.2	21.1	21.1	21.3	21.1	21.2	21.8	23.6	23.3	22.9	21.4	20.8	22.5	23.5	23.7	23.8	23.9	23.9	23.9	23.9	24.0	24.0	23.9	20.8	24.0	22.6
Dec 16	23.9	23.7	23.6	23.5	23.4	23.3	23.4	23.4	23.6	23.4	23.0	21.5	20.9	22.0	22.6	22.8	23.0	23.1	23.1	23.2	23.1	23.3	23.6	24.2	20.9	24.2	23.1
Dec 17	24.3	24.5	24.4	24.3	24.1	23.9	23.5	23.3	23.5	23.5	23.5	22.6	22.0	21.8	22.3	23.6	24.0	24.3	24.0	23.5	23.3	23.3	23.2	23.3	21.8	24.5	23.5
Dec 18	23.6	23.7	23.7	24.1	23.8	23.7	23.8	24.1	24.7	24.0	23.7	21.9	21.6	21.2	21.5	22.5	23.5	24.2	24.5	24.6	24.5	24.3	24.0	24.0	21.2	24.7	23.6
Dec 19	24.0	24.0	23.9	23.9	24.0	24.0	24.1	24.1	24.3	24.5	24.0	24.1	24.0	24.0	24.2	24.2	24.2	24.3	24.1	24.4	24.1	23.9	23.7	23.7	23.7	24.5	24.1
Dec 20	23.6	23.7	23.6	23.7	23.9	24.0	24.2	24.3	24.5	24.7	24.5	24.3	24.2	24.1	23.7	23.8	24.4	24.9	24.8	24.8	24.6	24.3	24.3	24.6	23.6	24.9	24.2
Dec 21	24.3	24.4	24.4	24.6	24.6	24.6	24.5	24.1	23.6	23.7	23.8	23.2	23.0	22.5	22.6	22.9	23.6	24.1	24.1	24.3	24.1	24.2	24.3	24.2	22.5	24.6	23.9
Dec 22	24.4	24.6	24.7	24.6	24.6	24.5	24.4	24.3	24.6	24.4	24.4	24.3	24.1	24.2	23.2	23.4	24.2	24.4	24.7	24.6	24.3	24.0	23.7	23.5	23.2	24.7	24.3
Dec 23	23.8	24.0	23.9	23.7	23.7	23.6	23.9	24.0	24.2	24.3	24.1	22.4	21.5	21.3	21.5	23.0	24.3	24.4	24.5	24.2	23.8	23.3	23.8	23.7	21.3	24.5	23.5
Dec 24	23.7	23.7	23.6	23.8	23.8	23.8	23.7	23.8	23.8	23.9	23.6	22.9	21.9	21.5	21.8	23.1	24.3	24.5	24.3	23.9	23.5	23.6	23.7	23.7	21.5	24.5	23.5
Dec 25	23.6	23.9	23.7	24.0	23.9	23.9	23.9	23.8	23.9	23.8	23.7	22.9	22.0	21.7	21.8	23.3	24.3	24.1	23.7	23.4	23.5	23.7	23.7	23.6	21.7	24.3	23.5
Dec 26	23.6	23.6	23.7	23.7	23.6	23.6	23.7	23.7	23.7	23.7	23.4	22.9	21.8	21.5	21.5	22.6	24.2	24.5	24.4	24.3	23.8	23.4	23.6	23.6	21.5	24.5	23.4
Dec 27	23.8	23.8	23.8	23.8	23.7	23.7	23.7	23.8	23.8	23.7	23.5	22.8	21.5	22.5	23.3	23.8	24.0	24.2	24.2	24.0	24.2	24.2	24.1	24.2	21.5	24.2	23.7
Dec 28	24.4	24.3	24.3	24.6	24.4	24.4	24.1	23.7	23.8	23.8	23.9	22.4	21.0	21.1	22.2	22.9	24.1	24.7	24.5	24.3	24.0	23.7	23.4	23.5	21.0	24.7	23.6
Dec 29	23.6	23.6	23.7	23.7	23.7	23.8	23.7	23.8	23.8	23.8	23.9	22.8	21.6	21.4	21.5	22.8	24.0	24.5	24.3	23.9	23.6	23.5	23.4	23.3	21.4	24.5	23.4
Dec 30	23.1	23.3	23.5	23.3	23.7	23.4	23.4	23.6	23.3	23.6	24.3	23.9	23.8	22.9	23.6	24.1	24.1	24.1	24.1	24.1	24.1	24.1	24.1	24.2	22.9	24.3	23.7
Dec 31	24.2	24.4	24.2	24.6	24.4	24.5	24.3	24.1	24.0	24.3	24.0	24.0	23.5	23.3	23.2	23.2	23.8	24.4	24.4	24.4	24.3	24.5	24.5	24.4	23.2	24.6	24.1
Diurnal Maximum	24.9	24.9	24.9	24.9	25.0	24.9	24.8	25.1	24.9	24.9	24.5	24.3	24.2	24.2	24.2	24.4	24.8	24.9	25.0	24.8	24.9	24.8	25.0	24.9			
Diurnal Average	23.4	23.5	23.4	23.5	23.5	23.4	23.4	23.4	23.6	23.5	23.3	22.5	21.9	21.9	22.2	22.8	23.5	23.6	23.6	23.5	23.4	23.4	23.4	23.4			

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> Invalid Data (Equipment Malfunction /Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per days is not met.  
Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.





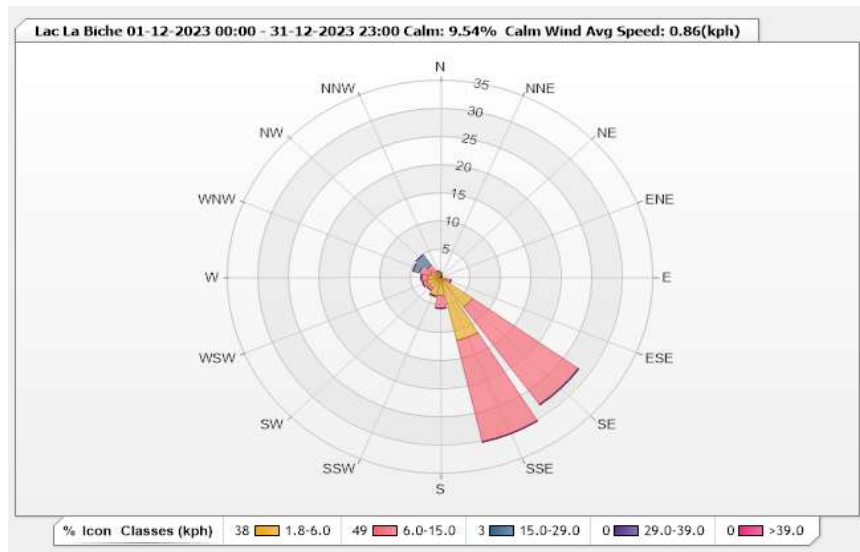


Station: Lac La Biche Monitor: WDS [kph] Monthly: 12-2023

Type: Wind Rose  
 Direction: Blowing From (Wind Frequency)  
 Time Base: 1 - Hour

Calm (WS<1.8kph): 9.54% Valid Data: 100.00%

Direction	1.8-6.0	6.0-15.0	15.0-29.0	29.0-39.0	>39.0	Total
N	0.81	0	0	0	0	0.81
NNE	0.4	0	0	0	0	0.4
NE	0.13	0	0	0	0	0.13
ENE	0.13	0	0	0	0	0.13
E	0.13	0	0	0	0	0.13
ESE	0.81	0.94	0	0	0	1.75
SE	6.45	21.37	0.13	0	0	27.95
SSE	11.56	18.55	0	0	0	30.11
S	3.23	2.28	0	0	0	5.51
SSW	3.36	0.13	0	0	0	3.49
SW	2.28	0.54	0	0	0	2.82
WSW	2.42	0.67	0	0	0	3.09
W	2.15	1.08	0	0	0	3.23
WNW	1.75	1.88	1.08	0	0	4.71
NW	0.81	1.88	2.28	0	0	4.97
NNW	1.21	0	0	0	0	1.21
Summary	37.63	49.32	3.49	0	0	90.44



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

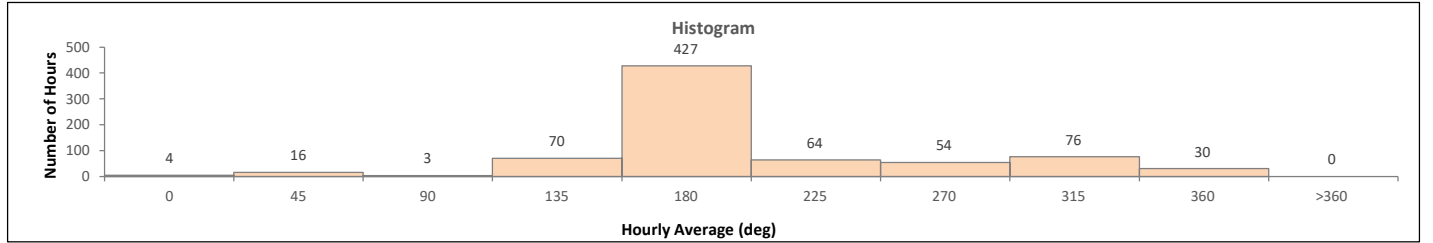
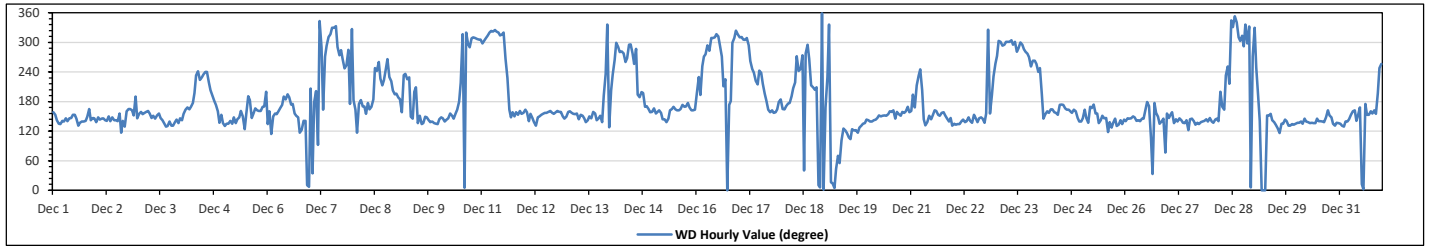
WIND DIRECTION (VWD) in sector

Monthly Average:	164 (SSE) degree	Hours in Service:	744
		Hours of Data:	744
		Hours of Missing Data:	0
		Hours of Calibration:	0
		Operational Uptime:	100.0

Day	Hourly Period Starting at (MST)																							Daily Average			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Degree	Quadrant	
Dec 1	SSE	SSE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SSE	SSE	SE	SE	SE	SE	SE	SSE	SSE	SE	SE	SE	SE	144	SE	
Dec 2	SE	SE	SE	SE	SE	SE	SE	SSE	SE	SE	SE	SE	SE	SSE	ESE	SE	SE	SSE	SSE	SSE	SSE	SSE	S	SE	145	SE	
Dec 3	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SE	SSE	SE	SSE	SSE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	143	SE	
Dec 4	SE	SSE	SSE	SSE	SSE	SSE	S	SSW	SW	WSW	SW	WSW	WSW	SW	SSW	S	S	SSE	SE	SSE	SSE	SSE	SSE	SE	192	S	
Dec 5	SE	SE	SE	SE	SE	SE	SE	SE	SE	SSE	SSE	ESE	SSE	S	S	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSW	150	SSE	
Dec 6	SE	SSE	ESE	SSE	SSE	SSE	SSE	SSE	S	S	S	SSW	S	S	S	SSE	SSE	SE	ESE	ESE	SE	SE	N	N	162	SSE	
Dec 7	SSW	NE	S	SSW	E	NNW	WNW	SSE	W	WNW	NW	NW	NNW	NNW	WNW	W	WNW	W	WSW	WSW	WNW	S	NW	292	WNW		
Dec 8	S	SSE	ESE	S	S	SSE	SSE	SSE	S	SSE	S	SSW	WSW	WSW	SW	SSW	SW	WSW	W	SW	SW	SSW	SSW	SSW	205	SSW	
Dec 9	SSW	S	S	SSE	SW	SW	SW	SW	SSE	SE	SSW	SSW	SE	SSE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	156	SSE	
Dec 10	SE	SE	SE	SE	SE	SE	SE	SSE	SE	SSE	SSE	S	SW	NW	N	NNW	WNW	WNW	NW	NW	NW	NW	NW	NW	274	W	
Dec 11	WNW	WNW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	W	SW	SSE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	305	WNW	
Dec 12	SSE	SSE	SE	SSE	SE	SE	SE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SE	SSE	153	SSE	
Dec 13	SSE	SSE	SSE	SSE	SSE	SSE	SE	SSE	SSE	SE	SE	SE	SSE	SE	SSE	SSE	SE	SSE	SE	SSE	SE	S	SW	NNW	SE	151	SSE
Dec 14	SSW	SW	W	WNW	WNW	W	W	W	WSW	W	WNW	WNW	W	WSW	WNW	SSW	S	SSW	SSW	SSE	S	SSE	SSE	SSE	246	WSW	
Dec 15	SSE	SSE	SSE	SSE	SE	SE	SE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	161	SSE	
Dec 16	SSW	SW	S	WSW	W	W	WNW	W	NW	NW	NW	NW	NW	WNW	W	SSW	SW	N	S	S	WNW	NW	NW	NW	298	WNW	
Dec 17	NW	NW	NW	WNW	NW	WNW	W	WSW	WSW	SW	SSW	WSW	SW	SSW	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	S	S	247	WSW	
Dec 18	SSE	SSE	S	S	S	S	SSW	SW	W	WSW	WSW	W	NE	W	WNW	W	SSW	SSW	SSW	SSW	N	N	N	N	203	SSW	
Dec 19	SSE	SW	NNW	NNE	N	NE	ENE	N	NE	E	SE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	ESE	SE	SE	SE	SE	120	ESE	
Dec 20	SE	SE	SE	SE	SE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	151	SSE	
Dec 21	SSE	SSW	SSE	SSW	SW	WSW	SSW	SE	SE	SE	SSE	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SE	SE	SE	156	SSE	
Dec 22	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SSE	SE	SE	SE	SE	SE	SE	SSE	NW	SSE	S	SW	WSW	144	SE
Dec 23	W	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	WNW	W	WNW	WNW	WNW	WNW	W	W	W	WSW	W	W	WSW	WSW	292	WNW	
Dec 24	WSW	SSW	SE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	S	S	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SE	SE	161	SSE	
Dec 25	SE	SSE	SE	SE	SSE	SSE	S	SSE	SSE	SE	SE	SE	SE	ESE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	143	SE
Dec 26	SE	SE	SE	SE	SSE	SE	SE	SE	SE	SE	SE	SSE	S	S	ESE	NNE	S	SSE	SSE	SE	SE	SE	SE	ENE	147	SE	
Dec 27	SE	SSE	SSE	SE	SE	SE	SE	SE	SE	SE	ESE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	140	SE
Dec 28	SE	SE	SE	SE	SE	SSW	SSE	SSE	SW	WSW	SW	NNW	N	NNW	NW	WNW	NW	WNW	WNW	NNW	N	W	W	W	277	W	
Dec 29	NNW	WSW	S	SE	N	N	N	SSE	SSE	SE	SE	SE	SE	SE	ESE	SE	SE	SE	SE	SE	SE	SE	SE	SE	136	SE	
Dec 30	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SSE	SSE	SE	SE	SE	SE	SE	140	SE	
Dec 31	SE	SE	SE	SE	SE	SE	SSE	SSE	SE	SSE	SSE	NNE	N	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSW	WSW	WSW	154	SSE	

<b>C</b> Monthly Calibration	<b>S</b> Daily Zero-Span Check	<b>Q</b> Quality Assurance
<b>K</b> Collection Error	<b>ND</b> No Data (Machine Not in Service)	<b>Y</b> Routine Maintenance
<b>X</b> Invalid Data (Machine Malfunction/Recovery)	<b>NRM</b> UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)	<b>P</b> Power Failure

Daily Average is shown "\*" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "\*" if minimum data completeness criteria of 75% of days per month is not met.



Lakeland Industry & Community Association

Lac La Biche Station - December 2023

Summary of Hourly Averages

VECTOR WIND SPEED (VWS) in km/hr & WIND DIRECTION (VWD) in sector

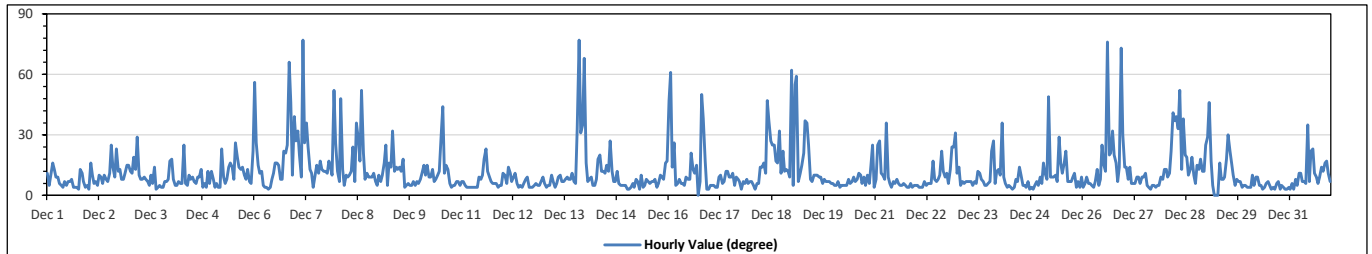
WIND SPEED																														
Maximum Hourly Value:	22.0	kph	on Dec 11 at hr 1	Hours in Service:	744																									
Maximum Daily Value:	11.6	kph	on Dec 11	Hours of Data:	744																									
Minimum Hourly Value:	0.0	kph	on Dec 6 at hr 20	Hours of Missing Data:	0																									
Minimum Daily Value:	2.7	kph	on Dec 8	Hours of Calibration:	0																									
Monthly Average:	3.5	kph		Operational Uptime:	100.0																									
WIND DIRECTION																														
Monthly Average:	164	degree	(SSE)																											
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Daily Minimum	Daily Maximum	Daily Average			
Dec 1	4.6	6.0	5.5	4.8	5.7	5.8	5.6	6.3	6.8	7.4	5.8	7.7	7.4	6.5	6.6	8.9	8.4	9.2	8.5	7.2	4.9	6.8	6.6	6.2	4.6	9.2	6.6			
Dec 2	7.8	5.2	6.0	5.4	7.2	6.6	7.5	6.3	7.9	7.3	7.6	7.3	2.8	2.7	4.2	3.6	2.2	3.9	3.4	1.9	1.6	0.6	2.7	2.3	0.6	7.9	4.8			
Dec 3	3.9	3.4	3.3	3.9	3.5	4.8	5.2	6.0	6.6	6.9	6.2	6.5	7.5	8.7	7.0	7.9	10.7	9.9	11.8	10.8	10.0	9.1	8.2	5.4	3.3	11.8	7.0			
Dec 4	4.3	5.8	5.4	5.8	6.4	6.6	5.7	5.4	5.8	9.2	8.0	8.6	9.0	7.5	7.4	5.7	5.6	5.0	4.9	5.8	6.1	7.7	6.3	6.7	4.3	9.2	6.4			
Dec 5	8.6	9.5	9.6	9.8	13.4	10.5	10.5	9.8	9.8	6.8	5.0	5.9	4.8	2.7	2.2	1.6	5.1	3.9	6.7	6.8	6.6	7.1	7.3	5.4	1.6	13.4	7.1			
Dec 6	1.6	5.6	4.8	6.7	4.9	5.8	6.4	6.9	6.0	6.2	5.5	5.3	5.9	3.6	4.0	4.8	5.4	3.4	0.3	3.0	0.0	1.5	3.3	0.3	0.0	6.9	4.2			
Dec 7	0.2	0.0	1.5	1.8	0.2	2.2	1.3	2.4	3.1	3.8	4.6	4.8	5.1	4.4	4.8	5.6	4.6	4.7	4.4	3.8	2.8	0.8	0.0	0.3	0.0	5.6	2.8			
Dec 8	0.8	2.0	0.0	0.0	1.7	3.2	2.8	3.3	3.9	1.9	4.3	0.2	1.1	3.5	0.5	0.8	3.0	3.7	4.2	4.5	5.0	4.3	5.2	5.3	0.0	5.3	2.7			
Dec 9	5.6	5.1	4.3	3.8	3.4	4.1	4.0	2.3	2.3	0.9	3.5	3.8	4.6	5.3	5.2	7.6	7.8	7.8	8.3	7.8	8.8	11.1	10.1	10.4	0.9	11.1	5.7			
Dec 10	9.6	7.6	6.3	5.1	7.0	7.3	7.5	6.2	7.0	6.6	7.2	4.6	5.2	4.4	3.4	4.5	4.6	9.4	12.6	16.4	17.2	17.4	20.9	19.4	3.4	20.9	9.1			
Dec 11	18.4	22.0	19.8	20.7	20.5	21.2	21.1	17.4	11.8	10.7	8.0	10.7	7.6	5.6	2.8	3.6	5.0	6.8	8.7	8.2	8.0	8.4	5.8	5.9	2.8	22.0	11.6			
Dec 12	5.8	4.4	4.0	3.9	3.7	6.1	5.8	6.6	7.9	8.1	8.4	7.8	6.0	6.6	7.5	7.8	8.7	8.1	7.7	6.4	6.7	7.8	8.2	7.4	3.7	8.7	6.7			
Dec 13	7.6	5.8	7.6	8.8	8.6	6.8	6.7	7.0	6.3	6.1	7.3	8.2	8.9	10.2	7.5	7.2	6.1	7.1	6.7	2.1	0.0	0.9	2.4	0.4	0.0	10.2	6.1			
Dec 14	4.9	5.2	8.1	12.7	10.3	8.8	6.6	3.9	1.7	4.5	4.6	4.9	4.7	3.1	2.7	3.8	3.9	4.3	3.3	5.1	5.9	6.1	7.5	1.7	12.7	5.4	5.4			
Dec 15	7.2	7.0	7.8	6.9	6.5	6.4	6.6	8.1	8.0	7.8	7.2	8.7	8.9	10.1	10.7	10.7	9.7	8.7	10.5	7.3	5.3	6.6	4.3	6.0	4.3	10.7	7.8			
Dec 16	3.5	1.3	3.9	4.9	9.6	9.4	11.7	9.0	11.8	11.5	8.8	13.1	11.0	4.9	3.4	1.7	1.2	0.0	1.6	1.3	3.9	18.6	17.8	14.2	0.0	18.6	7.4			
Dec 17	14.4	21.1	16.9	15.1	14.2	8.0	5.2	4.7	4.3	4.3	5.0	7.2	9.4	8.9	8.0	6.6	5.2	6.5	6.8	8.1	7.8	8.5	7.7	6.7	4.3	21.1	8.8			
Dec 18	5.9	7.9	8.6	8.0	8.6	8.1	4.8	3.6	5.8	1.6	2.7	2.0	1.7	1.8	2.6	2.6	1.5	1.3	2.1	0.7	4.0	3.2	3.5	1.4	0.7	8.6	3.9			
Dec 19	0.3	0.5	0.5	3.4	2.7	1.2	2.0	2.5	0.6	3.1	7.8	7.4	6.6	7.2	10.0	11.5	12.3	12.0	14.1	12.9	12.9	12.4	10.8	0.3	14.1	6.8	6.8			
Dec 20	11.2	13.7	10.8	10.7	10.9	10.1	9.7	9.4	7.7	7.6	7.4	8.3	9.1	8.2	6.5	5.7	7.7	7.8	9.1	7.0	7.6	5.9	2.5	5.7	2.5	13.7	8.3			
Dec 21	6.1	3.7	3.5	4.2	4.4	5.0	1.8	4.6	6.2	7.3	7.3	7.6	7.6	9.9	10.3	10.8	12.3	10.5	10.4	10.0	8.9	10.3	7.1	8.8	1.8	12.3	7.4			
Dec 22	5.1	3.7	3.5	4.2	4.4	5.0	1.8	4.6	6.2	7.3	7.3	7.6	7.6	9.9	10.3	10.8	12.3	10.5	10.4	10.0	8.9	10.3	7.1	8.8	1.8	12.3	7.4			
Dec 23	3.7	15.3	16.7	14.7	15.3	18.0	16.9	16.2	18.2	13.2	13.8	13.3	13.6	13.7	13.2	12.1	10.7	8.3	6.8	3.9	3.5	5.4	4.2	3.5	3.5	18.2	11.4			
Dec 24	4.6	3.0	5.1	7.8	8.1	7.2	8.3	7.7	6.0	6.1	6.3	5.5	6.6	6.9	9.9	8.3	7.2	7.3	8.2	9.1	7.0	5.8	6.6	6.4	3.0	9.9	6.9			
Dec 25	6.1	2.4	4.9	7.2	2.1	5.5	4.1	5.4	5.0	5.9	3.5	3.1	2.0	3.1	3.7	7.5	6.1	7.4	6.0	4.8	10.2	8.7	9.3	11.4	2.0	11.4	5.6			
Dec 26	12.4	10.3	7.3	10.2	9.0	9.2	8.4	6.5	7.5	9.1	8.6	7.2	6.0	5.4	0.2	2.4	1.7	2.9	3.6	3.4	4.9	5.6	1.2	2.5	0.2	12.4	6.1			
Dec 27	3.6	4.7	6.7	6.9	8.5	7.6	5.4	5.9	5.4	6.9	6.9	4.9	7.2	11.1	11.4	11.6	10.2	10.8	9.3	9.8	9.8	7.1	8.7	5.7	3.6	11.6	7.8			
Dec 28	5.8	7.2	6.7	3.7	3.2	1.6	0.5	2.8	2.0	4.0	0.6	1.0	2.8	5.2	2.5	0.8	2.8	4.2	2.9	4.2	3.7	5.4	1.8	0.2	0.2	7.2	3.2			
Dec 29	1.1	0.1	0.3	0.4	0.0	0.0	0.0	2.6	3.9	4.9	2.0	3.1	4.2	3.3	3.5	4.9	4.5	3.2	3.8	5.7	8.3	8.5	9.1	11.8	0.0	11.8	3.7			
Dec 30	10.5	11.2	7.8	10.7	8.5	11.1	12.6	11.5	12.5	11.1	12.2	9.7	10.9	14.1	15.5	12.5	10.4	11.1	9.9	8.8	9.0	10.8	10.4	9.9	7.8	15.5	10.9			
Dec 31	8.8	6.1	7.9	6.9	6.1	5.6	5.4	5.2	3.3	2.9	0.3	1.2	1.7	1.7	0.3	2.8	5.7	5.0	3.8	2.0	4.4	4.9	4.7	5.0	0.3	8.8	4.2			
	SE	SE	SE	SE	SE	SSE	SSE	SSE	SSE	ENE	N	S	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSE	SSW	WSW	WSW			154(SSE)			

**Lakeland Industry & Community Association**  
**Lac La Biche Station - December 2023**  
**Summary of Hour Standard Deviations**

**STANDARD DEVIATION WIND DIRECTION (STDWD) in Degree**

Maximum Hourly Value:		77 degree on Dec 7 at hr 4										Hours in Service:		744																																															
Minimum Hourly Value:		0 degree on Dec 16 at hr 17										Hours of Data:		744																																															
												Hours of Missing Data:		0																																															
												Hours of Calibration:		0																																															
												Operational Uptime:		100.0																																															
Day	Hourly Period Starting at (MST)																							Daily Minimum	Daily Maximum																																				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			23																																			
Dec 1	11	5	10	16	13	9	9	6	5	4	7	5	7	7	8	4	4	4	3	13	11	7	4	5	3	16																																			
Dec 2	3	16	10	6	7	5	10	9	6	10	8	7	11	25	14	9	23	12	13	8	8	11	15	15	3	25																																			
Dec 3	12	11	19	13	29	10	8	8	9	8	7	5	10	6	14	3	4	5	4	7	7	8	17	3	29																																				
Dec 4	18	8	5	5	7	6	6	25	6	5	10	8	9	7	6	9	9	13	4	6	4	12	6	12	4	25																																			
Dec 5	8	4	6	4	4	23	9	6	8	14	16	14	8	26	19	14	13	14	10	8	13	7	6	22	4	26																																			
Dec 6	56	26	15	11	12	5	4	4	3	4	8	11	16	16	15	8	8	22	21	25	66	46	10	39	3	66																																			
Dec 7	27	32	20	9	77	26	36	24	13	11	4	10	15	11	17	13	12	12	11	17	14	10	52	26	4	77																																			
Dec 8	12	7	48	13	5	10	9	10	12	24	7	36	28	17	52	21	8	11	9	9	9	11	7	5	5	52																																			
Dec 9	10	7	10	16	25	5	16	14	32	12	14	13	14	12	18	4	5	6	5	5	7	5	7	6	4	32																																			
Dec 10	8	11	15	10	15	9	9	13	7	8	10	12	30	44	11	15	13	6	4	5	5	7	7	5	4	44																																			
Dec 11	7	7	5	4	4	4	4	4	4	4	9	8	10	18	23	12	9	7	6	6	6	4	5	5	4	23																																			
Dec 12	11	10	6	14	11	7	9	11	6	4	5	4	6	8	9	4	4	5	6	5	5	7	9	4	14	14																																			
Dec 13	6	4	5	5	10	7	4	6	9	10	7	7	8	9	8	11	7	6	33	77	31	35	68	4	77																																				
Dec 14	16	7	8	9	5	5	8	18	20	12	12	11	15	12	27	12	7	7	12	6	5	5	5	5	5	27																																			
Dec 15	3	3	4	6	4	8	7	3	10	4	5	8	7	6	7	7	8	4	6	10	9	8	16	17	3	17																																			
Dec 16	47	61	14	26	5	6	8	6	6	5	9	8	8	21	13	11	15	0	7	50	38	17	3	3	0	61																																			
Dec 17	5	5	5	4	4	9	10	6	7	12	12	9	9	11	5	9	8	7	3	7	6	8	6	7	3	12																																			
Dec 18	7	5	3	6	6	14	14	16	11	47	37	27	25	25	17	16	32	11	22	12	13	12	9	62	3	62																																			
Dec 19	5	55	59	7	11	15	21	37	36	25	8	7	10	10	10	9	9	6	8	7	7	7	6	6	5	59																																			
Dec 20	5	5	7	4	5	5	5	5	8	6	7	9	7	8	11	10	6	9	5	10	6	15	25	4	4	25																																			
Dec 21	8	25	27	11	10	8	36	9	6	4	7	6	8	6	5	5	6	5	4	4	6	4	5	5	4	36																																			
Dec 22	5	4	4	4	7	5	6	6	6	17	8	7	8	10	22	12	9	11	6	13	24	24	31	11	4	31																																			
Dec 23	14	5	7	6	7	7	7	7	5	7	6	12	11	8	7	5	5	6	7	22	27	6	12	13	5	27																																			
Dec 24	10	36	9	6	4	5	4	3	4	8	7	14	10	5	5	4	7	3	4	3	5	7	5	9	3	36																																			
Dec 25	6	16	11	8	49	9	9	9	10	7	29	16	11	16	22	7	7	9	11	4	7	4	9	4	9	49																																			
Dec 26	4	6	9	6	6	5	4	7	13	5	8	25	15	12	76	20	21	32	20	16	7	14	73	30	4	76																																			
Dec 27	14	14	8	14	6	6	6	9	6	9	9	11	5	4	3	5	5	4	5	5	9	8	13	3	14	14																																			
Dec 28	13	9	11	22	41	37	39	33	52	13	38	20	19	10	13	19	10	6	15	13	18	12	12	25	6	52																																			
Dec 29	29	46	17	5	0	0	0	16	8	8	9	18	30	22	16	10	5	8	7	7	4	5	5	4	0	46																																			
Dec 30	4	4	10	5	9	9	5	5	3	4	6	7	5	3	4	3	6	7	3	5	4	3	3	4	3	10																																			
Dec 31	3	6	3	8	5	11	11	7	7	6	35	7	22	23	11	9	6	9	14	12	16	17	11	7	3	35																																			
Diurnal Minimum	3	3	3	4	0	0	0	3	3	4	4	4	4	5	3	4	3	4	0	3	3	4	3	3	3	3																																			
Diurnal Maximum	56	61	59	26	77	37	39	37	52	47	38	36	30	44	76	21	32	32	22	50	77	46	73	68	68																																				
<b>C</b>	Monthly Calibration										<b>S</b>	Daily Zero-Span Check										<b>Q</b>	Quality Assurance																																						
<b>K</b>	Collection Error										<b>ND</b>	No Data (Machine Not in Service)										<b>Y</b>	Routine Maintenance										<b>P</b>	Power Failure																											
<b>X</b>	Invalid Data (Machine Malfunction/Recovery)										<b>NRM</b>	UnitMaint (Repeat Calibration / Repeat Daily Zero-Span Check / Non-Routine Maintenance)																																																	

Daily Average is shown "-" if minimum data completeness criteria of 75% or 18 hours per day is not met.  
 Monthly Average is shown "-" if minimum data completeness criteria of 75% of days per month is not met.



END OF REPORT

This page, 160 of 160 ends the December 2023 Monthly Ambient Air Quality Monitoring Report.



**Lakeland Industry & Community Association**

**DECEMBER 2023**

**Ambient Air Monitoring Calibration Report**

**- COLD LAKE SOUTH STATION-**

**CAL-LICA-202312-01174**

**Station Operation and Maintenance:**

Bureau Veritas Canada

**Data Validation and Report:**

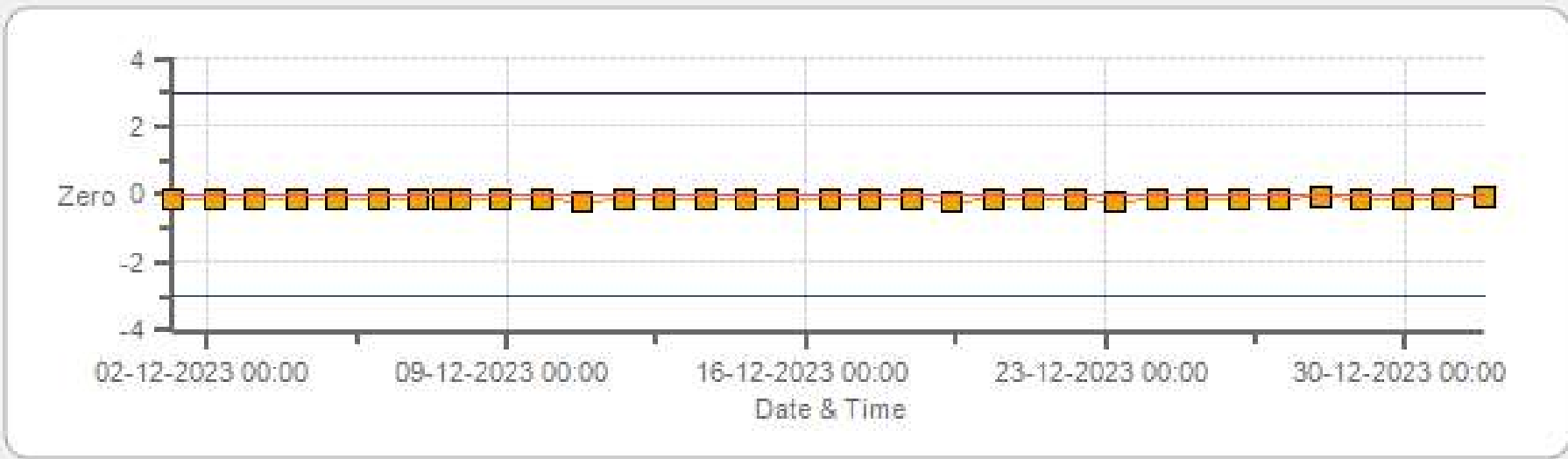
LICA / Bureau Veritas Canada

January 6, 2024

# DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

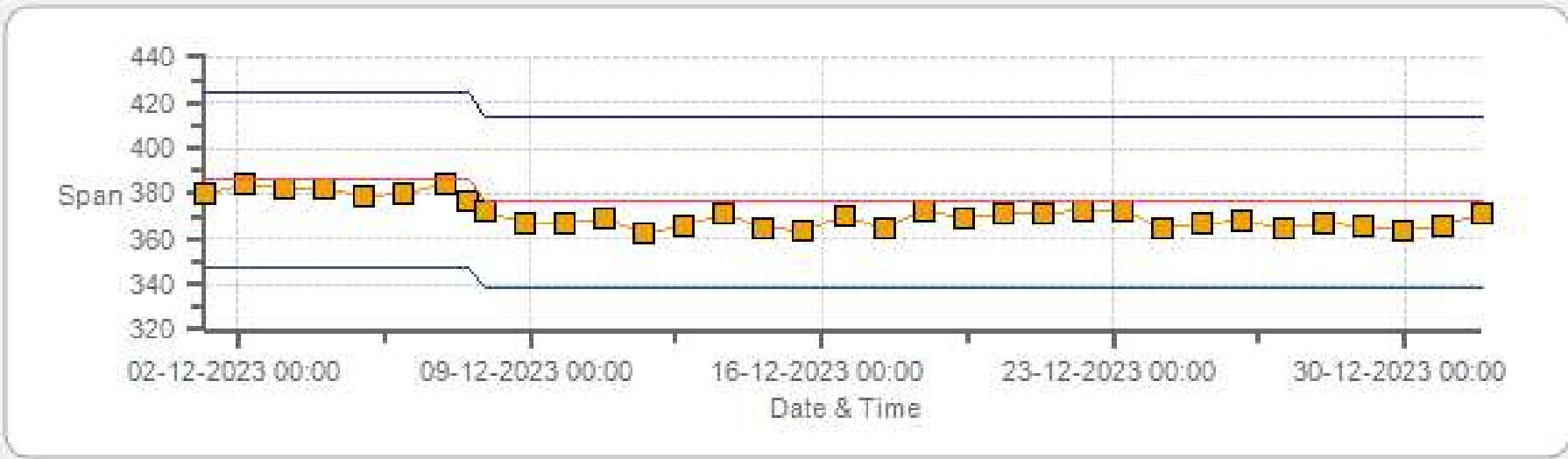


SO2[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



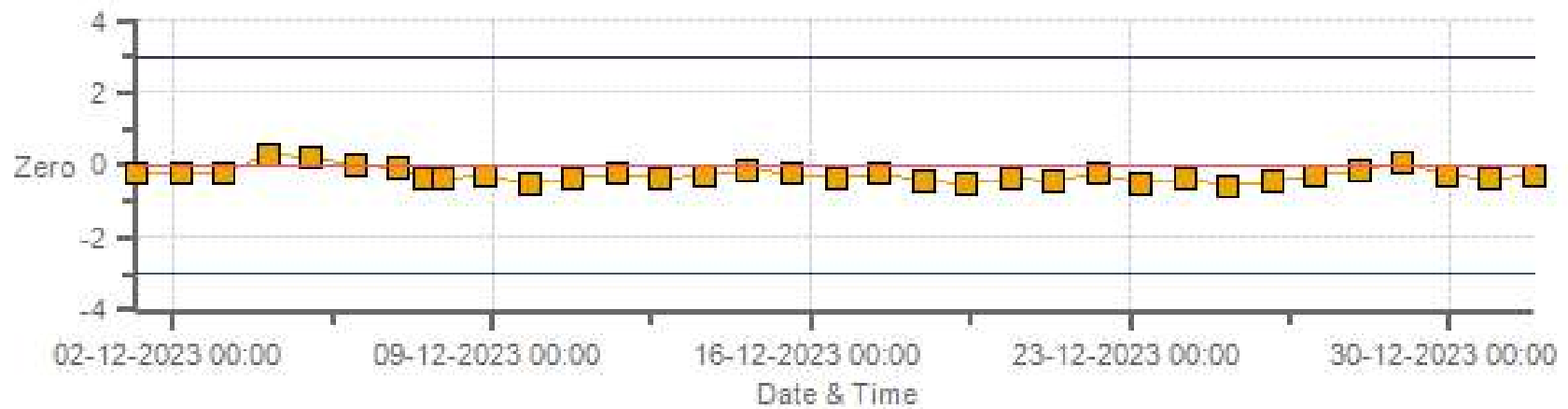
Zero Zero Ref Zero Low Zero High

SO2[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

TRS[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



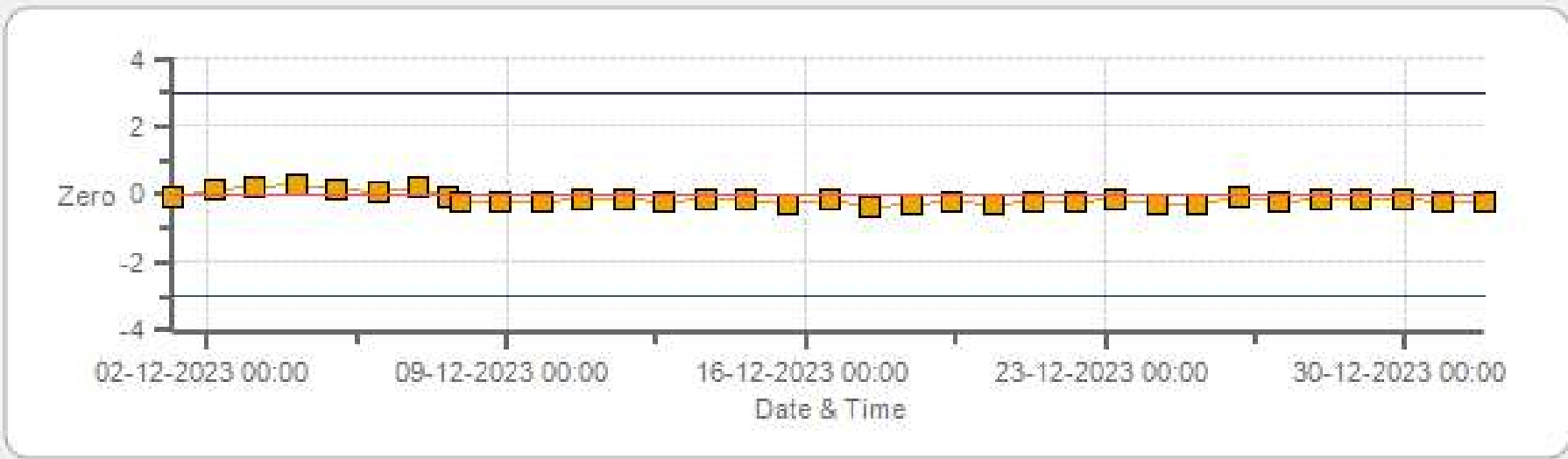
Zero Zero Ref Zero Low Zero High

TRS[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



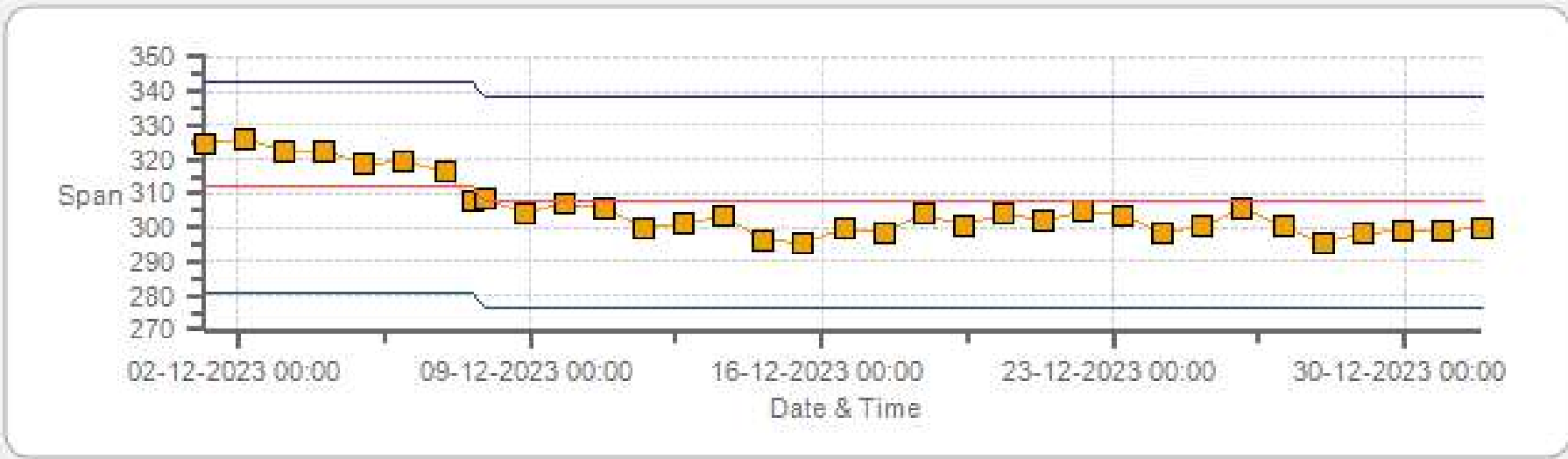
Span SpanRef Span Low Span High

NOX[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



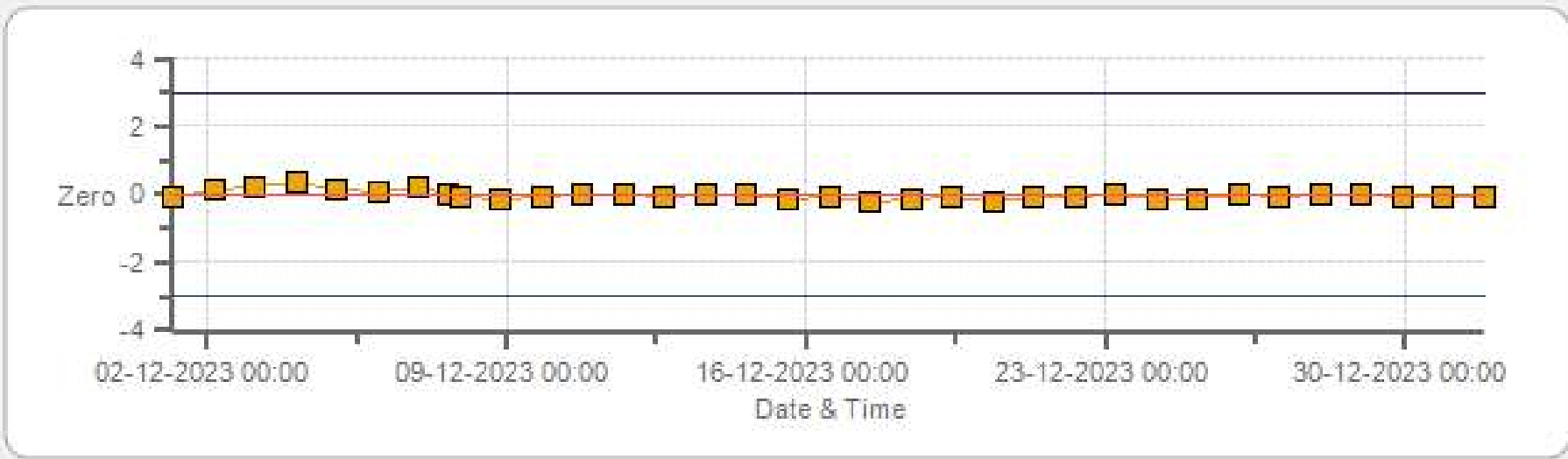
Zero Zero Ref Zero Low Zero High

NOX[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



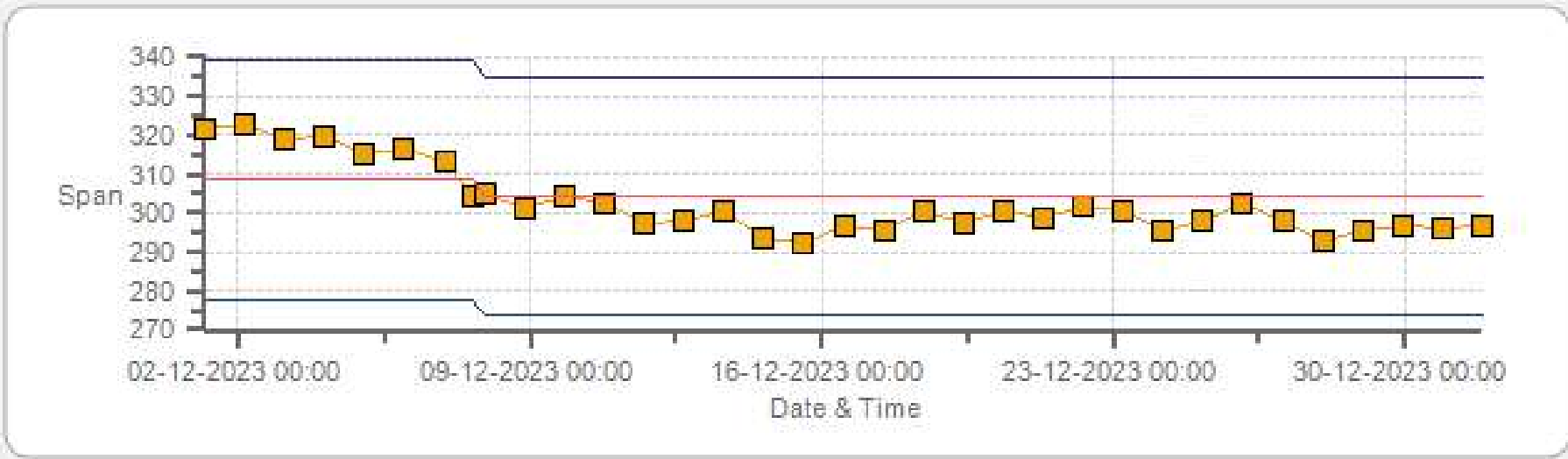
Span SpanRef Span Low Span High

NO2[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NO2[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

O3[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



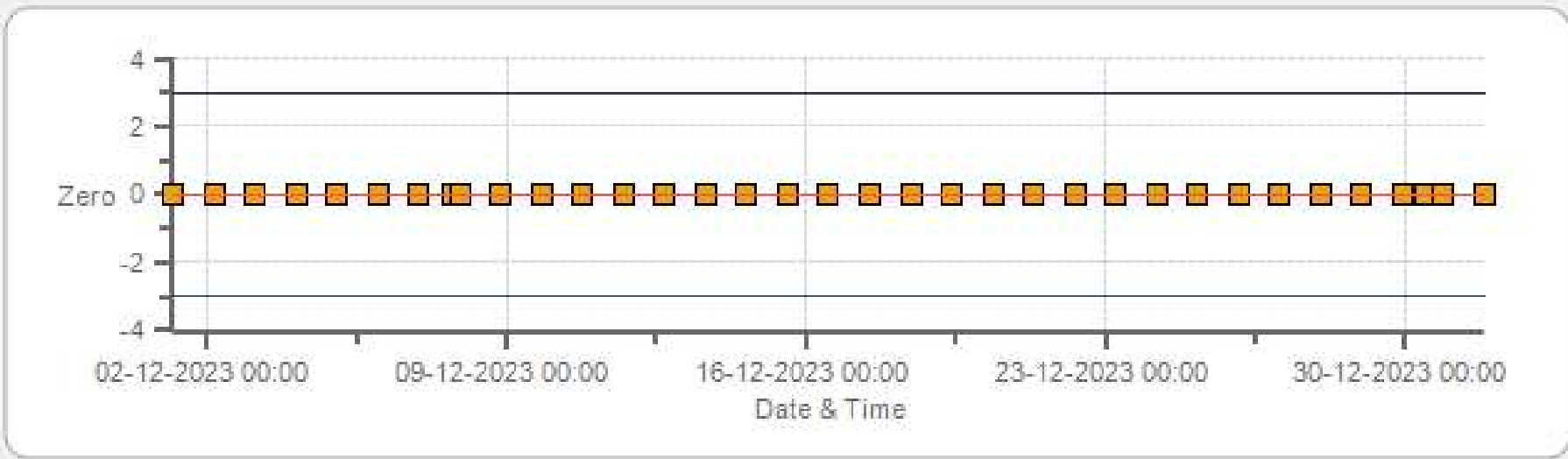
Zero Zero Ref Zero Low Zero High

O3[ppb] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



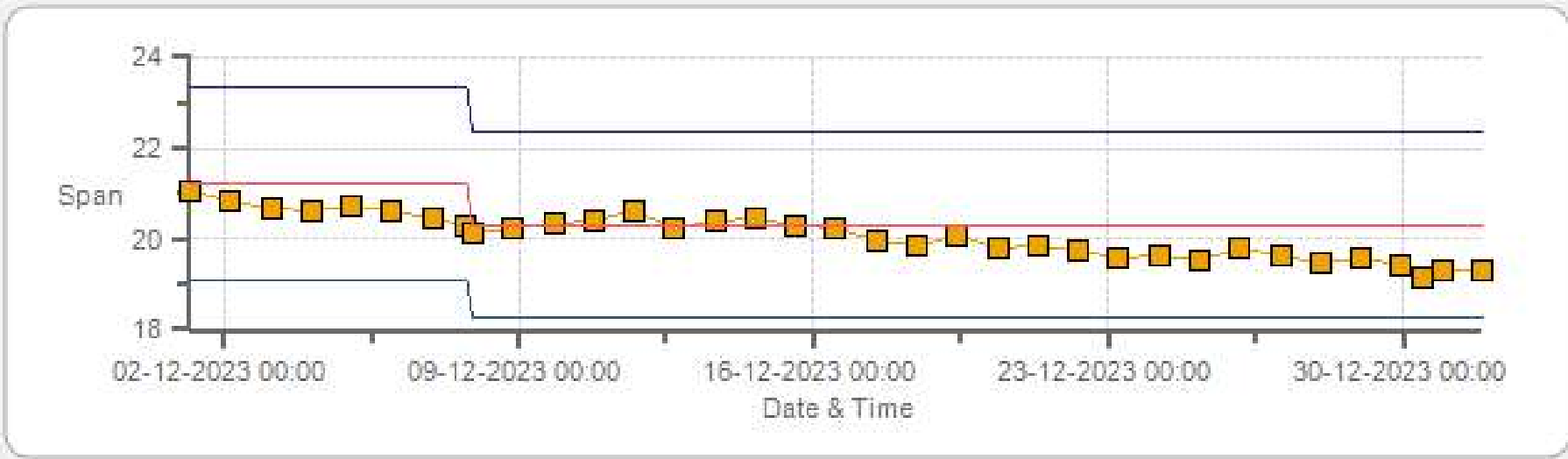
Span SpanRef Span Low Span High

THC55[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



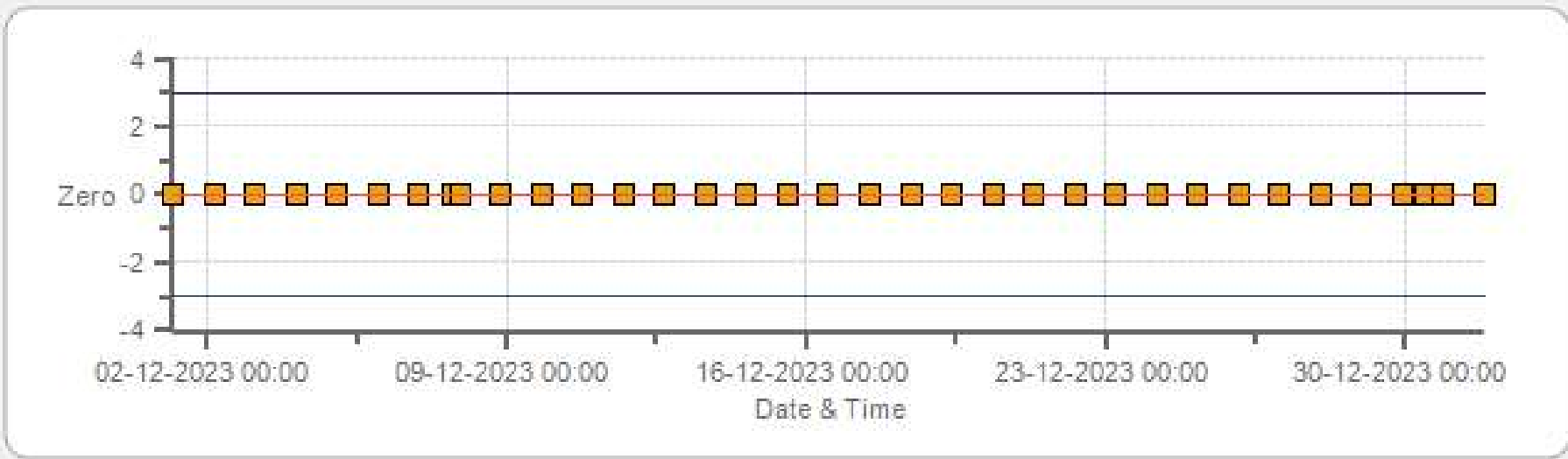
Zero Zero Ref Zero Low Zero High

THC55[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



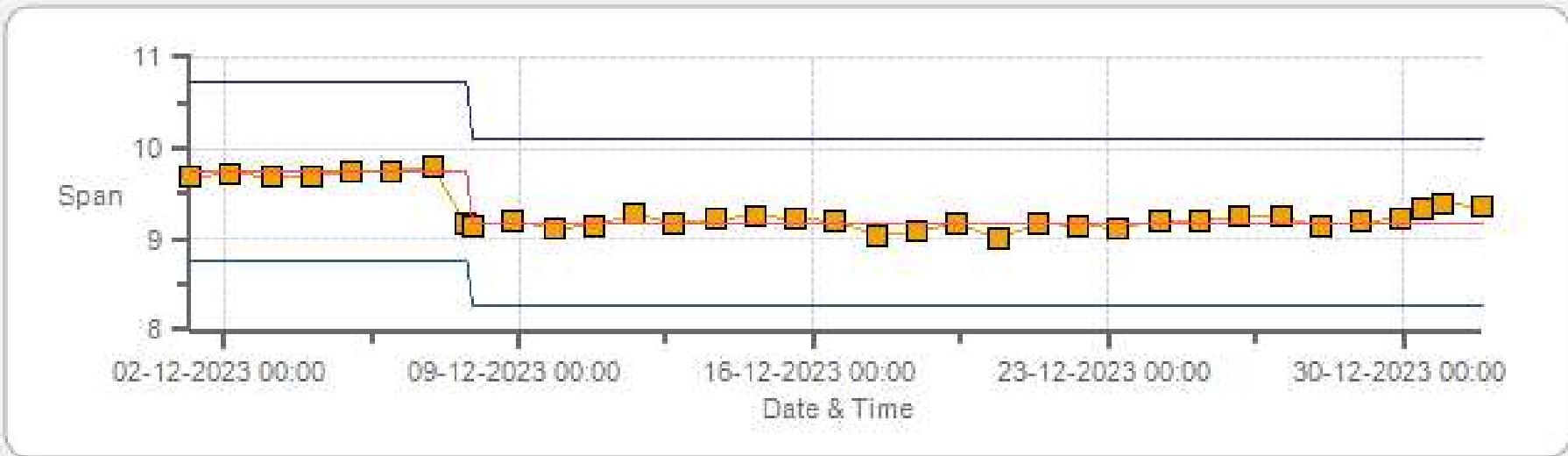
Span SpanRef Span Low Span High

CH4[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



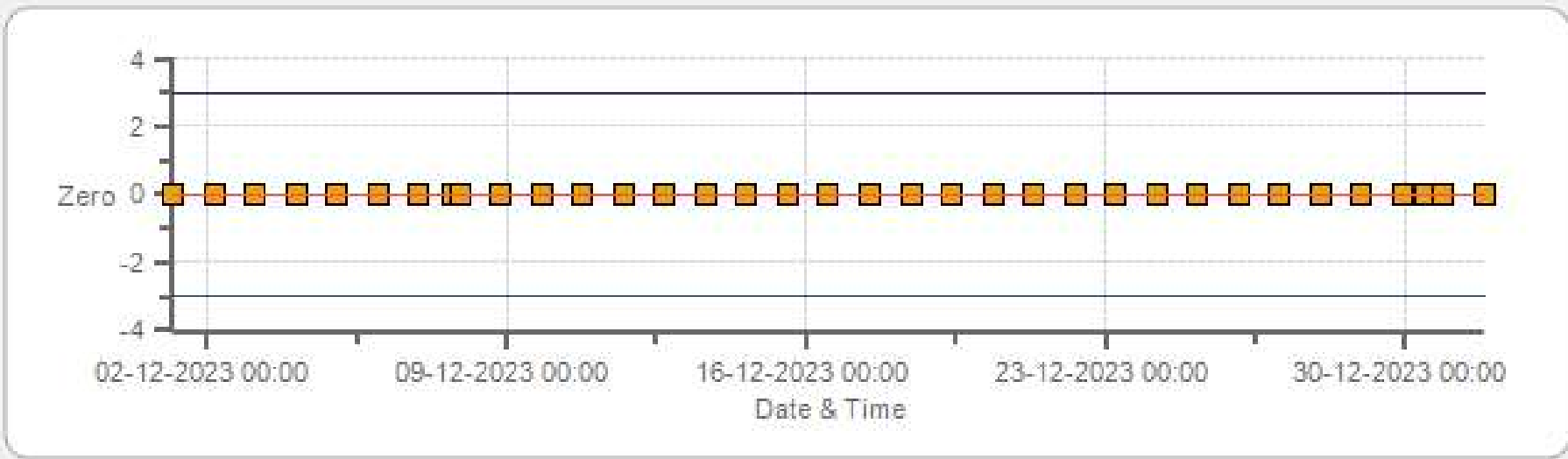
Zero Zero Ref Zero Low Zero High

CH4[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



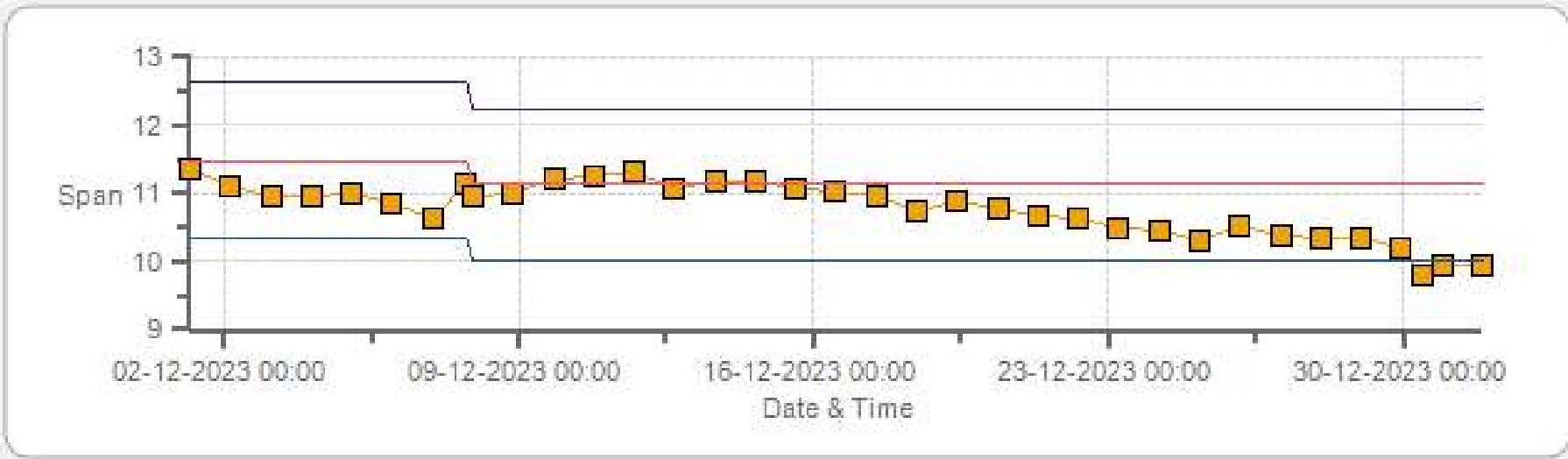
Span Span Ref Span Low Span High

NMHC[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NMHC[ppm] Calibration: Cold Lake South Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High



# MULTI-POINT CALIBRATION RECORDS

# SO2 Analyzer Calibration by Dilution



DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	23.6
LOCATION:	CLS	BAROMETRIC (mBar):	941
PURPOSE:	Removal/Shut-down	START TIME (MST):	16:20
PERFORMED BY:	Chris Wesson	END TIME (MST):	18:06

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180260018	FLOW (mL/min)	432
INITIAL		FINAL	
BKG/OFFSET	2.4	BKG/OFFSET	n/a
COEF/SLOPE	0.988	COEF/SLOPE	n/a
Expected (reference) Value	386.4	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

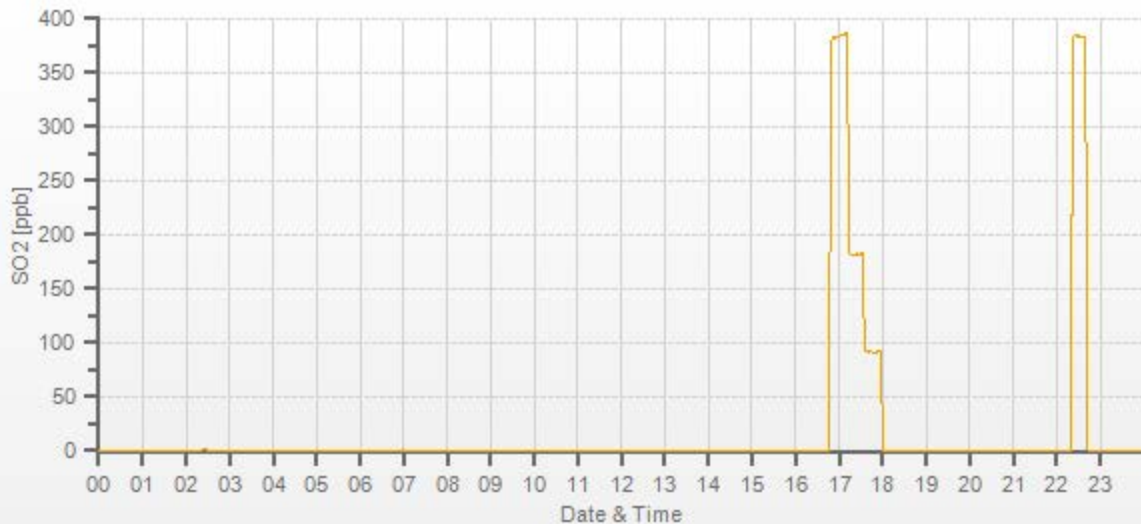
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>60.80</del>	4002	0.00	-0.2	n/a	<del>0.988</del>	<del>n/a</del>
3941	60.80	4002	381.33	385.8	n/a	0.988	n/a
3973	28.80	4002	180.63	182.3	n/a	0.990	n/a
3989	14.40	4003	90.29	91.4	n/a	0.986	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.012	0.0%

## COMMENTS:

Station audit Lamp voltage alarm. Limit = 1200, actual = 1223. Probable lamp needs replacing.
--



# SO2 Analyzer Calibration by Dilution



DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	23.9
LOCATION:	CLS	BAROMETRIC (mBar):	939
PURPOSE:	Routine	START TIME (MST):	08:37
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:57

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180260018	FLOW (mL/min)	432
INITIAL		FINAL	
BKG/OFFSET	2.4	BKG/OFFSET	2.36
COEF/SLOPE	0.988	COEF/SLOPE	0.966
Expected (reference) Value	386.4	Expected (reference) Value	376.5

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>60.80</del>	4002	0.00	-0.1	0	<del>0.979</del>	<del>1.001</del>
3941	60.80	4002	381.33	389.3	381	0.979	1.001
3974	28.80	4003	180.58	n/a	180	n/a	1.003
3989	14.40	4003	90.29	n/a	90.2	n/a	1.001

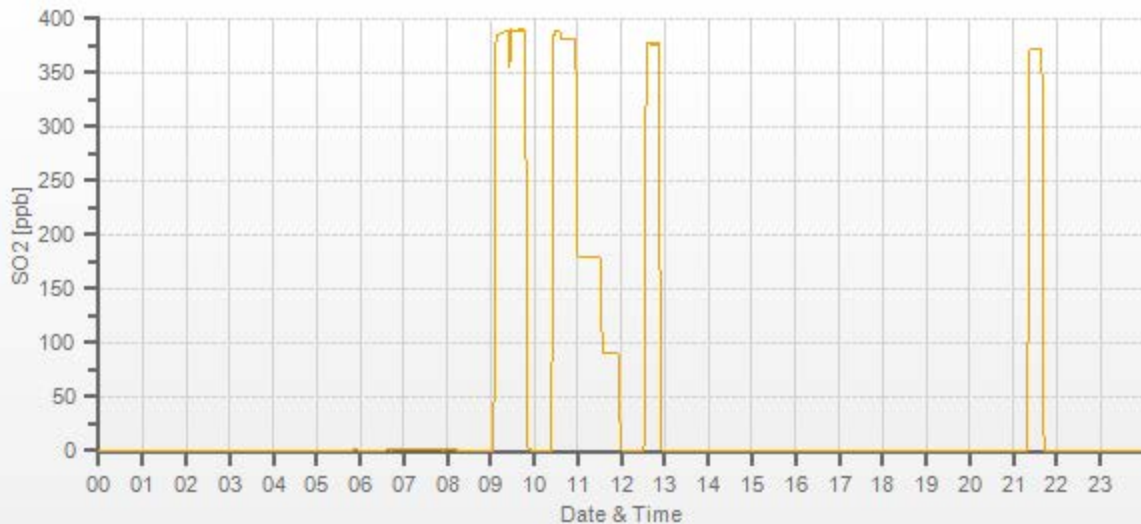
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	0.999	0.0%

## COMMENTS:

Sample filter changed  
09:25 = AF high restarted due to problems with H2S calibration

SO2[ppb] Station: Cold Lake South Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01174

# TRS Analyzer Calibration by Dilution



DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	23.6
LOCATION:	CLS	BAROMETRIC (mBar):	941
PURPOSE:	Removal/Shut-down	START TIME (MST):	16:20
PERFORMED BY:	Chris Wesson	END TIME (MST):	18:06

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	812728560	FLOW (mL/min)	490
INITIAL		FINAL	
BKG/OFFSET	28.1	BKG/OFFSET	n/a
COEF/SLOPE	1.2	COEF/SLOPE	n/a
Expected (reference) Value	44.5	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

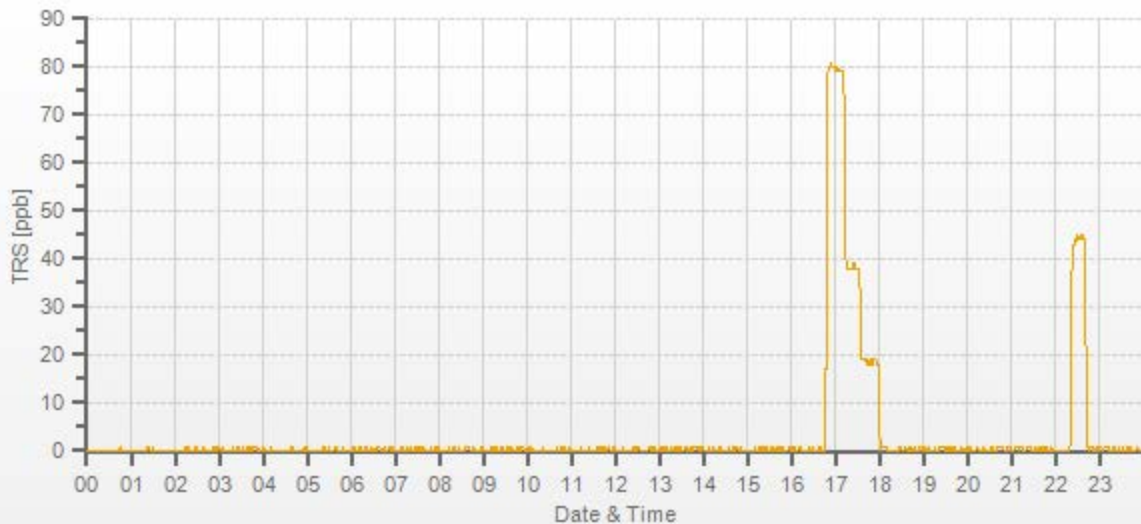
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>32.20</del>	4002	0.00	0.1	n/a	<del>0.989</del>	<del>n/a</del>
3970	32.20	4002	78.05	79	n/a	0.989	n/a
3986	15.70	4002	38.05	38.4	n/a	0.994	n/a
3995	7.80	4003	18.90	18.8	n/a	1.011	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.013	-0.1%

## COMMENTS:

Station audit
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# TRS Analyzer Calibration by Dilution



DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023
PARAMETER:	TRS	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	23.9
LOCATION:	CLS	BAROMETRIC (mBar):	939
PURPOSE:	Routine	START TIME (MST):	08:37
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:57

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	812728560	FLOW (mL/min)	487
INITIAL		FINAL	
BKG/OFFSET	28.1	BKG/OFFSET	28
COEF/SLOPE	1.2	COEF/SLOPE	1.19
Expected (reference) Value	44.5	Expected (reference) Value	43.4

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>32.30</del>	4002	0.00	0.1	0	<del>1.001</del>	<del>0.997</del>
3970	32.30	4002	78.29	78.3	78.5	1.001	0.997
3987	15.70	4003	38.04	n/a	37.8	n/a	1.006
3995	7.80	4003	18.90	n/a	18.8	n/a	1.005

## LINEAR REGRESSION ANALYSIS:

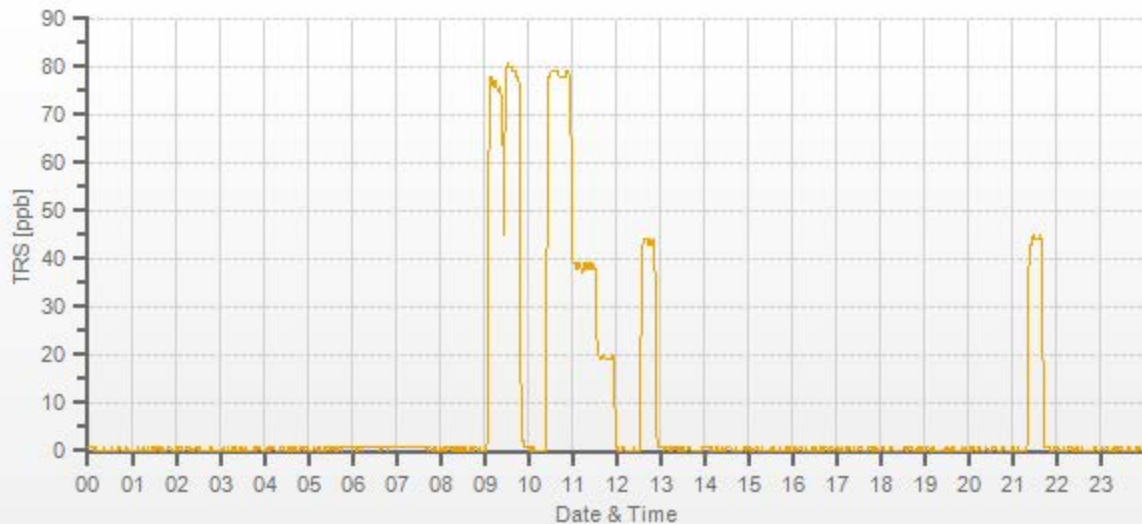
	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.003	-0.1%

## COMMENTS:

Sample filter changed  
 Convert = CDN-101 #501  
 09:25 = Conc unstable. Regulator flushed. AF high restarted



TRS[ppb] Station: Cold Lake South Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01174

# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	23.6	SERIAL #:	1505664393	NOx	1.000
LOCATION:	CLS	BAROMETRIC (mBar):	941	FLOW (mL/min)	673	NO	1.000
PURPOSE:	Removal/Shut-down	START TIME (MST):	16:20	RANGE (ppb)	500	NO2	0.998
PERFORMED BY:	Chris Wesson	END TIME (MST):	19:40	GPT FOR O3?		No	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	5.1	4.8	n/a	BKG/OFFSET:	n/a	n/a	n/a
SLOPE/COEF/CE:	1.006	1.063	0.999	SLOPE/COEF/CE:	n/a	n/a	n/a

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	311.9	3.3	308.5		n/a	n/a	n/a

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	380	250	230-265	n/a
MID	180	125	115-150	n/a
LOW	90	45	40-55	n/a
EXTRA 1	n/a	n/a	n/a	n/a

NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000	<del>5000</del>	5000	0.0	0.0	0.0	0.0	0.2	0.2	n/a	n/a	n/a	<del>0.993</del>	<del>0.989</del>	<del>0.984</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4960	38.60	4999	379.9	381.4	1.5	382.7	385.8	5.2	n/a	n/a	n/a	0.993	0.989	0.984	n/a	n/a	n/a
4982	18.30	5000	180.1	180.8	0.7	181.5	184.0	2.4	n/a	n/a	n/a	0.992	0.984	0.984	n/a	n/a	n/a
4991	9.10	5000	89.5	89.9	0.4	90.1	92.0	1.9	n/a	n/a	n/a	0.994	0.979	0.984	n/a	n/a	n/a

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	38.60	4999	0	381.2	387.2	6.0	<del>256.8</del>	<del>258.1</del>	<del>0.995</del>	<del>100.51%</del>
AS-FOUND HIGH	38.60	4999	270	124.4	388.5	264.1	256.8	258.1	0.995	100.51%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	38.60	4999	130	259.5	389.6	130.1	121.7	124.1	0.981	101.97%
LOW	38.60	4999	50	338.6	389.5	50.8	42.6	44.8	0.951	105.16%
NO2 adjustment not required.									AVERAGE:	102.55%

LINEAR REGRESSION ANALYSIS:				COMMENTS: No issues
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	1.007	0.00%	
NOx	1.000	1.010	0.16%	
NO2	1.000	0.995	0.52%	



CAL-LICA-202312-01174

# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	11-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	23.9	SERIAL #:	1505664393	NOx	1.000
LOCATION:	CLS	BAROMETRIC (mBar):	939	FLOW (mL/min)	673	NO	1.000
PURPOSE:	Routine	START TIME (MST):	08:37	RANGE (ppb)	500	NO2	0.998
PERFORMED BY:	Chris Wesson	END TIME (MST):	14:48	GPT FOR O3?		Yes	

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	5.1	4.8	n/a	BKG/OFFSET:	5.2	4.9	n/a
SLOPE/COEF/CE:	1.006	1.063	0.999	SLOPE/COEF/CE:	0.996	1.051	0.999

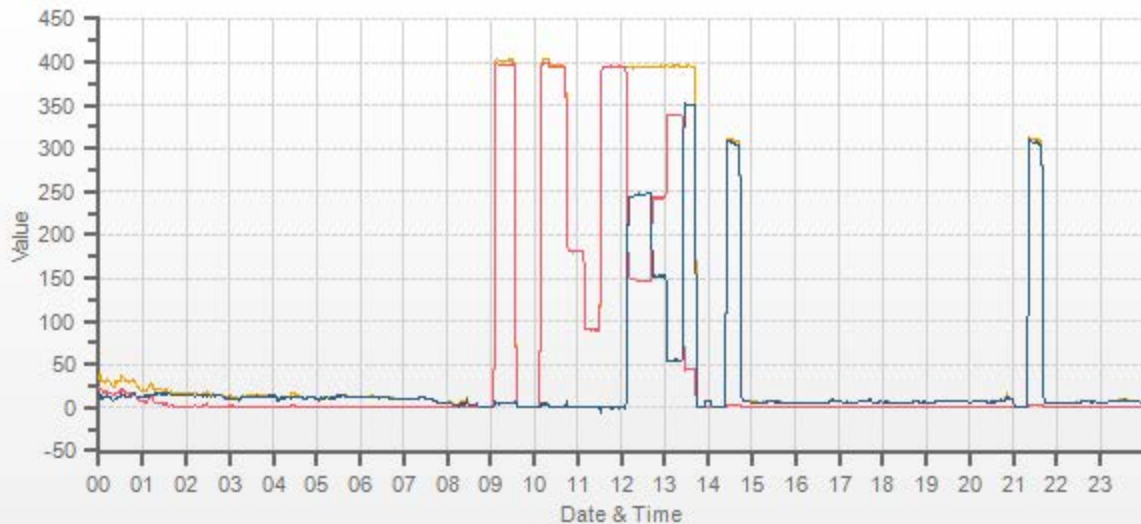
EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	311.9	3.3	308.5		307.6	3.2	304.4

POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	395	250	240-275	n/a
MID	180	154	150-157	Mid
LOW	90	54	50-58	Low
EXTRA 1	n/a	340	300-370	High

FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000	<del>40.10</del>	5000	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	<del>0.995</del>	<del>0.985</del>	<del>0.999</del>	<del>1.000</del>	<del>0.999</del>	<del>0.999</del>
4959	40.10	4999	394.7	396.3	1.6	396.7	402.5	5.8	394.9	396.2	1.3	0.995	0.985	0.999	1.000	0.999	0.999
4982	18.30	5000	180.1	180.8	0.7	n/a	n/a	n/a	180.9	181.0	0.1	n/a	n/a	0.995	0.999	0.999	0.999
4990	9.10	4999	89.6	89.9	0.4	n/a	n/a	n/a	90.6	90.9	0.3	n/a	n/a	0.989	0.989	0.989	0.989

Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	40.10	4999	0	395.3	395.3	0.0	<del>249</del>	<del>248.3</del>	<del>1.003</del>	<del>99.72%</del>
AS-FOUND HIGH	40.10	4999	260	146.3	394.6	248.3	249	248.3	1.003	99.72%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	40.10	4999	160	242.8	395.3	152.5	152.5	152.5	1.000	100.00%
LOW	40.10	4999	60	340.2	395.6	55.4	55.1	55.4	0.995	100.54%
NO2 adjustment not required.									AVERAGE:	100.09%

LINEAR REGRESSION ANALYSIS:				COMMENTS: Sample filter changed Extra point for O3: Setting = 360, NO drop/O3 Conc = 350.6 ppb
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	1.000	0.11%	
NOx	1.000	0.999	0.09%	
NO2	1.000	0.995	0.13%	



CAL-LICA-202312-01174

# Ozone Calibration by Direct GPT



DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	12-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.003
CLIENT:	LICA	TEMPERATURE (°C):	25.4
LOCATION:	CLS	BAROMETRIC (mBar):	940
PURPOSE	Removal/Shut-down	START TIME (MST):	13:52
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:37

## ANALYZER:

MAKE/MODEL	Thermo 49iQ	RANGE	500 ppb
SERIAL #	12208316585	FLOW (mL/min)	1300
INITIAL		FINAL	
BKG/OFFSET	0.8	BKG/OFFSET	n/a
COEF/SLOPE	1.084	COEF/SLOPE	n/a
Expected (reference) Value	280	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	07-Dec-2023	GPT END TIME:	13:50

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>          </del>	5000	0.0	-0.4	n/a	<del>          </del>	<del>          </del>
5000	<del>          </del>	5000	350.6	364.4	n/a	0.961	n/a
5000	<del>          </del>	5000	152.5	157.5	n/a	0.966	n/a
5000	<del>          </del>	5000	55.1	57.5	n/a	0.952	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.040	-0.1%

## COMMENTS:

Station audit
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# Ozone Calibration by Direct GPT



DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	12-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.003
CLIENT:	LICA	TEMPERATURE (°C):	24.7
LOCATION:	CLS	BAROMETRIC (mBar):	941
PURPOSE:	Install/Post-Repair	START TIME (MST):	15:37
PERFORMED BY:	Chris Wesson	END TIME (MST):	18:01

## ANALYZER:

MAKE/MODEL	Thermo 49iQ	RANGE	500 ppb
SERIAL #	12208316585	FLOW (mL/min)	1300
INITIAL		FINAL	
BKG/OFFSET	0.8	BKG/OFFSET	0.4
COEF/SLOPE	1.084	COEF/SLOPE	1.047
Expected (reference) Value	280	Expected (reference) Value	268.1

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	07-Dec-2023	GPT END TIME:	13:50

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>          </del>	5000	0.0	n/a	0.0	<del>          </del>	<del>          </del>
5000	<del>          </del>	5000	350.6	n/a	350.1	n/a	1.001
5000	<del>          </del>	5000	152.5	n/a	152.8	n/a	0.998
5000	<del>          </del>	5000	55.1	n/a	56.1	n/a	0.982

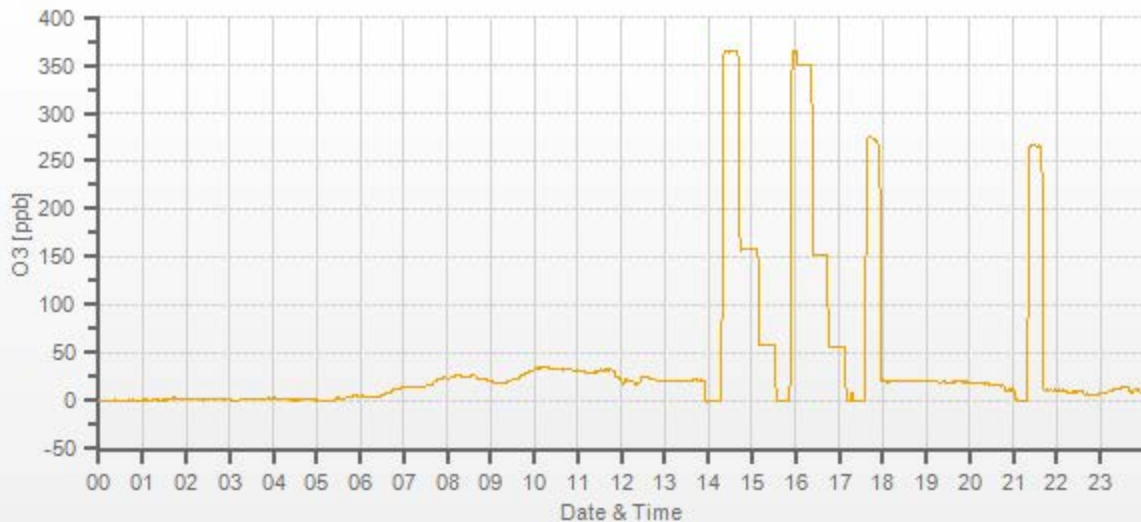
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	0.997	0.1%

## COMMENTS:

Sample filter changed  
As-found determined during preceding audit

O3[ppb] Station: Cold Lake South Daily: 07-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01174



# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	12-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	24.9		Thermo 55i	1180930025	1153
LOCATION:	CLS	BAROMETRIC (mBar):	940	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Removal/Shut-down	START TIME (MST):	18:05	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	19:45	PREVIOUS CF:	0.998	1.001	0.999

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	9.74	11.49	21.23		n/a	n/a	n/a

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	15.36	12.92	28.28	n/a	n/a	n/a	0.936	1.052	0.989	n/a	n/a	n/a
3228	26.90	3255	7.19	6.80	13.99	7.62	6.74	14.36	n/a	n/a	n/a	0.944	1.008	0.974	n/a	n/a	n/a
3240	13.50	3253	3.61	3.41	7.02	3.81	3.44	7.26	n/a	n/a	n/a	0.948	0.992	0.967	n/a	n/a	n/a

## LINEAR REGRESSION ANALYSIS:

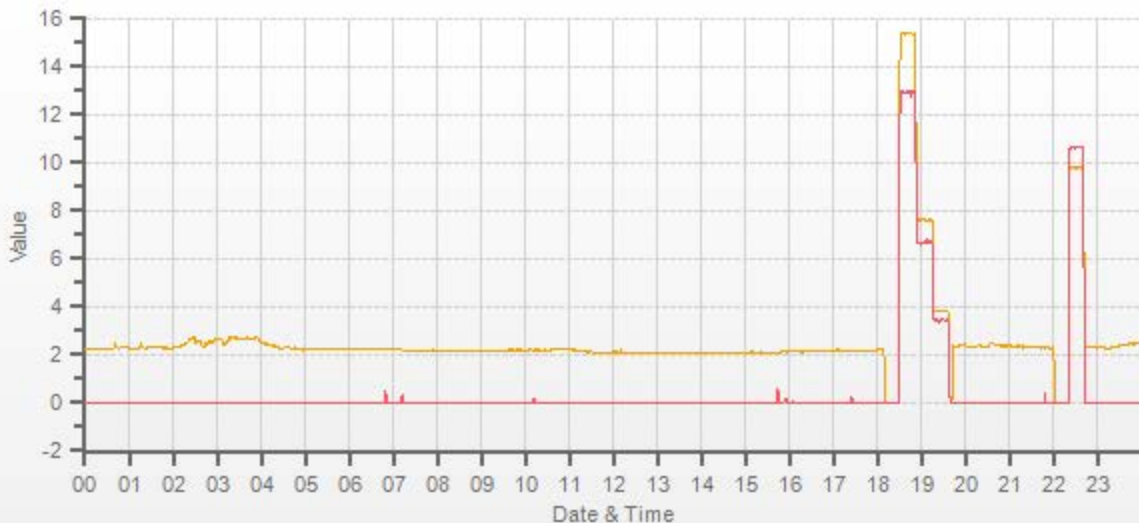
	CORRELATION	SLOPE	INTERCEPT
CH <sub>4</sub>	1.000	1.069	-0.2%
NMHC	1.000	0.948	0.7%
THC	1.000	1.010	0.3%

## Comments:

Station audit.

Use Zero Chrom?

Yes



CAL-LICA-202312-01174

# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	07-Dec-2023	PREVIOUS CALIBRATION DATE:	12-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	25.5		Thermo 55i	1180930025	1153
LOCATION:	CLS	BAROMETRIC (mBar):	940	PARAMETER:	CH4	NMHC	THC
PURPOSE	Routine	START TIME (MST):	12:15	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	18:01	PREVIOUS CF:	0.998	1.001	0.999

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

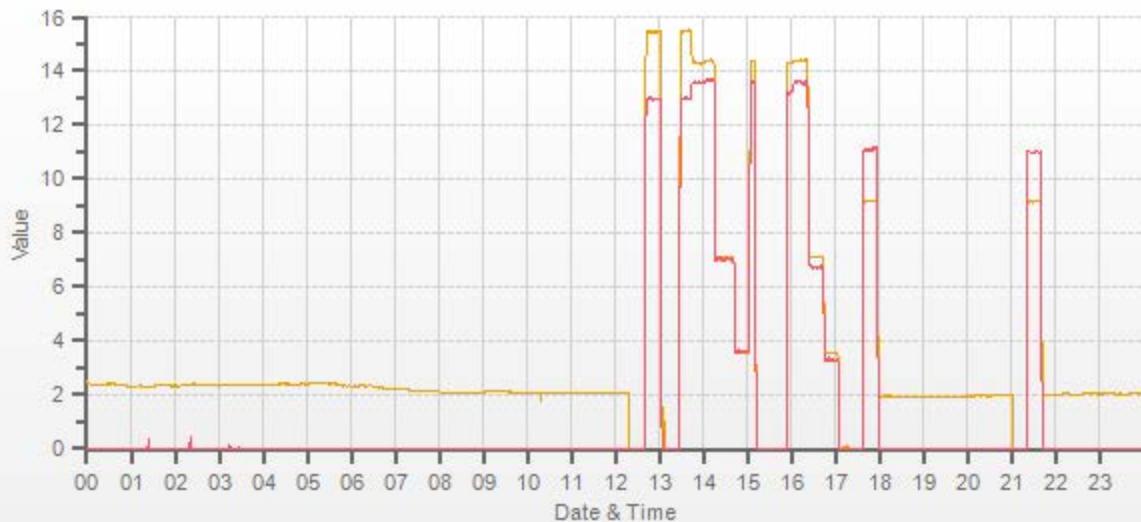
INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	9.74	11.49	21.23		9.18	11.13	20.31

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	15.45	12.98	28.43	14.40	13.56	27.96	0.931	1.047	0.984	0.999	1.002	1.000
3228	26.90	3255	7.19	6.80	13.99	n/a	n/a	n/a	7.12	6.76	13.90	n/a	n/a	n/a	1.010	1.005	1.006
3240	13.40	3253	3.58	3.39	6.97	n/a	n/a	n/a	3.57	3.28	6.85	n/a	n/a	n/a	1.004	1.033	1.018

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	1.001	-0.1%	Sample filter changed 1st attempt failed at low. Changed zero chrom to YES, redo zero chrom. Repeated from adjusted zero	
NMHC	1.000	1.000	-0.2%		
THC	1.000	1.000	-0.1%		
				Use Zero Chrom?	Yes



CAL-LICA-202312-01174



# Teledyne T640 Audit/Calibration

<b>Date/Previous Audit Date:</b> December 27, 2023   November 12, 2023		<b>Weather Conditions:</b> Mainly sunny			
<b>Company:</b> LICA		<b>Start Time (mst):</b> 15:45			
<b>Station:</b> Cold Lake South		<b>End Time (mst):</b> 16:52			
<b>Parameter:</b> PM 2.5	<b>Performed By/Reviewer:</b> Alex Yakupov   Chris Wesson				
<b>Instrument Data:</b>					
<b>Make/Model:</b>	Teledyne T640	<b>Serial Number:</b>	575		
<b>Owner:</b>	LICA	<b>Alarms (detail in comments):</b>	No		
<b>Reference Standards/I.D./Expiry Date:</b>					
Flow Standard: DeltaCal DC-1/#177246 / Nov 27, 2024		Temperature: Vaisala / HM70 / #T1640130/ Jun 26, 2024			
Digital Manometer: DeltaCal DC-1/#177246 / Nov 27, 2024		Pressure: Fisher / FB 61291/ #130168457/ Mar 20, 2024			
<b>DIAGNOSTICS:</b>					
Ambient Pressure (mmHg)	712.0	Ambient Temp (°C)	-2.4	ASC Heater Duty (%)	0.0
Box Temp (°C)	27.3	Current PMT HV (V)	1428	LED Temp (°C)	36.51
P3 Value	47	PMT Setting (V)	1432	Pump PWM (%)	43
Sample Flow (L/min)	5.00	Sample RH (%RH)	11.3	Number concentration	327.0
<b>Monthly Audit/Calibration:</b>					
<b>Item:</b>	<b>As-found</b>		<b>As-left</b>		<b>Tolerance</b>
	<b>Reference</b>	<b>T640x</b>	<b>Reference</b>	<b>T640x</b>	
Zero Test (Leak Check)	PM10	0.0	PM10	0.0	0.0 to 0.2
	PM2.5	0.0	PM2.5	0.0	
Ambient Pressure (mmHg)	712.0	712.0	712	712	+/- 10 mm Hg
Ambient Temperature (°C)	-2.40	-2.4	n/a		+/- 2°C
Sample Flow (L/min)	5.01	5	5.01	5	+/- 5% of T640x (e.g., 4.75 – 5.25 lpm)
<b>Additional Monthly Maintenance :</b>					<b>Completed</b>
Inlet cleaned?					Yes
Sample tubing inspected (inner and outer)?					Yes
<b>Comments:</b>					
n/a					

## Cold Lake South Station Checklist

COMPANY: LICA PLANT: Cold Lake South DATE: December 6, 2023

Station Location: X,Y Coordinates: 54.4140, -110.2331  
 Elevation (m): 535  
 Declination: 13° 5' East

GENERAL	Yes	No	n/a	Comments:
Has site location changed from previous audit?	x	x		Trees infringing on wind system - see photos
Is site secure?	x			
Are station operating conditions adequate?	x			
Last twelve month's of calibrations available?	x			Sharepoint
All applicable SOP's available in station?	x			Sharepoint
Site documentation up to date?				

DATA ACQUISITION	Yes	No	n/a	Comments:
Are strip charts in use?		x		
Is a digital data logger in use?	x			

TRAILER COMPONENTS	Yes	No	n/a	Comments:
Is a glass sampling manifold installed?	x			
Is sampling manifold clean and free of chips and cracks?	x			
Is a trap in place?	x			
Are spare manifold ports capped?	x			
Is manifold pump properly installed and operative?		X		Flow weak. Suspect blockage
Do sample lines extend halfway into manifold?		X		
Are monitor sampling lines connected to manifold?	x			
Are sampling lines clean?	x			
Are monitors properly mounted and secure?	x			
Are monitors properly exhausted from room or	x			
Are zero and span systems operational?	x			

Meteorological	Yes	No	n/a	Comments:
Is wind equipment properly oriented?	x			
Is the wind equipment functioning properly?	x			

	Indicated Value:	Audit Value:	% Difference	Scalar Difference:
Station Temperature °C	24.2	24.1	-0.41	-0.10
Barometric Pressure	938.9	939.4	0.05	0.50
Wind Speed (kph)	6.8	5~10	n/a	n/a
Wind Direction (Deg)	SW	SW	n/a	n/a
Relative Humidity %	78.7	75	-4.93	-3.70
Ambient Temperature °C	1.9	1.9	0.00	0.00

**Recommendations:**  
 Check/clean manifold blower  
 Manifold exit cover, vermin screen for pump cabinet

AUDITOR: Chris Wesson



# Meteorological Sensor Audit/Calibration

## Location Information

Company: LICA  
 Audit Location: Cold Lake South  
 Audit Date: July 6, 2022  
 Calibration Purpose: routine annual

Performed By: Alex Yakupov  
 Reviewed By: Chris Wesson  
 Start/End Time (mst): 15:54 / 17:48  
 Weather Conditions: A few clouds

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	n/a
Sensor Model:	05305AQ	Velocity Unit Output Range:	0-200
Serial #:	177354	Direction Voltage Output Range:	n/a
Previous Cal/Audit Date:	April 20, 2021	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# CA4744 expires Aug 6, 2022

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.2	18.2	1.013
2000	36.9	36.6	36.6	1.007
3000	55.3	55.1	55.1	1.003
4000	73.7	73.5	73.5	1.003
5000	92.2	92.1	92.0	1.001
6000	110.6	110.4	110.3	1.002
7000	129.0	128.8	128.8	1.002
8000	147.4	147.3	147.3	1.001
9000	165.9	165.6	165.6	1.002
10000	184.3	184.2	184.2	1.001
The audit meets AMD requirements.			Average Correction Factor=	1.003

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	0	355	0.1	0.0	0.1
30	330	27	329	2.7	1.4	2.0
60	300	58	298	2.4	1.9	2.1
90	270	89	268	1.1	2.1	1.6
120	240	119	239	0.9	1.1	1.0
150	210	148	208	1.6	2.1	1.8
180	180	178	180	2.4	-0.2	1.3
210	150	208	149	2.3	1.1	1.7
240	120	239	119	1.3	0.6	1.0
270	90	268	91	2.2	-1.2	1.7
300	60	298	58	2.3	1.9	2.1
330	30	329	28	1.3	2.5	1.9
355	0	355	0	-0.1	0.1	0.1
The audit meets AMD requirements.				Average Absolute Degrees Difference=		1.4

## Comments:

Output via RMY32400 Serial Interface



# Meteorological Sensor Audit/Calibration

## Location Information

Company: LICA  
 Audit Location: Cold Lake South  
 Audit Date: December 27, 2023  
 Calibration Purpose: routine annual

Performed By: Alex Yakupov  
 Reviewed By: Chris Wesson  
 Start/End Time (mst): 12:09 / 14:17  
 Weather Conditions: Mainly sunny

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	0-1
Sensor Model:	05305AQ	Velocity Unit Output Range:	0-200
Serial #:	177354	Direction Voltage Output Range:	0-1
Previous Cal/Audit Date:	July 6, 2022	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 ID# CA4744 expires Oct 18, 2024

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.0	0.0	-
1000	18.4	18.3	18.3	1.007
2000	36.9	36.9	36.7	1.002
3000	55.3	55.1	55.1	1.003
4000	73.7	73.6	73.6	1.002
5000	92.2	92.0	92.0	1.002
6000	110.6	110.5	110.5	1.001
7000	129.0	128.9	128.9	1.001
8000	147.4	147.3	147.3	1.001
9000	165.9	165.8	165.8	1.000
10000	184.3	184.2	184.2	1.001
The audit meets AMD requirements.			Average Correction Factor=	1.002

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	0	353	0.2	2.4	1.3
30	330	26	329	3.7	1.0	2.4
60	300	58	298	2.3	2.0	2.2
90	270	87	268	2.8	2.3	2.6
120	240	119	236	1.5	4.5	3.0
150	210	149	208	1.4	1.7	1.6
180	180	177	177	2.7	2.7	2.7
210	150	206	149	4.0	0.9	2.5
240	120	235	120	4.6	0.5	2.6
270	90	266	89	3.7	1.2	2.5
300	60	297	58	2.7	1.9	2.3
330	30	328	27	1.9	3.1	2.5
355	0	353	0	2.4	0.1	1.2
The audit meets AMD requirements.				Average Absolute Degrees Difference=		2.2

### Comments:

No issues.



# End of Report



**Lakeland Industry & Community Association**

**DECEMBER 2023**

**Ambient Air Monitoring Calibration Report**

**- TAMARACK STATION-**

**CAL-LICA-202312-01248**

**Station Operation and Maintenance:**

Bureau Veritas Canada

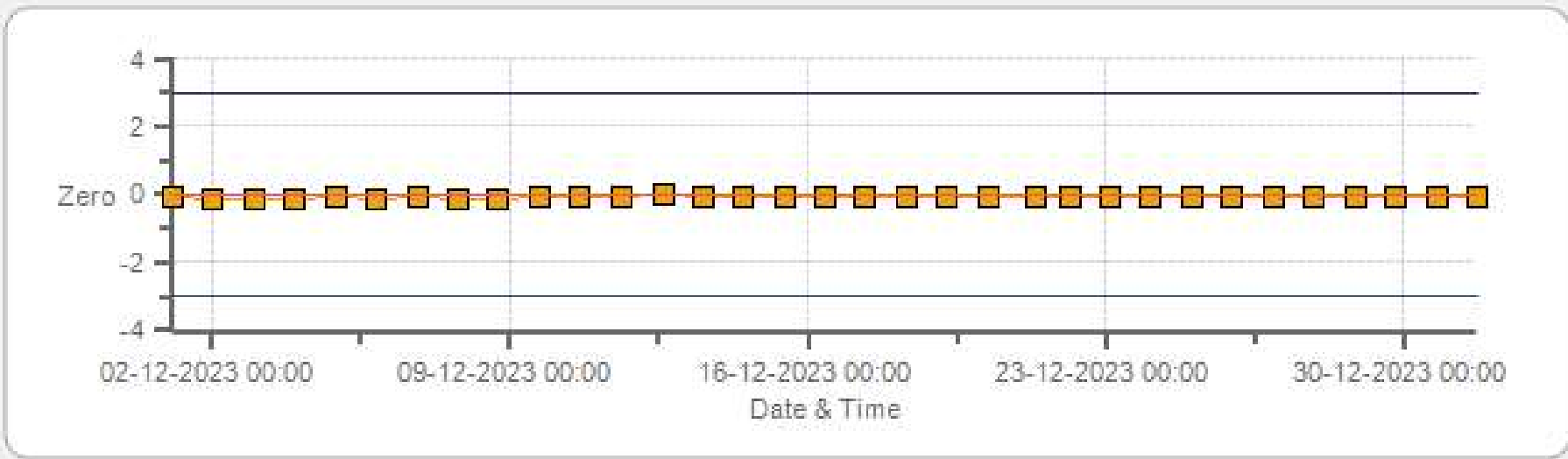
**Data Validation and Report:**

LICA / Bureau Veritas Canada

January 6, 2024

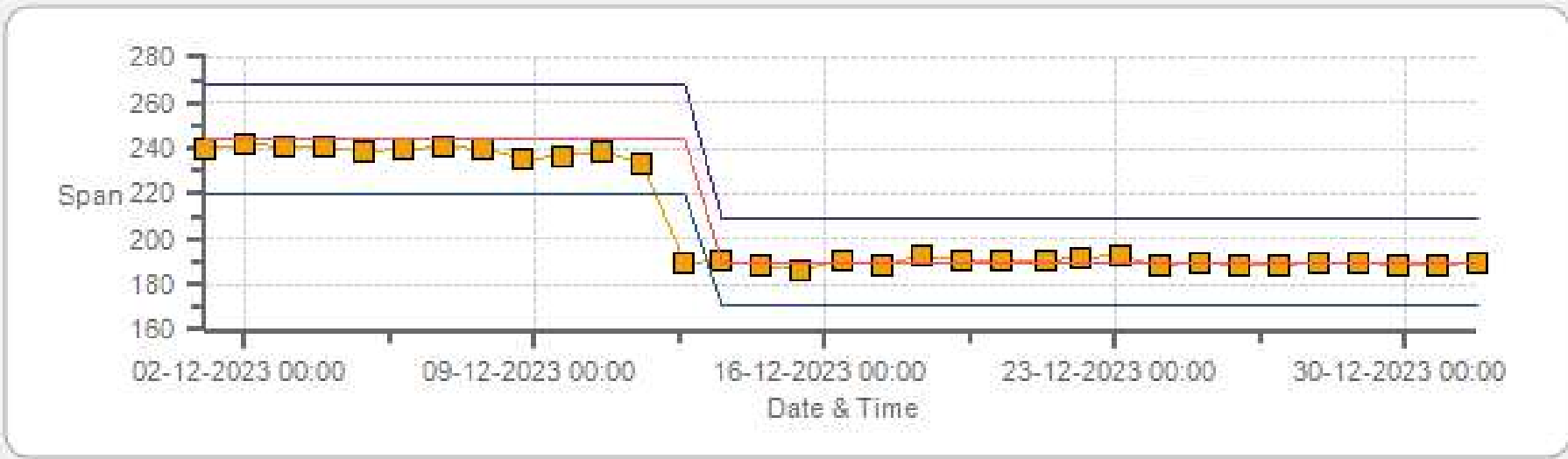
# DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

SO2[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



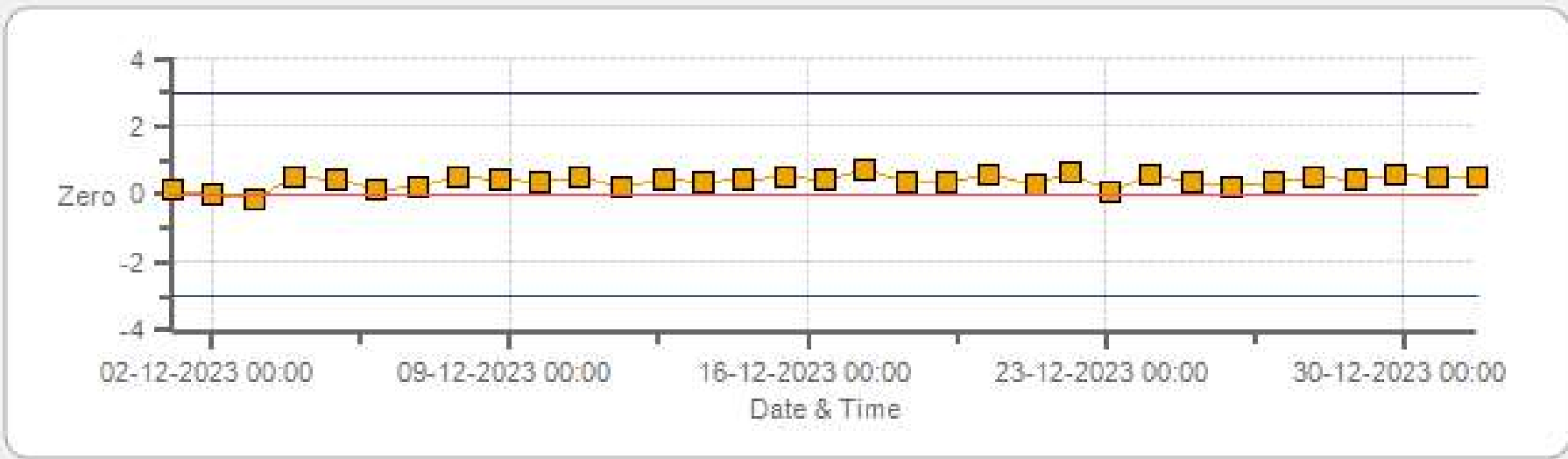
Zero Zero Ref Zero Low Zero High

SO2[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



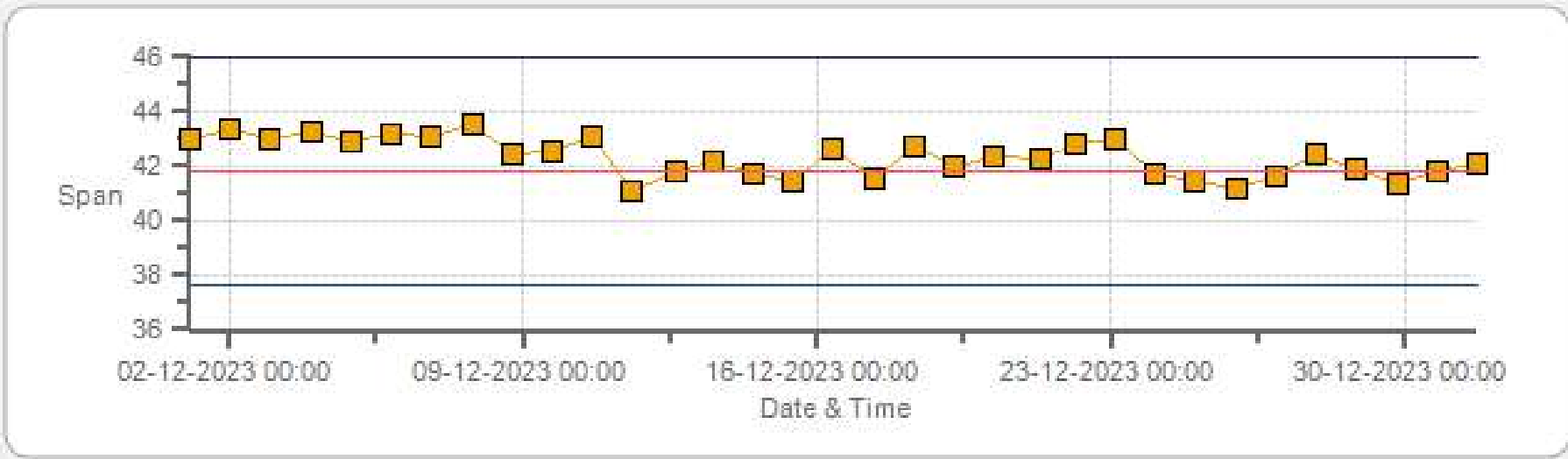
Span SpanRef Span Low Span High

H2S[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



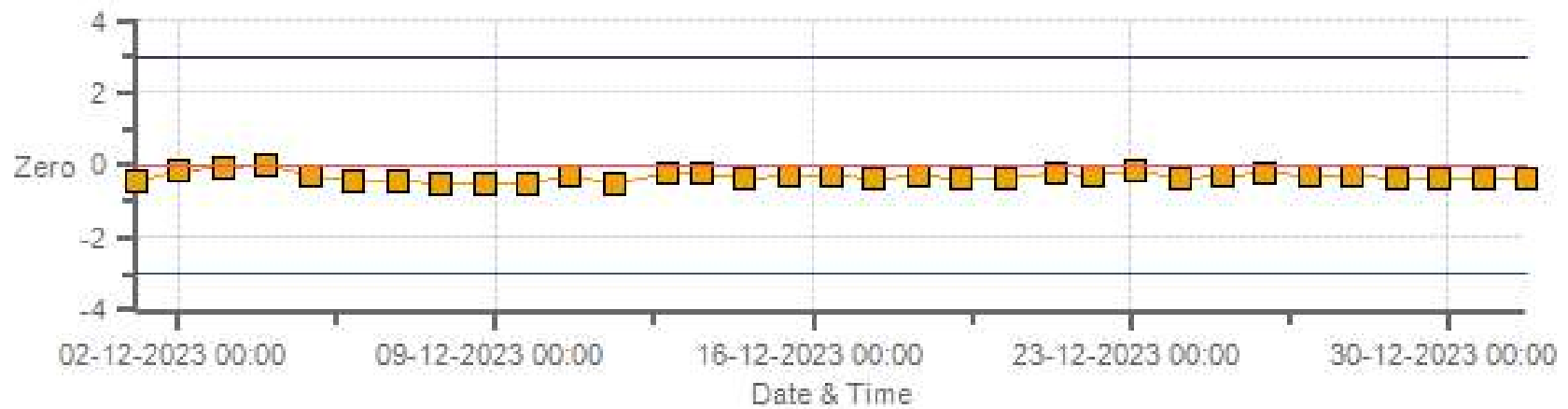
Zero Zero Ref Zero Low Zero High

H2S[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

NOX[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



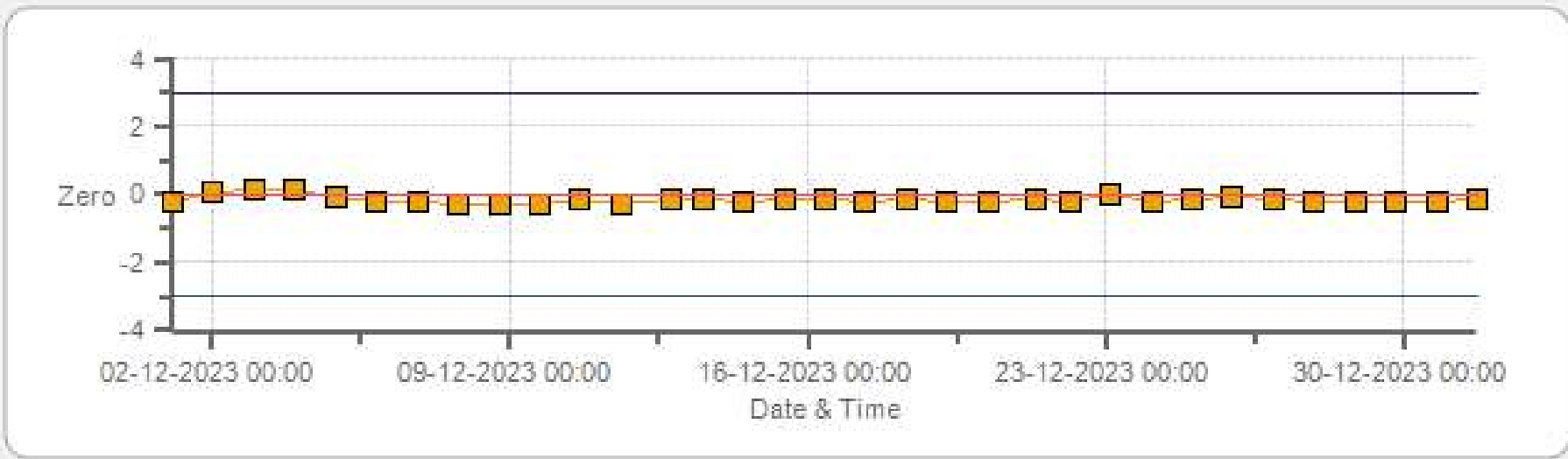
Zero Zero Ref Zero Low Zero High

NOX[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



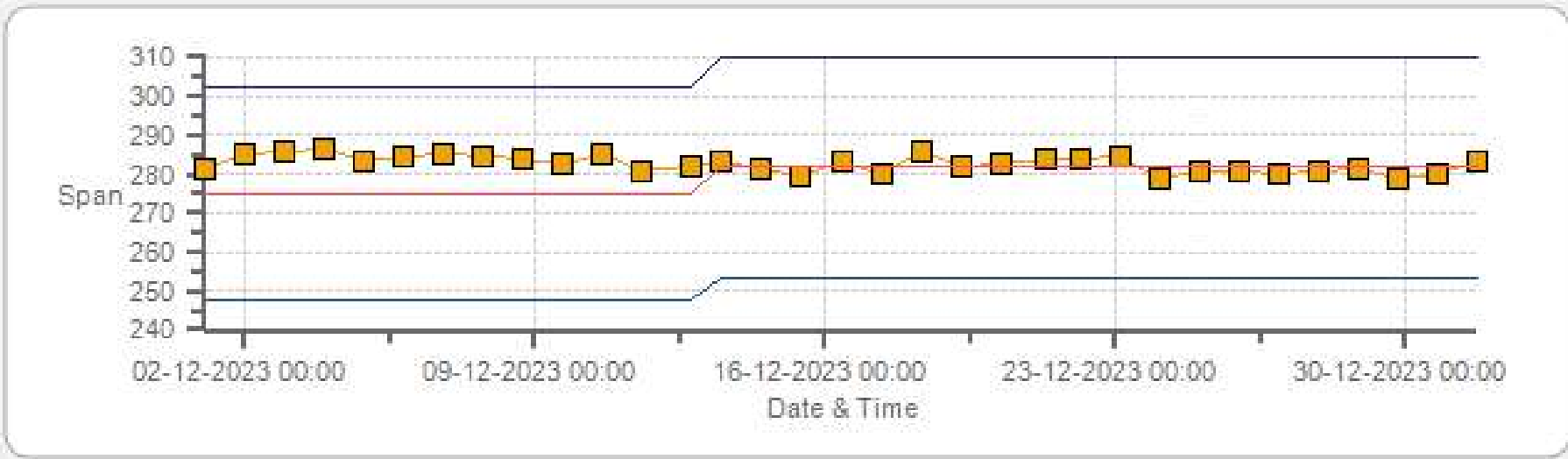
Span Span Ref Span Low Span High

NO2[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



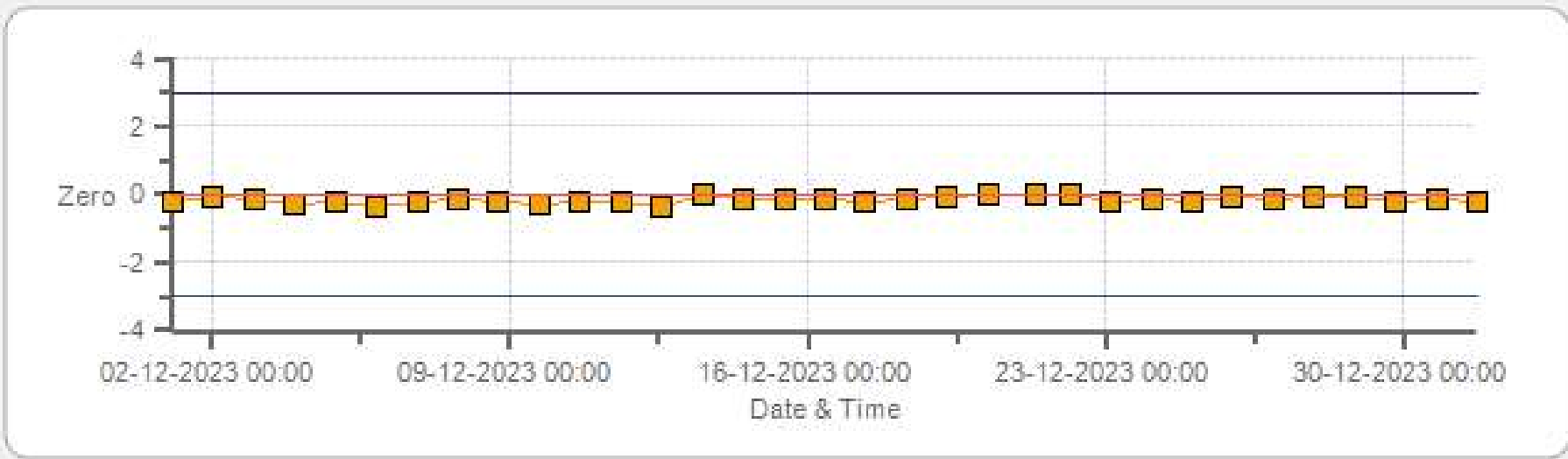
Legend: Zero (Yellow square), Zero Ref (Red line), Zero Low (Blue line), Zero High (Purple line)

NO2[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



Legend: Span (Yellow square), SpanRef (Red line), Span Low (Blue line), Span High (Purple line)

O3[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

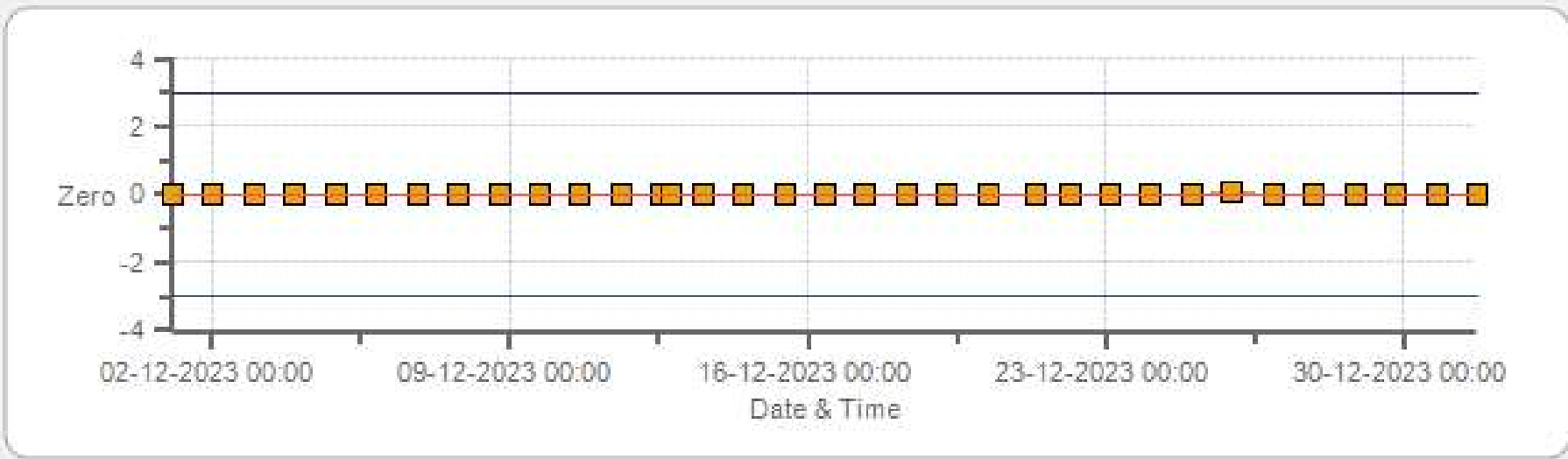
O3[ppb] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

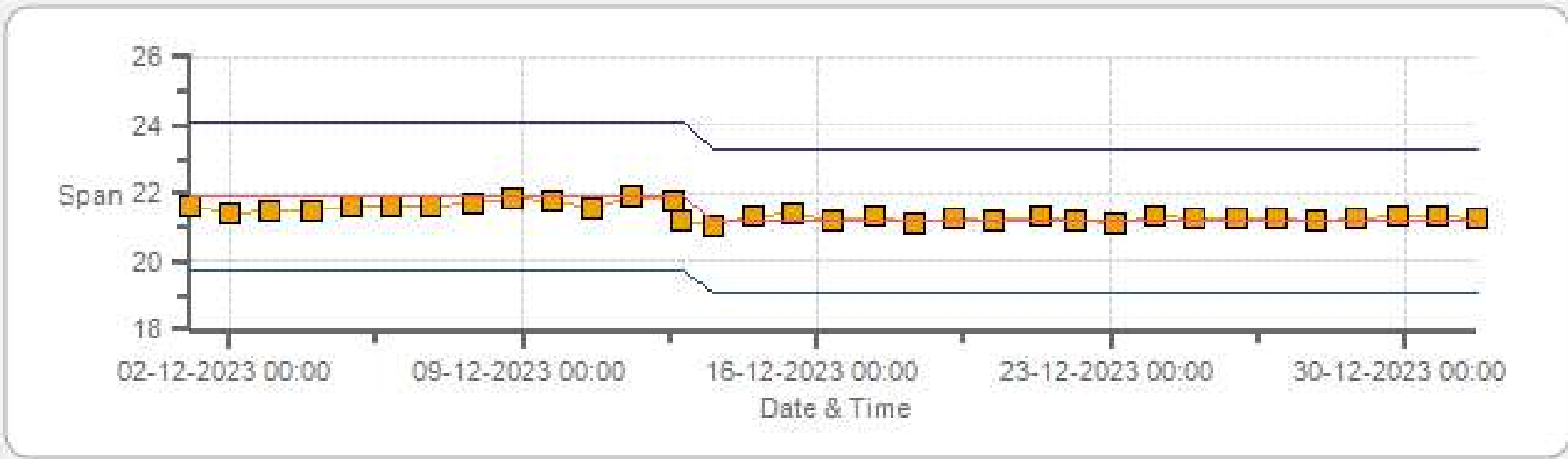


THC55[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



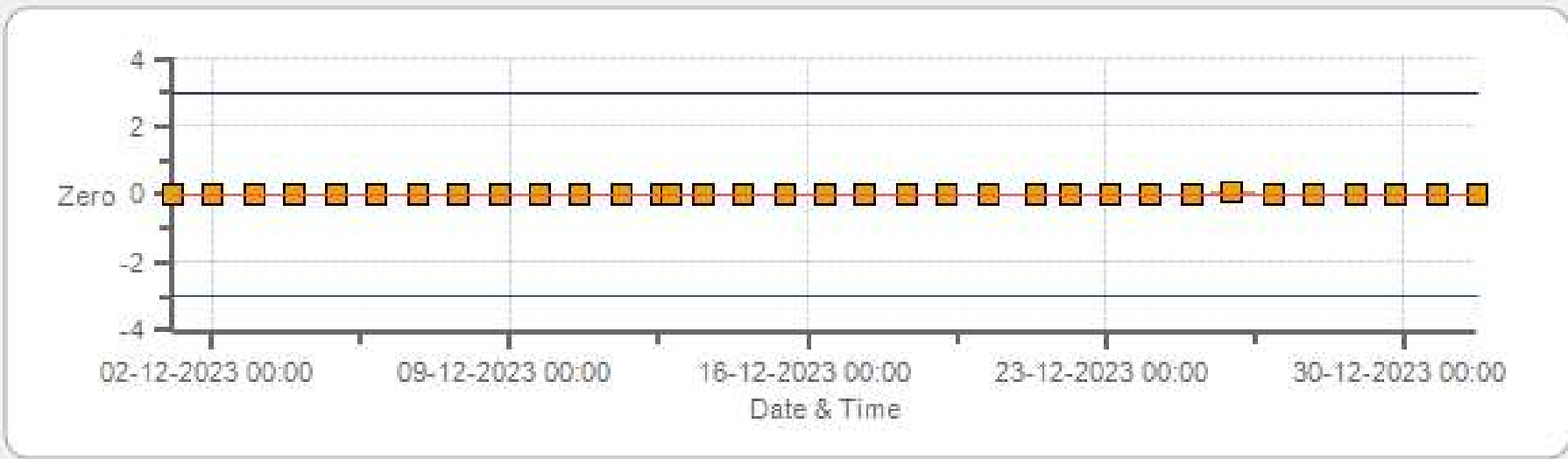
Zero Zero Ref Zero Low Zero High

THC55[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



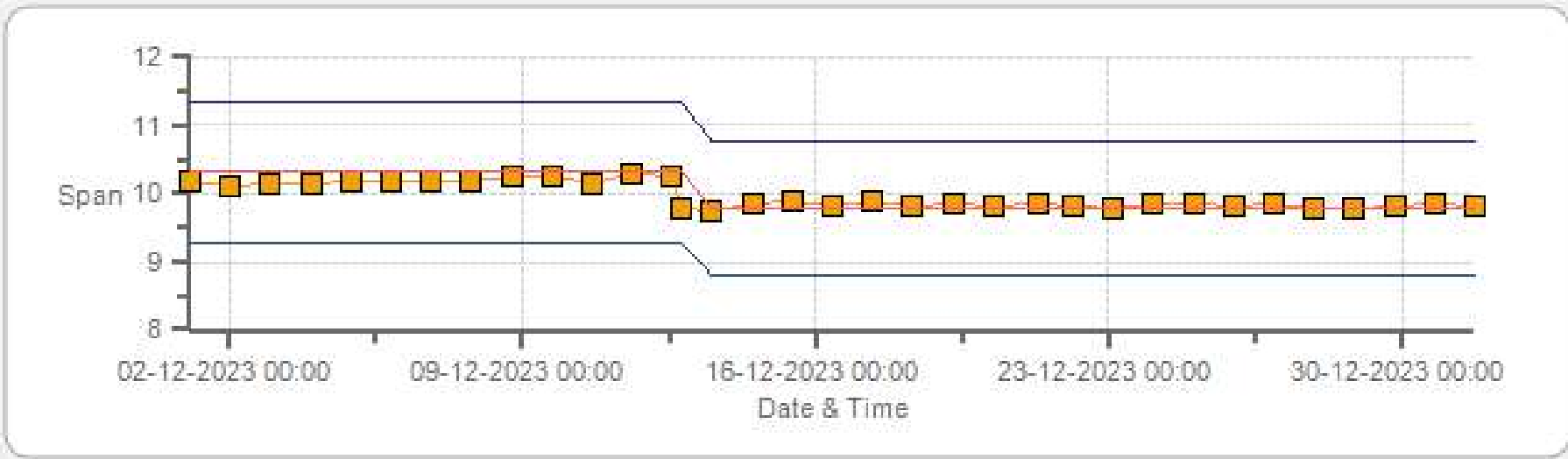
Span Span Ref Span Low Span High

CH4[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



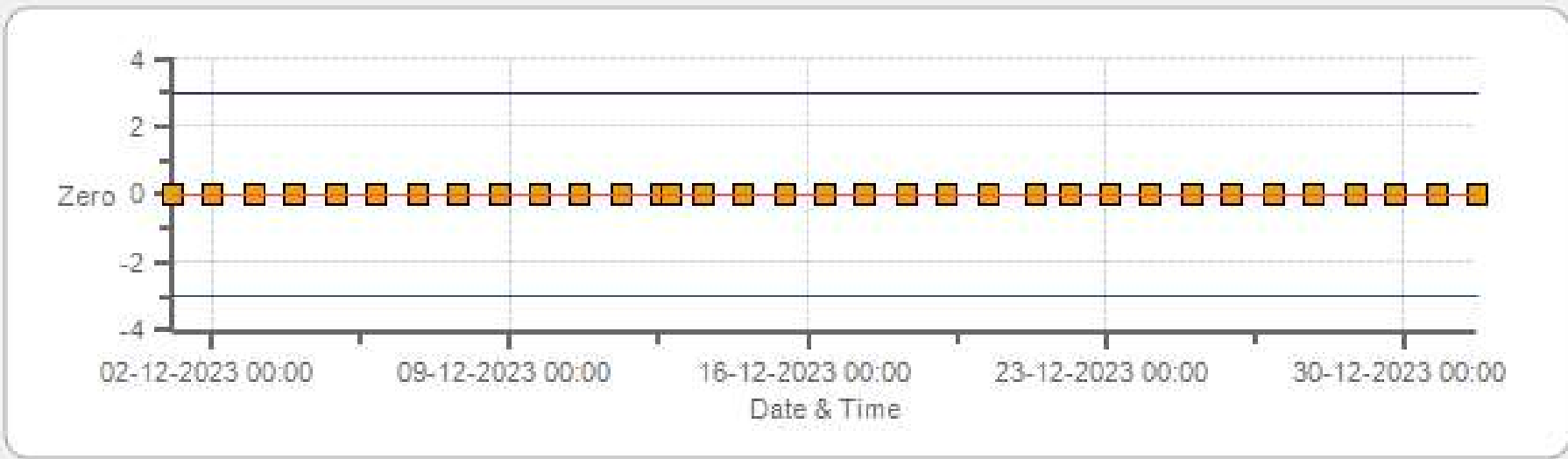
Zero Zero Ref Zero Low Zero High

CH4[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



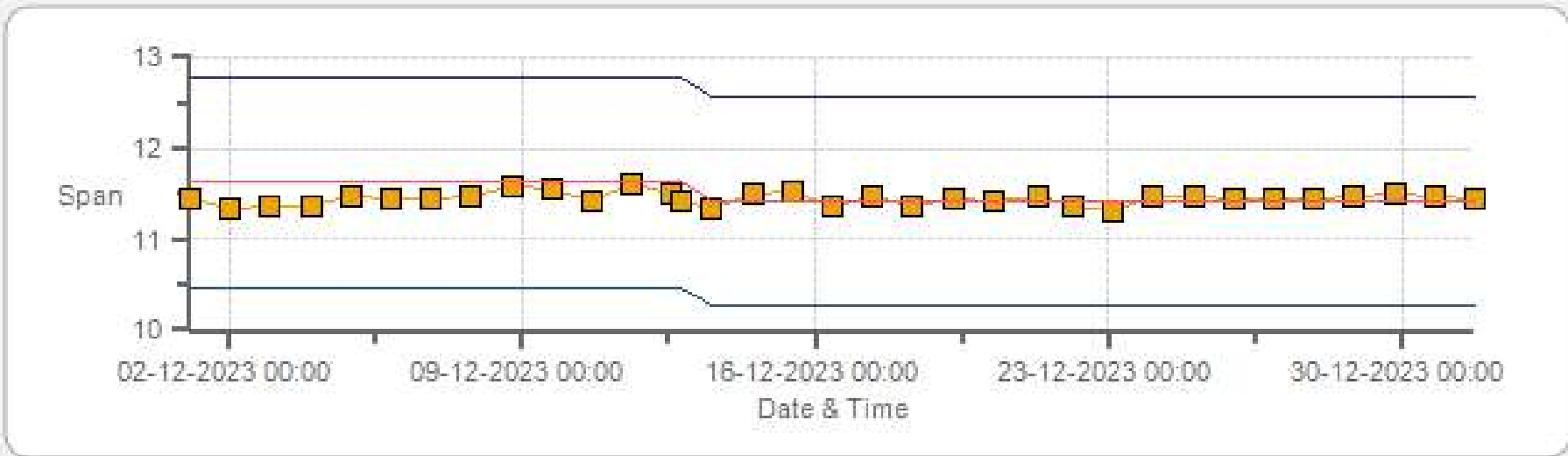
Span SpanRef Span Low Span High

NMHC[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NMHC[ppm] Calibration: Tamarack Monthly: 12-2023 Type: SpanAndZero - Span



Span Span Ref Span Low Span High

# MULTI-POINT CALIBRATION RECORDS

# SO2 Analyzer Calibration by Dilution



DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	21-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	20.8
LOCATION:	Tamarack	BAROMETRIC (mBar):	937
PURPOSE:	Removal/Shut-down	START TIME (MST):	10:04
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:02

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180930031	FLOW (mL/min)	329
INITIAL		FINAL	
BKG/OFFSET	2.96	BKG/OFFSET	n/a
COEF/SLOPE	1.056	COEF/SLOPE	n/a
Expected (reference) Value	244	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>60.80</del>	4002	0.00	-0.1	n/a	<del>0.993</del>	<del>n/a</del>
3941	60.80	4002	381.33	383.8	n/a	0.993	n/a
3974	28.80	4003	180.58	180.1	n/a	1.002	n/a
3989	14.40	4003	90.29	90.1	n/a	1.001	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.007	-0.1%

## COMMENTS:

Station audit Low flow alarm. Limit = 0.350, actual = 0.329. Maintenance required
--

# SO2 Analyzer Calibration by Dilution



DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	21-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	21.8
LOCATION:	Tamarack	BAROMETRIC (mBar):	943
PURPOSE:	Install/Post-Repair	START TIME (MST):	12:32
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:22

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180930031	FLOW (mL/min)	419
INITIAL		FINAL	
BKG/OFFSET	2.96	BKG/OFFSET	2.89
COEF/SLOPE	1.056	COEF/SLOPE	1.028
Expected (reference) Value	244	Expected (reference) Value	189.8

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>60.80</del>	3999	0.00	n/a	0	<del>n/a</del>	<del>1.000</del>
3942	60.80	4003	381.23	n/a	381.1	n/a	1.000
3974	28.80	4003	180.58	n/a	179	n/a	1.009
3989	14.40	4003	90.29	n/a	89.7	n/a	1.007

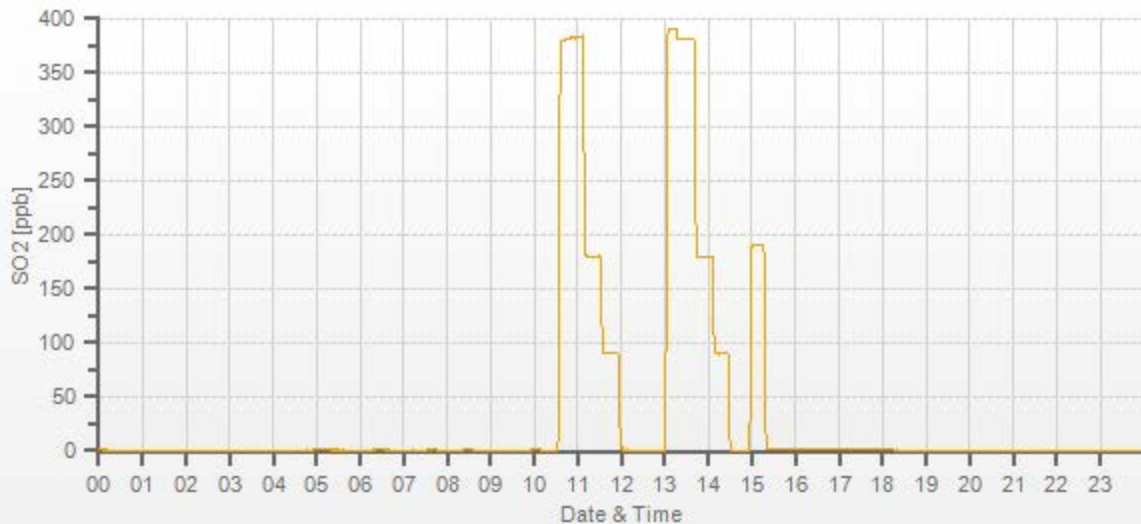
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.000	-0.1%

## COMMENTS:

As-found performed during preceding audit  
Sample filter changed

SO2[ppb] Station: Tamarack Daily: 12-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01248

# H2S Analyzer Calibration by Dilution



DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	21-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.001
CLIENT:	LICA	TEMPERATURE (°C):	20.8
LOCATION:	Tamarack	BAROMETRIC (mBar):	937
PURPOSE:	Removal/Shut-down	START TIME (MST):	10:04
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:02

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	CM17360005	FLOW (mL/min)	904
INITIAL		FINAL	
BKG/OFFSET	36.6	BKG/OFFSET	n/a
COEF/SLOPE	0.809	COEF/SLOPE	n/a
Expected (reference) Value	41.8	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>32.20</del>	4002	0.00	-0.2	n/a	<del>0.998</del>	<del>n/a</del>
3970	32.20	4002	78.05	78	n/a	0.998	n/a
3987	15.70	4003	38.04	38	n/a	0.996	n/a
3995	7.80	4003	18.90	18.8	n/a	0.995	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.002	-0.2%

## COMMENTS:

Station audit



# H2S Analyzer Calibration by Dilution



DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	21-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.001
CLIENT:	LICA	TEMPERATURE (°C):	21.8
LOCATION:	Tamarack	BAROMETRIC (mBar):	943
PURPOSE:	Install/Post-Repair	START TIME (MST):	12:02
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:22

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	CM17360005	FLOW (mL/min)	904
INITIAL		FINAL	
BKG/OFFSET	36.6	BKG/OFFSET	36.2
COEF/SLOPE	0.809	COEF/SLOPE	0.802
Expected (reference) Value	41.8	Expected (reference) Value	41.8

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

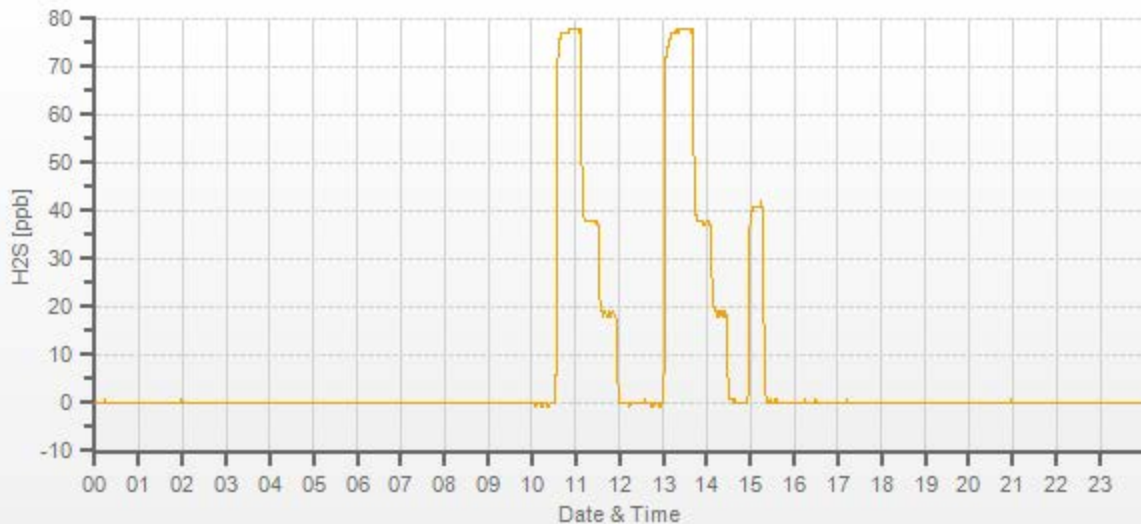
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>32.20</del>	3999	0.00	n/a	0	<del>n/a</del>	<del>0.997</del>
3971	32.20	4003	78.03	n/a	78.3	n/a	0.997
3987	15.70	4003	38.04	n/a	37.7	n/a	1.009
3995	7.80	4003	18.90	n/a	19	n/a	0.995

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.003	-0.1%

## COMMENTS:

As-found performed during preceding audit  
Sample filter changed



# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	22-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	20.8	SERIAL #:	1180930028	NOx	0.997
LOCATION:	Tamarack	BAROMETRIC (mBar):	937	FLOW (mL/min)	729	NO	0.998
PURPOSE:	Removal/Shut-down	START TIME (MST):	10:04	RANGE (ppb)	500	NO2	1.000
PERFORMED BY:	Chris Wesson	END TIME (MST):	14:01	GPT FOR O3?		No	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	5.1	4.8	n/a	BKG/OFFSET:	n/a	n/a	n/a
SLOPE/COEF/CE:	1.006	1.063	0.999	SLOPE/COEF/CE:	n/a	n/a	n/a

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	277.5	2.4	275.1		n/a	n/a	n/a

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	380	250	230-265	n/a
MID	180	125	115-150	n/a
LOW	90	45	40-55	n/a
EXTRA 1	n/a	n/a	n/a	n/a

NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
4999	<del>38.60</del>	4999	0.0	0.0	0.0	-0.1	0.0	0.1	n/a	n/a	n/a	<del>1.002</del>	<del>0.991</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4959	38.60	4998	380.0	381.5	1.5	379.3	385.1	5.7	n/a	n/a	n/a	1.002	0.991	<del>n/a</del>	n/a	n/a	<del>n/a</del>
4982	18.30	5000	180.1	180.8	0.7	179.4	182.7	3.3	n/a	n/a	n/a	1.003	0.990	<del>n/a</del>	n/a	n/a	<del>n/a</del>
4990	9.10	4999	89.6	89.9	0.4	89.3	91.7	2.3	n/a	n/a	n/a	1.002	0.981	<del>n/a</del>	n/a	n/a	<del>n/a</del>

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	38.60	4999	0	377.5	383.8	6.3	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
AS-FOUND HIGH	38.60	4999	260	126.5	385.0	258.5	251	252.2	0.995	100.48%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	38.60	4999	140	242.6	384.6	142.0	134.9	135.7	0.994	100.59%
LOW	38.60	4999	50	332.3	384.5	52.1	45.2	45.8	0.987	101.33%
NO2 adjustment not required.									AVERAGE:	100.80%

LINEAR REGRESSION ANALYSIS:				COMMENTS:
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	0.998	-0.03%	
NOx	1.000	1.009	0.08%	
NO2	1.000	1.003	0.09%	

No issues  
13:00 = daily ZS (high>md GPT)

# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	22-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	22.8	SERIAL #:	1180930028	NOx	0.997
LOCATION:	Tamarack	BAROMETRIC (mBar):	942	FLOW (mL/min)	729	NO	0.998
PURPOSE:	Install/Post-Repair	START TIME (MST):	14:01	RANGE (ppb)	500	NO2	1.000
PERFORMED BY:	Chris Wesson	END TIME (MST):	18:46	GPT FOR O3?		Yes	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	2.5	2	n/a	BKG/OFFSET:	2.3	2	n/a
SLOPE/COEF/CE:	1.001	1.165	0.998	SLOPE/COEF/CE:	0.999	1.173	0.998

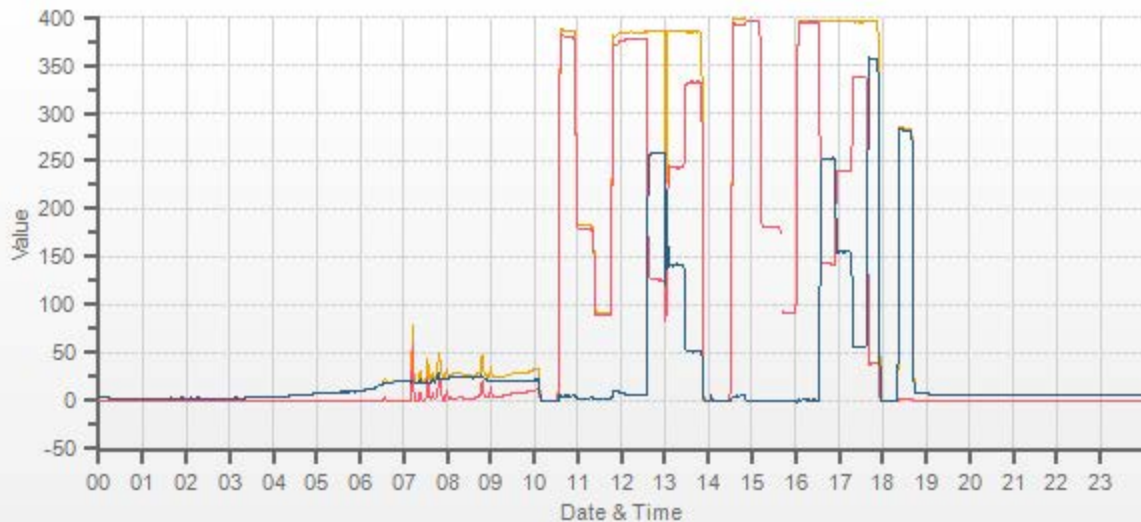
EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	277.5	2.4	275.1		283.8	2.0	281.8

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	395	250	240-275	n/a
MID	180	154	150-157	Mid
LOW	90	54	50-58	Low
EXTRA 1	n/a	340	300-370	High

NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000	<del>5000</del>	5000	0.0	0.0	0.0	n/a	n/a	n/a	0.0	0.0	0.0	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4960	40.10	5000	394.6	396.2	1.6	n/a	n/a	n/a	394.8	395.8	1.0	n/a	n/a	<del>n/a</del>	0.999	1.001	<del>n/a</del>
4982	18.30	5000	180.1	180.8	0.7	n/a	n/a	n/a	181.0	181.5	0.5	n/a	n/a	<del>n/a</del>	0.995	0.996	<del>n/a</del>
4991	9.10	5000	89.5	89.9	0.4	n/a	n/a	n/a	90.7	91.2	0.5	n/a	n/a	<del>n/a</del>	0.987	0.986	<del>n/a</del>

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	40.10	5000	0	394.4	395.4	1.0	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
AS-FOUND HIGH	40.10	5000	260	142.8	395.6	252.8	251.6	251.8	0.999	100.08%
ADJUSTED HIGH	n/a	n/a	n/a	39.3	n/a	n/a	355.1	n/a	n/a	n/a
MID	40.10	5000	160	239.3	395.0	155.7	155.1	154.7	1.003	99.74%
LOW	40.10	5000	60	337.9	394.6	56.7	56.5	55.7	1.014	98.58%
NO2 adjustment not required.									AVERAGE:	99.47%

LINEAR REGRESSION ANALYSIS:				COMMENTS: Sample filter changed Extra point for O3: Setting = 360, NO drop/O3 conc = 355.1 ppb
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	1.000	0.13%	
NOx	1.000	0.998	0.15%	
NO2	1.000	1.005	-0.22%	



CAL-LICA-202312-01248

# Ozone Calibration by Direct GPT



DATE:	13-Dec-2023	PREVIOUS CALIBRATION DATE:	28-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.000
CLIENT:	LICA	TEMPERATURE (°C):	21.0
LOCATION:	Tamarack	BAROMETRIC (mBar):	936
PURPOSE:	Removal/Shut-down	START TIME (MST):	08:46
PERFORMED BY:	Chris Wesson	END TIME (MST):	10:48

## ANALYZER:

MAKE/MODEL	Thermo 49i	RANGE	500 ppb
SERIAL #	1002240371	FLOW (mL/min)	1483
INITIAL		FINAL	
BKG/OFFSET	0.2	BKG/OFFSET	n/a
COEF/SLOPE	1.054	COEF/SLOPE	n/a
Expected (reference) Value	208	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	12-Dec-2023	GPT END TIME:	18:46

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>5000</del>	5000	0.0	-0.2	n/a	<del>0.941</del>	<del>n/a</del>
5000	<del>5000</del>	5000	355.1	377.1	n/a	0.941	n/a
5000	<del>5000</del>	5000	155.1	164.0	n/a	0.945	n/a
5000	<del>5000</del>	5000	56.5	59.9	n/a	0.940	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.062	-0.1%

## COMMENTS:

Station audit
---------------

# Ozone Calibration by Direct GPT



DATE:	13-Dec-2023	PREVIOUS CALIBRATION DATE:	28-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.000
CLIENT:	LICA	TEMPERATURE (°C):	21.0
LOCATION:	Tamarack	BAROMETRIC (mBar):	936
PURPOSE:	Install/Post-Repair	START TIME (MST):	10:48
PERFORMED BY:	Chris Wesson	END TIME (MST):	13:41

## ANALYZER:

MAKE/MODEL	Thermo 49i	RANGE	500 ppb
SERIAL #	1002240371	FLOW (mL/min)	1483
INITIAL		FINAL	
BKG/OFFSET	0.2	BKG/OFFSET	0.1
COEF/SLOPE	1.054	COEF/SLOPE	0.998
Expected (reference) Value	208	Expected (reference) Value	208

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	12-Dec-2023	GPT END TIME:	18:46

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>          </del>	5000	0.0	n/a	0.0	<del>          </del>	<del>          </del>
5000	<del>          </del>	5000	355.1	n/a	355.4	n/a	0.999
5000	<del>          </del>	5000	155.1	n/a	155.0	n/a	1.001
5000	<del>          </del>	5000	56.5	n/a	56.8	n/a	0.995

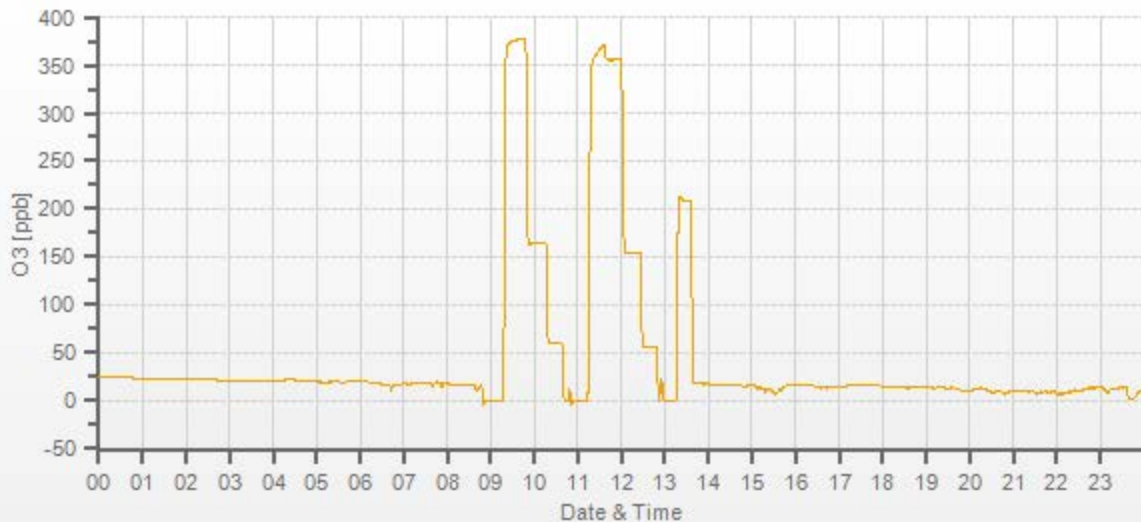
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.001	0.0%

## COMMENTS:

Sample filter changed
-----------------------

O3[ppb] Station: Tamarack Daily: 13-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01248



# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	22-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	23.2		Thermo 55i	1505664392	1082
LOCATION:	Tamarack	BAROMETRIC (mBar):	942	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Removal/Shut-down	START TIME (MST):	14:39	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	16:27	PREVIOUS CF:	0.999	0.996	0.998

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	10.32	11.63	21.95		n/a	n/a	n/a

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	15.03	13.72	28.75	n/a	n/a	n/a	0.957	0.991	0.973	n/a	n/a	n/a
3228	26.90	3255	7.19	6.80	13.99	7.49	6.82	14.31	n/a	n/a	n/a	0.960	0.996	0.977	n/a	n/a	n/a
3240	13.40	3253	3.58	3.39	6.97	3.79	3.41	7.20	n/a	n/a	n/a	0.946	0.993	0.968	n/a	n/a	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	1.044	0.1%	Station audit. 15:35-15:40 = Tech error. Mid-point restarted	
NMHC	1.000	1.009	-0.1%		
THC	1.000	1.027	0.0%		
				Use Zero Chrom?	Yes

# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	12-Dec-2023	PREVIOUS CALIBRATION DATE:	22-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	23.2		Thermo 55i	1505664392	1082
LOCATION:	Tamarack	BAROMETRIC (mBar):	942	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Install/Post-Repair	START TIME (MST):	16:27	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	19:07	PREVIOUS CF:	0.999	0.996	0.998

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

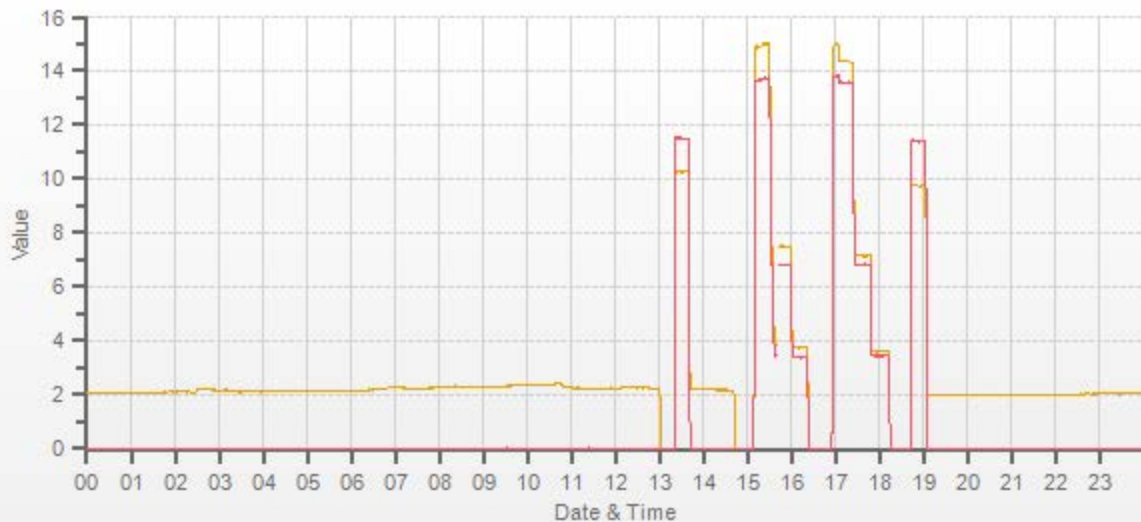
INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	10.32	11.63	21.95		9.79	11.41	21.20

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	n/a	n/a	n/a	0.00	0.00	0.00	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	n/a	n/a	n/a	14.36	13.57	27.96	n/a	n/a	n/a	1.001	1.002	1.000
3228	26.90	3255	7.19	6.80	13.99	n/a	n/a	n/a	7.17	6.80	13.97	n/a	n/a	n/a	1.003	0.999	1.001
3241	13.40	3254	3.58	3.39	6.97	n/a	n/a	n/a	3.62	3.44	7.06	n/a	n/a	n/a	0.990	0.984	0.987

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	0.998	0.1%	Sample filter changed	
NMHC	1.000	0.997	0.1%		
THC	1.000	0.998	0.1%		
				Use Zero Chrom?	Yes



CAL-LICA-202312-01248

## Thermo 5030 SHARP Monitor Monthly Check

<b>Date:</b> December 13, 2023	<b>Performed By/Reviewer:</b> Chris Wesson   Chris Wesson
<b>Company:</b> LICA	<b>Start Time (mst):</b> 10:08
<b>Station Name/Location:</b> Tamarack	<b>End Time (mst):</b> 10:35
<b>Previous Audit Date:</b> November 22, 2023	<b>Calibration Purpose:</b> routine monthly
<b>Parameter:</b> PM 2.5	<b>Weather Conditions:</b> Mainly sunny

**SHARP Information and Status:**

<b>Serial Number:</b> CM-2209	<b>Status:</b> 0.00
<b>Approx Tape remaining:</b> 4/10	<b>Error Code:</b> 0.00

**Reference Standards: Air Flow**

	Manometer	Orifice	Pressure:	Temperature:
<b>Make:</b>	Delta Cal	Delta Cal	DeltaCal	DeltaCal
<b>Model:</b>	DC-1	DC-1	DC-1	DC-1
<b>Serial Number:</b>	177246	177246	177246	177246
<b>Calibration Expiration Date:</b>	November 27, 2024	November 27, 2024	November 27, 2024	November 27, 2024

**As found temperature and pressure:**

<b>Tolerance +/- 4°C</b>	<b>Tolerance +/- 13.33 hPa</b>
<b>SHARP T1 °C:</b> -2.0	<b>SHARP P3 (hPa):</b> 934.000
<b>Reference °C:</b> -1.3	<b>Reference (hPa):</b> 934.600
<b>Difference °C:</b> 0.7	<b>Difference (hPa) :</b> -0.600

**As left temperature and pressure (same as above if as found adequate):**

<b>Tolerance +/- 4°C</b>	<b>Tolerance +/- 13.33 hPa</b>
<b>SHARP T1 °C:</b> -2.0	<b>SHARP P3 (hPa):</b> 934.000
<b>Reference °C:</b> -1.3	<b>Reference (hPa):</b> 934.600
<b>Difference °C:</b> 0.7	<b>Difference :</b> -0.600

**As found flows:**

<b>Targets: 1000 l/hr / &lt;90%</b>	<b>Flow Tolerance 16.67 lpm +/- 0.67 lpm</b>
<b>SHARP AirFlow l/hr</b> 1000.00	<b>SHARP Airflow (l/min)</b> 16.67
<b>Pump Voltage (%)</b> 53.70	<b>Reference AirFlow (l/min)</b> 16.66
	<b>Difference (l/min)</b> -0.01

**As left flows (same as above if as found adequate):**

<b>Targets: 1000 l/hr / &lt;90%</b>	<b>Flow Tolerance 16.67 lpm +/- 0.67 lpm</b>
<b>SHARP AirFlow l/hr</b> 1000.00	<b>SHARP Airflow (l/min)</b> 16.67
<b>Pump Voltage (%)</b> 53.70	<b>Reference AirFlow (l/min)</b> 16.66
	<b>Difference (l/min)</b> -0.01

**Inlet Assembly:**

	Yes/No?	If No, give reason
PM10 Inlet Cleaned	yes	
PM2.5 Cyclone Cleaned	yes	

**Comments:**

Leak check: 16.66 vs 16.56, 0.10 < 0.80 lpm, passed.

# Tamarack Station Checklist

COMPANY: LICA PLANT: Tamarack DATE: December 12, 2023

Station Location: X,Y Coordinates: 54.6051, -110.4527  
 Elevation (m): 610  
 Declination: 13° 5' East

GENERAL	Yes	No	n/a	Comments:
Has site location changed from previous audit?	x	x		Trees infringing on wind system - see photos
Is site secure?	x			
Are station operating conditions adequate?	x			
Last twelve month's of calibrations available?	x			Sharepoint
All applicable SOP's available in station?	x			Sharepoint
Site documentation up to date?				

DATA ACQUISITION	Yes	No	n/a	Comments:
Are strip charts in use?		x		
Is a digital data logger in use?	x			

TRAILER COMPONENTS	Yes	No	n/a	Comments:
Is a glass sampling manifold installed?	x			
Is sampling manifold clean and free of chips and cracks?	x			
Is a trap in place?	x			
Are spare manifold ports capped?	x			
Is manifold pump properly installed and operative?	x			
Do sample lines extend halfway into manifold?	x			
Are monitor sampling lines connected to manifold?	x			
Are sampling lines clean?	x			
Are monitors properly mounted and secure?	x			
Are monitors properly exhausted from room or	x			
Are zero and span systems operational?	x			

Meteorological	Yes	No	n/a	Comments:
Is wind equipment properly oriented?	x			
Is the wind equipment functioning properly?	x			

	Indicated Value:	Audit Value:	% Difference	Scalar Difference:
Station Temperature °C	21	21.9	4.11	0.90
Barometric Pressure	936.9	943.7	0.72	6.80
Wind Speed (kph)	3.5	0-5	n/a	n/a
Wind Direction (Deg)	S	S	n/a	n/a
Relative Humidity %	72.6	65.5	-10.84	-7.10
Ambient Temperature °C	-6.5	-6.2	-4.84	0.30

Recommendations:

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AUDITOR: Chris Wesson



# Meteorological Sensor Audit/Calibration

## Location Information

**Company:** LICA  
**Audit Location:** Tamarack  
**Audit Date:** September 17, 2023  
**Calibration Purpose:** routine annual  
**Performed By:** Alex Yakupov  
**Reviewed By:** Chris Wesson  
**Start/End Time (mst):** 15:01 / 17:09  
**Weather Conditions:** Mainly sunny

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	0-1
Sensor Model:	05305VK	Velocity Unit Output Range:	0-200
Serial #:	161465	Direction Voltage Output Range:	0-1
Previous Cal/Audit Date:	July 26, 2022	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: Model 18860-90/18802 SN: CA 4744, expires - Oct 18, 2024

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.1	0.1	-
1000	18.4	18.5	18.5	0.996
2000	36.9	37.0	36.9	0.998
3000	55.3	55.4	55.4	0.998
4000	73.7	73.9	73.9	0.998
5000	92.2	92.5	92.5	0.996
6000	110.6	111.0	111.0	0.996
7000	129.0	129.6	129.6	0.995
8000	147.4	148.1	148.1	0.996
9000	165.9	166.7	166.7	0.995
10000	184.3	185.2	185.2	0.995
The audit meets AMD requirements.			Average Correction Factor=	0.996

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	0	354	0.3	0.8	0.6
30	330	31	331	-0.8	-0.7	0.7
60	300	61	301	-1.4	-0.8	1.1
90	270	94	271	-3.5	-1.0	2.3
120	240	123	242	-2.8	-1.5	2.2
150	210	152	212	-2.3	-2.4	2.4
180	180	182	183	-1.9	-3.4	2.7
210	150	212	155	-2.2	-4.5	3.3
240	120	241	124	-0.7	-4.1	2.4
270	90	270	95	-0.4	-4.8	2.6
300	60	301	64	-0.5	-3.6	2.1
330	30	329	34	0.7	-3.5	2.1
355	0	354	0	0.8	0.4	0.6
The audit meets AMD requirements.				Average Absolute Degrees Difference=		1.9

## Comments:

n/a

# End of Report



**Lakeland Industry & Community Association**

**DECEMBER 2023**

**Ambient Air Monitoring Calibration Report**

**- ST. LINA STATION-**

**CAL-LICA-202312-01250**

**Station Operation and Maintenance:**

Bureau Veritas Canada

**Data Validation and Report:**

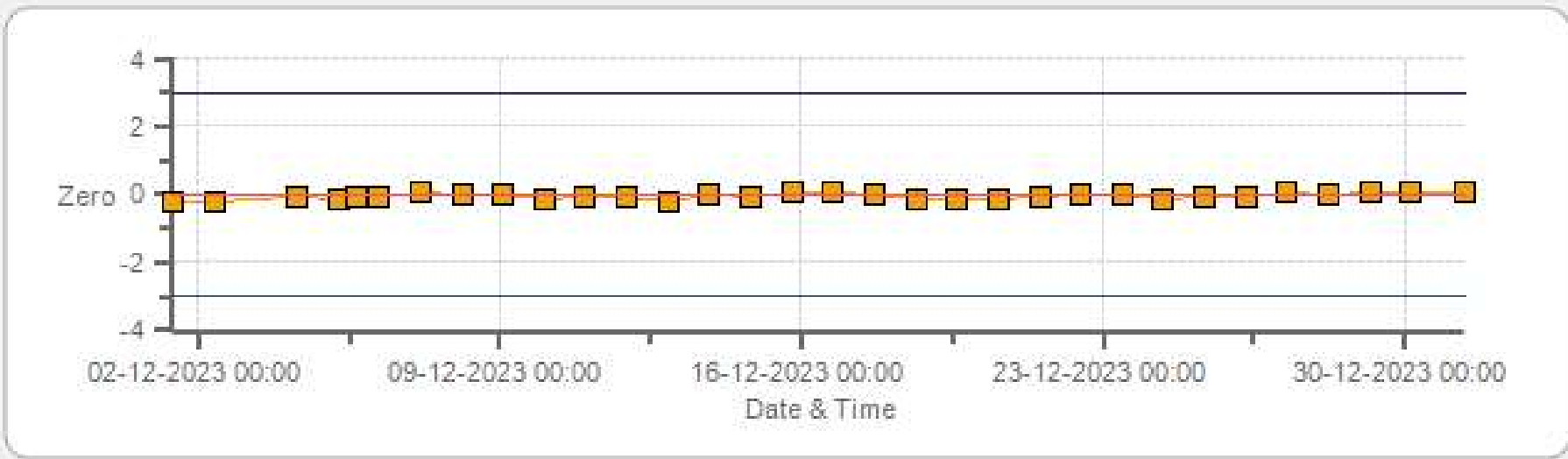
LICA / Bureau Veritas Canada

January 6, 2024



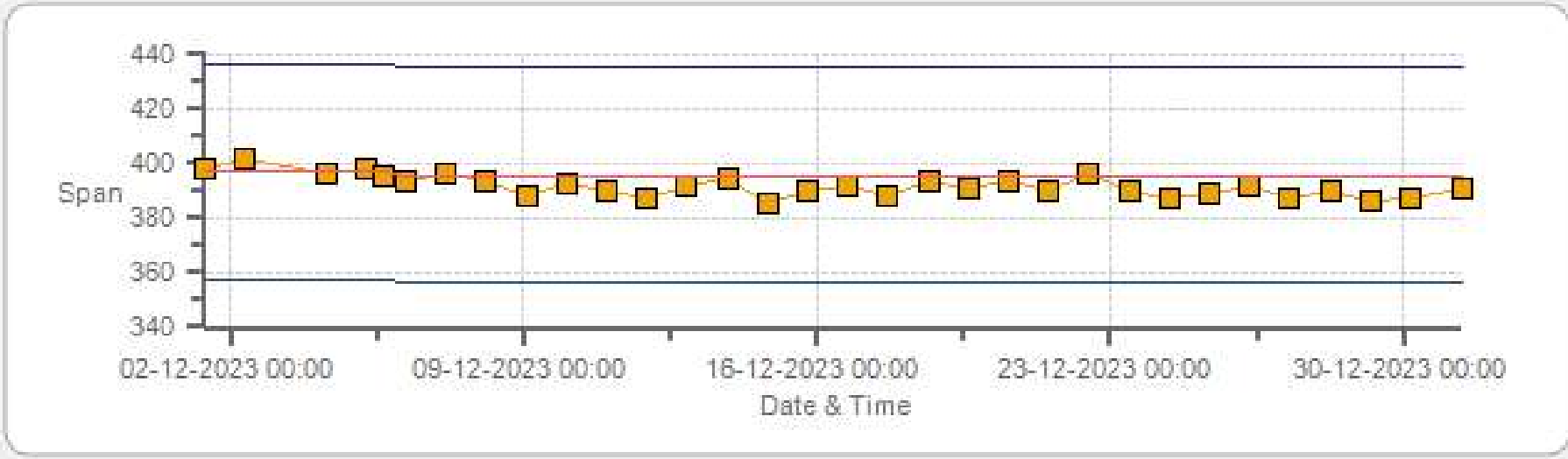
# DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

SO2[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



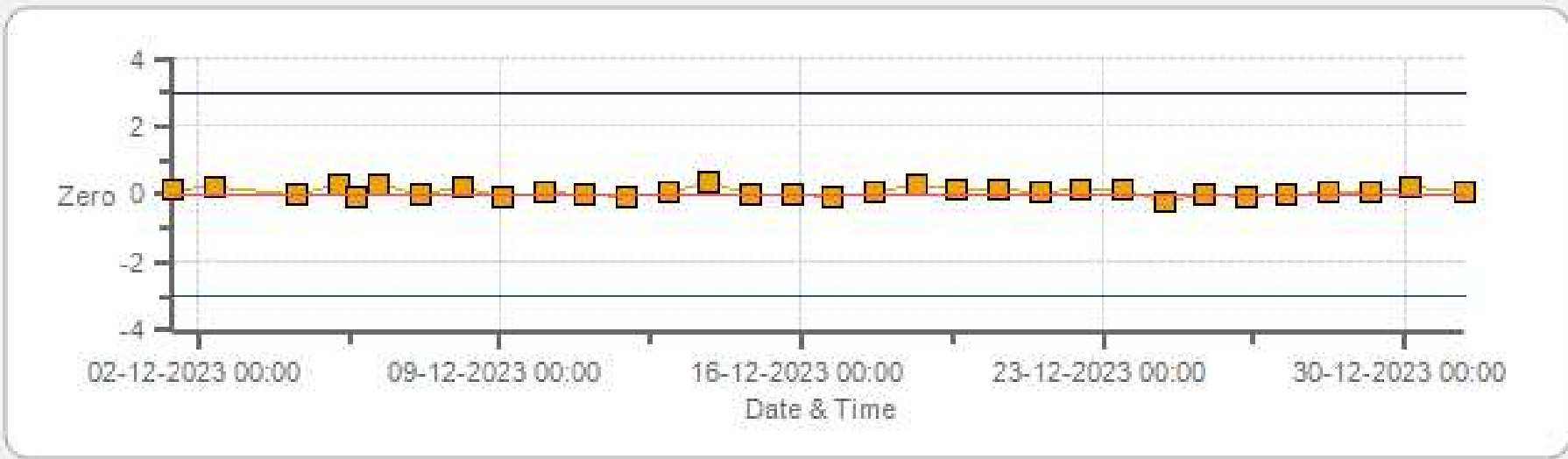
Zero Zero Ref Zero Low Zero High

SO2[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



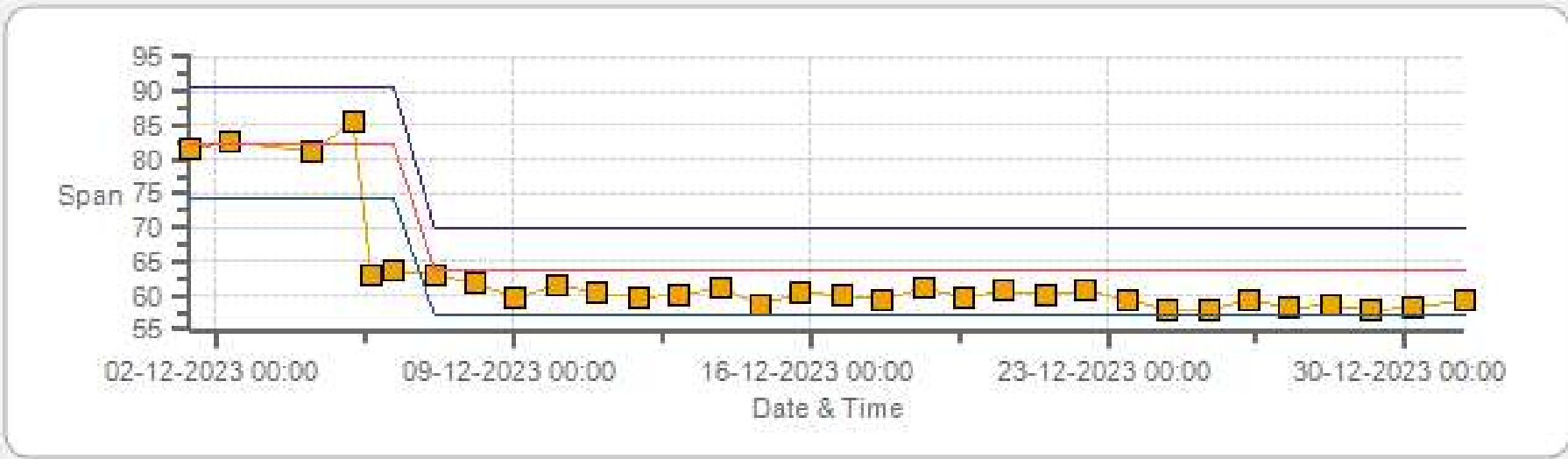
Span SpanRef Span Low Span High

H2S[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



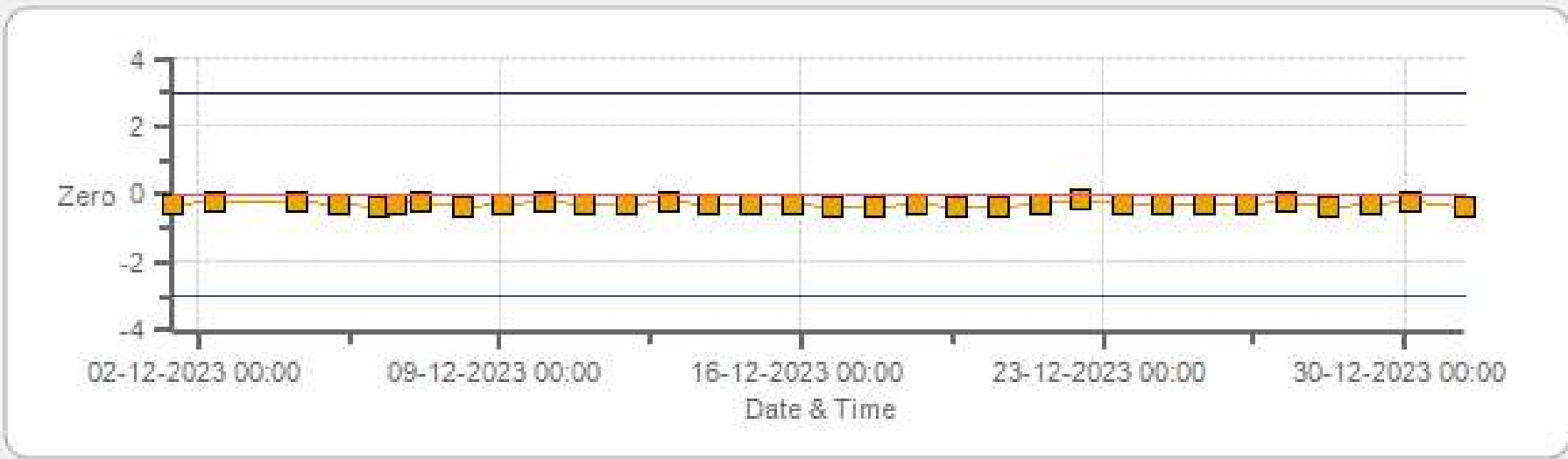
Zero Zero Ref Zero Low Zero High

H2S[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



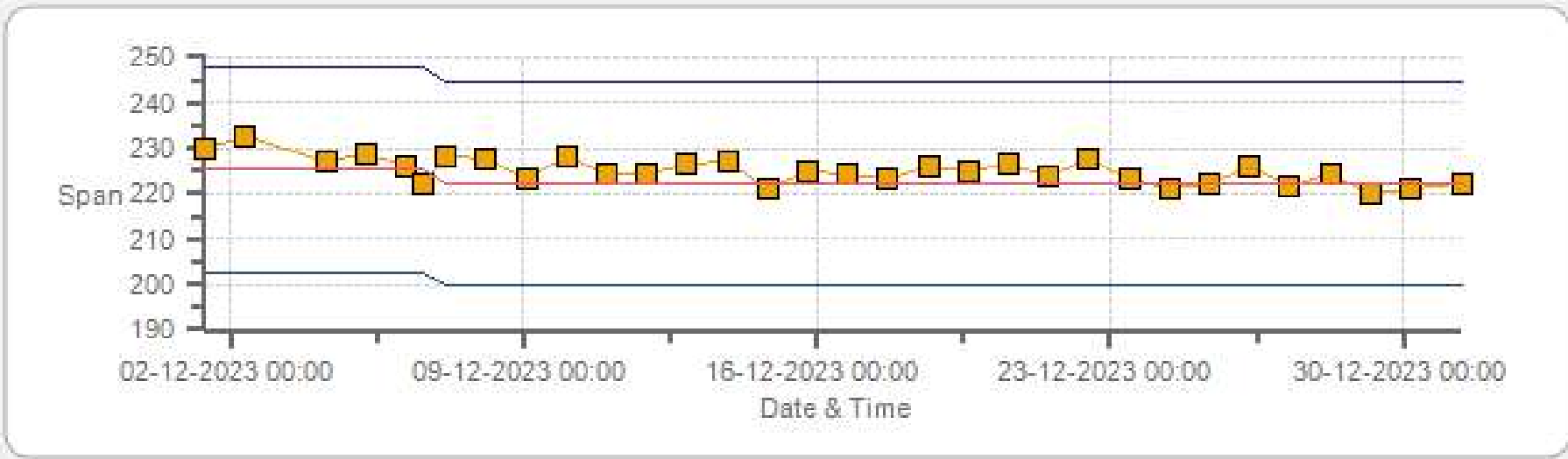
Span SpanRef Span Low Span High

NOX[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



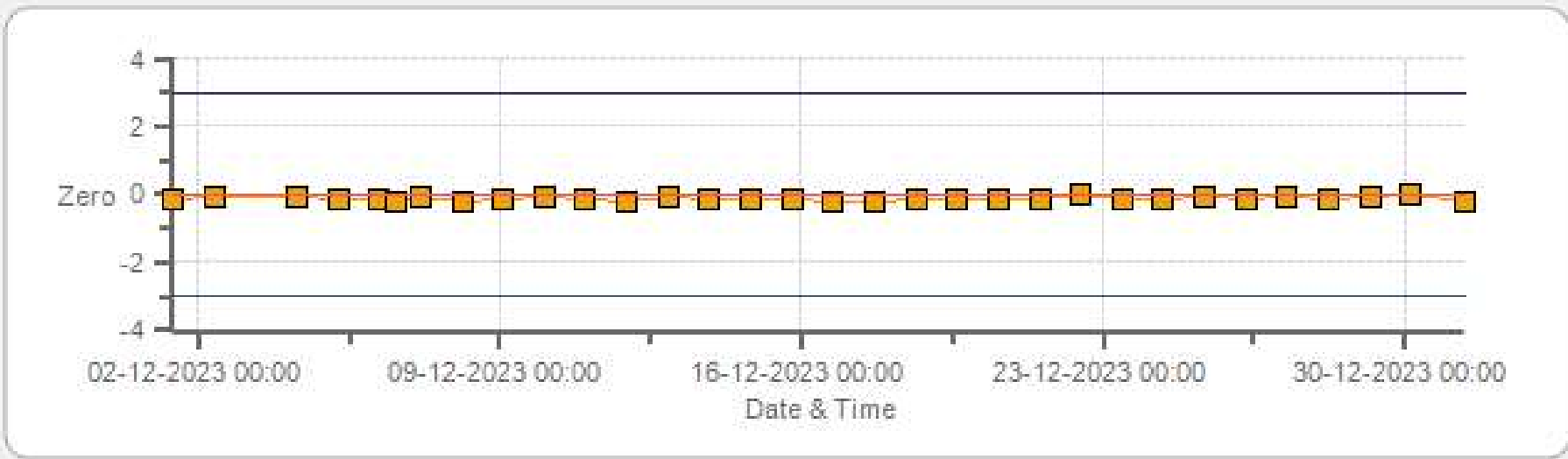
Zero Zero Ref Zero Low Zero High

NOX[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



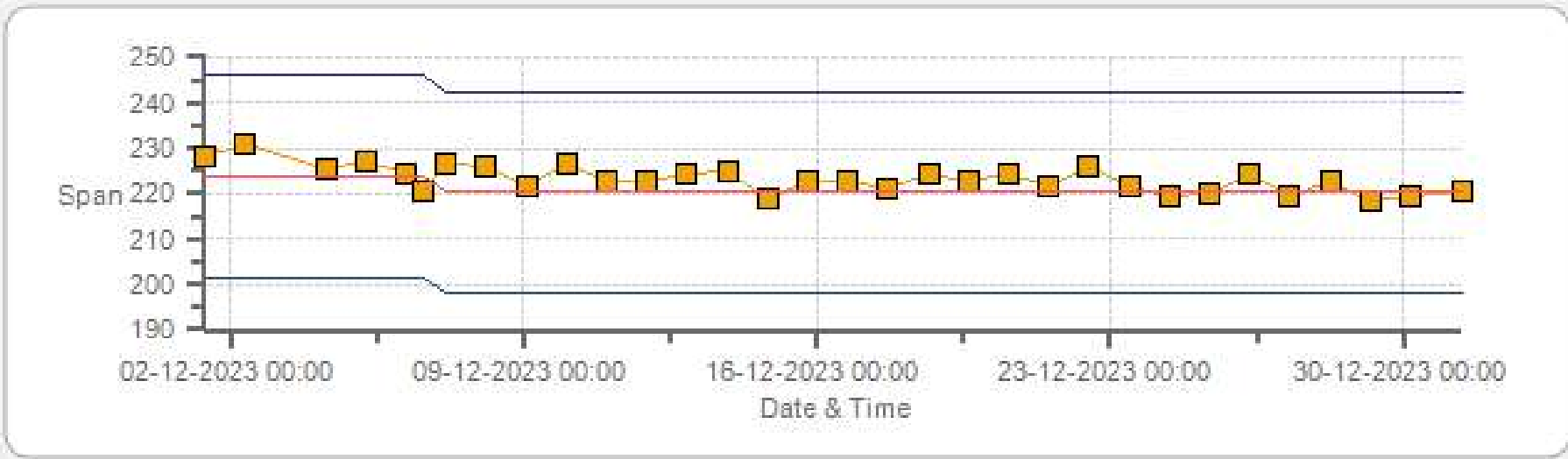
Span Span Ref Span Low Span High

NO2[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NO2[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



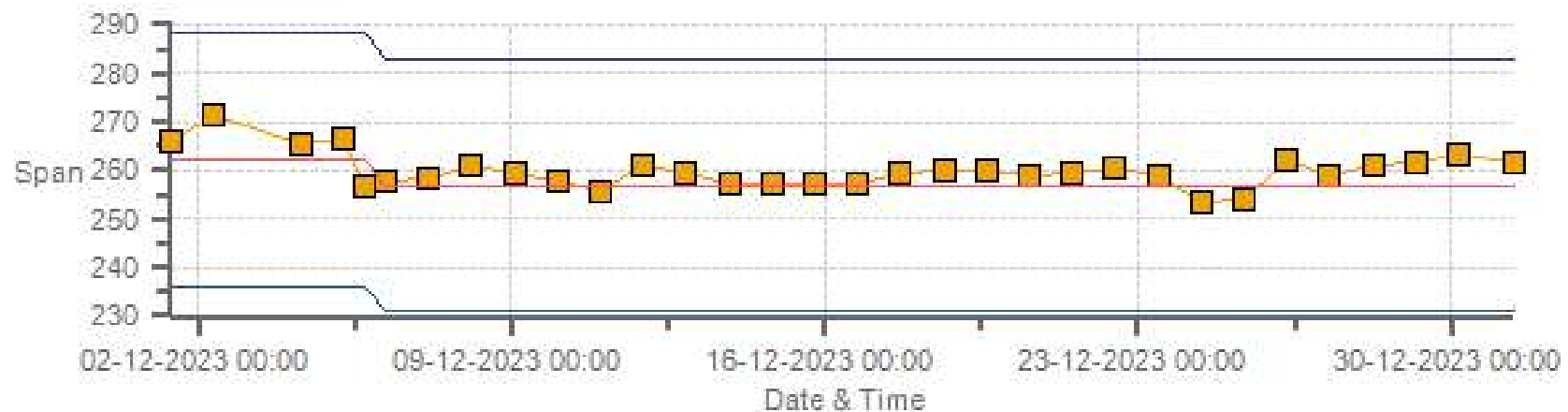
Span Span Ref Span Low Span High

O3[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



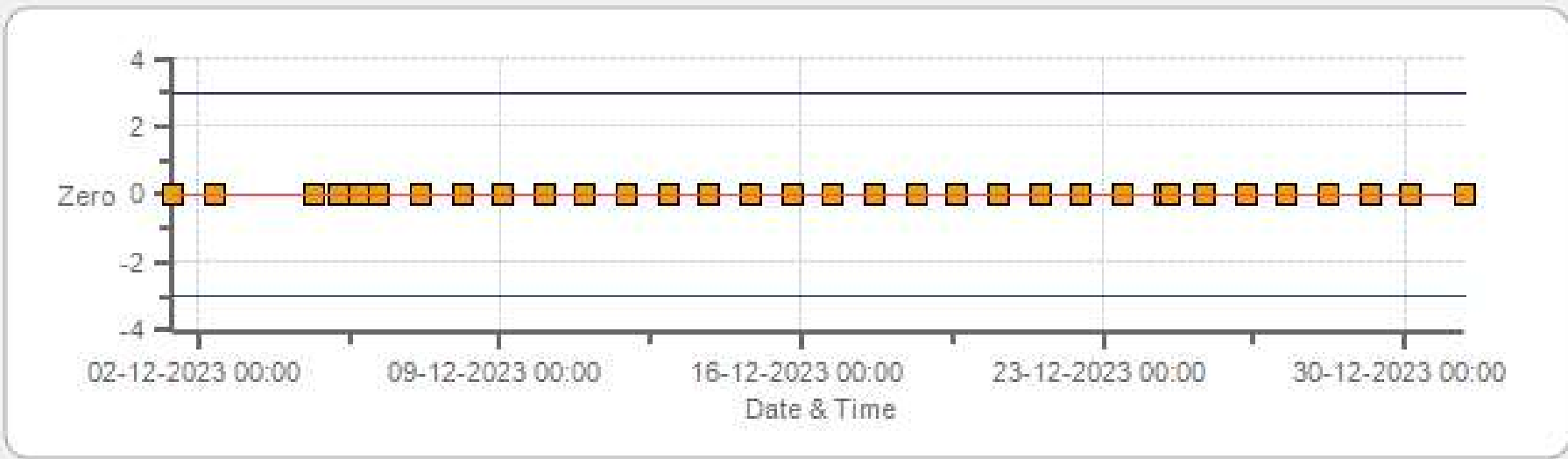
Zero Zero Ref Zero Low Zero High

O3[ppb] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



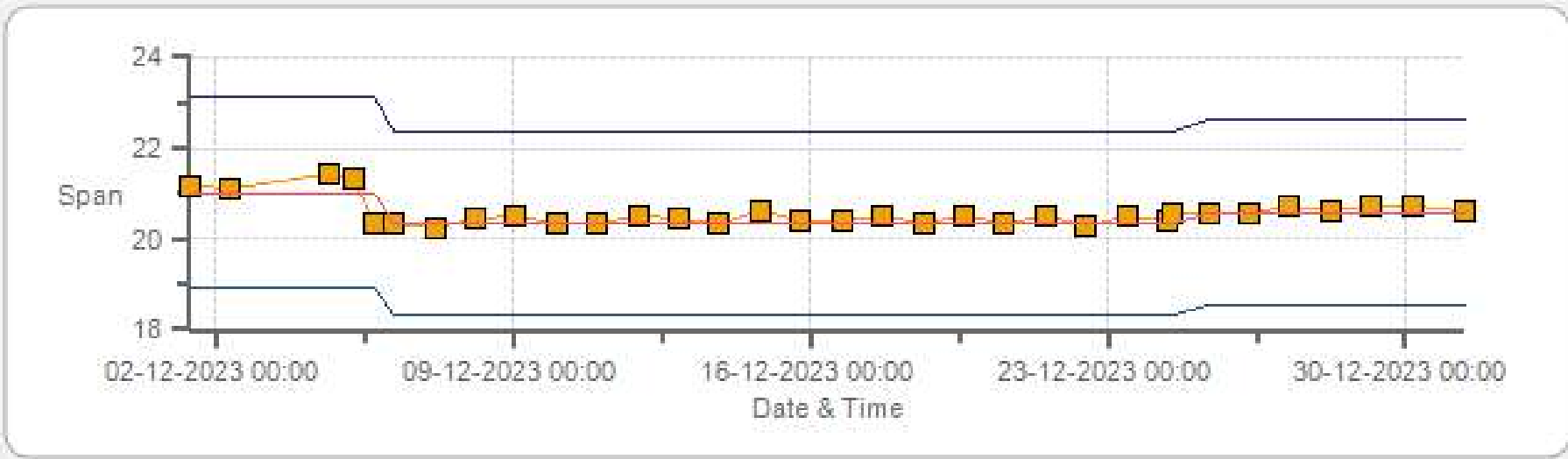
Span SpanRef Span Low Span High

THC55[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



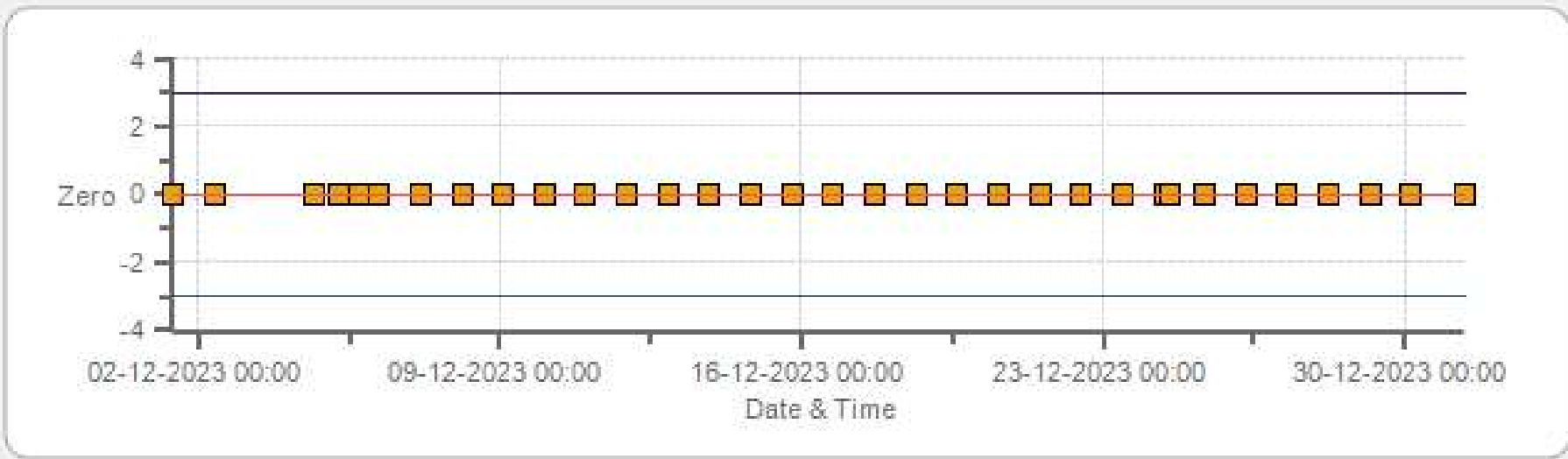
Zero Zero Ref Zero Low Zero High

THC55[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



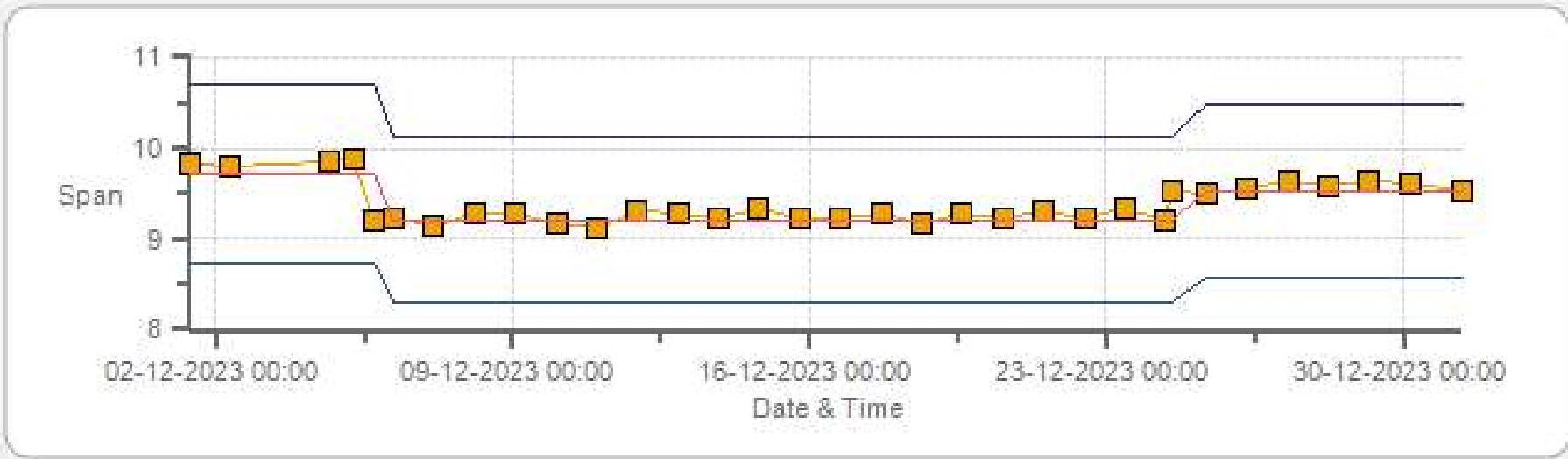
Span SpanRef Span Low Span High

CH4[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

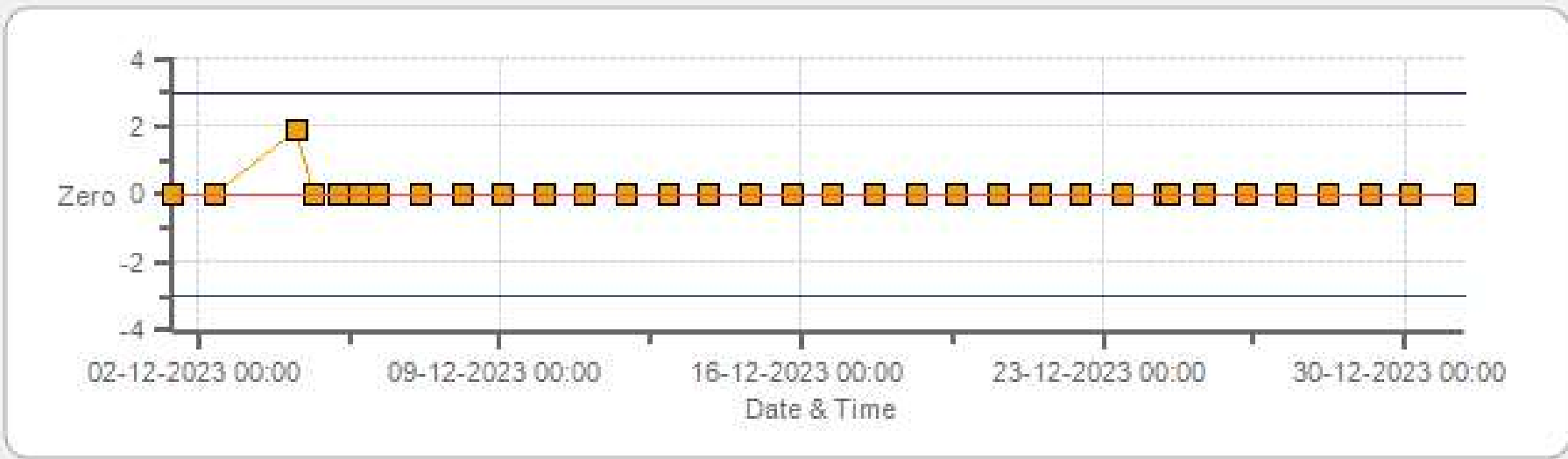
CH4[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

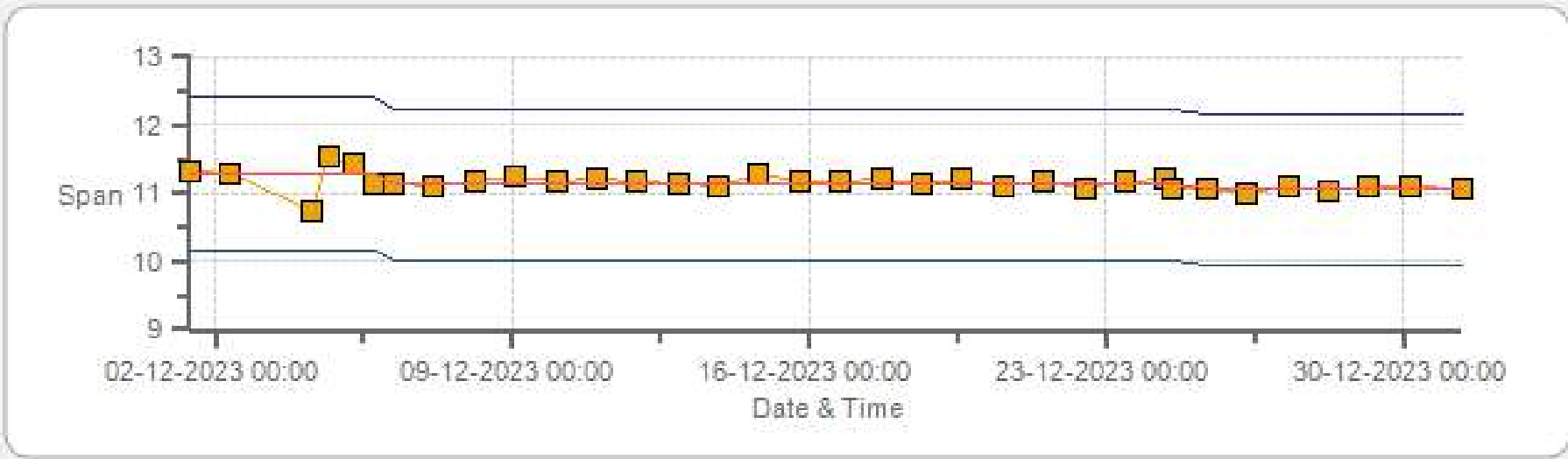


NMHC[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NMHC[ppm] Calibration: St. Lina Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

# MULTI-POINT CALIBRATION RECORDS

# SO2 Analyzer Calibration by Dilution



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	10-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	23.0
LOCATION:	St. Lina	BAROMETRIC (mBar):	907
PURPOSE:	Removal/Shut-down	START TIME (MST):	09:02
PERFORMED BY:	Chris Wesson	END TIME (MST):	11:05

## ANALYZER:

MAKE/MODEL	Thermo 43i	RANGE	500 ppb
SERIAL #	1226154720	FLOW (mL/min)	407
INITIAL		FINAL	
BKG/OFFSET	16.3	BKG/OFFSET	n/a
COEF/SLOPE	1.023	COEF/SLOPE	n/a
Expected (reference) Value	397	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>60.80</del>	4002	0.00	-0.1	n/a	<del>0.995</del>	<del>n/a</del>
3941	60.80	4002	381.33	383.2	n/a	0.995	n/a
3973	28.80	4002	180.63	180.2	n/a	1.002	n/a
3989	14.40	4003	90.29	89.9	n/a	1.003	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.006	-0.1%

## COMMENTS:

Station audit BV analyzer
------------------------------

# SO2 Analyzer Calibration by Dilution



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	10-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	24.7
LOCATION:	St. Lina	BAROMETRIC (mBar):	921
PURPOSE:	Routine	START TIME (MST):	13:02
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:53

## ANALYZER:

MAKE/MODEL	Thermo 43i	RANGE	500 ppb
SERIAL #	1226154720	FLOW (mL/min)	407
INITIAL		FINAL	
BKG/OFFSET	16.3	BKG/OFFSET	16.1
COEF/SLOPE	1.023	COEF/SLOPE	1.019
Expected (reference) Value	397	Expected (reference) Value	395.7

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>60.80</del>	4002	0.00	n/a	0	<del>n/a</del>	<del>0.999</del>
3941	60.80	4002	381.33	n/a	381.6	n/a	0.999
3974	28.80	4003	180.58	n/a	179.7	n/a	1.005
3989	14.40	4003	90.29	n/a	90	n/a	1.003

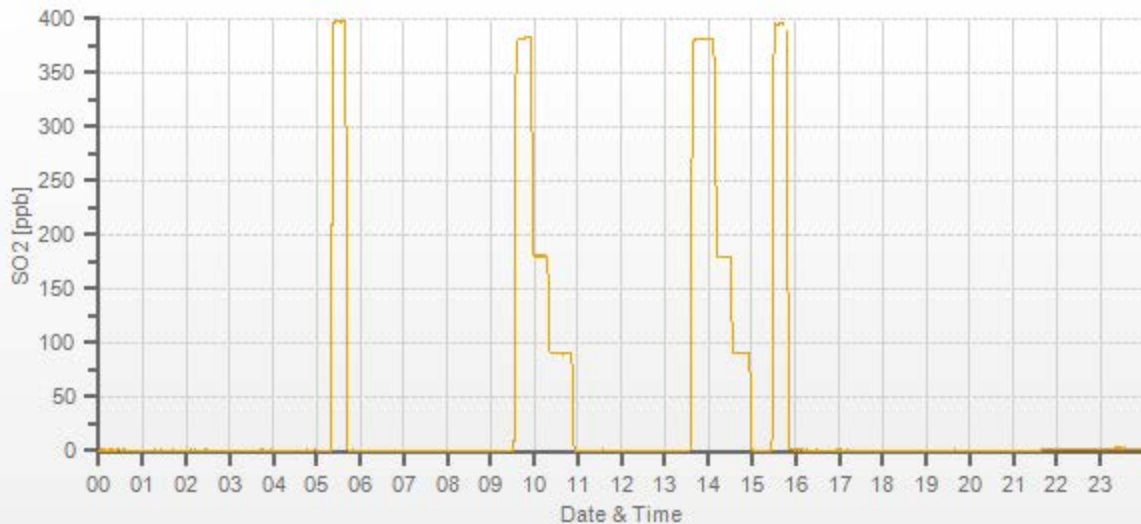
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.001	-0.1%

## COMMENTS:

Replaced filter holder due to damaged threads.  
BV analyzer

SO2[ppb] Station: St. Lina Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01250

# H2S Analyzer Calibration by Dilution



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.000
CLIENT:	LICA	TEMPERATURE (°C):	23.0
LOCATION:	St. Lina	BAROMETRIC (mBar):	907
PURPOSE:	Removal/Shut-down	START TIME (MST):	09:02
PERFORMED BY:	Chris Wesson	END TIME (MST):	11:05

## ANALYZER:

MAKE/MODEL	Teledyne T100	RANGE	100 ppb
SERIAL #	1014	FLOW (mL/min)	504
INITIAL		FINAL	
BKG/OFFSET	7.774	BKG/OFFSET	n/a
COEF/SLOPE	1.649	COEF/SLOPE	n/a
Expected (reference) Value	82.4	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>32.20</del>	4002	0.00	0.3	n/a	<del>0.967</del>	<del>n/a</del>
3970	32.20	4002	78.05	81	n/a	0.967	n/a
3986	15.70	4002	38.05	38.8	n/a	0.988	n/a
3995	7.80	4003	18.90	19	n/a	1.011	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.037	-0.2%

## COMMENTS:

Station audit BV analyzer T101
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# H2S Analyzer Calibration by Dilution



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.000
CLIENT:	LICA	TEMPERATURE (°C):	24.7
LOCATION:	St. Lina	BAROMETRIC (mBar):	921
PURPOSE:	Install/Post-Repair	START TIME (MST):	13:02
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:53

## ANALYZER:

MAKE/MODEL	Teledyne T100	RANGE	100 ppb
SERIAL #	1014	FLOW (mL/min)	504
INITIAL		FINAL	
BKG/OFFSET	7.774	BKG/OFFSET	8.204
COEF/SLOPE	1.649	COEF/SLOPE	1.631
Expected (reference) Value	82.4	Expected (reference) Value	see comment

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

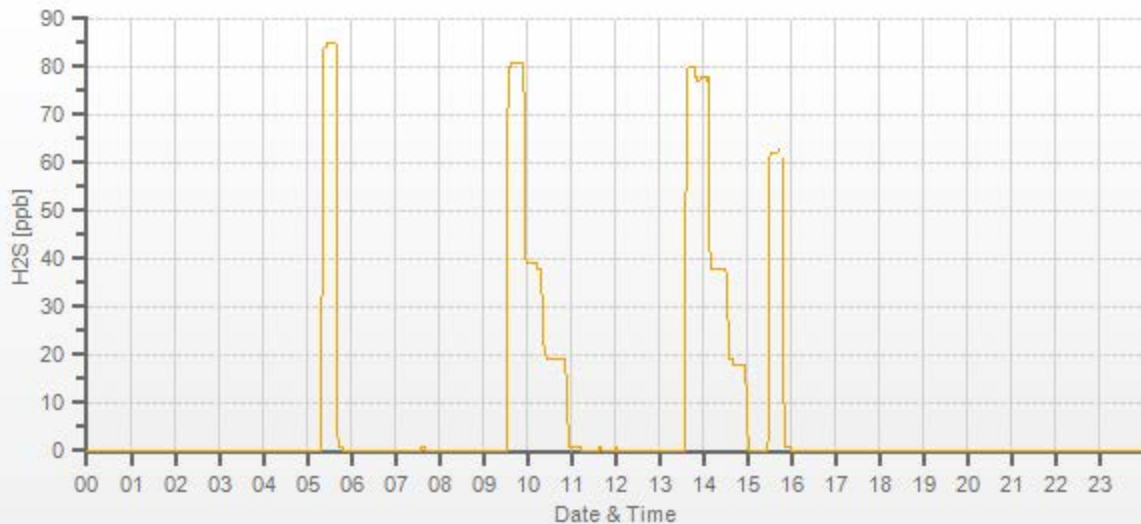
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
4002	<del>32.20</del>	4002	0.00	n/a	0	<del>n/a</del>	<del>1.002</del>
3970	32.20	4002	78.05	n/a	77.9	n/a	1.002
3987	15.70	4003	38.04	n/a	38	n/a	1.001
3995	7.80	4003	18.90	n/a	18.5	n/a	1.022

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.000	-0.1%

## COMMENTS:

Sample filter changed.  
 As-found completed during preceding audit  
 BV analyzer T101  
 Perm oven adjusted (50>45C) due to high EV. New EV not yet set.





# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	10-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	23.0	SERIAL #:	1180930029	NOx	1.003
LOCATION:	St. Lina	BAROMETRIC (mBar):	907	FLOW (mL/min)	788	NO	1.002
PURPOSE:	Removal/Shut-down	START TIME (MST):	09:02	RANGE (ppb)	500	NO2	0.999
PERFORMED BY:	Chris Wesson	END TIME (MST):	13:17	GPT FOR O3?		Yes	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	4.7	4.4	n/a	BKG/OFFSET:	n/a	n/a	n/a
SLOPE/COEF/CE:	1.009	0.9	0.997	SLOPE/COEF/CE:	n/a	n/a	n/a

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	225.3	1.7	223.7		n/a	n/a	n/a

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	395	250	240-275	n/a
MID	180	154	150-157	Mid
LOW	90	54	50-58	Low
EXTRA 1	n/a	340	300-370	High

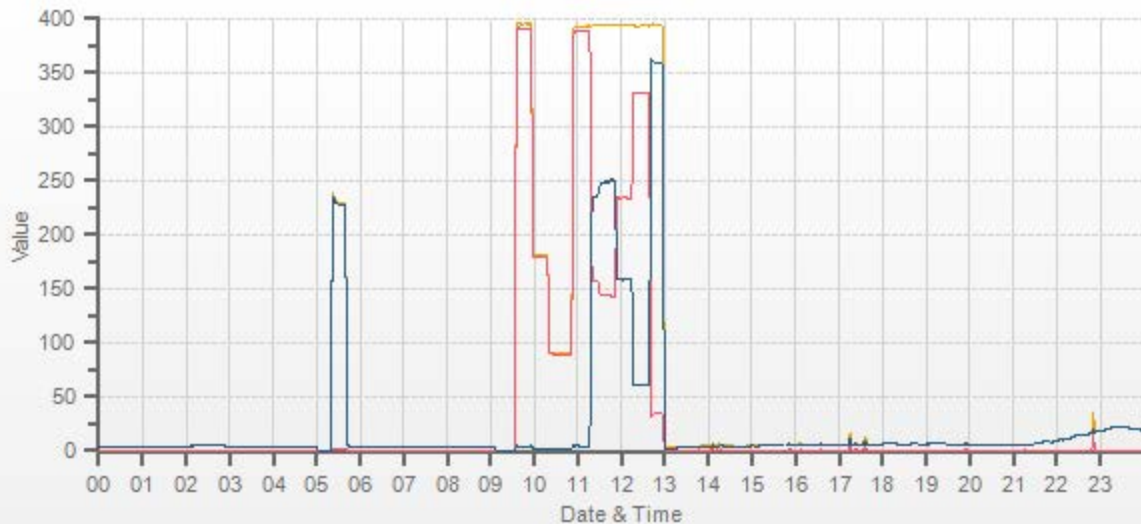
NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000	<del>40.10</del>	5000	0.0	0.0	0.0	-0.2	0.0	0.2	n/a	n/a	n/a	<del>1.008</del>	<del>1.003</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4959	40.10	4999	394.7	396.3	1.6	391.2	395.2	4.0	n/a	n/a	n/a	1.008	1.003	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4983	18.30	5001	180.0	180.8	0.7	178.8	180.7	1.9	n/a	n/a	n/a	1.006	1.000	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4990	9.10	4999	89.6	89.9	0.4	89.2	90.3	1.1	n/a	n/a	n/a	1.002	0.996	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	40.10	5000	0	389.1	393.0	3.9	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
AS-FOUND HIGH	40.10	5000	270	143.4	393.7	250.3	245.7	246.4	0.997	100.28%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	40.10	5000	170	234.7	394.0	159.3	154.4	155.4	0.994	100.65%
LOW	40.10	5000	65	331.4	393.5	62.0	57.7	58.1	0.993	100.69%
NO2 adjustment not required.									AVERAGE:	100.54%

LINEAR REGRESSION ANALYSIS:				COMMENTS:
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	0.991	0.03%	
NOx	1.000	0.997	0.07%	
NO2	1.000	1.002	0.09%	

11:29 = increased O3 setting. GPT high restarted.  
Extra O3 point. Setting = 380, NO drop/O3 conc = 353

Station: St. Lina Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01250

NOX [ppb] NO [ppb] NO2 [ppb]

# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	06-Dec-2023	PREVIOUS CALIBRATION DATE:	10-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	22.8	SERIAL #:	1180930029	NOx	1.003
LOCATION:	St. Lina	BAROMETRIC (mBar):	912	FLOW (mL/min)	788	NO	1.002
PURPOSE:	Routine	START TIME (MST):	08:59	RANGE (ppb)	500	NO2	0.999
PERFORMED BY:	Chris Wesson	END TIME (MST):	14:15	GPT FOR O3?		No	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	4.7	4.4	n/a	BKG/OFFSET:	4.7	4.4	n/a
SLOPE/COEF/CE:	1.009	0.9	0.997	SLOPE/COEF/CE:	1.002	0.909	0.997

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	225.3	1.7	223.7				

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	380	250	230-265	n/a
MID	180	125	115-150	n/a
LOW	90	45	40-55	n/a
EXTRA 1	n/a	n/a	n/a	n/a

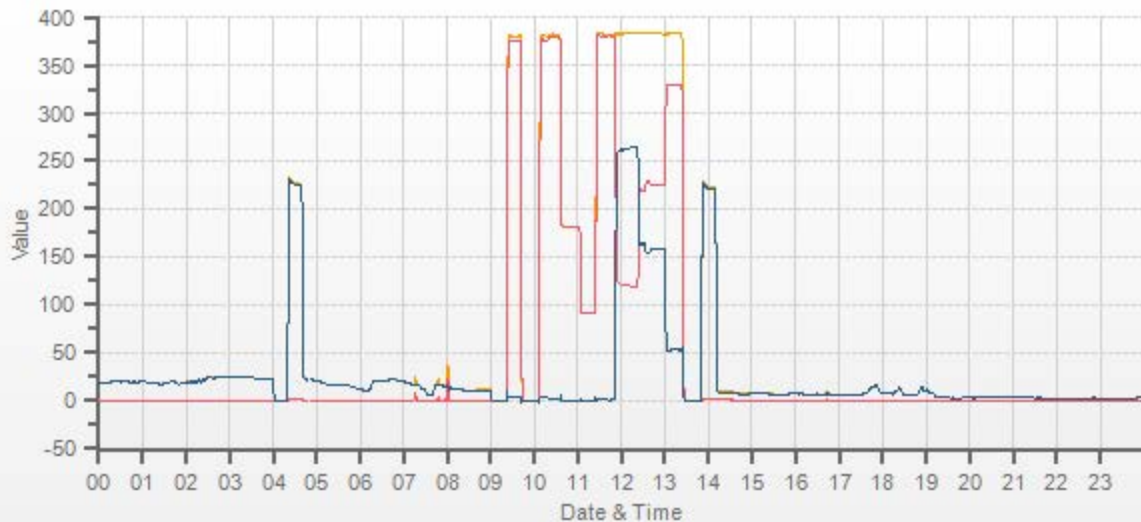
NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
4999	<del>38.60</del>	4999	0.0	0.0	0.0	-0.2	0.1	0.3	0.0	0.0	0.0	<del>1.013</del>	<del>1.004</del>	<del>0.998</del>	<del>1.000</del>	<del>0.998</del>	<del>0.998</del>
4960	38.60	4999	379.9	381.4	1.5	374.9	379.9	4.9	379.9	382.1	2.2	1.013	1.004	0.998	1.000	0.998	0.998
4982	18.30	5000	180.1	180.8	0.7	n/a	n/a	n/a	180.9	181.8	0.9	n/a	n/a	0.995	0.995	0.995	0.995
4991	9.10	5000	89.5	89.9	0.4	n/a	n/a	n/a	90.8	91.3	0.4	n/a	n/a	0.986	0.985	0.985	0.985

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	38.60	4999	0	380.5	381.9	1.4	<del>261.1</del>	<del>262.1</del>	<del>0.996</del>	<del>100.38%</del>
AS-FOUND HIGH	38.60	4999	275	119.4	382.8	263.5	261.1	262.1	0.996	100.38%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	38.60	4999	160	224.1	382.7	158.6	156.4	157.2	0.995	100.51%
LOW	38.60	4999	55	329.3	383.1	53.9	51.2	52.5	0.975	102.54%
NO2 adjustment not required.									AVERAGE:	101.14%

LINEAR REGRESSION ANALYSIS:				COMMENTS:
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	0.999	0.14%	
NOx	1.000	1.001	0.13%	
NO2	1.000	0.999	0.25%	

Sample inlet filter was changed.  
12:33-12:40 = adjusted O3 setting. GPT mid-point restarted.

Station: St. Lina Daily: 06-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01250

NOX [ppb] NO [ppb] NO2 [ppb]

# Ozone Calibration by Direct GPT



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	07-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.004
CLIENT:	LICA	TEMPERATURE (°C):	24.8
LOCATION:	St. Lina	BAROMETRIC (mBar):	921
PURPOSE:	Removal/Shut-down	START TIME (MST):	12:58
PERFORMED BY:	Chris Wesson	END TIME (MST):	14:46

## ANALYZER:

MAKE/MODEL	Thermo 49iQ	RANGE	500 ppb
SERIAL #	12208316586	FLOW (mL/min)	1310
INITIAL		FINAL	
BKG/OFFSET	0.3	BKG/OFFSET	n/a
COEF/SLOPE	1.017	COEF/SLOPE	n/a
Expected (reference) Value	262	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	05-Dec-2023	GPT END TIME:	12:55

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>5000</del>	5000	0.0	0.7	n/a	<del>0.960</del>	<del>n/a</del>
5000	<del>5000</del>	5000	353.0	368.4	n/a	0.960	n/a
5000	<del>5000</del>	5000	154.4	162.2	n/a	0.956	n/a
5000	<del>5000</del>	5000	57.7	62.2	n/a	0.938	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.040	0.3%

## COMMENTS:

Station audit
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# Ozone Calibration by Direct GPT



DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	07-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	1.004
CLIENT:	LICA	TEMPERATURE (°C):	24.0
LOCATION:	St. Lina	BAROMETRIC (mBar):	922
PURPOSE:	Install/Post-Repair	START TIME (MST):	12:46
PERFORMED BY:	Chris Wesson	END TIME (MST):	17:30

## ANALYZER:

MAKE/MODEL	Thermo 49iQ	RANGE	500 ppb
SERIAL #	12208316586	FLOW (mL/min)	1310
INITIAL		FINAL	
BKG/OFFSET	0.3	BKG/OFFSET	0.5
COEF/SLOPE	1.017	COEF/SLOPE	0.98
Expected (reference) Value	262	Expected (reference) Value	257

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	05-Dec-2023	GPT END TIME:	12:55

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>          </del>	5000	0.0	n/a	0.0	<del>          </del>	<del>          </del>
5000	<del>          </del>	5000	353.0	n/a	353.3	n/a	0.999
5000	<del>          </del>	5000	154.4	n/a	154.6	n/a	0.999
5000	<del>          </del>	5000	57.7	n/a	58.4	n/a	0.988

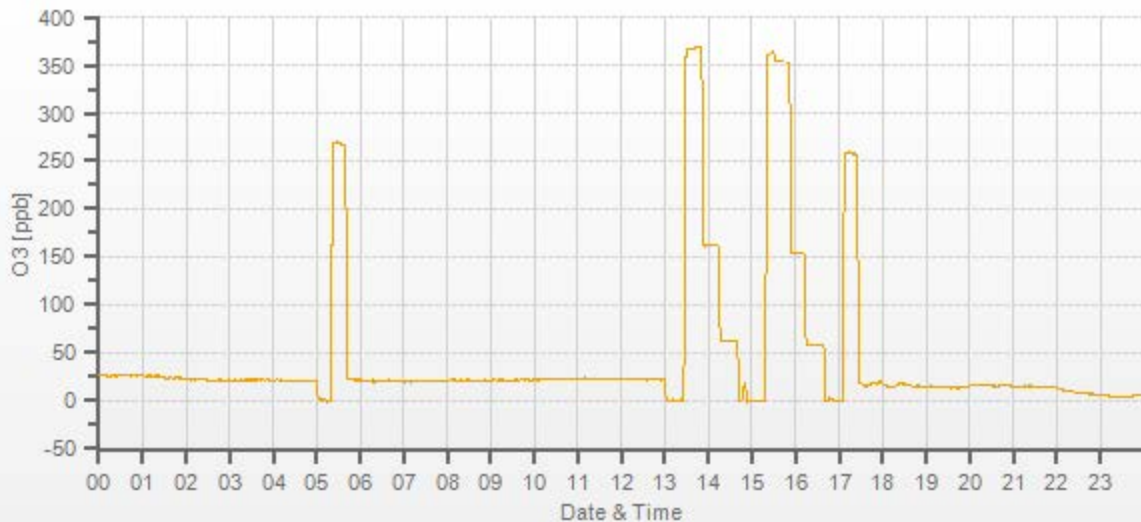
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.000	0.1%

## COMMENTS:

sample filter changed  
As-found determined during preceding audit

O3[ppb] Station: St. Lina Daily: 05-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01250

# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	24.1		Thermo 55i	1180930026	1057
LOCATION:	St. Lina	BAROMETRIC (mBar):	921	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Removal/Shut-down	START TIME (MST):	10:59	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:49	PREVIOUS CF:	1.001	1.001	1.001

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	9.72	11.30	21.02		n/a	n/a	n/a

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	15.41	14.03	29.44	n/a	n/a	n/a	0.933	0.969	0.950	n/a	n/a	n/a
3228	26.90	3255	7.19	6.80	13.99	7.69	6.99	14.68	n/a	n/a	n/a	0.935	0.972	0.953	n/a	n/a	n/a
3240	13.50	3253	3.61	3.41	7.02	3.87	3.53	7.41	n/a	n/a	n/a	0.933	0.967	0.948	n/a	n/a	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	1.072	0.0%	Station audit.	
NMHC	1.000	1.032	0.0%		
THC	1.000	1.052	0.0%		
				Use Zero Chrom?	Yes



# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	05-Dec-2023	PREVIOUS CALIBRATION DATE:	08-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	24.3		Thermo 55i	1180930026	1057
LOCATION:	St. Lina	BAROMETRIC (mBar):	923	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Install/Post-Repair	START TIME (MST):	15:11	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	17:48	PREVIOUS CF:	1.001	1.001	1.001

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE:	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

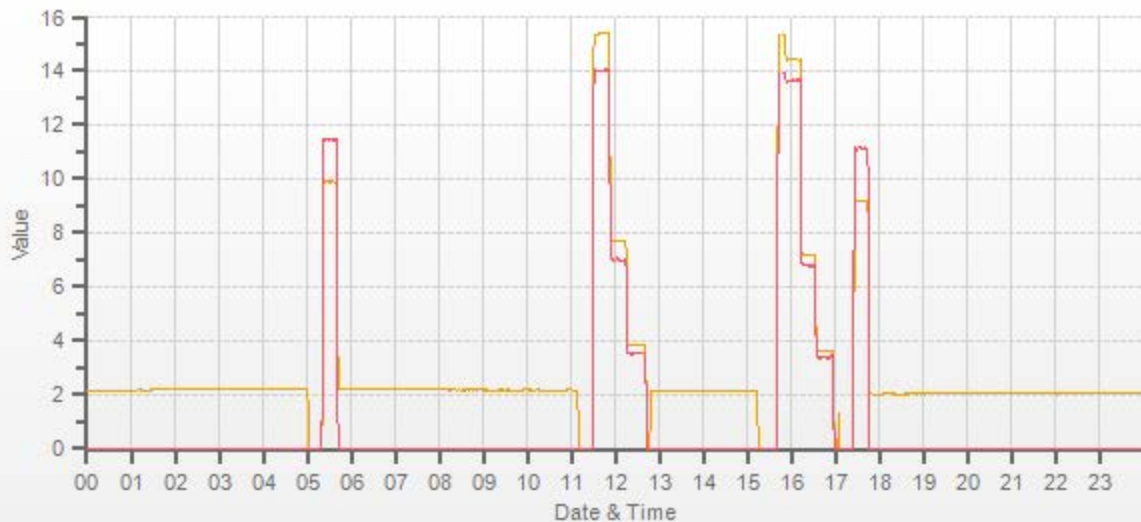
INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	9.72	11.30	21.02		9.21	11.14	20.35

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	n/a	n/a	n/a	0.00	0.00	0.00	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	n/a	n/a	n/a	14.42	13.66	28.08	n/a	n/a	n/a	0.997	0.995	0.996
3227	26.90	3254	7.19	6.80	13.99	n/a	n/a	n/a	7.19	6.80	13.99	n/a	n/a	n/a	1.000	1.000	1.000
3240	13.40	3253	3.58	3.39	6.97	n/a	n/a	n/a	3.61	3.40	7.00	n/a	n/a	n/a	0.993	0.996	0.996

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	1.002	0.0%	Sample filter changed As-found determined during preceding audit	
NMHC	1.000	1.005	0.0%		
THC	1.000	1.004	0.0%		
				Use Zero Chrom?	Yes



CAL-LICA-202312-01250

## Thermo 5030i SHARP Monitor Calibration

<b>Date:</b> December 24, 2023	<b>Performed By/Reviewer:</b> Alex Yakupov   Chris Wesson
<b>Company:</b> LICA	<b>Start Time (mst):</b> 12:19
<b>Station Name/Location:</b> St. Lina	<b>End Time (mst):</b> 15:15
<b>Previous Audit Date:</b> November 10, 2023	<b>Calibration Purpose:</b> Quarterly
<b>Parameter:</b> PM 2.5	<b>Weather Conditions:</b> Mainly sunny

<b>SHARP 5030i Information and Status:</b>		
Serial Number: CM 17091001	Filter Tape Counter	424

Reference Standards: Air Flow						
	Manometer		Orifice		Pressure:	
Make:	DeltaCal		DeltaCal		Fisher	Vaisala
Model:	DC1		DC1		FB61291	HMP76B
Serial Number:	177246		177246		130168457	SN: T1640130
Expiry Date:	November 27, 2024		November 27, 2024		March 20, 2024	June 26, 2024

Ambient Temperature (°C)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	-5.80	-5.5	-0.3	-5.80	-5.5	-0.3
#2	-5.80	-5.5	-0.3	-5.80	-5.5	-0.3
#3	-5.80	-5.5	-0.3	-5.80	-5.5	-0.3
Average	-5.8	-5.5	-0.3	-5.8	-5.5	-0.3
<i>Temp Limit: ± 2°C</i>						

Ambient Relative Humidity (%RH)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Offset (ZERO)	Reference	SHARP	Offset (ZERO)
#1	53.70	53.9	-0.2	53.70	53.9	-0.2
#2	53.70	53.9	-0.2	53.70	53.9	-0.2
#3	53.70	53.9	-0.2	53.70	53.9	-0.2
Average	53.7	53.9	-0.2	53.7	53.9	-0.2
<i>RH Limit: ± 2 %RH</i>						

Flow Temperature (°C)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	20.30	19.5	0.8	20.30	19.5	0.8
#2	20.30	19.5	0.8	20.30	19.5	0.8
#3	20.30	19.5	0.8	20.30	19.5	0.8
Average	20.3	19.5	0.8	20.3	19.5	0.8
<i>Temp Limit: ± 2°C</i>						

Barometric Pressure (mmHg)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	700.0	700.0	2.0	700.0	700.0	0.0
<i>BP Limit: ± 2 mmHg</i>						

Nephelometer Relative Humidity (%RH)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	16.60	15.9	0.7	16.60	15.9	0.7
<i>RH Limit: ± 2 %RH</i>						

Nephelometer Temperature (%RH)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	21.80	22.6	-0.8	21.80	22.6	-0.8
<i>Temp Limit: ± 2°C</i>						

Nephelometer Source Level						
As Found:			As Left: (same as found if acceptable)			
	Variable	Value		Variable	Value	
	IRED	66		IRED	66	
	SRC LEVEL	47		SRC LEVEL	47	
<i>IRED Limit (as found): 60-70 mA Adjusted IRED Limit (as left): 65 mA</i>						

Detector Calibration (Auto)						
Detector Auto Calibration Completed: YES			As Left:			
	Variable	Value		Variable	Value	
	HIGH VOLT	1400		BETA REF TH	310	
	ALPHA TH	790		DIFF HV	0	

Mass Coefficient (Auto)						
Zero			Span			
	Variable	Value		Variable	Value	
	MASS COEF	7129.2		MASS COEF	7089.0	
	FOIL VALUE	1045		FOIL VALUE	1045	
	Beta Avg	9453		Beta Avg	8157	
	difference	Foil set # 4804		difference	-0.6	
<b>Foil Set: CM1597</b>						

Flow Calibration (L/min)						
As Found:			As Left: (same as found if acceptable)			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	16.68	16.67	0.01	16.68	16.67	0.01
#2	16.68	16.67	0.01	16.68	16.67	0.01
#3	16.68	16.68	0.00	16.68	16.67	0.01
Average	16.68	16.67	0.01	16.68	16.67	0.01
<i>Flow Limit: 16.67 ± 0.33 L/min</i>						

Leak Check (L/min)						
Without Leak Check Adapter			With leak Check Adapter			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	16.68	16.67	0.01	16.48	16.65	-0.17
<i>Leak Limit: 0.08 L/min</i>						
<b>LEAK RATE: -0.18</b>						

# Meteorological System Checklist



Date:	December 6, 2023		
Technician:	Chris Wesson		
Station:	St. Lina		
<b>Unit:</b>	<b>Make:</b>	<b>Model:</b>	<b>Serial #:</b>
Temperature Sensor:	Rotronic	HC2-S3	20404750
Barometric Pressure Sensor:	Met One	O90D	F4498
Relative Humidity Sensor:	Rotronic	HC2-S3	20404750
Anemometer:	RM Young	05305VK	161466

### PRECIPITATION SENSOR CHECK

Checklist:	Reply:	Comments:
Is the sensor Level?	yes	
Is the heater operating properly?	yes	
Are the bucket drain holes clean?	yes	Tip test = 12:49 - 12:53
Is the screen on the housing? (screen should be on between July and September)	no	
Is the housing clean?	yes	
Is the area around the housing clean and free from obstacles?	yes	

### TIP TEST - Slowly pour water until 10 tip are heard. (10 tips = 1 mm)

# of Tips	Data Logger Response (mm):	Manual Specification = +/- 0.2 mm
10	1.00	TRUE

### AMBIENT TEMPERATURE SENSOR CHECK

Parameter:	Temperature @ 2 metres	
Reference Thermometer ID:	Traceable 20250-21 #230557122 Exp: Aug 17, 2025	
Reference Temperature (°C):	6.3	
Station - Ambient Temperature (°C):	5.8	
Temperature Difference (°C):	1.1	

### BAROMETRIC PRESSURE SENSOR CHECK

Reference Barometer ID:	Brunton ADC #231010, Exp: Oct 10, 2024	
Reference Pressure - Units/Reading:	millibar	925.1
Station Pressure - Units/Reading:	millibar	911.5
Pressure Tolerance +/- 15% of error:	786 - 1064	1.47%

### RELATIVE HUMIDITY (HYGROMETER) SENSOR CHECK

Reference Hygrometer ID:	Traceable 20250-21 #230557122 Exp: Aug 17, 2025	
Reference Hygrometer % RH- Reading:	58.80	
Station Hygrometer % RH- Reading:	65.80	
RH Tolerance +/- 15% of difference:	49.98 - 67.62	-11.9%

### ANEMOMETER - WIND SPEED & WIND DIRECTION SENSOR CHECK

WIND SPEED		WIND DIRECTION	
Wind Speed Observed (kph):	0~10	Wind Direction Observed:	W
Wind speed on Data Logger (kph):	4.9	Wind Direction on Data Logger:	W
	Annual audit: Jul 22, 2022	Wind Direction Pass/Fail?:	Pass

Comments

Station (Trailer) temperature vs Reference gauge temperature: 22.1 vs 22.2. Difference: 0.1 degrees. Passed

# ST LINA Station Checklist

COMPANY: LICA PLANT: ST LINA DATE: December 5, 2023

Station Location: X,Y Coordinates: 54.2165, -111.5027  
 Elevation (m): 690  
 Declination: 13° 5' East

GENERAL	Yes	No	n/a	Comments:
Has site location changed from previous audit?	x			
Is site secure?	x			
Are station operating conditions adequate?	x			
Last twelve month's of calibrations available?	x			Sharepoint
All applicable SOP's available in station?	x			Sharepoint
Site documentation up to date?	x			2023. Wind roses need updating?

DATA ACQUISITION	Yes	No	n/a	Comments:
Are strip charts in use?		x		
Is a digital data logger in use?	x			

TRAILER COMPONENTS	Yes	No	n/a	Comments:
Is a glass sampling manifold installed?	x			
Is sampling manifold clean and free of chips and cracks?	x			
Is a trap in place?	x			
Are spare manifold ports capped?	x			
Is manifold pump properly installed and operative?	x			
Do sample lines extend halfway into manifold?		X		NOx not extended to center
Are monitor sampling lines connected to manifold?	x			
Are sampling lines clean?	x			
Are monitors properly mounted and secure?	x			
Are monitors properly exhausted from room or	x			
Are zero and span systems operational?	x			

Meteorological	Yes	No	n/a	Comments:
Is wind equipment properly oriented?		x		Misaligned by ~10degs
Is the wind equipment functioning properly?	x			

	Indicated Value:	Audit Value:	% Difference	Scalar Difference:
Station Temperature °C	24.5	24.5	0.00	0.00
Barometric Pressure	907.9	921.5	1.48	13.60
Wind Speed (kph)	15.7	10~20	n/a	n/a
Wind Direction (Deg)	SW	SW	n/a	n/a
Relative Humidity %	72	67	-7.46	-5.00
Ambient Temperature °C	1	0.9	-11.11	-0.10

**Recommendations:**  
 Wind needs realignment  
 BP inaccurate.  
 TPX/RH mounted ~1m above roof. Relocate to 2m above ground (set-up cross-bar off tower)

AUDITOR: Chris Wesson



# Meteorological Sensor Audit/Calibration

## Location Information

Company: LICA  
 Audit Location: St. Lina  
 Audit Date: July 22, 2022  
 Calibration Purpose: routine annual

Performed By: Alex Yakupov  
 Reviewed By: Chris Wesson  
 Start/End Time (mst): 15:07 / 16:23  
 Weather Conditions: A few clouds

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	0-1
Sensor Model:	05305VK	Velocity Unit Output Range:	0-200
Serial #:	161466	Direction Voltage Output Range:	0-1
Previous Cal/Audit Date:	March 16, 2021	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: Model 18860-90/18802 SN: CA 4744, expires - Aug 6, 2022

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.1	0.1	-
1000	18.4	18.5	18.5	0.996
2000	36.9	36.9	37.0	0.998
3000	55.3	55.4	55.5	0.997
4000	73.7	74.1	74.1	0.995
5000	92.2	92.5	92.4	0.997
6000	110.6	111.0	111.0	0.996
7000	129.0	129.4	129.4	0.997
8000	147.4	148.1	148.1	0.996
9000	165.9	166.6	166.6	0.996
10000	184.3	185.1	185.1	0.996
The audit meets AMD requirements.			Average Correction Factor=	0.996

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	0	355	0.4	0.0	0.2
30	330	31	331	-0.6	-0.8	0.7
60	300	62	301	-2.1	-0.6	1.4
90	270	93	270	-2.7	-0.1	1.4
120	240	123	241	-2.9	-1.2	2.1
150	210	152	212	-2.1	-2.1	2.1
180	180	182	183	-2.0	-2.9	2.5
210	150	211	153	-1.2	-2.8	2.0
240	120	241	123	-0.8	-3.1	2.0
270	90	270	93	-0.3	-3.0	1.7
300	60	301	62	-0.8	-2.3	1.6
330	30	331	30	-0.5	-0.4	0.4
355	0	355	1	0.0	0.5	0.3
The audit meets AMD requirements.				Average Absolute Degrees Difference=		1.4

## Comments:

n/a



# Meteorological Sensor Audit/Calibration

## Location Information

Company: LICA  
 Audit Location: St. Lina  
 Audit Date: December 20, 2023  
 Calibration Purpose: routine annual

Performed By: Alex Yakupov  
 Reviewed By: Chris Wesson  
 Start/End Time (mst): 11:54 / 15:37  
 Weather Conditions: Mainly sunny

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	0-1
Sensor Model:	05305VK	Velocity Unit Output Range:	0-200
Serial #:	161466	Direction Voltage Output Range:	0-1
Previous Cal/Audit Date:	July 22, 2022	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: Model 18860-90/18802 SN: CA 4744, expires - Oct 18, 2024

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.1	0.1	-
1000	18.4	18.5	18.5	0.996
2000	36.9	37.0	37.0	0.996
3000	55.3	55.5	55.5	0.996
4000	73.7	74.1	74.1	0.995
5000	92.2	92.6	92.6	0.995
6000	110.6	111.2	111.2	0.994
7000	129.0	129.8	129.8	0.994
8000	147.4	148.4	148.4	0.994
9000	165.9	167.1	167.1	0.993
10000	184.3	185.7	185.7	0.992
The audit meets AMD requirements.			Average Correction Factor=	0.995

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	1	353	0.9	2.0	1.5
30	330	31	329	-1.0	0.6	0.8
60	300	63	300	-2.7	0.5	1.6
90	270	93	270	-3.4	-0.3	1.9
120	240	124	241	-4.0	-1.3	2.7
150	210	153	212	-3.1	-1.8	2.5
180	180	182	183	-1.8	-2.7	2.3
210	150	211	154	-1.4	-3.6	2.5
240	120	241	125	-0.5	-4.8	2.7
270	90	269	95	1.2	-4.6	2.9
300	60	299	64	1.3	-3.7	2.5
330	30	328	31	1.7	-1.1	1.4
355	0	353	1	2.0	1.1	1.6
The audit meets AMD requirements.				Average Absolute Degrees Difference=		2.0

### Comments:

n/a

# End of Report





**Lakeland Industry & Community Association**

**DECEMBER 2023**

**Ambient Air Monitoring Calibration Report**

**- LAC LA BICHE STATION-**

**CAL-LICA-202312-01690**

**Station Operation and Maintenance:**

Bureau Veritas Canada

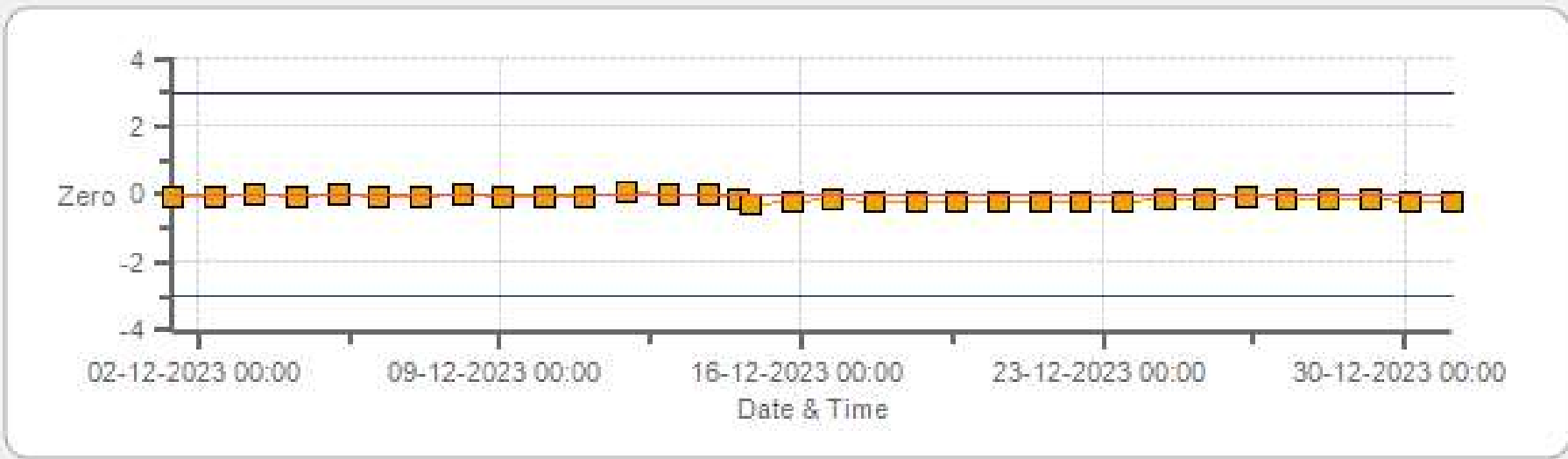
**Data Validation and Report:**

LICA / Bureau Veritas Canada

January 6, 2024

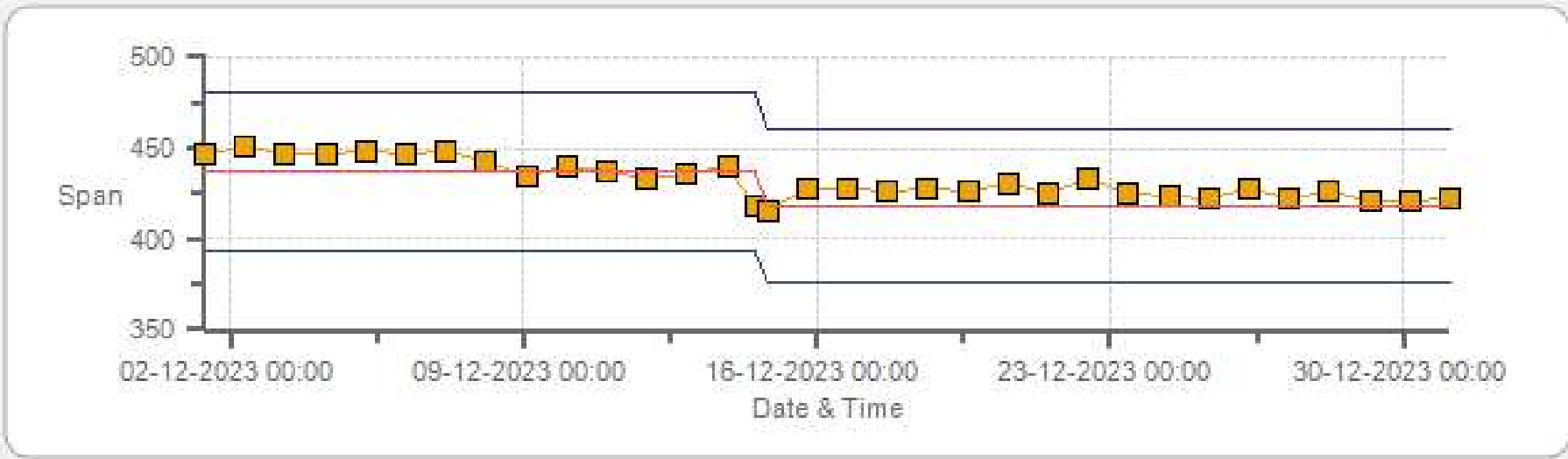
# DAILY INTERNAL ZERO-SPAN CALIBRATION RECORDS

SO2[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



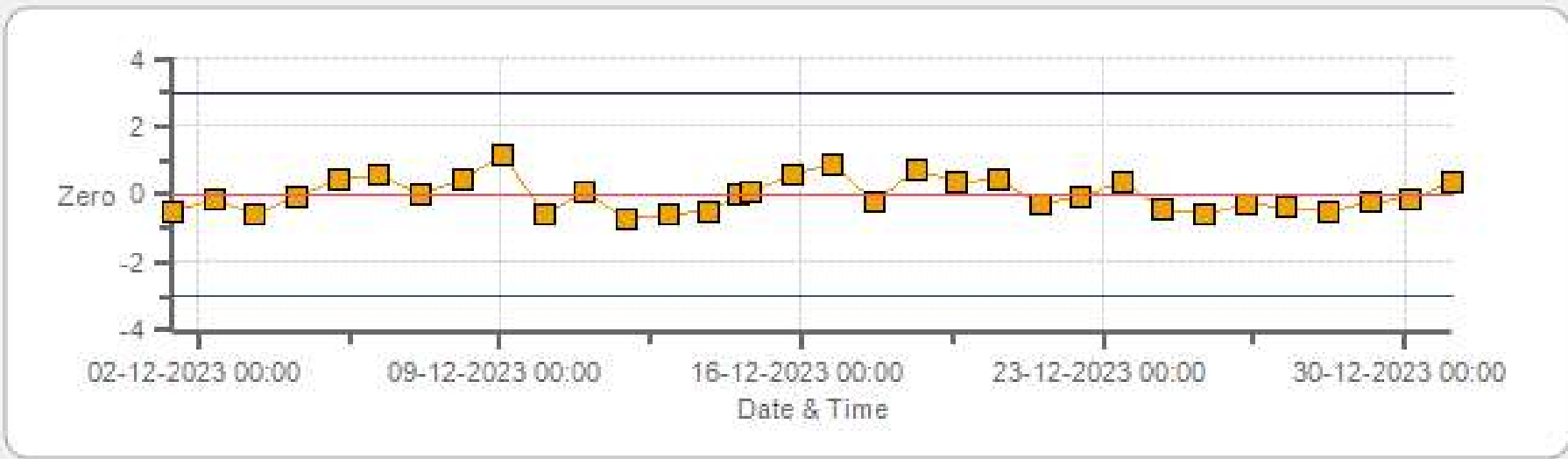
Zero Zero Ref Zero Low Zero High

SO2[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



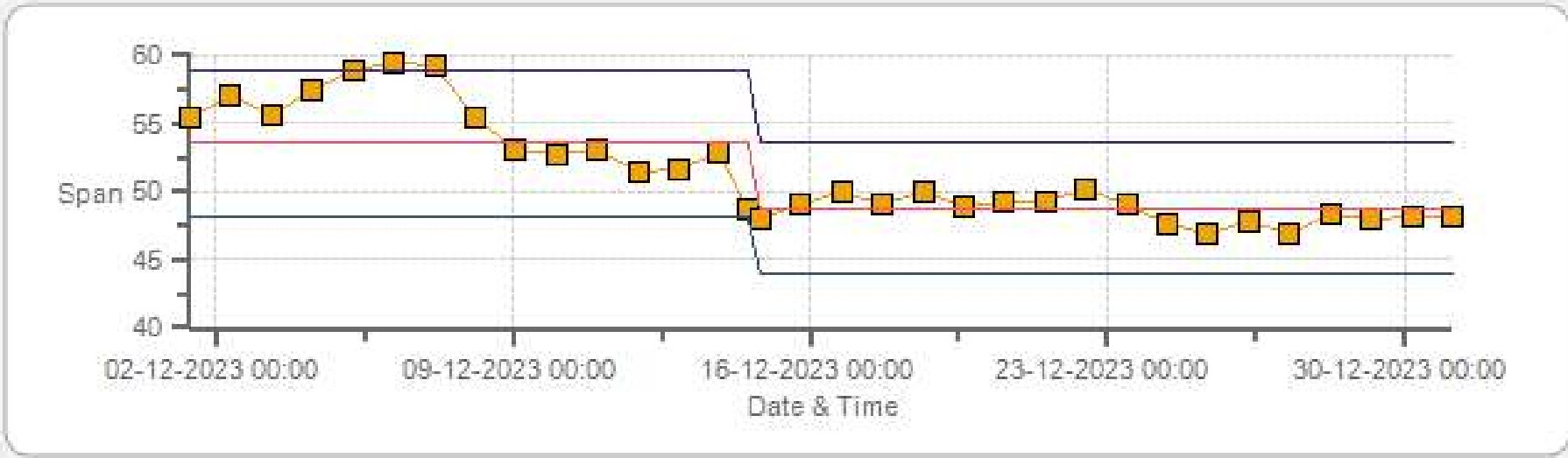
Span SpanRef Span Low Span High

H2S[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



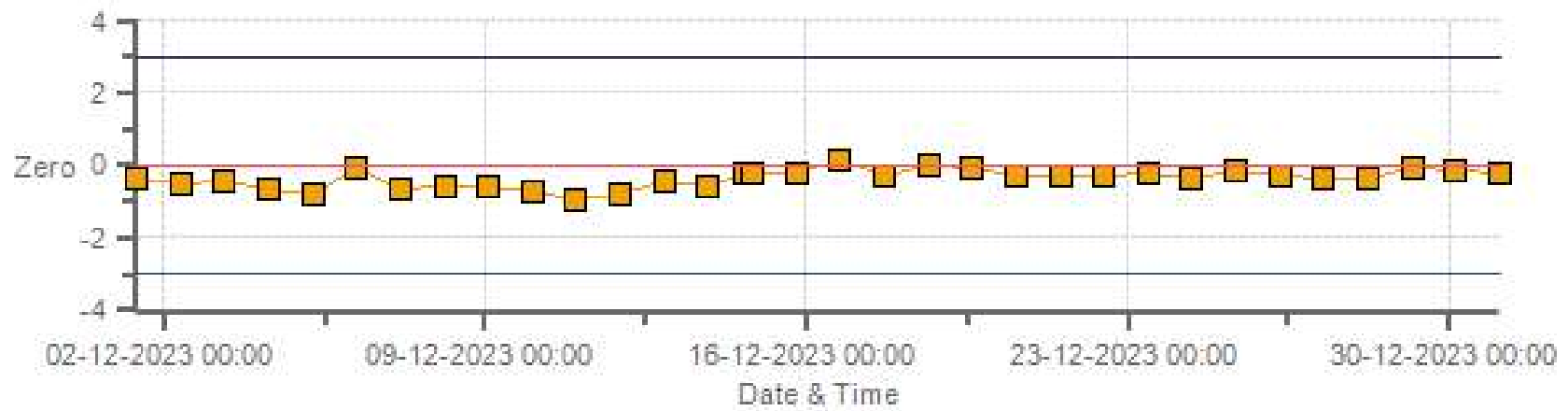
Zero Zero Ref Zero Low Zero High

H2S[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



Span Span Ref Span Low Span High

NOX[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



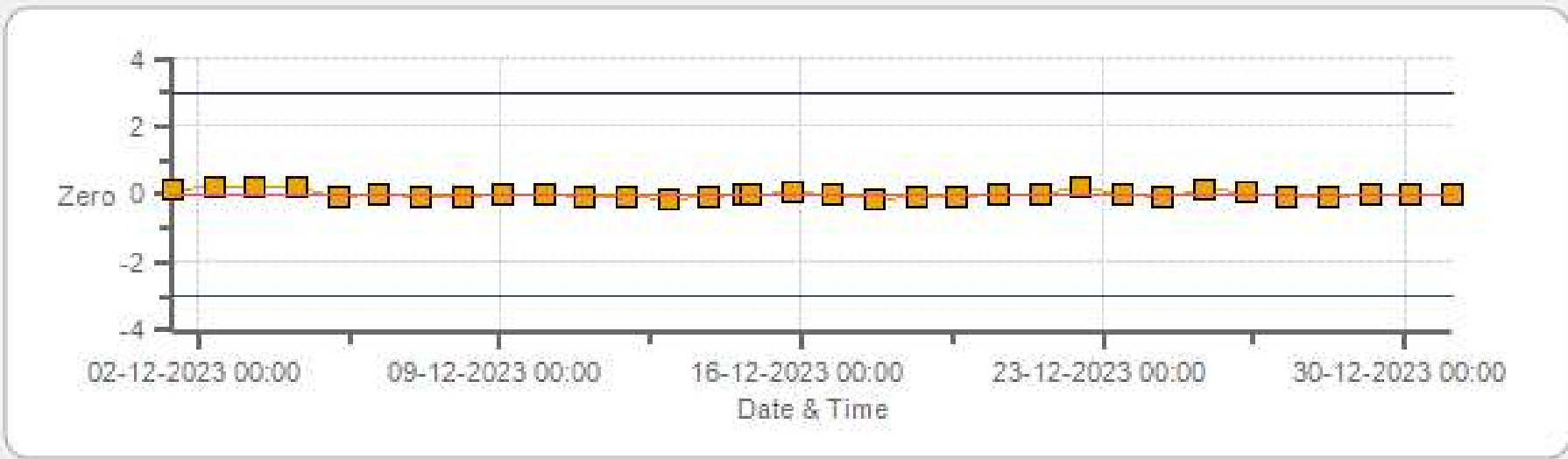
Zero Zero Ref Zero Low Zero High

NOX[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



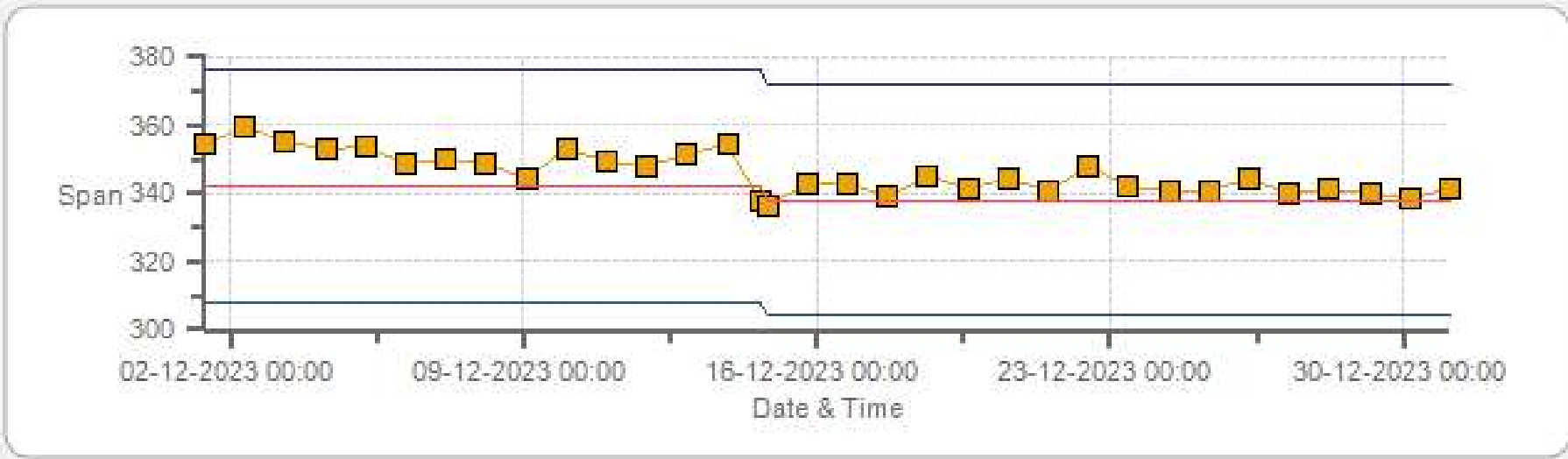
Span SpanRef Span Low Span High

NO2[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



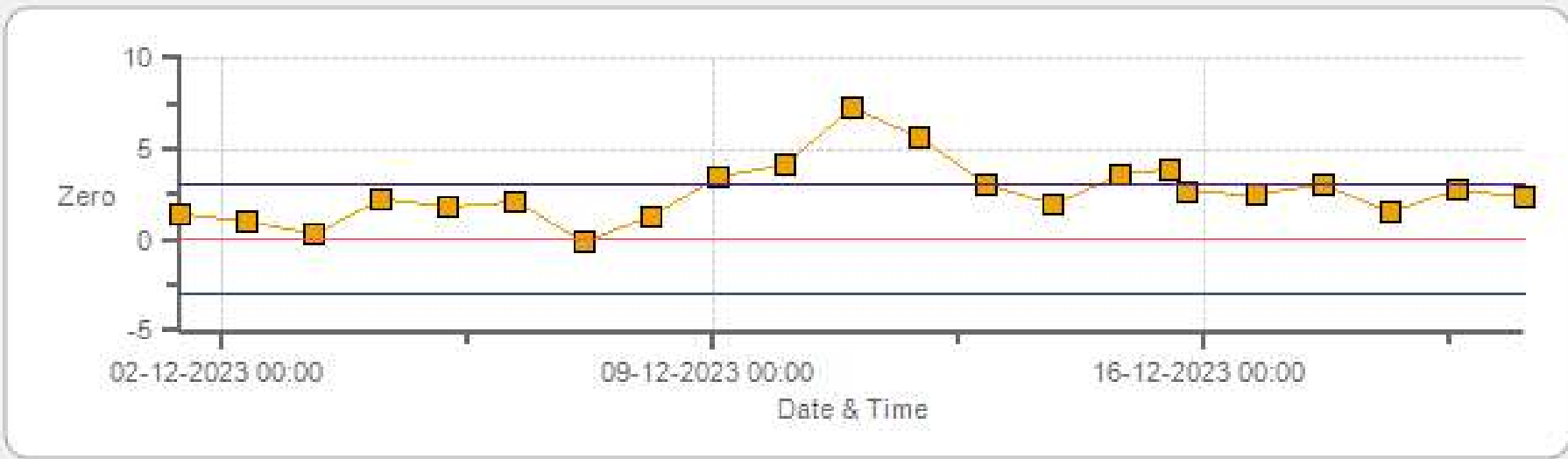
Zero Zero Ref Zero Low Zero High

NO2[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



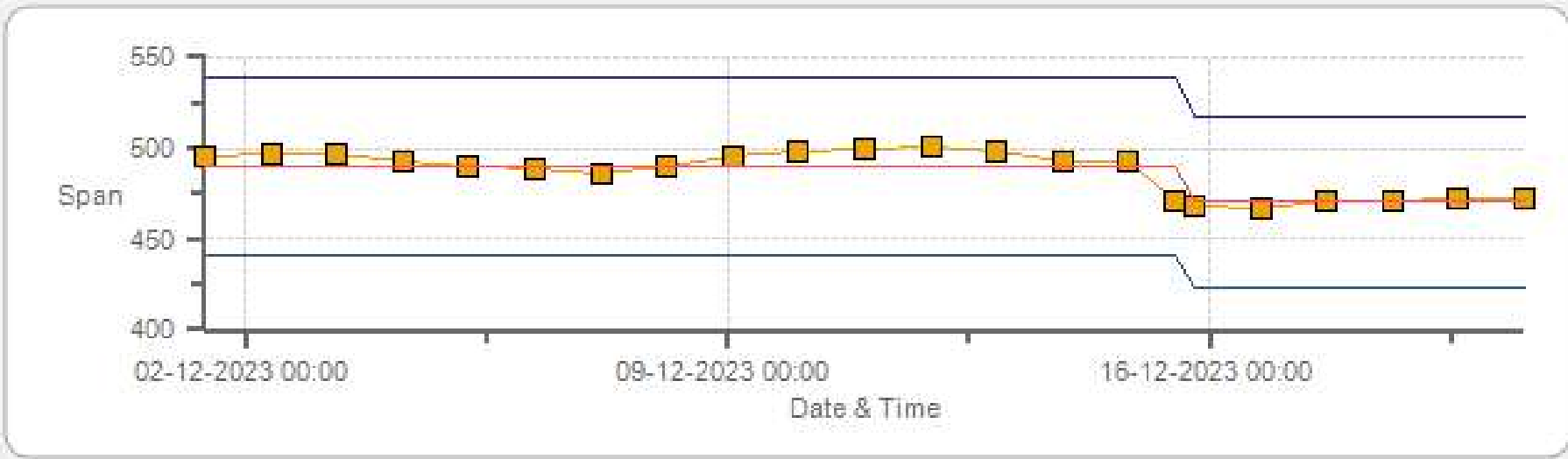
Span SpanRef Span Low Span High

O3[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



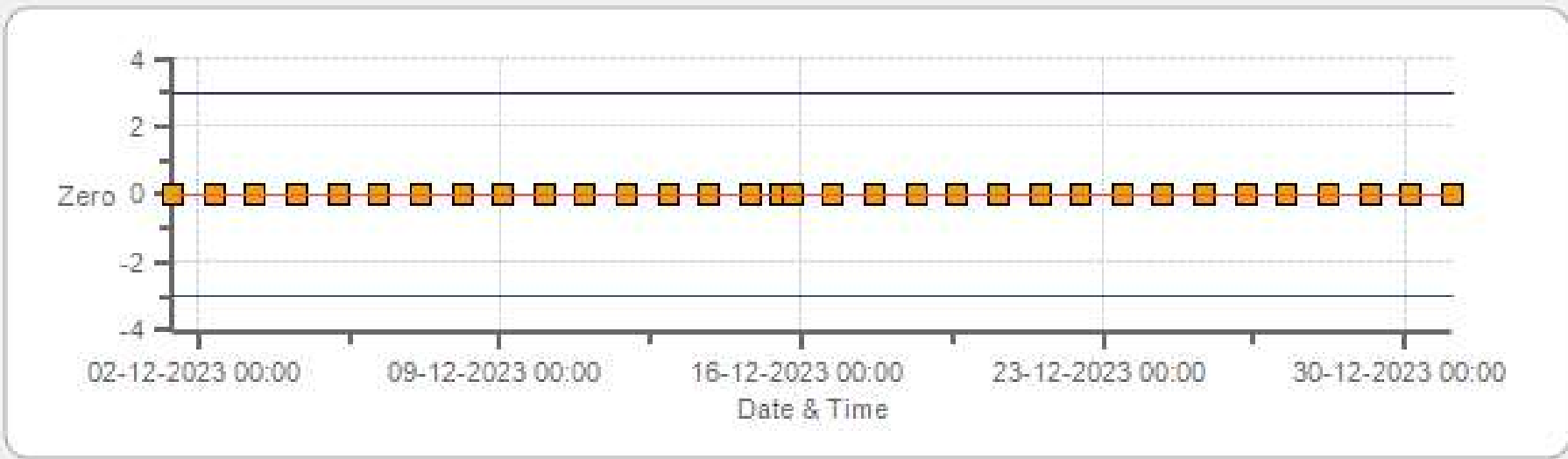
Zero Zero Ref Zero Low Zero High

O3[ppb] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



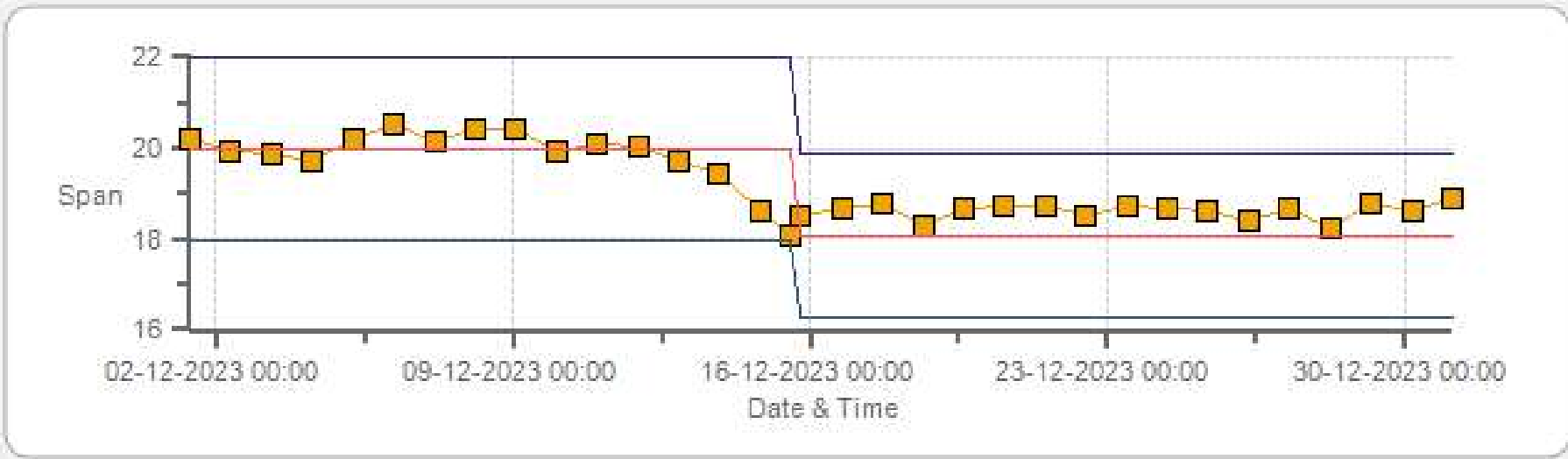
Span SpanRef Span Low Span High

THC55[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

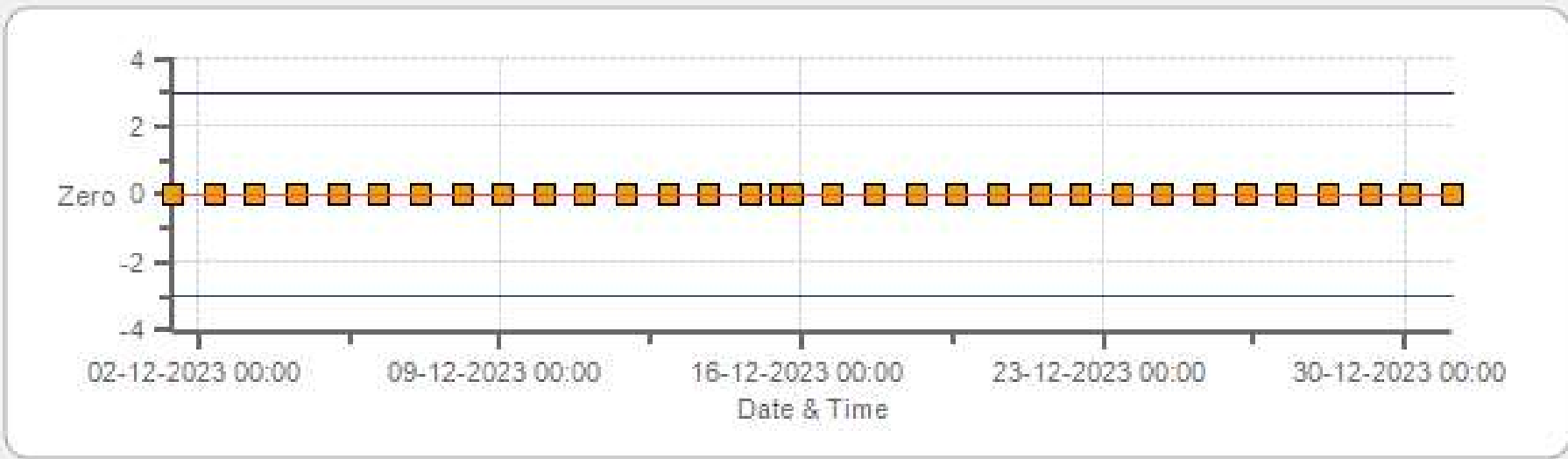
THC55[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

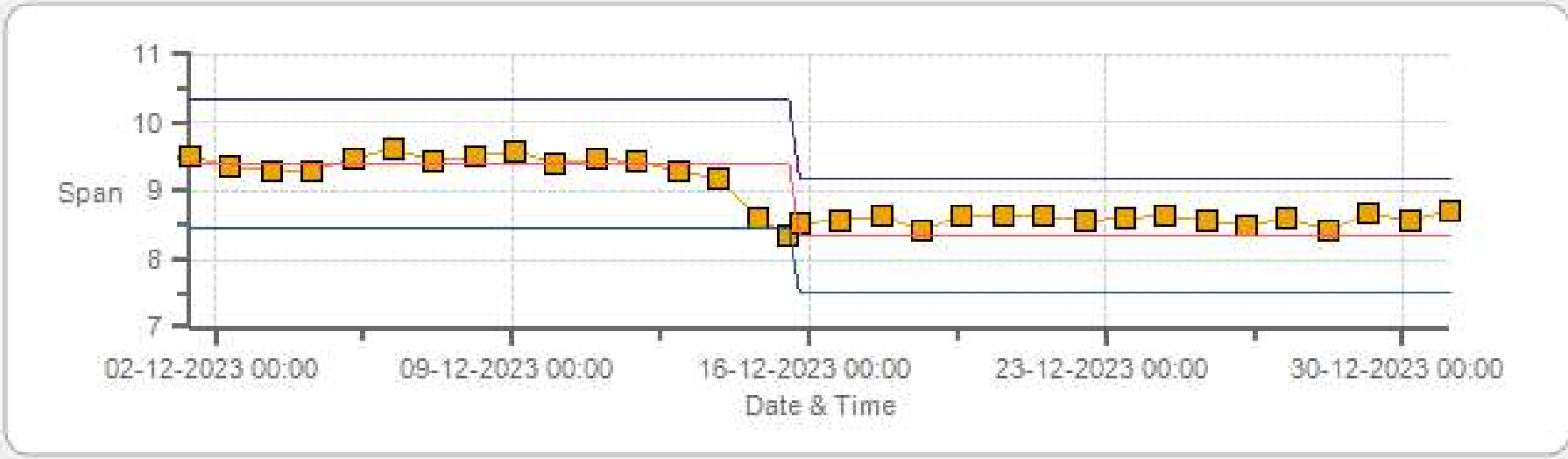


CH4[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



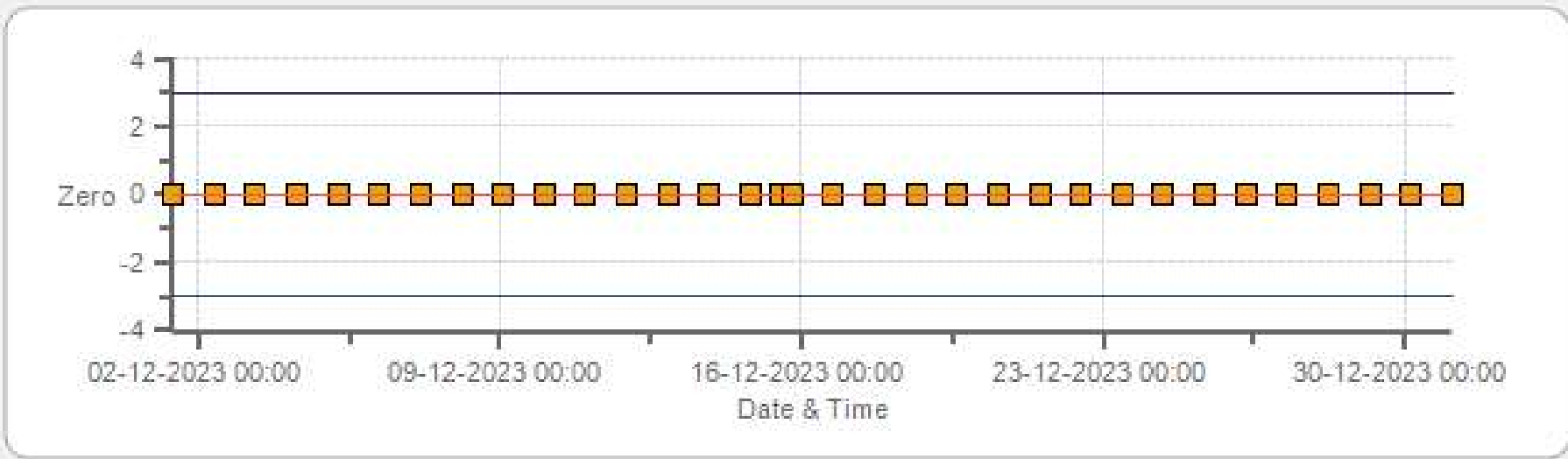
Zero Zero Ref Zero Low Zero High

CH4[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



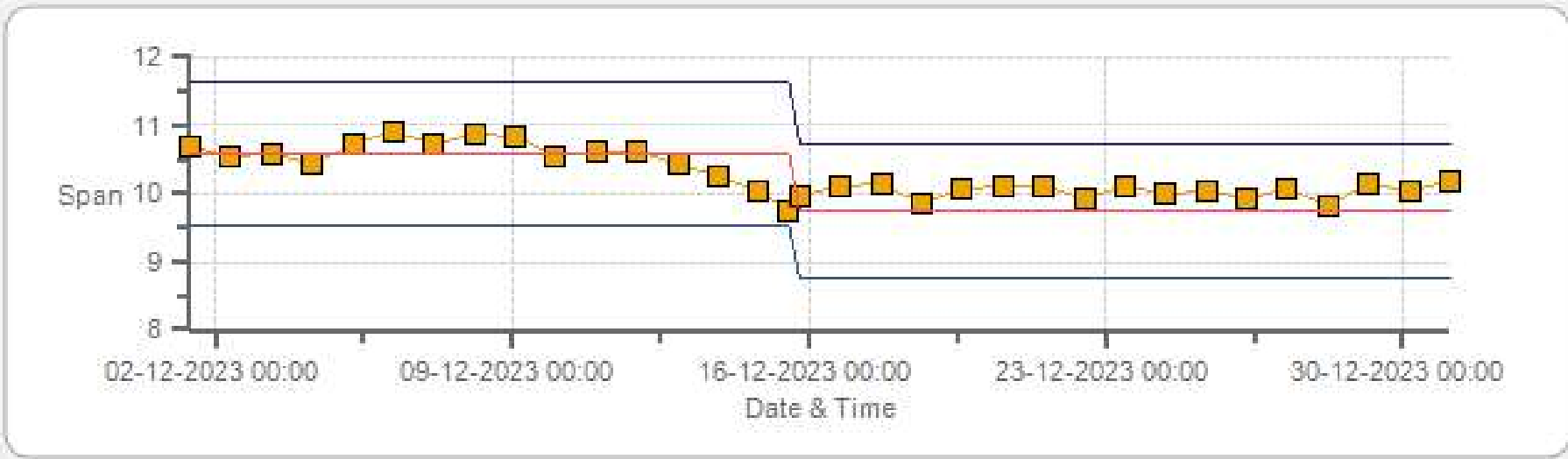
Span SpanRef Span Low Span High

NMHC[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Zero



Zero Zero Ref Zero Low Zero High

NMHC[ppm] Calibration: Lac La Biche Monthly: 12-2023 Type: SpanAndZero - Span



Span SpanRef Span Low Span High

# MULTI-POINT CALIBRATION RECORDS

# SO2 Analyzer Calibration by Dilution



DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	21.3
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	950
PURPOSE:	Removal/Shut-down	START TIME (MST):	07:33
PERFORMED BY:	Chris Wesson	END TIME (MST):	09:58

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180320043	FLOW (mL/min)	459
INITIAL		FINAL	
BKG/OFFSET	7.47	BKG/OFFSET	n/a
COEF/SLOPE	1.425	COEF/SLOPE	n/a
Expected (reference) Value	437	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>60.80</del>	3999	0.00	-0.02	n/a	<del>0.976</del>	<del>n/a</del>
3940	60.80	4001	381.42	390.7	n/a	0.976	n/a
3973	28.80	4002	180.63	185	n/a	0.976	n/a
3989	14.40	4003	90.29	93.34	n/a	0.967	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.024	0.1%

## COMMENTS:

Station audit
---------------

# SO2 Analyzer Calibration by Dilution



DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023
PARAMETER:	SO2	PREVIOUS CORRECTION FACTOR:	0.997
CLIENT:	LICA	TEMPERATURE (°C):	23.3
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	952
PURPOSE:	Install/Post-Repair	START TIME (MST):	09:58
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:37

## ANALYZER:

MAKE/MODEL	Thermo 43I-TLE	RANGE	500 ppb
SERIAL #	1180320043	FLOW (mL/min)	459
INITIAL		FINAL	
BKG/OFFSET	7.47	BKG/OFFSET	7.34
COEF/SLOPE	1.425	COEF/SLOPE	1.383
Expected (reference) Value	437	Expected (reference) Value	418.1

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	LL107286	HIGH ID	n/a
CONC (ppm):	25.10	EXPIRY DATE	n/a
CYLINDER (psi):	700	LOW ID	n/a
EXPIRY DATE	02-Nov-2025	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	390	190	95
RANGE	300 - 400	150 - 200	50 - 100

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

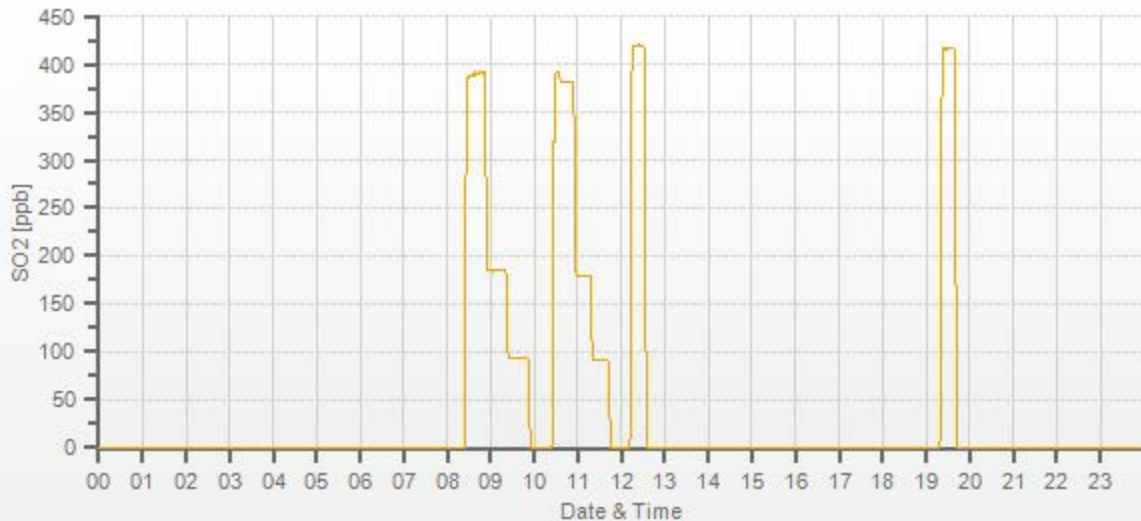
FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>60.80</del>	3999	0.00	n/a	0	<del>n/a</del>	<del>1.000</del>
3940	60.80	4001	381.42	n/a	381.4	n/a	1.000
3973	28.80	4002	180.63	n/a	179.5	n/a	1.006
3989	14.40	4003	90.29	n/a	91	n/a	0.992

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	0.999	0.0%

## COMMENTS:

Station audit
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# H2S Analyzer Calibration by Dilution



DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.006
CLIENT:	LICA	TEMPERATURE (°C):	21.3
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	950
PURPOSE:	Removal/Shut-down	START TIME (MST):	07:33
PERFORMED BY:	Chris Wesson	END TIME (MST):	09:58

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	CM17360002	FLOW (mL/min)	932
INITIAL		FINAL	
BKG/OFFSET	86.5	BKG/OFFSET	n/a
COEF/SLOPE	1.061	COEF/SLOPE	n/a
Expected (reference) Value	53.6	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>32.20</del>	3999	0.00	-0.5	n/a	<del>0.918</del>	<del>n/a</del>
3969	32.20	4001	78.07	84.5	n/a	0.918	n/a
3986	15.70	4002	38.05	41.1	n/a	0.915	n/a
3995	7.80	4003	18.90	19.9	n/a	0.927	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.090	-0.5%

## COMMENTS:

Station audit  
08:30 = user error. High point restarted

# H2S Analyzer Calibration by Dilution



DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023
PARAMETER:	H2S	PREVIOUS CORRECTION FACTOR:	1.006
CLIENT:	LICA	TEMPERATURE (°C):	23.3
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	952
PURPOSE:	Install/Post-Repair	START TIME (MST):	09:58
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:37

## ANALYZER:

MAKE/MODEL	Thermo 450i	RANGE	100 ppb
SERIAL #	CM17360002	FLOW (mL/min)	932
INITIAL		FINAL	
BKG/OFFSET	86.5	BKG/OFFSET	79
COEF/SLOPE	1.061	COEF/SLOPE	0.975
Expected (reference) Value	53.6	Expected (reference) Value	48.8

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	58100720	ID:	18700921
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	n/a
CALIBRATION GAS:		FLOWMETERS (if applicable):	
CYLINDER ID:	EY 0002455	HIGH ID	n/a
CONC (ppm):	9.70	EXPIRY DATE	n/a
CYLINDER (psi):	2000	LOW ID	n/a
EXPIRY DATE	29-Sep-2026	EXPIRY DATE	n/a

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
TARGET	78	38	19
RANGE	60 - 80	30 - 40	10 - 20

## SCRUBBER CHECK (15 MINS; TRS/H2S ONLY):

START TIME:	n/a	SO2 Conc (ppb)	n/a
END TIME:	n/a	Analyzer Response (ppb)	n/a

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
3999	<del>32.20</del>	3999	0.00	n/a	0	<del>n/a</del>	<del>1.000</del>
3969	32.20	4001	78.07	n/a	78.1	n/a	1.000
3986	15.70	4002	38.05	n/a	37.9	n/a	1.004
3995	7.80	4003	18.90	n/a	19.1	n/a	0.990

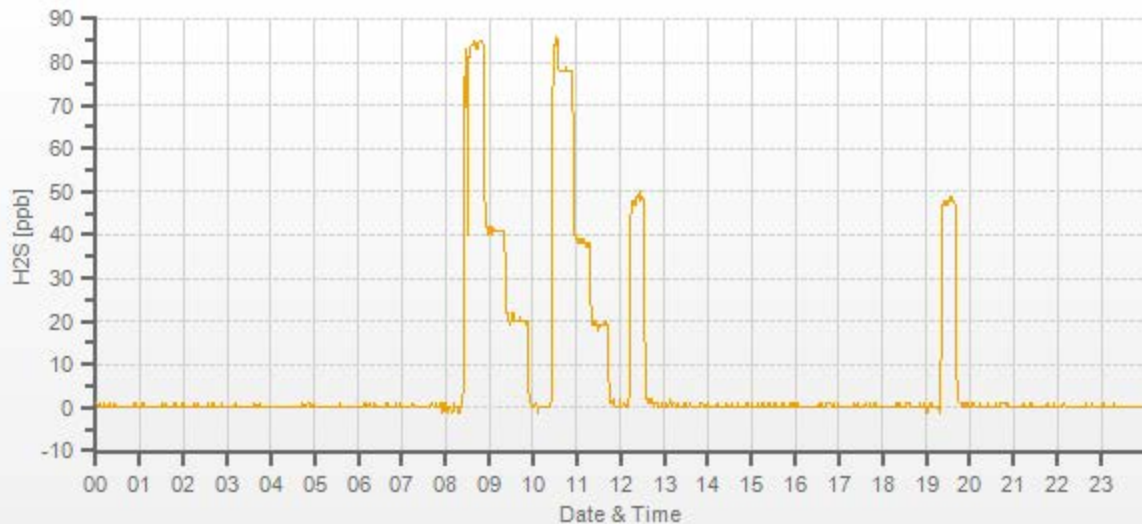
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	0.999	0.0%

## COMMENTS:

Sample filter changed





# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	21.3	SERIAL #:	1180930027	NOx	1.000
LOCATION:	Tamarack	BAROMETRIC (mBar):	950	FLOW (mL/min)	761	NO	1.000
PURPOSE:	Removal/Shut-down	START TIME (MST):	07:33	RANGE (ppb)	500	NO2	0.998
PERFORMED BY:	Chris Wesson	END TIME (MST):	11:13	GPT FOR O3?		No	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	9.2	8.9	n/a	BKG/OFFSET:	n/a	n/a	n/a
SLOPE/COEF/CE:	1.008	0.841	0.998	SLOPE/COEF/CE:	n/a	n/a	n/a

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	344.0	2.4	342.0		n/a	n/a	n/a

CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	380	250	230-265	n/a
MID	180	125	115-150	n/a
LOW	90	45	40-55	n/a
EXTRA 1	n/a	n/a	n/a	n/a

NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
4999	<del>38.60</del>	4999	0.0	0.0	0.0	-0.3	-0.3	0.0	n/a	n/a	n/a	<del>0.991</del>	<del>0.979</del>	<del>0.989</del>	<del>0.975</del>	<del>0.985</del>	<del>0.968</del>
4960	38.60	4999	379.9	381.4	1.5	383.2	389.2	6.0	n/a	n/a	n/a	0.991	0.979	<del>0.989</del>	<del>0.975</del>	n/a	n/a
4982	18.30	5000	180.1	180.8	0.7	181.8	185.1	3.3	n/a	n/a	n/a	0.989	0.975	<del>0.985</del>	<del>0.968</del>	n/a	n/a
4991	9.10	5000	89.5	89.9	0.4	90.6	92.6	2.0	n/a	n/a	n/a	0.985	0.968	<del>0.989</del>	<del>0.975</del>	n/a	n/a

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	38.60	4999	0	383.9	388.8	4.9	<del>254.5</del>	<del>255.2</del>	<del>0.997</del>	<del>100.28%</del>
AS-FOUND HIGH	38.60	4999	260	129.4	389.5	260.1	254.5	255.2	0.997	100.28%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	38.60	4999	140	249.4	388.5	139.1	134.5	134.2	1.002	99.78%
LOW	38.60	4999	50	336.8	388.4	51.6	47.1	46.7	1.009	99.15%
NO2 adjustment not required.									AVERAGE:	99.73%

LINEAR REGRESSION ANALYSIS:				COMMENTS: No issues
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	1.009	-0.01%	
NOx	1.000	1.020	0.06%	
NO2	1.000	1.005	-0.16%	

# NOx Calibration by Dilution/Gas-Phase Titration



CALIBRATION:				ANALYZER:			
DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	24-Nov-2023	MAKE/MODEL:	Thermo 42i	PREVIOUS CF.	
CLIENT:	LICA	TEMPERATURE (°C):	23.2	SERIAL #:	1180930027	NOx	1.000
LOCATION:	Tamarack	BAROMETRIC (mBar):	952	FLOW (mL/min)	761	NO	1.000
PURPOSE:	Install/Post-Repair	START TIME (MST):	11:13	RANGE (ppb)	500	NO2	0.998
PERFORMED BY:	Chris Wesson	END TIME (MST):	15:34	GPT FOR O3?		Yes	

CALIBRATION SYSTEM:							
CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	EY0001013	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	NO/NOx (PPM):	49.2   49.4	HIGH EXPIRY:	n/a
ID:	26701218	ID:	18700921	CYLINDER (psi):	1000	LOW ID:	n/a
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a	EXPIRY DATE	11-Nov-2029	LOW EXPIRY:	n/a

CALIBRATION SETTINGS:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
BKG/OFFSET:	9.2	8.9	n/a	BKG/OFFSET:	8.7	8.5	n/a
SLOPE/COEF/CE:	1.008	0.841	0.998	SLOPE/COEF/CE:	0.999	0.833	0.998

EXPECTED (REFERENCE) VALUE:							
INITIAL	NOx	NO	NO2	FINAL	NOx	NO	NO2
	344.0	2.4	342.0		340.4	2.4	337.9

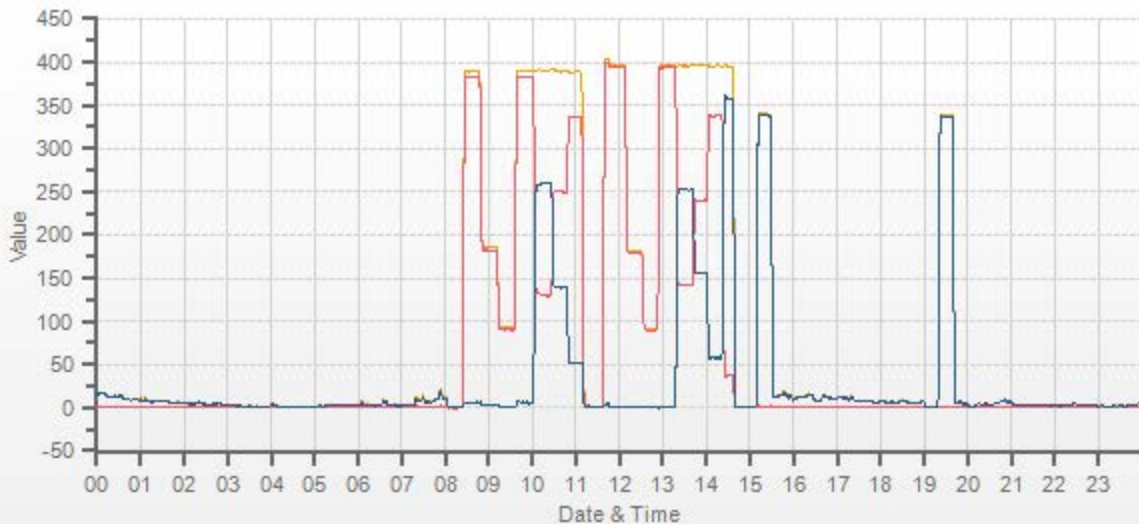
CALIBRATION PARAMETERS:				
POINT	NO TARGET (PPB)	NO2 TARGET (PPB)	NO2 RANGE	O3 POINT
HIGH	395	250	240-275	n/a
MID	180	154	150-157	Mid
LOW	90	54	50-58	Low
EXTRA 1	n/a	340	300-370	High

NO/NOx CALIBRATION:																	
FLOW RATE			CONCENTRATION (ppb)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2	NO	NOx	NO2
5000	<del>5000</del>	5000	0.0	0.0	0.0	n/a	n/a	n/a	0.0	0.0	0.0	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
4960	40.10	5000	394.6	396.2	1.6	n/a	n/a	n/a	395.0	396.5	1.5	n/a	n/a	<del>n/a</del>	0.999	0.999	<del>n/a</del>
4982	18.30	5000	180.1	180.8	0.7	n/a	n/a	n/a	180.1	180.6	0.5	n/a	n/a	<del>n/a</del>	1.000	1.001	<del>n/a</del>
4991	9.10	5000	89.5	89.9	0.4	n/a	n/a	n/a	90.2	90.5	0.3	n/a	n/a	<del>n/a</del>	0.993	0.993	<del>n/a</del>

GPT CALIBRATION:										
Point	CALIBRATOR			INDICATED (ppb)			NO DROP / O3 Conc (ppb)	NO2 GAIN (ppb)	NO2 Corr. FACTOR	CONV. EFFICIENCY
	GAS	TOTAL	O3 SETPOINT	NO	NOx	NO2				
REFERENCE	40.10	5000	0	395.0	395.9	0.8	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>	<del>n/a</del>
AS-FOUND HIGH	40.10	5000	260	142.7	395.1	252.4	252.3	251.6	1.003	99.72%
ADJUSTED HIGH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MID	40.10	5000	160	240.5	396.4	155.9	154.5	155.1	0.996	100.39%
LOW	40.10	5000	60	337.9	395.3	57.4	57.1	56.6	1.009	99.12%
NO2 adjustment not required.									AVERAGE:	99.75%

LINEAR REGRESSION ANALYSIS:				COMMENTS:
	CORRELATION	SLOPE	INTERCEPT	
NO	1.000	1.001	0.04%	
NOx	1.000	1.000	0.03%	
NO2	1.000	0.999	-0.01%	

sample filter changed  
Extra O3 point: Setting = 360, NO drop/O3 conc = 357.6 ppb



CAL-LICA-202312-01690

# Ozone Calibration by Direct GPT



DATE:	15-Dec-2023	PREVIOUS CALIBRATION DATE:	25-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	20.0
LOCATION:	Tamarack	BAROMETRIC (mBar):	957
PURPOSE:	Removal/Shut-down	START TIME (MST):	07:27
PERFORMED BY:	Chris Wesson	END TIME (MST):	09:21

## ANALYZER:

MAKE/MODEL	Thermo 49i	RANGE	500 ppb
SERIAL #	1002240372	FLOW (mL/min)	1427
INITIAL		FINAL	
BKG/OFFSET	0	BKG/OFFSET	n/a
COEF/SLOPE	1.055	COEF/SLOPE	n/a
Expected (reference) Value	490	Expected (reference) Value	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	14-Dec-2023	GPT END TIME:	14:44

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>5000</del>	5000	0.0	0.0	n/a	<del>0.955</del>	<del>n/a</del>
5000	<del>5000</del>	5000	357.6	374.5	n/a	0.955	n/a
5000	<del>5000</del>	5000	154.5	162.4	n/a	0.951	n/a
5000	<del>5000</del>	5000	57.1	59.1	n/a	0.966	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.048	0.0%

## COMMENTS:

Station audit
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# Ozone Calibration by Direct GPT



DATE:	15-Dec-2023	PREVIOUS CALIBRATION DATE:	25-Nov-2023
PARAMETER:	O3	PREVIOUS CORRECTION FACTOR:	0.999
CLIENT:	LICA	TEMPERATURE (°C):	24.6
LOCATION:	Tamarack	BAROMETRIC (mBar):	957
PURPOSE:	Install/Post-Repair	START TIME (MST):	09:21
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:03

## ANALYZER:

MAKE/MODEL	Thermo 49i	RANGE	500 ppb
SERIAL #	1002240372	FLOW (mL/min)	1427
INITIAL		FINAL	
BKG/OFFSET	0	BKG/OFFSET	0
COEF/SLOPE	1.055	COEF/SLOPE	1.013
Expected (reference) Value	490	Expected (reference) Value	470.8

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:	
MAKE:	SABIO	MAKE:	Sabio
MODEL:	2010	MODEL:	2020EXP
ID:	26701218	ID:	18700921
MFC CALIBRATION DATE:	08-Sep-2023	OXIDIZER ID:	n/a
CALIBRATION METHOD:		Direct GPT	
GPT DATE:	14-Dec-2023	GPT END TIME:	14:44

## CALIBRATION PARAMETERS:

POINT	HIGH	MID	LOW
RANGE	300 - 400	150 - 200	50 - 100

## CALIBRATION:

FLOW RATES (mL/min)			CONCENTRATION (ppb)			CORRECTION FACTOR	
DILUENT	GAS	TOTAL	ACTUAL	INDICATED		Initial	Final
				Initial	Final		
5000	<del>          </del>	5000	0.0	n/a	0.0	<del>          </del>	<del>          </del>
5000	<del>          </del>	5000	357.6	n/a	358.2	n/a	0.998
5000	<del>          </del>	5000	154.5	n/a	156.3	n/a	0.988
5000	<del>          </del>	5000	57.1	n/a	56.6	n/a	1.009

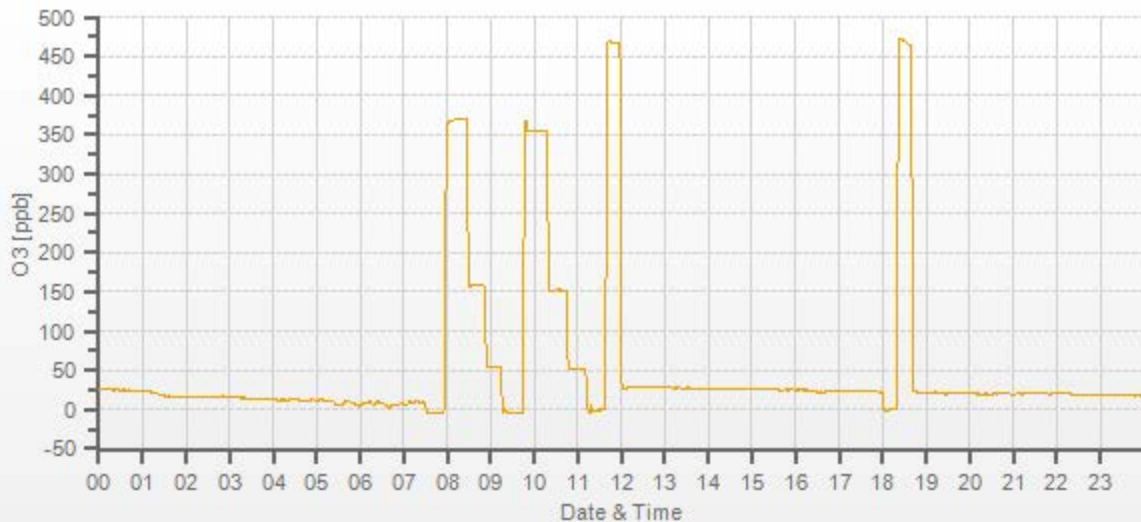
## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT
VALUE	1.000	1.003	0.0%

## COMMENTS:

Sample filter changed
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O3[ppb] Station: Lac La Biche Daily: 15-12-2023 Type: AVG 1 Min. [1 Min.]



CAL-LICA-202312-01690

# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	14-Dec-2023	PREVIOUS CALIBRATION DATE:	22-Nov-2023	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	23.5		Thermo 55i	1180320044	876
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	953	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Removal/Shut-down	START TIME (MST):	11:55	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	13:30	PREVIOUS CF:	1.005	1.001	1.002

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	9.39	10.59	19.98		n/a	n/a	n/a

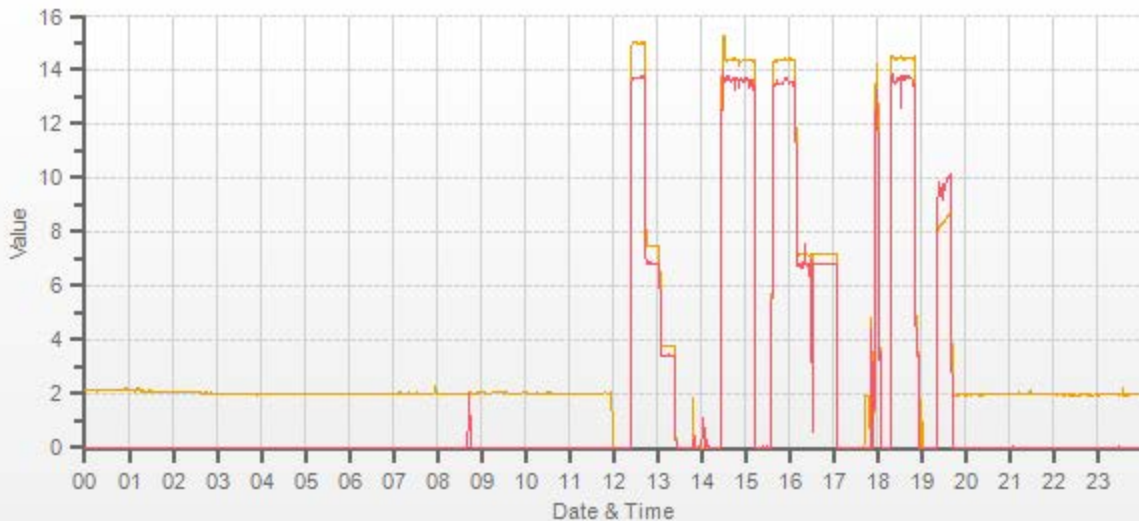
## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	0.00	0.00	0.00	n/a	n/a	n/a	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	14.98	13.74	28.73	n/a	n/a	n/a	0.960	0.989	0.974	n/a	n/a	n/a
3228	26.90	3255	7.19	6.80	13.99	7.48	6.83	14.31	n/a	n/a	n/a	0.961	0.995	0.977	n/a	n/a	n/a
3240	13.40	3253	3.58	3.39	6.97	3.77	3.42	7.18	n/a	n/a	n/a	0.951	0.990	0.971	n/a	n/a	n/a

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	1.041	0.1%	Station audit.	
NMHC	1.000	1.011	0.0%		
THC	1.000	1.027	0.0%		
				Use Zero Chrom?	Yes





CAL-LICA-202312-01690

# Methane/Non-Methane Analyzer Calibration by Dilution



CALIBRATION:				ANALYZER:			
DATE:	15-Dec-2023	PREVIOUS CALIBRATION DATE:	n/a	VALUE	MAKE/MODEL	SERIAL	FLOW (mL/min)
CLIENT:	LICA	TEMPERATURE (°C):	23.4		Thermo 55i	1180320044	903
LOCATION:	Lac la Biche	BAROMETRIC (mBar):	955	PARAMETER:	CH4	NMHC	THC
PURPOSE:	Install/Post-Repair	START TIME (MST):	09:25	RANGE (ppm):	20	20	40
PERFORMED BY:	Chris Wesson	END TIME (MST):	12:31	PREVIOUS CF:	n/a	n/a	n/a

## CALIBRATION SYSTEM:

CALIBRATOR:		ZERO AIR:		CALIBRATION GAS:		FLOWMETERS (if applicable):	
MAKE:	SABIO	MAKE:	Sabio	CYLINDER ID:	LL119576	HIGH ID:	n/a
MODEL:	2010	MODEL:	2020EXP	CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub> (ppm):	870.0   299.0	HIGH EXPIRY:	n/a
ID:	58100720	ID:	18700921	CYLINDER (psi):	1300	LOW ID:	n/a
MFC CALIBRATION DATE:	09-Oct-2023	OXIDIZER ID:	115	EXPIRY DATE:	22-Dec-2028	LOW EXPIRY:	n/a

## CALIBRATION PARAMETERS:

POINT (CH <sub>4</sub> /NMHC)	HIGH	MID	LOW	CH <sub>4</sub> EQUIVILANCE		
TARGET	14	7	3.5	C <sub>3</sub> H <sub>8</sub> as CH <sub>4</sub>		822.3
RANGE	12 - 16	6 - 8	2 - 4	THC as CH <sub>4</sub>		1692.3

## EXPECTED (REFERENCE) VALUE:

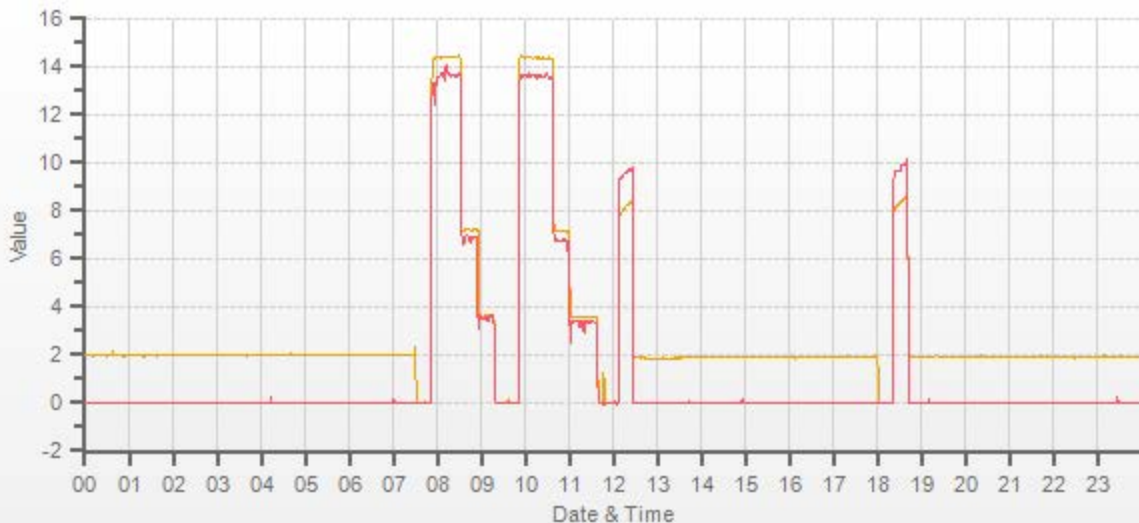
INITIAL	CH <sub>4</sub>	NMHC	THC	FINAL	CH <sub>4</sub>	NMHC	THC
	n/a	n/a	n/a		n/a	8.34	9.74

## CALIBRATION:

FLOW RATE			CONCENTRATION (PPM)									CORRECTION FACTOR (CF.)					
(mL/min)			CALCULATED			INITIAL INDICATED			FINAL INDICATED			INITIAL			FINAL		
DILUENT	GAS	TOTAL	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC	CH <sub>4</sub>	NMHC	THC
3255	<del>X</del>	3255	0.00	0.00	0.00	n/a	n/a	n/a	0.00	0.00	0.00	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
3201	53.80	3255	14.38	13.59	27.97	n/a	n/a	n/a	14.35	13.60	27.95	n/a	n/a	n/a	1.002	0.999	1.001
3228	26.90	3255	7.19	6.80	13.99	n/a	n/a	n/a	7.14	6.79	13.92	n/a	n/a	n/a	1.007	1.001	1.005
3240	13.40	3253	3.58	3.39	6.97	n/a	n/a	n/a	3.56	3.39	6.95	n/a	n/a	n/a	1.007	0.999	1.003

## LINEAR REGRESSION ANALYSIS:

	CORRELATION	SLOPE	INTERCEPT	Comments:	
CH <sub>4</sub>	1.000	0.998	-0.1%	Sample filter changed Changed ZAG Adjusted N <sub>2</sub> and H <sub>2</sub> pressure. Rebuilt sample pump	
NMHC	1.000	1.001	0.0%		
THC	1.000	0.999	0.0%		
				Use Zero Chrom?	Yes



CAL-LICA-202312-01690

## Thermo 5030i SHARP Monitor Monthly Check

<b>Date:</b> December 15, 2023	<b>Performed By/Reviewer:</b> Chris Wesson   Chris Wesson
<b>Company:</b> LICA	<b>Start Time (mst):</b> 10:40
<b>Station Name/Location:</b> Lac La Biche	<b>End Time (mst):</b> 11:09
<b>Previous Audit Date:</b> November 25, 2023	<b>Calibration Purpose:</b> routine monthly
<b>Parameter:</b> PM 2.5	<b>Weather Conditions:</b> Mainly sunny

**SHARP 5030i Information and Status:**

<b>Serial Number:</b> CM 17071016	<b>Filter Tape Counter</b>	23
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**Reference Standards:**

Air Flow				
	Manometer	Orifice	Pressure:	Temp / RH:
<b>Make:</b>	Delta Cal	Delta Cal	DeltaCal	Traceable
<b>Model:</b>	DC-1	DC1	DC1	9009, 20250-21
<b>Serial Number:</b>	177246	177246	177246	230557122
<b>Calibration Expiration Date:</b>	November 27, 2024	November 27, 2024	November 27, 2024	August 17, 2025

Ambient Temperature (°C)				Range	Action
	Reference	SHARP	Difference	$\pm 2^\circ\text{C}$	OK
#1	-0.50	-0.3	-0.2	2-3 °C	Recalibrate
				$> 3^\circ\text{C}$	Fail

Ambient Relative Humidity (%RH)				Range	Action
<b>As Found:</b>				$\pm 2\% \text{RH}$	OK
	Reference	SHARP	Difference	2-5 %RH	Recalibrate
#1	81.30	79.5	1.8	$> 5\% \text{RH}$	Fail

Barometric Pressure (mmHg)				Range	Action
<b>As Found:</b>				$\pm 10 \text{ mmHg}$	OK
	Reference	SHARP	Difference	10-12 mmHg	Recalibrate
#1	715.3	713.6	1.7	$> 12 \text{ mmHg}$	Fail

Flow Audit (L/min)						Range	Action
<b>As Found:</b>						$\pm 4\%$	OK
	Reference	SHARP				4-5%	Recalibrate
#1	16.70	16.67	% Difference	-0.18%		$> 5\%$	Fail
#2	16.70	16.67					
#3	16.70	16.67					
Average	16.70	16.67					

Leak Check (L/min)						
Without Leak Check Adapter			With leak Check Adapter			
	Reference	SHARP	Difference	Reference	SHARP	Difference
#1	16.70	16.67	0.03	16.59	16.65	-0.06
					LEAK RATE:	-0.09

*Leak Limit: 0.80 L/min*

## Lac la Biche Station Checklist

COMPANY: LICA PLANT: Lac la Biche DATE: December 14, 2023

Station Location: X,Y Coordinates: 54.7653, -111.9714  
 Elevation (m): 560  
 Declination: 13° 26' East

GENERAL	Yes	No	n/a	Comments:
Has site location changed from previous audit?	x			
Is site secure?	x			
Are station operating conditions adequate?	x			
Last twelve month's of calibrations available?	x			Sharepoint
All applicable SOP's available in station?	x			Sharepoint
Site documentation up to date?				

DATA ACQUISITION	Yes	No	n/a	Comments:
Are strip charts in use?		x		
Is a digital data logger in use?	x			

TRAILER COMPONENTS	Yes	No	n/a	Comments:
Is a glass sampling manifold installed?	x			
Is sampling manifold clean and free of chips and cracks?	x			
Is a trap in place?	x			
Are spare manifold ports capped?		x		VOC/Xontech line not in use but still mounted in manifold. Line needs cap
Is manifold pump properly installed and operative?	x			
Do sample lines extend halfway into manifold?	x			
Are monitor sampling lines connected to manifold?	x			
Are sampling lines clean?	x			
Are monitors properly mounted and secure?	x			
Are monitors properly exhausted from room or	x			
Are zero and span systems operational?	x			

Meteorological	Yes	No	n/a	Comments:
Is wind equipment properly oriented?	x			
Is the wind equipment functioning properly?	x			

	Indicated Value:	Audit Value:	% Difference	Scalar Difference:
Station Temperature °C	23.4	23.8	1.68	0.40
Barometric Pressure	951.9	952.2	0.03	0.30
Wind Speed (kph)	6.2	5~10	n/a	n/a
Wind Direction (Deg)	NW	NW	n/a	n/a
Relative Humidity %	42.4	42	-0.95	-0.40
Ambient Temperature °C	2.6	2.9	10.34	0.30

Recommendations:

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AUDITOR: Chris Wesson



# Meteorological Sensor Audit/Calibration

## Location Information

Company: LICA Performed By: Alex Yakupov  
 Audit Location: Lac La Biche Reviewed By: Chris Wesson  
 Audit Date: September 15, 2023 Start/End Time (mst): 16:41 / 18:22  
 Calibration Purpose: routine annual Weather Conditions: Mainly sunny

## Wind Sensor Information

Sensor ID Data:		Sensor Outputs:	
Sensor Make:	RM Young	Velocity Voltage Output Range:	0-1
Sensor Model:	05305VK	Velocity Unit Output Range:	0-200
Serial #:	56778	Direction Voltage Output Range:	0-1
Previous Cal/Audit Date:	May 9, 2022	Direction Unit Output Range:	0-360

## Wind Calibrator Information

Calibrator I.D. and Expiry Date: RM Young 18802 id# CA 4744 expires October 18, 2024

## Wind Speed Audit Data **\*\*+/- 2% of the average correction factor is the limit\*\***

RPM	Wind Speed Generated kph	Clockwise Wind Speed kph	Counter Clockwise Wind Speed kph	Correction Factor
0	0	0.1	0.1	-
1000	18.4	18.4	18.4	1.002
2000	36.9	36.9	36.9	0.999
3000	55.3	55.4	55.4	0.998
4000	73.7	73.8	73.8	0.999
5000	92.2	92.2	92.3	0.999
6000	110.6	110.7	110.7	0.999
7000	129.0	129.2	129.2	0.999
8000	147.4	147.7	147.7	0.998
9000	165.9	166.1	166.1	0.999
10000	184.3	184.6	184.6	0.998
The audit meets AMD requirements.			Average Correction Factor=	0.999

## Wind Direction Audit Data **\*\*+/- 3° of the absolute average degrees difference for all points is the limit\*\***

Generated Wind Direction 0-360 (Up)	Generated Wind Direction 360-0 (Down)	Indicated Wind Direction 0-360 (Up)	Indicated Wind Direction 360-0 (Down)	Degrees Difference 0-360 (Up)	Degrees Difference 360-0 (Down)	Average Absolute Degrees Difference
0	355	1	355	1.0	-0.1	0.6
30	330	31	331	-1.4	-0.9	1.1
60	300	63	301	-3.3	-1.1	2.2
90	270	93	272	-3.2	-1.9	2.5
120	240	123	242	-3.4	-2.0	2.7
150	210	154	212	-3.9	-1.6	2.8
180	180	182	183	-2.4	-2.9	2.7
210	150	212	152	-2.3	-2.2	2.3
240	120	242	124	-1.6	-4.1	2.8
270	90	270	94	-0.3	-3.9	2.1
300	60	300	64	0.0	-4.2	2.1
330	30	330	33	0.0	-2.7	1.4
355	0	355	2	-0.1	1.6	0.9
The audit meets AMD requirements.				Average Absolute Degrees Difference=		2.0

### Comments:

No issues.

**End of Report**

<b>Parameter</b>	<b>Method &amp; Procedure</b>
<b>SULPHUR DIOXIDE (SO<sub>2</sub>)</b>	<b>Bureau Veritas EMS SOP-00209: Ambient Sulphur Monitoring</b>
<b>HYDROGEN SULPHIDE (H<sub>2</sub>S)</b>	<b>Bureau Veritas EMS SOP-00209: Ambient Sulphur Monitoring</b>
<b>TOTAL HYDROCARBONS (THC), METHANE (CH<sub>4</sub>), NON-METHANE(NMHC)</b>	<b>Bureau Veritas EMS SOP-00001: Methane, Non-Methane Hydrocarbon Analyzer Monitoring</b>
<b>OXIDES OF NITROGEN (NO<sub>x</sub>), NITRIC OXIDE (NO) &amp; NITROGEN DIOXIDE (NO<sub>2</sub>)</b>	<b>Bureau Veritas EMS SOP-00213: Ambient NO/NO<sub>2</sub>/NO<sub>x</sub> Monitoring</b>
<b>OZONE (O<sub>3</sub>)</b>	<b>Bureau Veritas EMS SOP-00212: Ambient O<sub>3</sub> Monitoring</b>
<b>PARTICULATE MATTER &lt; 2.5 MICRONS (PM<sub>2.5</sub>)</b>	<b>Bureau Veritas EMS SOP-00010: Thermo Model 5030 SHARP Monitor &amp; EMS SOP-00015: Teledyne API PM Monitor Model T640</b>
<b>WIND SPEED (WS) &amp; WIND DIRECTION (WD)</b>	<b>Bureau Veritas EMS SOP-00013: RM Young Wind Monitor Calibration</b>
<b>RELATIVE HUMIDITY (RH)</b>	<b>Operation Manual</b>
<b>BAROMETRIC PRESSURE (BP)</b>	<b>Operation Manual</b>
<b>AMBIENT TEMPERATURE (AmbTPX)</b>	<b>Operation Manual</b>
<b>STATION TEMPERATURE (StnTPX)</b>	<b>Operation Manual</b>
<b>PRECIPITATION</b>	<b>Bureau Veritas EMS SOP-00242: Precipitation Collector Installation / Maintenance</b>