Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Alberta Environment and Parks (AEP)
Air.Reporting@gov.ab.ca

January 2, 2018

Subject: Annual Report Submission for LICA Cold Lake South Station

Lakeland Industry & Community Association (LICA) is pleased to submit the ambient air monitoring annual report conducted at the Cold Lake South Station in the year of 2016.

The air monitoring program consists of continuous air monitoring, passive sampling, intermittent sampling, including both VOC and PAH sampling program, and VOC canister sampling program. All the air monitoring activities were conducted by contractors.

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Review and Prepared By	Electronic Submission Conducted By
Continuous ambient air	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics
Passive	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics
Intermittent	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Maxxam Analytics
VOC Canister	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable

PM2.5: There were twenty-three 1-Hour exceedances reported between May 5 and May 22, ranging from 81.0 to 307.6 µg/m3. The 1989 AMD, section B Monthly Reports and Appendix B-1, require reporting of "results in excess of Alberta Environment Guidelines". However, the Alberta Environment Guidelines were not available at the time exceedances were recorded. As a result, no 1-Hour exceedances was reported to Alberta Environment.

Notification of Changes Made After Monthly Report Issuance

- Wind Speed Calculated Averages: In the 2016 monthly reports and 2015 annual report, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages for both 2015 and 2016 were derived using vector averaging.

As the LICA Environmental Program Manager and Data & Reporting Specialist, we certify that we 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. We also certify all air data that are required by the AMD to be electronically submitted to Alberta's Ambient Air Quality Data Warehouse have been submitted by the time of this report

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submission, with the exception of electronic submission for the results of passive samples, intermittent samples and VOC canister samples. The results for both intermittent samples and VOC canister samples is scheduled to be submitted by the end of January 2018.

Should you have any questions, please don't hesitate to contact us.

Respectfully,

Michael Bisaga
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AMBIENT AIR MONITORING ANNUAL REPORT

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

COLD LAKE SOUTH CONTINUOUS MONITORING STATION

JOB #: 2833-2016-1-A

JANUARY - DECEMBER
2016

Prepared for:

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION
5107 50 ST.
BONNYVILLE, ALBERTA
T9N 2J5

Attention: MIKE BISAGA

DATE: **December 31, 2017**

Prepared by: Maram Ghaleb
Maram Ghaleb, B.Sc.
Project Manager, Customer Service, Air Services

Reviewed by: Cheri Sinclair
Cheri Sinclair, B.Sc.
Supervisor, Customer Service, Air Services

SUMMARY

In 2016, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the Cold Lake South Continuous Monitoring Station, near Bonnyville, Alberta. The monitoring station provides continuous meteorological measurements and air quality data for non-compliance parameters, as requested by Lakeland Industry & Community Association.

Data presented in this report has undergone the Post-Final Validation Procedures, which include a cursory inspection of annual charts. If errors or omissions in the data are suspected or discovered after the initial submittal of data (monthly report), the post-validation step serves to re-evaluate the affected data. The report certification form is also included in this report to verify that the annual validation review has been completed, as per the Reporting Chapter (Chapter 9) of the Air Monitoring Directive (AMD).

Statistical summaries for monthly mean, maximum and minimum values, as well as comparisons to historical values from 2015 are presented on the following pages.

Any deviations or modifications made to the sampling or analytical methods during the monitoring period are outlined in Section 1.0 Discussion. On this basis, Maxxam is issuing this completed report to Lakeland Industry & Community Association.

Should you have any questions concerning the results or if we can be of further assistance, please contact us at 403-219-3678 or toll-free at 1-800-386-7247.

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1.0 Discussion

This annual validation report consists of data for parameters Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Reduced Sulphur (TRS), Total Hydrocarbon (THC), Oxides of Nitrogen (NOx), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter 2.5 ($PM_{2.5}$), Wind Speed (WS), Relative Humidity (RH) and Ambient Temperature (TPX). It also includes analytical results for the Passive Sampling Program for 2016.

The air monitoring trailer was located at 54°24'50.9"N and Longitude 110°13'58.5"W for the monitoring period.

The monitoring methods and equipment met all AMD requirements.

All monitoring analyzers and meteorological systems, with the exception of TRS in May (82.4%), met the 90% operational uptime requirements during the monitoring period.

All data collected during the monitoring period, with the exception of $PM_{2.5}$, were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.

Notification of Changes Made After Monthly Report Issuance

- **Wind Speed Calculated Averages:** In the 2016 monthly reports and 2015 annual report, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages for both 2015 and 2016 were derived using vector averaging.

The summaries of the monthly maintenance report for the monitoring period are presented below:

SULPHUR DIOXIDE (SO_2)

January	• No issues were identified.
February	• No issues were identified.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. This was incurred as the channel was placed in "Maintenance" mode on March 18 while the sample manifold was being cleaned.
April	• Operational time was 99.2%, equivalent to 6 hours of downtime. These were incurred due maintenance activities and additional quality checks performed on April 19 while replacing the sample pump. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.
May	• No issues were identified.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer did not span correctly during the scheduled daily zero/span check on July 27. A repeat zero/span check was therefore triggered, resulting in one hour of downtime.
August	• Operational time was 98.1%, equivalent to 14 hours of downtime. These were incurred during an annual maintenance event that occurred between August 4 and August 5.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• Operational time was 99.7%, equivalent to 2 hours of downtime. These were incurred due to an as-found response check performed on December 15 prior to replacing a depleted permeation tube.

TOTAL REDUCED SULPHUR (TRS)

January	• No issues were identified.
February	• No issues were identified.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. This was incurred as the channel was placed in "Maintenance" mode on March 18 while the sample manifold was being cleaned.
April	• Operational time was 93.6%, equivalent to 46 hours of downtime. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report. The audit did not meet the AMD, 2016 requirements. Upon investigation, the issue was traced to a contaminated converter and compromised scrubber material. Forty-six hours of downtime were recorded as a result of additional calibrations and corrective actions carried out to address this non-compliance.
May	• Operational time was 82.4%, equivalent to 131 hours of downtime. Maxxam did not report this contravention directly to AEP. At this time Maxxxam and AEP were deliberating the April 2016 AEMERA audit findings regarding this analyzer. • The analyzer failed the external audit conducted by AEMERA on April 26 due to issues with the convertor and scrubber material. Analyzer functionality was restored on May 6 after a successful calibration. One hundred and twenty-eight hours of downtime were recorded as a result of additional calibrations and corrective actions carried out to address this non-compliance. • A scrubber challenge was conducted on May 18 as a follow-up action, resulting in two hours of downtime.
June	• Operational time was 97.8%, equivalent to 16 hours of downtime. • The sample pump was rebuilt on June 3, resulting in six hours of downtime. • Repeat calibrations and quality checks were conducted between June 7 and 11 to assess a biased low span drift. Ten hours of downtime were incurred. • An internal audit was performed on June 21. The audit report was included in the June 2016 monthly report.
July	• Operational time was 99.7%, equivalent to 2 hours of downtime. • The analyzer spanned high on July 8. A repeat span check was performed to assess the analyzer's functionality, incurring one hour of downtime. • The analyzer did not span correctly during the scheduled daily zero/span check on July 27. A repeat zero/span check was therefore triggered, incurring one hour of downtime.
August	• Operational time was 97.6%, equivalent to 18 hours of downtime. These were incurred during an annual maintenance event that occurred between August 4 and August 5.
September	• No issues were identified.
October	• No issues were identified.
November	• Operational time was 99.4%, equivalent to 4 hours of downtime. • Four hours of downtime were recorded on November 9, due to a repeat calibration, performed for quality assurance purposes.
December	• No issues were identified.

TOTAL HYDROCARBONS (THC)

January	• No issues were identified.
February	• Operational time was 99.9%, equivalent to 1 hour of downtime. This was attributed to a repeat zero/span check performed on February 1 for quality assurance purposes.
March	• Operational time was 97.4%, equivalent to 19 hours of downtime. • The internal pump of the analyzer failed on March 3. The pump was replaced and a post-repair calibration was completed. Data was invalidated back to the last valid daily calibration preceding the pump failure which was on March 2. Sixteen hours of data were discarded due to this event. • Two hours of downtime were incurred on March 9 due to an additional zero/span check performed for quality assurance purposes. • The channel was placed in "Maintenance" mode on March 18 while the sample manifold was being cleaned, incurring one hour of downtime.
April	• No issues identified. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.
May	• No issues were identified.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer did not span correctly during the scheduled daily zero/span check on July 27. A repeat zero/span check was therefore triggered, incurring one hour of downtime.
August	• Operational time was 99.1%, equivalent to 7 hours of downtime. • Three hours of downtime were incurred during an annual maintenance event that occurred on August 5. • Four hours of downtime were recorded due to an additional calibration performed on August 22 to correct a zero drift trend.
September	• No issues were identified.
October	• Operational time was 97.7%, equivalent to 17 hours of downtime. • A repeat calibration was performed on October 18 to address a biased low span drift. Four hours of downtime were attributed to this event. • The analyzer began recording lower than historical concentrations on October 20 due to a damaged sample pump. The sample pump was rebuilt followed by a successful post-repair calibration on the same day. Thirteen hours of downtime were recorded due to this event.
November	• No issues were identified.
December	• Operational time was 96.2%, equivalent to 28 hours of downtime. Between December 6 and 19 maintenance, span checks and repeat calibrations were performed due to a malfunction of the zero air generator. Minute data corresponding to the malfunction were discarded and the hourly averages were re-calculated. In cases where more than 25% of the minute data were impacted, that hourly average was invalidated.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

January	• No issues were identified.
February	• No issues were identified.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. This was incurred as the channel was placed in "Maintenance" mode on March 18 while the sample manifold was being cleaned.
April	• No issues were identified. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.
May	• No issues were identified.
June	• Operational time was 99.3%, equivalent to 5 hours of downtime. • One hour of downtime was incurred on June 3 due to a repeat zero/span check performed for quality assurance purposes. • Four hours of downtime were incurred on June 21 as the analyzer was placed in "maintenance" mode for a calibrator cross check.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer did not span correctly during the scheduled daily zero/span check on July 27. A repeat zero/span check was therefore triggered, resulting in one hour of downtime.
August	• No issues were identified. • Annual maintenance was conducted between August 4 and August 5. This did not impact operational time on the NO_X channels .
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

OZONE (O_3)

January	• No issues were identified.
February	• No issues were identified.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. This was incurred as the channel was placed in "Maintenance" mode on March 18 while the sample manifold was being cleaned.
April	• No issues were identified. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.
May	• Operational time was 99.2%, equivalent to 6 hours of downtime. • Following a shut-down calibration on May 18, the analyzer's screen was replaced in accordance with recommendations from the AEMERA audit. A post-repair calibration was completed afterwards. Six hours of downtime were recorded due to this event.
June	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The pump of the zero/span system was rebuilt on June 3. A zero/span check was performed afterwards and expected span value was adjusted. One hour of downtime was recorded due to this event.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer did not span correctly during the scheduled daily zero/span check on July 27. A repeat zero/span check was subsequently triggered, resulting in one hour of downtime.
August	• Operational time was 99.3%, equivalent to 5 hours of downtime. These were incurred during an annual maintenance event that occurred on August 5.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$)

January	• Operational time was 98.4%, equivalent to 12 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
February	• Operational time was 92.5%, equivalent to 52 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
March	• Operational time was 93.1%, equivalent to 51 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
April	• Operational time was 93.6%, equivalent to 46 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid. • An external audit was conducted by AEMERA on April 26. The audit report was included in the April 2016 monthly report.
May	• Operational time was 94.1%, equivalent to 44 hours of downtime. • The Teom unit started recording negative data on May 23. An extra audit check was performed on May 24. The Teom unit passed the audit requirements. Three hours of downtime were incurred due to this event. • Eight hours of downtime were incurred while the Teom unit was recovering after audits conducted on May 20 and 24. • Thirty-two hours of downtime were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid. • There were twenty-three 1-Hr exceedances reported between May 5 and May 22, ranging from 81.0 to 307.6 µg/m^3. At this time, Maxxam was not relaying AAAQO Table 2 Guideline exceedances on behalf of LICA. • There were five 24-Hr exceedances recorded between May 5 and May 22, ranging from 30.6 to 87.6 µg/m^3. These were reported to AEP under reference numbers 311085, 311497, 311684, 311733 and 311756.
June	• Operational time was 92.9%, equivalent to 51 hours of downtime. • On June 3 routine maintenance was performed on the TEOM unit resulting in one hour of downtime. • Fifty hours of downtime were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
July	• Operational time was 96.1%, equivalent to 29 hours of downtime. • During annual maintenance on July 26, an unsuccessful leak check led to a series of troubleshooting and maintenance activities, resulting in twenty-three hours of downtime. • Six hours of downtime were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
August	• Operational time was 97.0%, equivalent to 22 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
September	• Operational time was 94.3%, equivalent to 41 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.

October	• Operational time was 95.8%, equivalent to 31 hour of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
November	• Operational time was 99.4%, equivalent to 4 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.
December	• Operational time was 95.8%, equivalent to 31 hours of downtime. These were incurred as the data were recorded at concentrations less than –3 µg/m^3, rendering it invalid.

WIND SPEED (WS)
• No issues were identified this year

RELATIVE HUMIDITY (RH)
• No issues were identified this year

AMBIENT TEMPERATURE (TPX)
• No issues were identified this year

2.0 Project Personnel

Mike Bisaga was the contact for Lakeland Industry & Community Association, and the Maxxam field sampling team consisted of Alexander Yakupov and Limin Li.

3.0 Plant Monthly Required AMD Summary

All data collected during the monitoring period were within the objectives as outlined in the AAAQOs.

All monitoring analyzers and meteorological systems, with the exception of TRS in May (82.4%), met the 90% operational uptime requirements during the monitoring period.

4.0 Calculations and Results

All calculations and reporting of results follow the method described in the Air Monitoring Directive, 1989, 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) as well as AMD 2015 and 2016.

5.0 Methods and Procedures

The following methods and procedures were used to complete the test program:

Met One Instruments: Operation Manual Document No. 50.5-9800
Maxxam AIR SOP-00209: Ambient Sulphur Monitoring
Maxxam AIR SOP-00212: Ambient O_3 Monitoring
Maxxam AIR SOP-00213: Ambient NO/NO_2/NOx Monitoring
Maxxam AIR SOP-00214: Ambient Hydrocarbon (THC) Monitoring
Maxxam AIR SOP-00215: Teom Operation
Maxxam PTC SOP-00151: Mass Determination of Particulate Matter ($PM_{2.5}$ and PM_{10})

There were no deviations from the prescribed methods.

The following instruments were used to perform the test program:

Sulphur Dioxide - Thermo 43i UV Flourescent Analyzer
Total Reduced Sulphur - Thermo 450i UV Flourescent Analyzer
Total Hydrocarbons - Thermo 51C and FID Analyzer
Oxides of Nitrogen - Thermo 42i Chemiluminescent Analyzer
Ozone - Thermo 49i Photometric Analyzer
Particulate Matter (PM2.5) - R&P 1405F Teom Unit
Wind System - Met One Unit
Relative Humidity - Met One Unit
Ambient Temperature - Met One Unit
Partisol - R&P 2000H Unit
Datalogger - ESC 8832

APPENDIX I
CONTINUOUS MONITORING DATA RESULTS

SULPHUR DIOXIDE

SULPHUR DIOXIDE (SO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB SO_2)						OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 20	20 < C ≤ 60	60 < C ≤ 110	110 < C ≤ 170	170 < C ≤ 340	> 340	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0
February	662	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
March	706	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
April	675	99.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
May	709	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
June	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
July	706	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
August	689	98.1	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
September	684	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
October	709	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
November	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
December	705	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.3
											ANNUAL AVERAGE		0.1

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

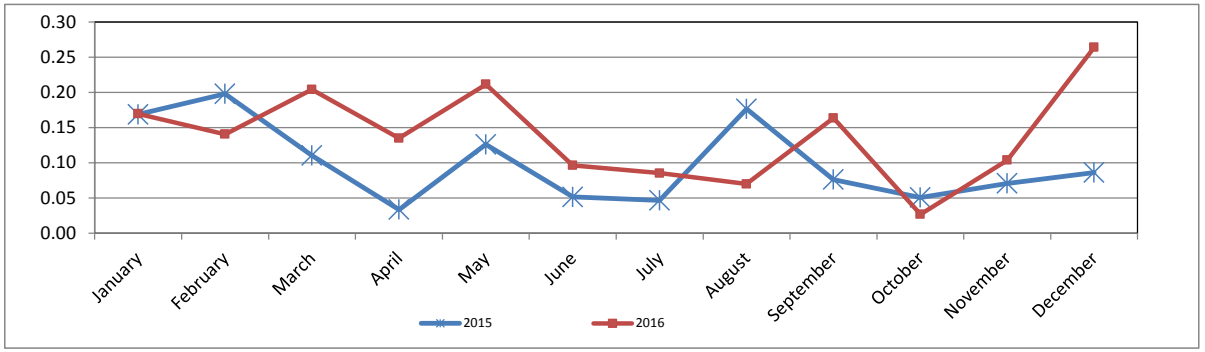
Alberta Ambient Air Quality Objectives Annual Average**	8.0	PPB
Annual Average for 2016	0.1	PPB

SULPHUR DIOXIDE (SO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

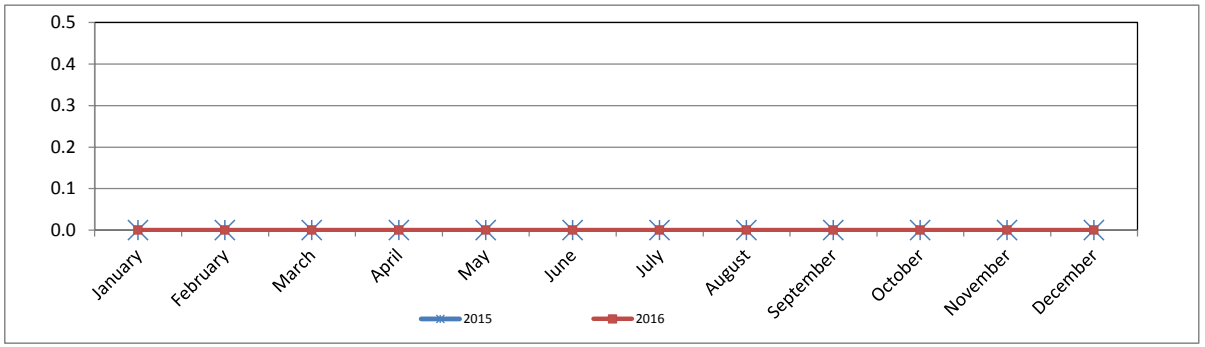
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0**	0	4	0	0	1	0
February	0	0	3	0.1	0.0	1.6	0.1
March	0	0	4	0.2	0.0	2.4	-0.1
April	0	0	1	0.1	0.0	2.1	-0.1
May	0	0	**5**	0.2	0.0	**2.5**	-0.1
June	0	0	1	0.1	0.0	1.1	0.0
July	0	0	2	0.1	0.0	1.1	0.0
August	0	0	3	0.1	0.0	0.7	0.1
September	0	0	2	0.2	0.0	1.1	-0.1
October	0	0	2	0.0	0.0	0.3	0.0
November	0	0	2	0.1	0.0	1.0	0.0
December	0	0	3	**0.3**	0.0	2.4	-0.2

*Annual peak is bolded and highlighted.

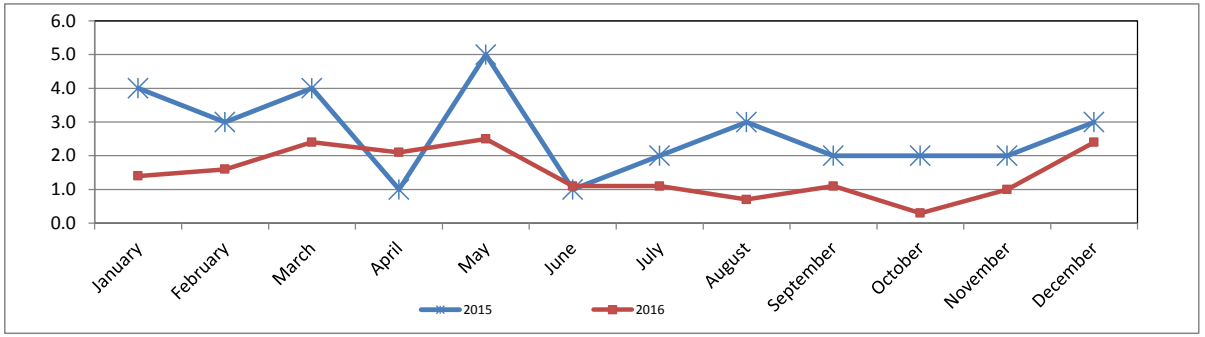
SULPHUR DIOXIDE (SO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



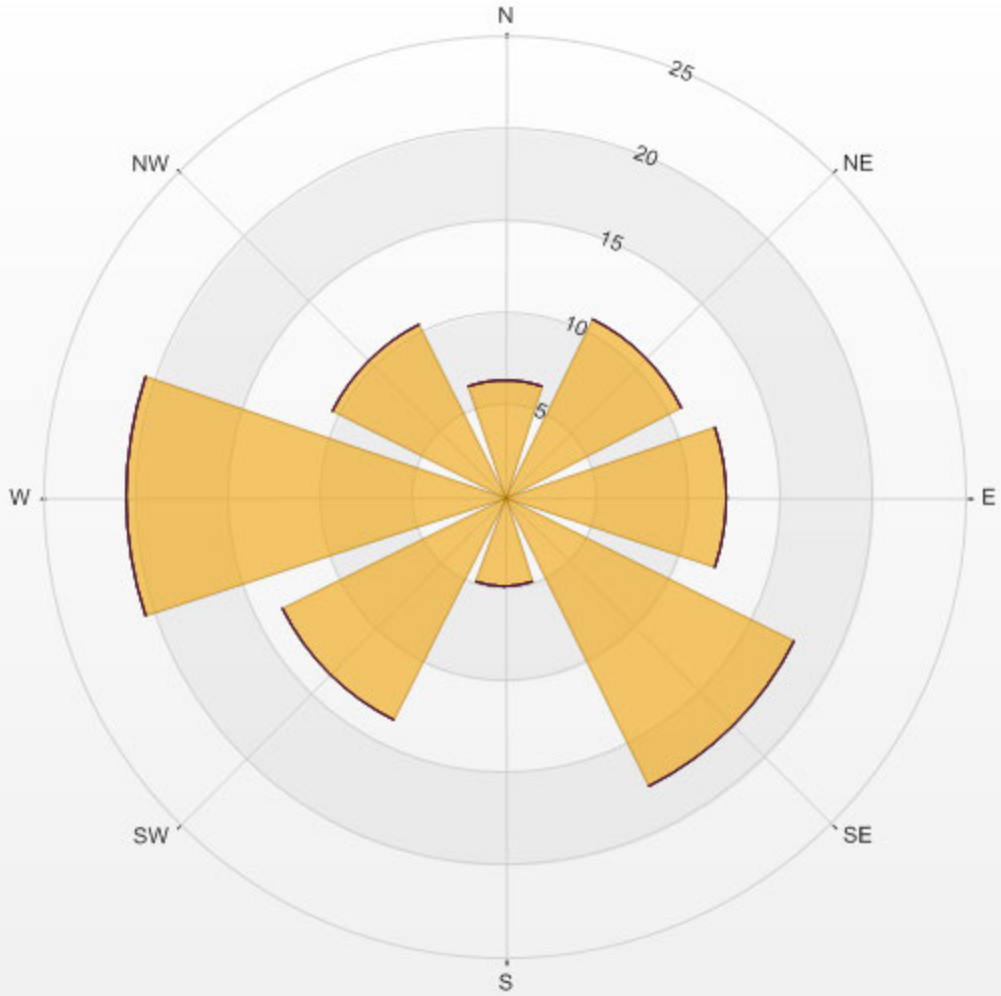
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-SO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose Direction:
Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.85% Calm Avg: 0.08 [ppb]

Direction	0-20	20-60	60-110	110-170	170-340	>340.0	Total
N	6.4	0.0	0.0	0.0	0.0	0.0	6.4
NE	10.7	0.0	0.0	0.0	0.0	0.0	10.7
E	12.0	0.0	0.0	0.0	0.0	0.0	12.0
SE	17.6	0.0	0.0	0.0	0.0	0.0	17.6
S	4.9	0.0	0.0	0.0	0.0	0.0	4.9
SW	13.5	0.0	0.0	0.0	0.0	0.0	13.5
W	20.5	0.0	0.0	0.0	0.0	0.0	20.5
NW	10.5	0.0	0.0	0.0	0.0	0.0	10.5
Summary	96.2	0.0	0.0	0.0	0.0	0.0	96.2

% Icon Classes (ppb)	96 0-20	0 20-60	0 60-110	0 110-170	0 170-340	0 >340.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-SO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.85% Calm Poll Avg: 0.08[ppb]



TOTAL REDUCED SULPHUR

TOTAL REDUCED SULPHUR (TRS) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB TRS)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 3	4 < C ≤ 10	11 < C ≤ 50	> 50	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
February	662	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
March	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
April	636	93.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
May	579	82.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
June	667	97.8	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
July	704	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
August	686	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
September	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
October	709	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
November	681	99.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
December	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
									ANNUAL AVERAGE		0.2

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

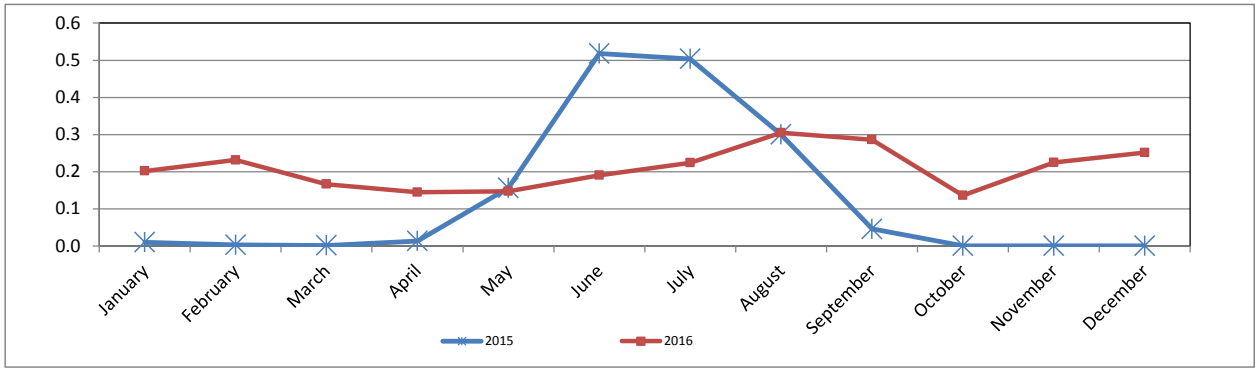
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.2	PPB

TOTAL REDUCED SULPHUR (TRS) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

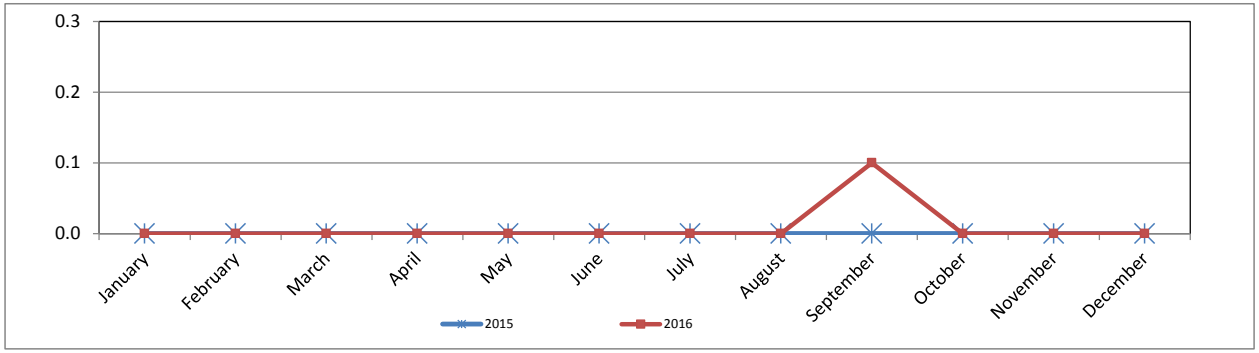
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	0	0	1	0	0	1	0
February	0	0	1	0.2	0.0	0.4	-0.2
March	0	0	1	0.2	0.0	0.7	-0.2
April	0	0	1	0.1	0.0	0.7	-0.1
May	0	0	3	0.1	0.0	1.0	0.0
June	**1**	0	4	0.2	0.0	1.4	0.3
July	1	0	**14**	0.2	0.0	1.9	0.3
August	0	0	7	**0.3**	0.0	**2.8**	0.0
September	0	0	7	0.3	0.1	1.0	-0.2
October	0	0	0	0.1	0.0	0.5	-0.1
November	0	0	0	0.2	0.0	0.5	-0.2
December	0	0	0	0.3	0.0	0.6	-0.3

*Annual peak is bolded and highlighted.

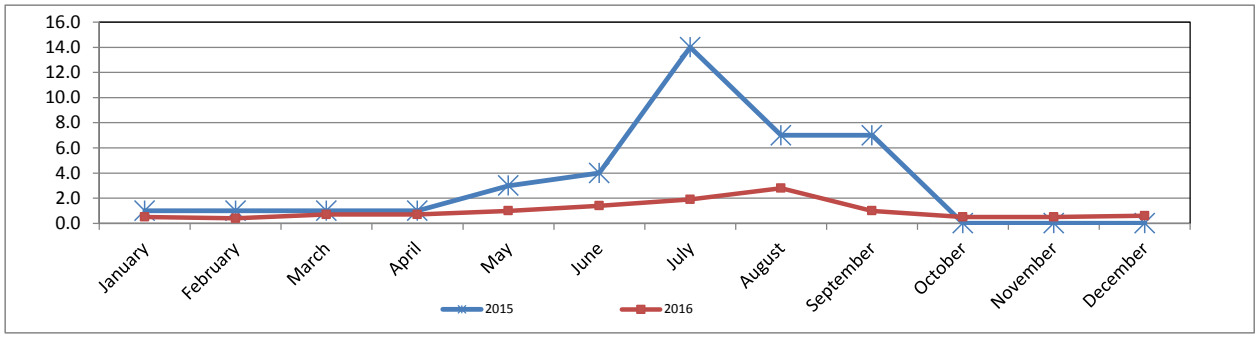
TOTAL REDUCED SULPHUR (TRS) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



TOTAL REDUCED SULPHUR (TRS) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



TOTAL REDUCED SULPHUR (TRS) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



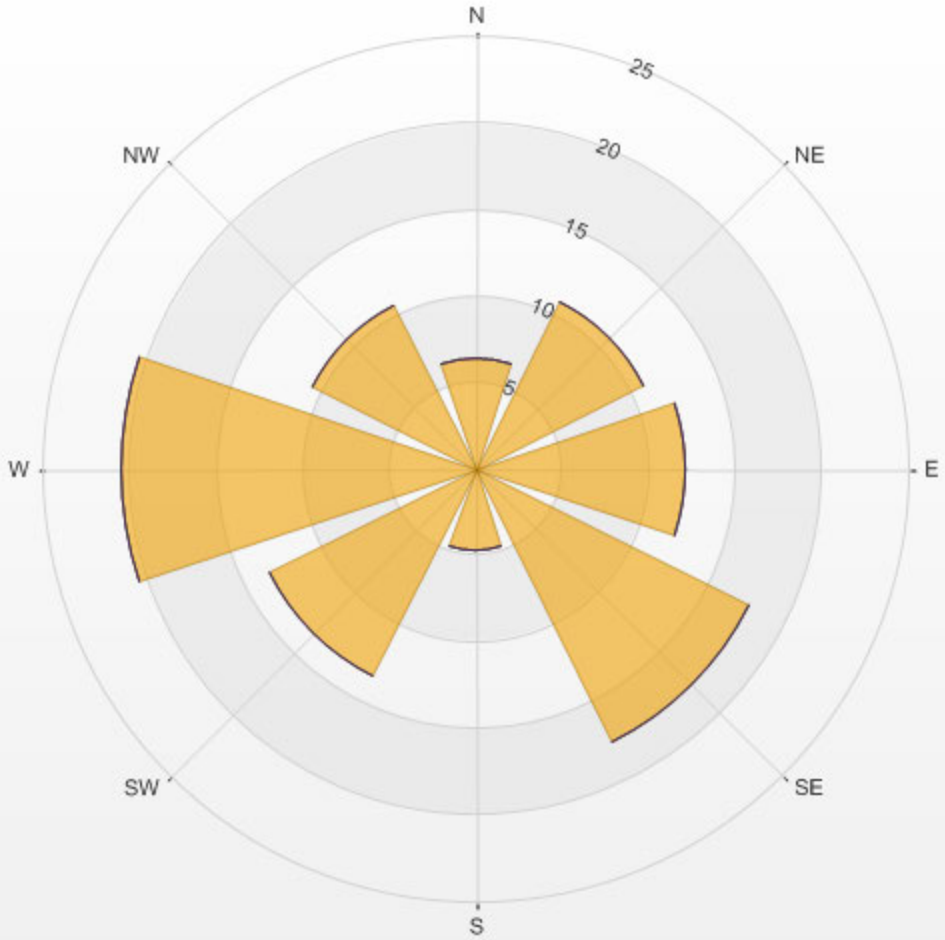
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-TRS[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.79% Calm Avg: 0.26 [ppb]

Direction	0-3	3-10	10-50	>50.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.8	0.0	0.0	0.0	10.8
E	12.1	0.0	0.0	0.0	12.1
SE	17.7	0.0	0.0	0.0	17.7
S	4.7	0.0	0.0	0.0	4.7
SW	13.4	0.0	0.0	0.0	13.4
W	20.6	0.0	0.0	0.0	20.6
NW	10.5	0.0	0.0	0.0	10.5
Summary	96.2	0.0	0.0	0.0	96.2

% Icon Classes (ppb)	96 0-3	0 3-10	0 10-50	0 >50.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-TRS[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.79% Calm Poll Avg: 0.26[ppb]



TOTAL HYDROCARBON

TOTAL HYDROCARBONS (THC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM THC)				OBJECTIVES** (PPM)		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	93.8%	6.2%	0.0%	0.0%	-	-	-	-	2.4
February	661	99.9	99.1%	0.9%	0.0%	0.0%	-	-	-	-	2.24
March	688	97.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.18
April	682	100.0	99.9%	0.1%	0.0%	0.0%	-	-	-	-	2.12
May	707	100.0	99.9%	0.1%	0.0%	0.0%	-	-	-	-	2.03
June	686	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.05
July	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.11
August	698	99.1	99.3%	0.7%	0.0%	0.0%	-	-	-	-	2.15
September	685	100.0	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.12
October	693	97.7	99.7%	0.3%	0.0%	0.0%	-	-	-	-	2.12
November	685	100.0	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.24
December	678	96.2	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.19
									ANNUAL AVERAGE		2.16

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

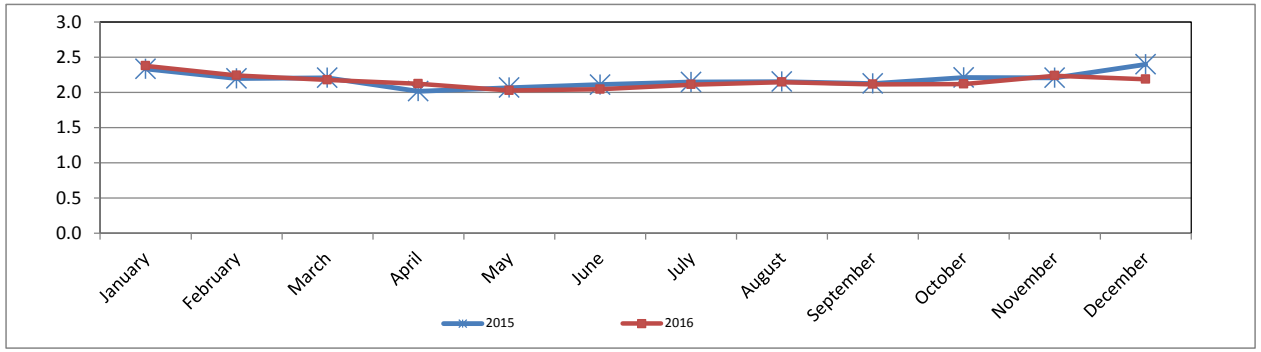
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.16	PPM

TOTAL HYDROCARBONS (THC) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

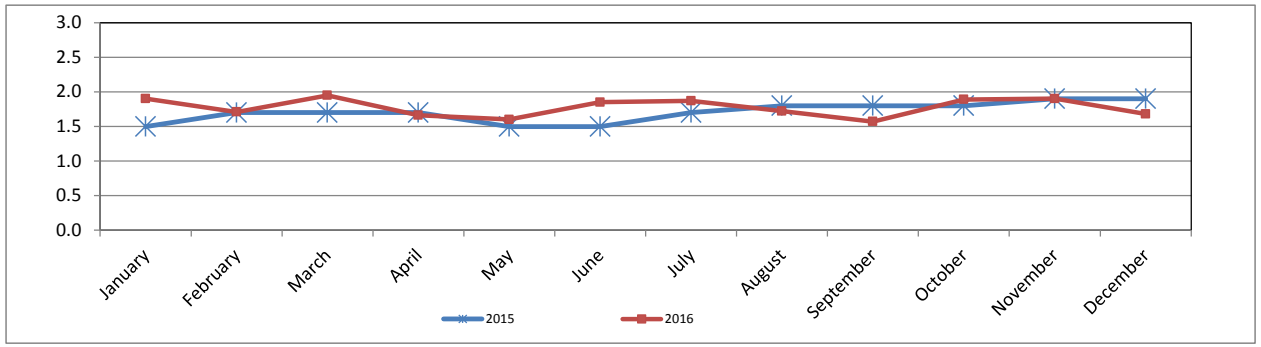
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	2.3	1.5	3.9	**2.4**	1.9	**4.7**	0.0
February	2.2	1.7	3.4	2.24	1.71	3.41	-0.04
March	2.2	1.7	**4.6**	2.18	1.95	2.81	0.03
April	2.0	1.7	2.8	2.12	1.66	3.15	-0.11
May	2.1	1.5	3.0	2.03	1.60	3.07	0.04
June	2.1	1.5	3.2	2.05	1.85	2.83	0.07
July	2.1	1.7	3.2	2.11	1.87	2.82	0.04
August	2.2	1.8	3.2	2.15	1.72	3.20	0.01
September	2.1	1.8	3.5	2.12	1.57	3.10	0.01
October	2.2	1.8	4.3	2.12	1.89	3.08	0.09
November	2.2	1.9	3.2	2.24	1.90	3.12	-0.03
December	**2.4**	1.9	4.3	2.19	1.68	3.17	0.21

*Annual peak is bolded and highlighted.

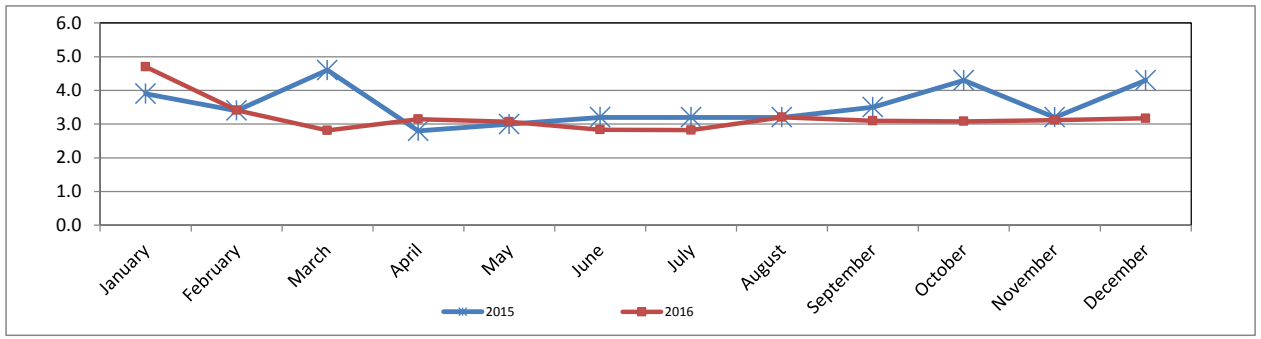
TOTAL HYDROCARBONS (THC) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM



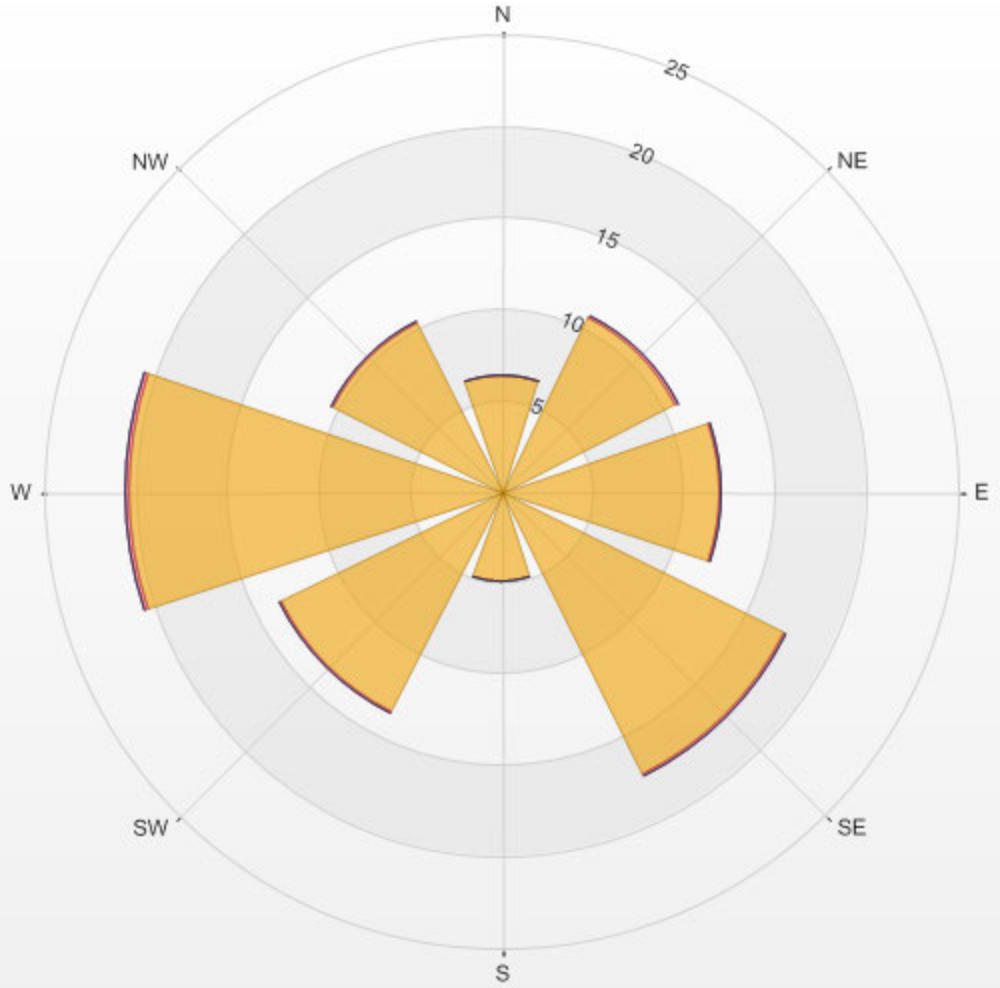
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-THC[ppm]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.87% Calm Avg: 2.43 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.6	0.2	0.0	0.0	10.8
E	11.9	0.1	0.0	0.0	12.0
SE	17.3	0.0	0.0	0.0	17.4
S	4.9	0.0	0.0	0.0	5.0
SW	13.5	0.1	0.0	0.0	13.6
W	20.4	0.2	0.0	0.0	20.6
NW	10.3	0.1	0.0	0.0	10.4
Summary	95.4	0.8	0.0	0.0	96.1

%	Icon	Classes (ppm)	95	0-3	1	3-10	0	10-50	0	>50.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-THC[ppm] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.87% Calm Poll Avg: 2.43[ppm]



OXIDES OF NITROGEN

OXIDES OF NITROGEN (NO_x) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NOx)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	707	100.0	98.2%	1.8%	0.0%	0.0%	-	-	-	-	10.3
February	660	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	6.7
March	705	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.9
April	680	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.7
May	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.6
June	680	99.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.3
July	702	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.2
August	703	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.5
September	682	100.0	99.9%	0.1%	0.0%	0.0%	-	-	-	-	3.7
October	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.4
November	683	100.0	99.1%	0.9%	0.0%	0.0%	-	-	-	-	7.1
December	705	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	5.3
									ANNUAL AVERAGE		4.5

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

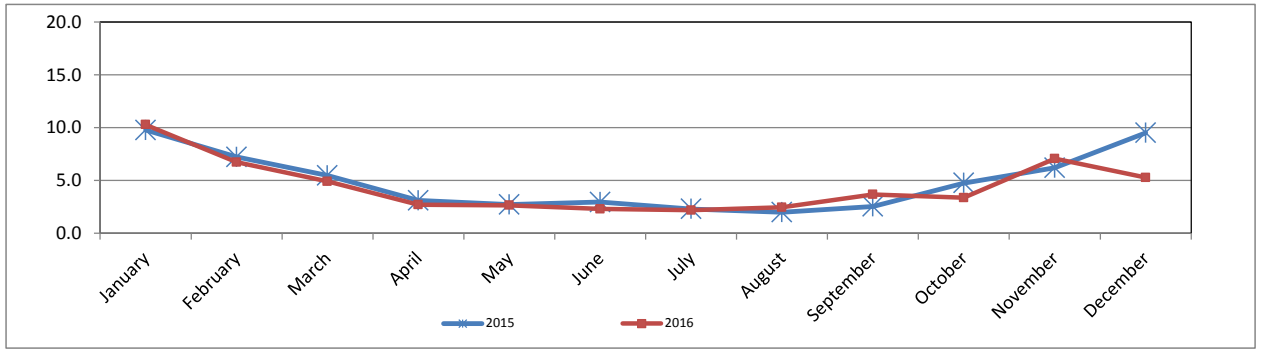
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	4.5	PPB

OXIDES OF NITROGEN (NO_x) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

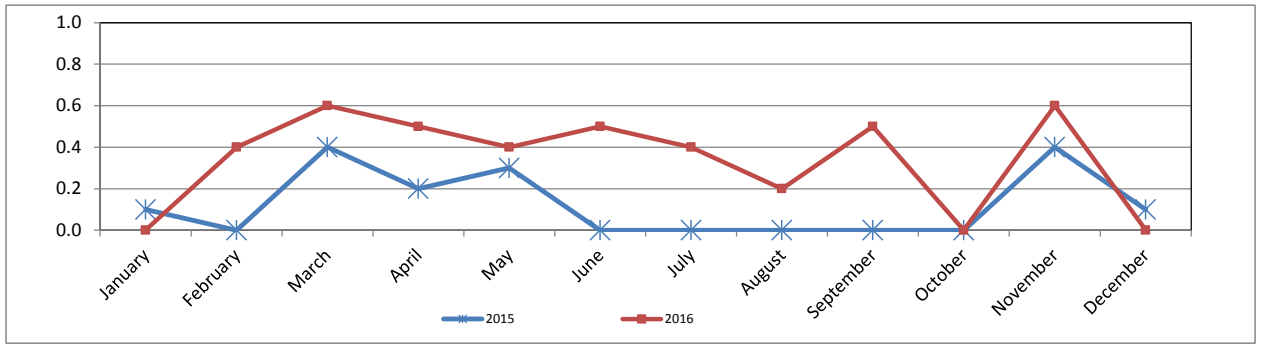
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**9.8**	0.1	78.0	**10.3**	0.0	**83.0**	-0.5
February	7.2	0.0	**103.4**	6.7	0.4	71.8	0.5
March	5.5	0.4	65.2	4.9	0.6	37.0	0.6
April	3.1	0.2	35.7	2.7	0.5	31.1	0.4
May	2.7	0.3	22.5	2.6	0.4	26.8	0.1
June	3.0	0.0	15.2	2.3	0.5	12.5	0.7
July	2.3	0.0	14.9	2.2	0.4	11.2	0.1
August	2.0	0.0	12.6	2.5	0.2	17.6	-0.5
September	2.5	0.0	40.9	3.7	0.5	60.4	-1.1
October	4.8	0.0	61.1	3.4	0.0	39.1	1.4
November	6.2	0.4	35.4	7.1	0.6	66.4	-0.9
December	9.5	0.1	65.3	5.3	0.0	36.0	4.2

*Annual peak is bolded and highlighted.

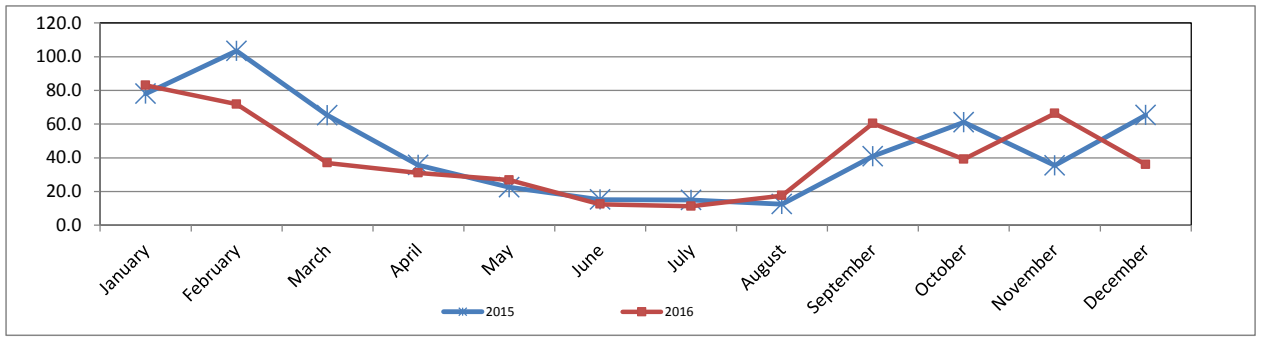
OXIDES OF NITROGEN (NO_x) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OXIDES OF NITROGEN (NO_x) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OXIDES OF NITROGEN (NO_x) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



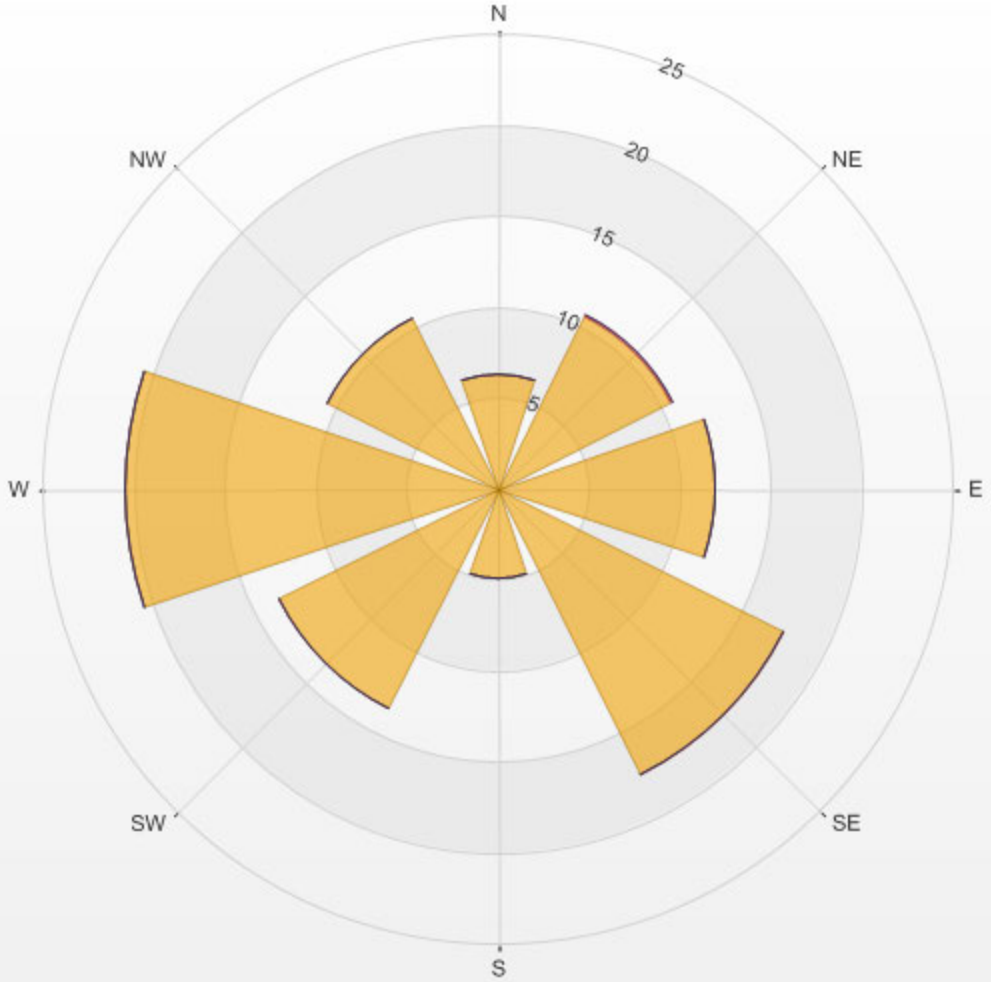
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-NOX[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.87% Calm Avg: 9.25 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.6	0.1	0.0	0.0	10.7
E	12.0	0.0	0.0	0.0	12.0
SE	17.6	0.0	0.0	0.0	17.6
S	4.9	0.0	0.0	0.0	4.9
SW	13.5	0.0	0.0	0.0	13.5
W	20.5	0.0	0.0	0.0	20.5
NW	10.5	0.0	0.0	0.0	10.5
Summary	95.9	0.2	0.0	0.0	96.1

% Icon Classes (ppb)	96 0-50	0 50-110	0 110-210	0 >210.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-NOX[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.87% Calm Poll Avg: 9.25[ppb]



NITRIC OXIDES

NITRIC OXIDE (NO) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	707	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	3.1
February	660	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.1
March	705	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
April	680	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
May	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
June	680	99.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
July	702	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.3
August	703	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.6
September	682	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.0
October	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.9
November	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.3
December	705	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.6
									ANNUAL AVERAGE		1.0

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

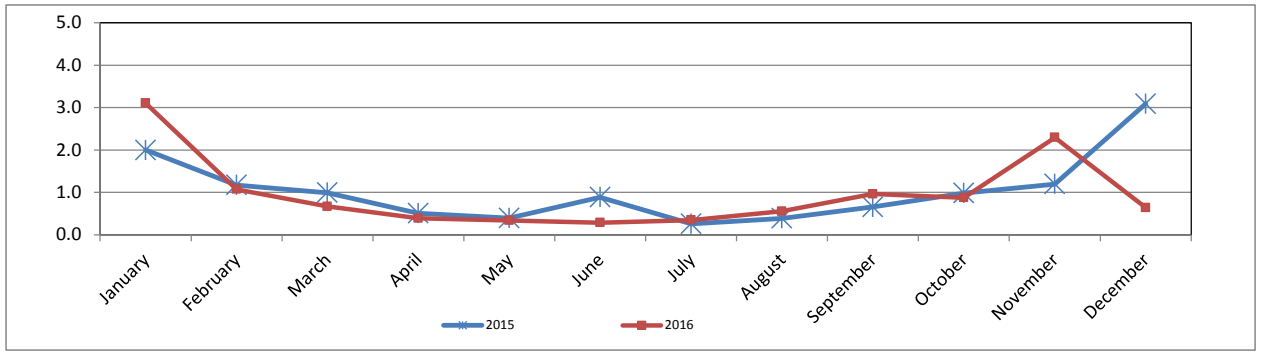
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	1.0	PPB

NITRIC OXIDE (NO) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

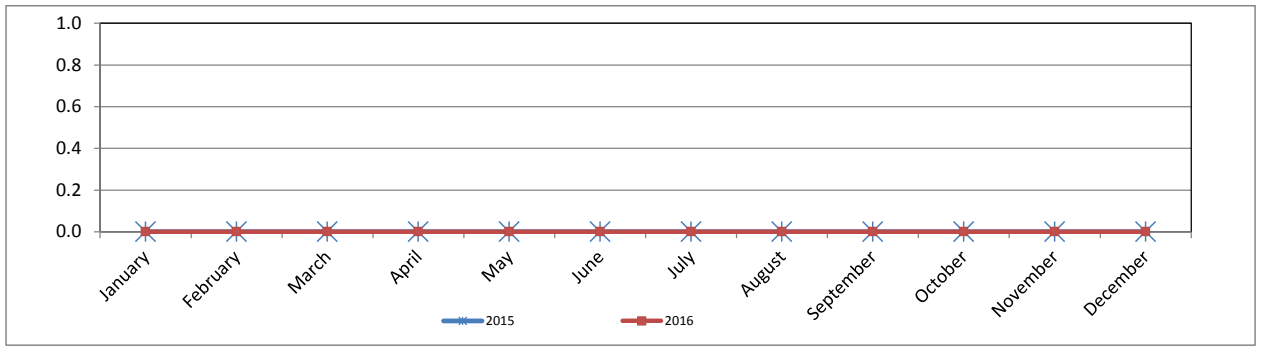
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	2.0	0.0	52.8	**3.1**	0.0	**59.3**	-1.1
February	1.2	0.0	**68.9**	1.1	0.0	45.9	0.1
March	1.0	0.0	35.8	0.7	0.0	14.7	0.3
April	0.5	0.0	19.3	0.4	0.0	14.5	0.1
May	0.4	0.0	10.9	0.3	0.0	10.2	0.1
June	0.9	0.0	11.4	0.3	0.0	4.2	0.6
July	0.3	0.0	8.3	0.3	0.0	6.9	-0.1
August	0.4	0.0	8.7	0.6	0.0	10.9	-0.2
September	0.7	0.0	28.1	1.0	0.0	48.2	-0.3
October	1.0	0.0	47.4	0.9	0.0	26.2	0.1
November	1.2	0.0	22.1	2.3	0.0	48.1	-1.1
December	**3.1**	0.0	39.8	0.6	0.0	11.7	2.4

*Annual peak is bolded and highlighted.

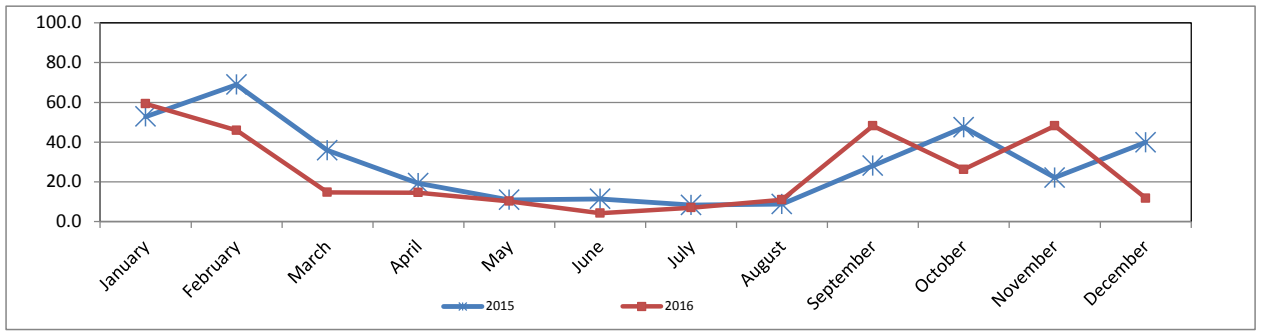
NITRIC OXIDE (NO) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITRIC OXIDE (NO) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



NITRIC OXIDE (NO) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



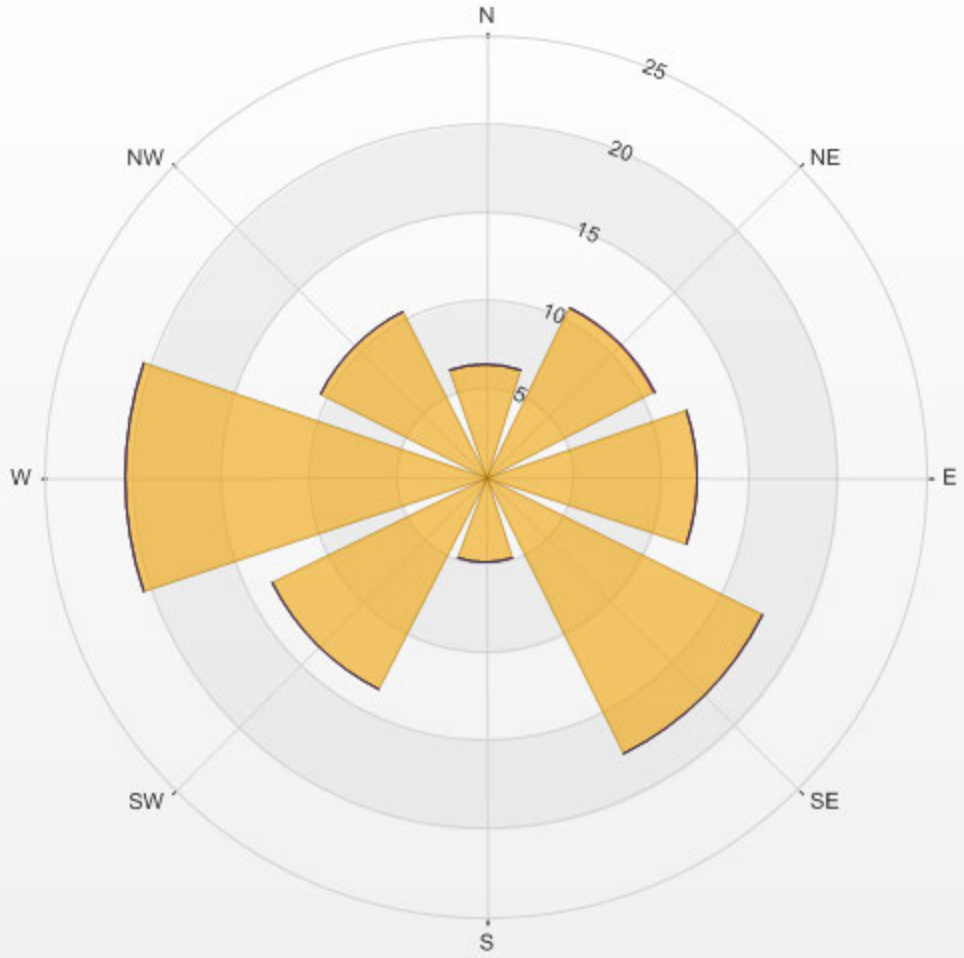
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-NO[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.87% Calm Avg: 3.03 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.7	0.0	0.0	0.0	10.7
E	12.0	0.0	0.0	0.0	12.0
SE	17.6	0.0	0.0	0.0	17.6
S	4.9	0.0	0.0	0.0	4.9
SW	13.5	0.0	0.0	0.0	13.5
W	20.5	0.0	0.0	0.0	20.5
NW	10.5	0.0	0.0	0.0	10.5
Summary	96.1	0.0	0.0	0.0	96.1

% Icon Classes (ppb)	96 0-50	0 50-110	0 110-210	0 >210.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-NO[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.87% Calm Poll Avg: 3.03[ppb]



NITROGEN DIOXIDE

NITROGEN DIOXIDE (NO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO_2)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	707	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	7.2
February	660	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	5.7
March	705	99.9	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.2
April	680	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.3
May	707	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.3
June	680	99.3	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.0
July	702	99.9	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.8
August	703	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.9
September	682	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.7
October	707	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.5
November	683	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.8
December	705	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.6
									ANNUAL AVERAGE		3.5

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

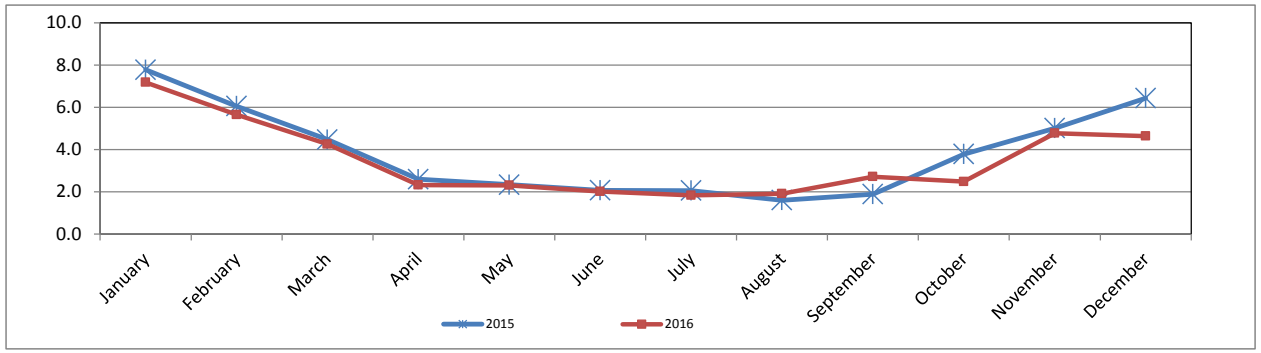
Alberta Ambient Air Quality Objectives Annual Average**	24.0	PPB
Annual Average for 2016	3.5	PPB

NITROGEN DIOXIDE (NO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

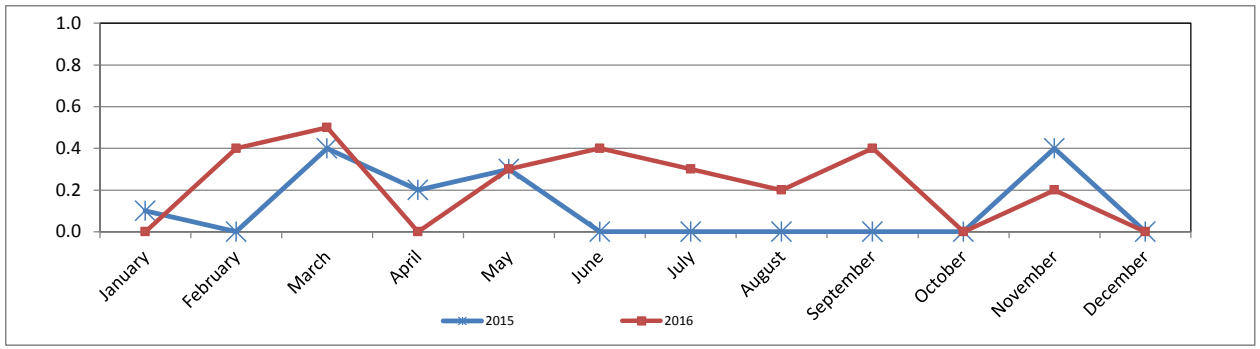
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**7.8**	0.1	33.3	**7.2**	0.0	30.3	0.6
February	6.1	0.0	**34.5**	5.7	0.4	26.4	0.4
March	4.5	0.4	29.4	4.2	0.5	29.9	0.2
April	2.6	0.2	17.6	2.3	0.0	16.6	0.3
May	2.3	0.3	15.4	2.3	0.3	16.7	0.0
June	2.1	0.0	7.2	2.0	0.4	8.4	0.1
July	2.1	0.0	9.4	1.8	0.3	7.2	0.2
August	1.6	0.0	6.6	1.9	0.2	8.9	-0.3
September	1.9	0.0	12.8	2.7	0.4	16.4	-0.8
October	3.8	0.0	17.1	2.5	0.0	13.0	1.3
November	5.0	0.4	21.6	4.8	0.2	21.4	0.2
December	6.4	0.0	26.9	4.6	0.0	**30.9**	1.8

*Annual peak is bolded and highlighted.

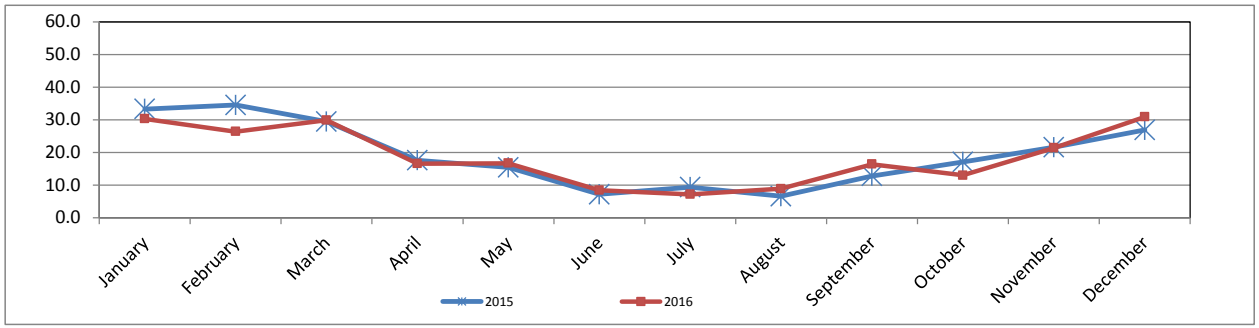
NITROGEN DIOXIDE (NO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



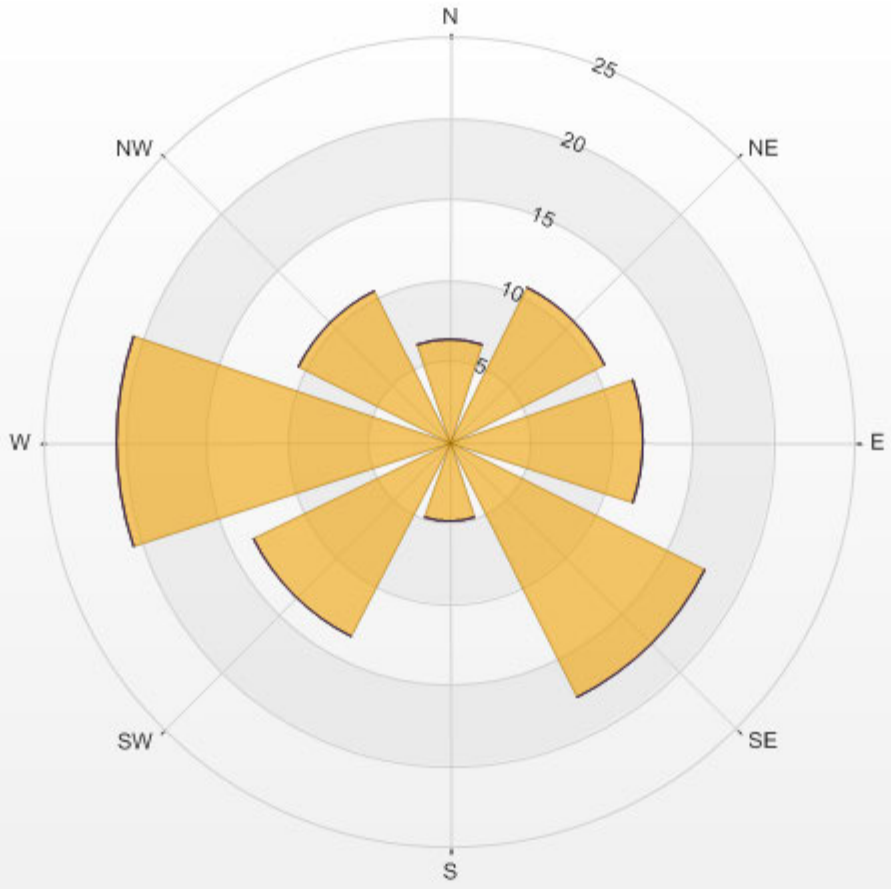
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-NO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.87% Calm Avg: 6.22 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.7	0.0	0.0	0.0	10.7
E	12.0	0.0	0.0	0.0	12.0
SE	17.6	0.0	0.0	0.0	17.6
S	4.9	0.0	0.0	0.0	4.9
SW	13.5	0.0	0.0	0.0	13.5
W	20.5	0.0	0.0	0.0	20.5
NW	10.5	0.0	0.0	0.0	10.5
Summary	96.1	0.0	0.0	0.0	96.1

% Icon Classes (ppb)	96 0-50	0 50-110	0 110-210	0 >210.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-NO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.87% Calm Poll Avg: 6.22[ppb]



OZONE

OZONE (O_3) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB O_3)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	21
February	663	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	26.4
March	706	99.9	99.6%	0.4%	0.0%	0.0%	82	-	0	-	31.4
April	682	100.0	96.3%	3.7%	0.0%	0.0%	82	-	0	-	34.3
May	700	99.2	92.9%	7.1%	0.0%	0.0%	82	-	0	-	29.0
June	685	99.9	95.5%	4.5%	0.0%	0.0%	82	-	0	-	29.4
July	706	99.9	100.0%	0.0%	0.0%	0.0%	82	-	0	-	21.5
August	700	99.3	100.0%	0.0%	0.0%	0.0%	82	-	0	-	16.7
September	685	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	16.6
October	708	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	17.0
November	685	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	16.1
December	705	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	24.6
									ANNUAL AVERAGE		23.7

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

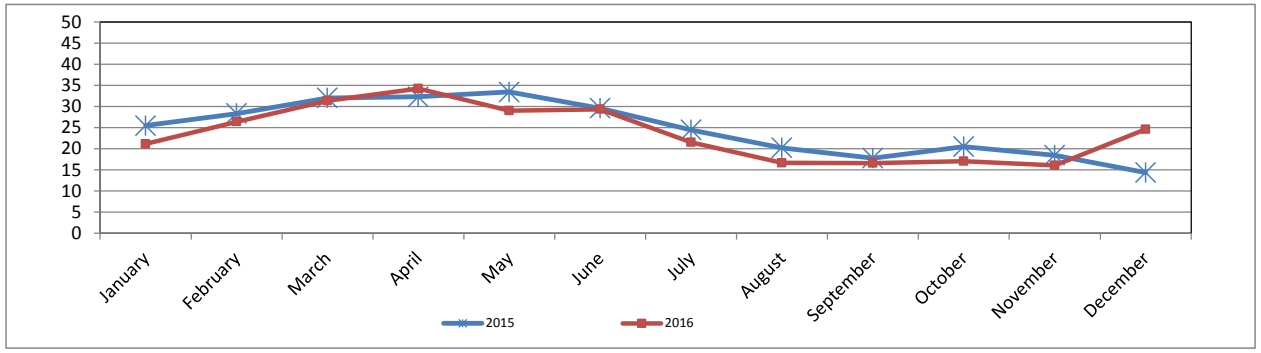
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	23.7	PPB

OZONE (O_3) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

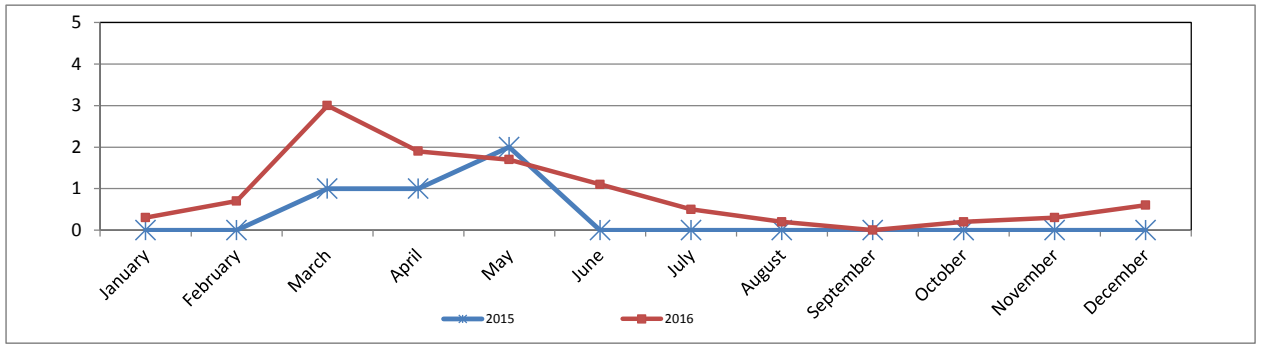
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	25	0	43	21	0	41	4
February	28	0	44	26.4	0.7	44.8	1.9
March	32	1	50	31.4	3.0	51.1	0.7
April	32	1	52	**34.3**	1.9	54.4	-2.0
May	**33**	2	**65**	29.0	1.7	58.1	4.4
June	30	0	65	29.4	1.1	**63.7**	0.3
July	24	0	56	21.5	0.5	47.9	2.9
August	20	0	58	16.7	0.2	42.4	3.5
September	18	0	41	16.6	0.0	48.5	1.2
October	21	0	41	17.0	0.2	36.7	3.5
November	18	0	39	16.1	0.3	36.7	2.4
December	14	0	34	24.6	0.6	38.9	-10.3

*Annual peak is bolded and highlighted.

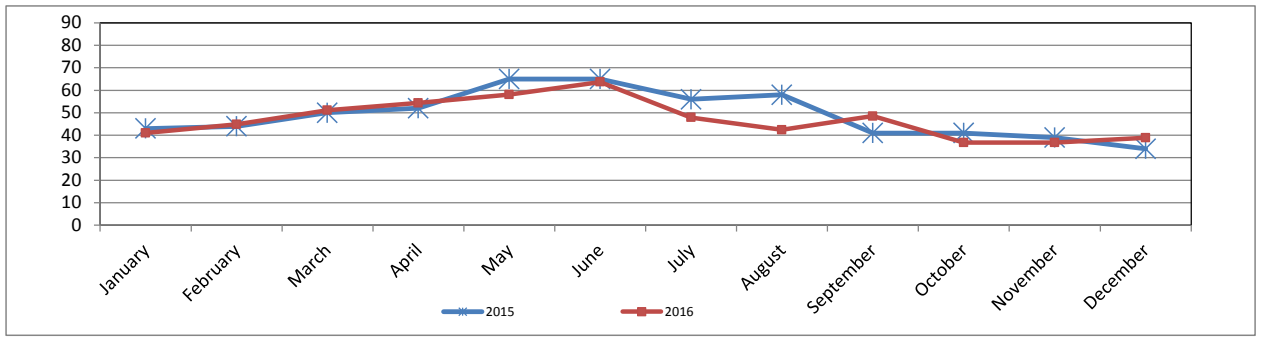
OZONE (O_3) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OZONE (O_3) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OZONE (O_3) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



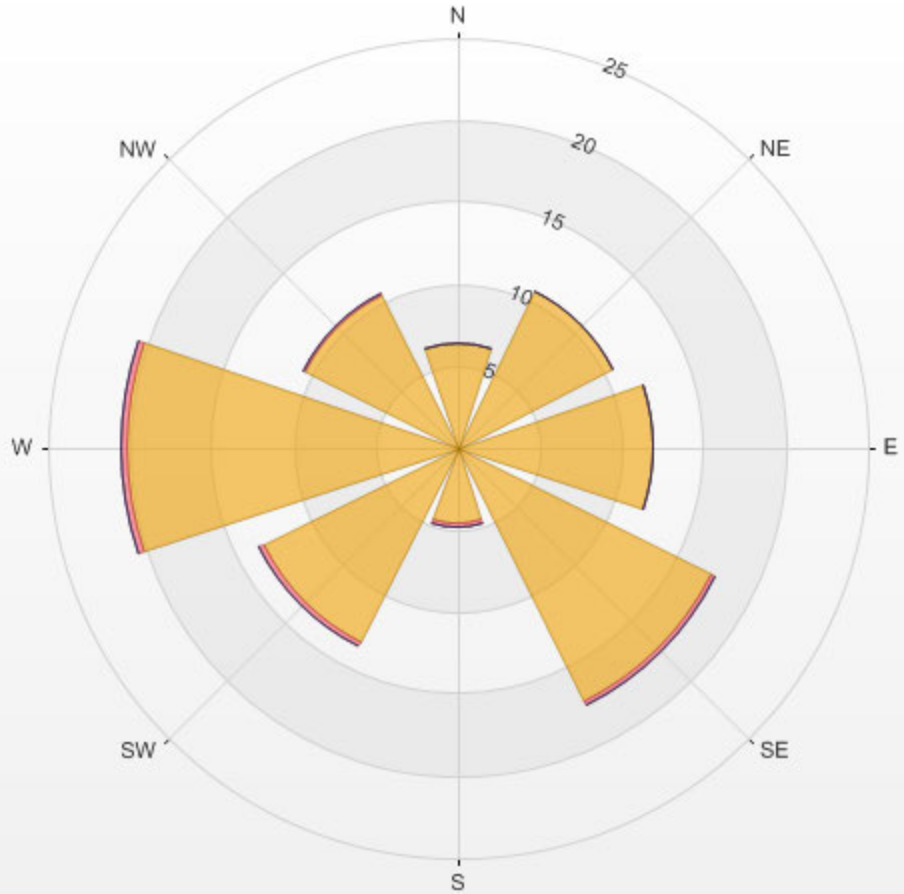
Wind: LICA COLD LAKE SOUTH
Poll.: LICA COLD LAKE SOUTH-O3[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 3.84% Calm Avg: 8.02 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	6.4	0.0	0.0	0.0	6.4
NE	10.7	0.0	0.0	0.0	10.7
E	12.0	0.1	0.0	0.0	12.0
SE	17.3	0.2	0.0	0.0	17.6
S	4.7	0.3	0.0	0.0	4.9
SW	13.3	0.3	0.0	0.0	13.5
W	20.2	0.4	0.0	0.0	20.5
NW	10.4	0.1	0.0	0.0	10.6
Summary	94.9	1.3	0.0	0.0	96.2

%	Icon	Classes (ppb)							
95		0-50	1		50-110	0		110-210	0		>210.0

LICA COLD LAKE SOUTH Poll.: LICA COLD LAKE SOUTH-O3[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 3.84% Calm Poll Avg: 8.02[ppb]



PARTICULATE MATTER 2.5

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (µg/m³ $PM_{2.5}$)						OBJECTIVES** (µg/m³)		EXCEEDANCES		MONTHLY AVERAGE (µg/m³)
			≤ 30	31 < C ≤ 60	61 < C ≤ 80	81 < C ≤ 120	121 < C ≤ 240	> 240	1-HR	24-HR	1-HR	24-HR	
January	729	98.4	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	10
February	642	92.5	97.5%	2.5%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	10
March	690	93.1	98.4%	1.4%	0.1%	0.0%	0.0%	0.0%	82	30	-	0	10.1
April	665	93.6	98.0%	1.7%	0.3%	0.0%	0.0%	0.0%	82	30	-	0	10.5
May	695	94.1	86.3%	9.9%	0.4%	2.0%	1.0%	0.3%	82	30	23	5	18.2
June	663	92.9	99.4%	0.5%	0.2%	0.0%	0.0%	0.0%	82	30	-	0	5.4
July	710	96.1	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	5.4
August	716	97.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	3.3
September	675	94.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	1.8
October	711	95.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	2.2
November	713	99.4	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	4.2
December	709	95.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	-	0	3.7
											ANNUAL AVERAGE		7.1

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

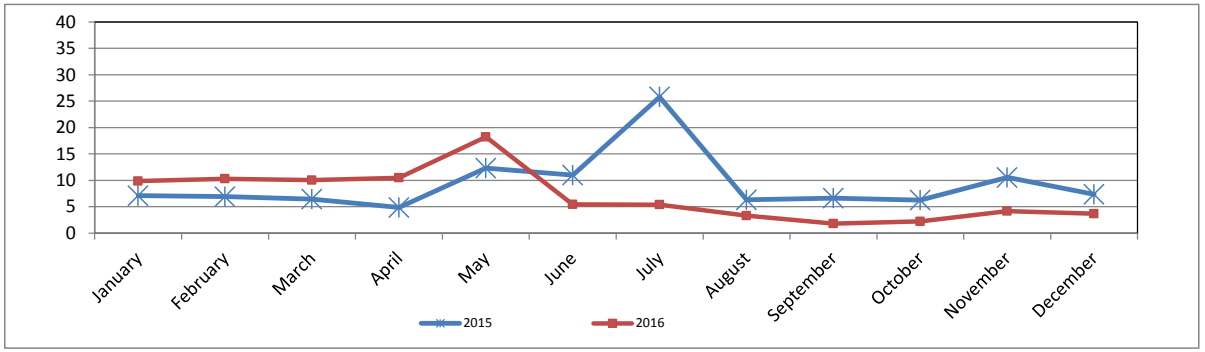
Alberta Ambient Air Quality Objectives Annual Average**	N/D	µg/m³
Annual Average for 2016	7	µg/m³

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 One-Hour Readings vs. 2016 One-Hour Readings in µg/m^3

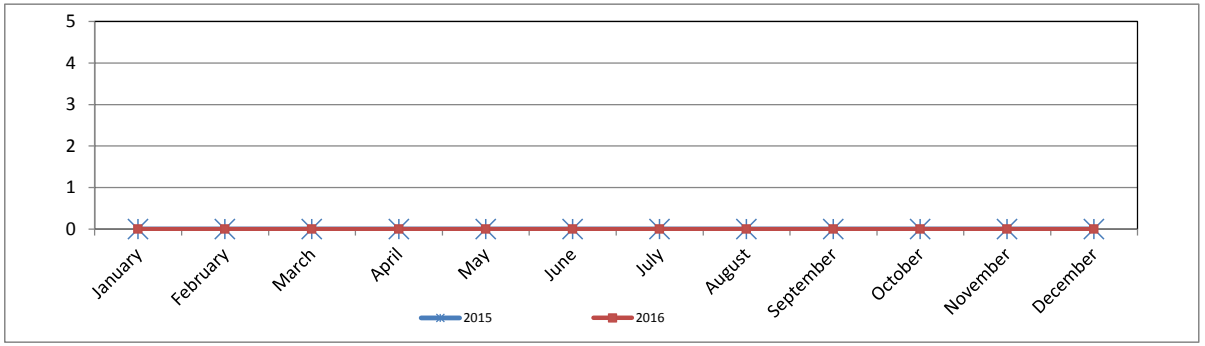
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	7	0	36	10	0	46	-3
February	7	0	38	10	0	60	-3
March	6	0	33	10.1	0.0	69.0	-3.6
April	5	0	38	10.5	0.0	79.5	-5.6
May	12	0	266	**18.2**	0.0	**307.6**	-5.9
June	11	0	131	5.4	0.0	66.0	5.5
July	**26**	0	**278**	5.4	0.0	33.4	20.4
August	6	0	40	3.3	0.0	12.4	3.0
September	7	0	59	1.8	0.0	14.0	4.8
October	6	0	48	2.2	0.0	14.4	4.1
November	11	0	46	4.2	0.0	23.4	6.4
December	7	0	33	3.7	0.0	20.2	3.7

*Annual peak is bolded and highlighted.

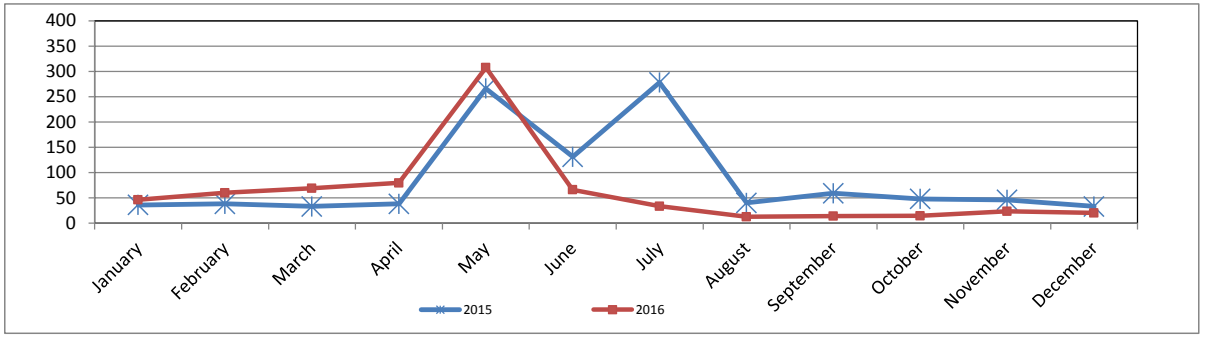
PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Mean vs. 2016 Monthly Mean in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Minimum vs. 2016 Monthly Minimum in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Maximum vs. 2016 Monthly Maximum in µg/m^3



WIND SYSTEM

WIND SPEED (WS) 2016 Monthly Data Summary of One Hour Readings

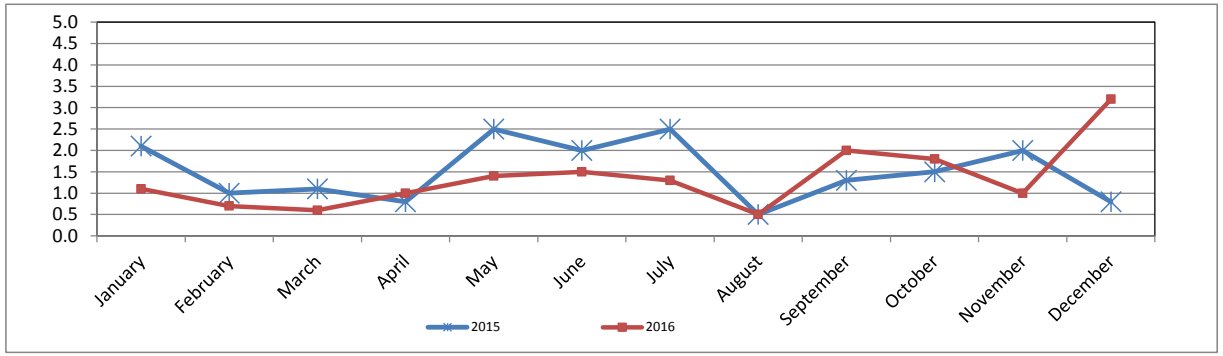
Month	Number of Readings*	Operational Time (%)	Monthly Average (KPH)	Minimum Hourly Average (KPH)	Maximum Hourly Average (KPH)	Maximum Daily Average (KPH)
January	744	100.0	1.1	0.1	21.0	12.8
February	696	100.0	0.7	0.0	27.8	12.7
March	744	100.0	0.6	0.0	17.5	9.5
April	720	100.0	1.0	0.1	20.5	11.5
May	744	100.0	1.4	0.1	19.4	9.1
June	720	100.0	1.5	0.2	18.2	9.8
July	744	100.0	1.3	0.0	16.5	7.2
August	744	100.0	0.5	0.1	20.3	9.0
September	720	100.0	2.0	0.1	17.0	11.3
October	744	100.0	1.8	0.1	16.7	13.4
November	720	100.0	1.0	0.0	15.0	11.0
December	744	100.0	3.2	0.1	18.6	12.6

WIND SPEED (WS) 2015 One-Hour Readings vs. 2016 One-Hour Readings in km/hr

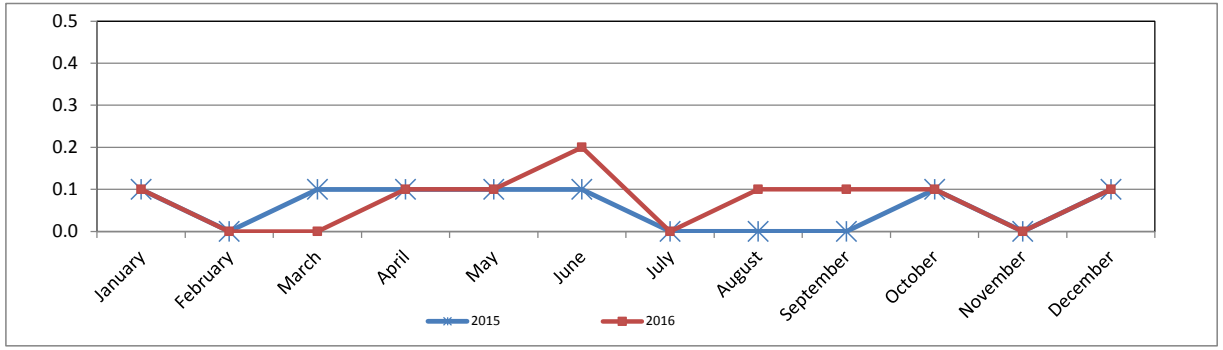
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	2.1	0.1	17.6	1.1	0.1	21.0	1.0
February	1.0	0.0	14.8	0.7	0.0	**27.8**	0.3
March	1.1	0.1	23.1	0.6	0.0	17.5	0.5
April	0.8	0.1	24.0	1.0	0.1	20.5	-0.2
May	**2.5**	0.1	20.7	1.4	0.1	19.4	1.1
June	2.0	0.1	**24.4**	1.5	0.2	18.2	0.5
July	2.5	0.0	17.7	1.3	0.0	16.5	1.2
August	0.5	0.0	16.8	0.5	0.1	20.3	0.0
September	1.3	0.0	20.6	2.0	0.1	17.0	-0.7
October	1.5	0.1	21.7	1.8	0.1	16.7	-0.3
November	2.0	0.0	23.2	1.0	0.0	15.0	1.0
December	0.8	0.1	13.7	**3.2**	0.1	18.6	-2.4

*Annual peak is bolded and highlighted.

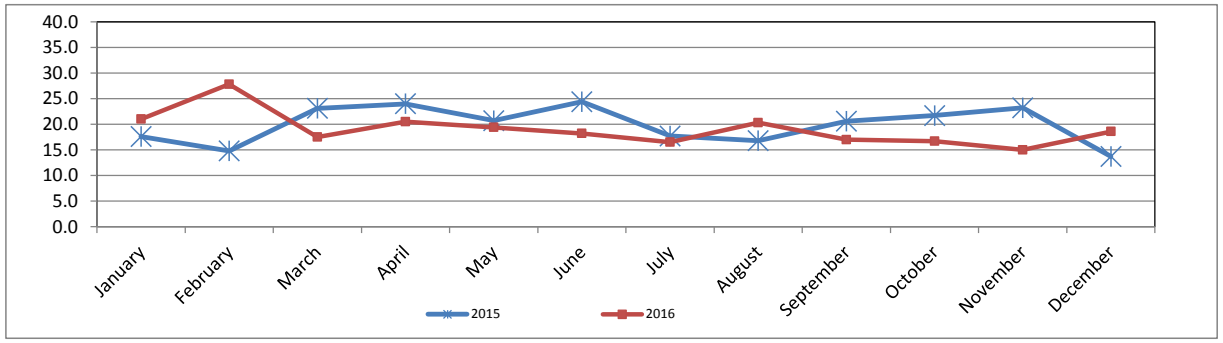
WIND SPEED (WS) 2015 Monthly Mean vs. 2016 Monthly Mean in km/hr



WIND SPEED (WS) 2015 Monthly Minimum vs. 2016 Monthly Minimum in km/hr



WIND SPEED (WS) 2015 Monthly Maximum vs. 2016 Monthly Maximum in km/hr



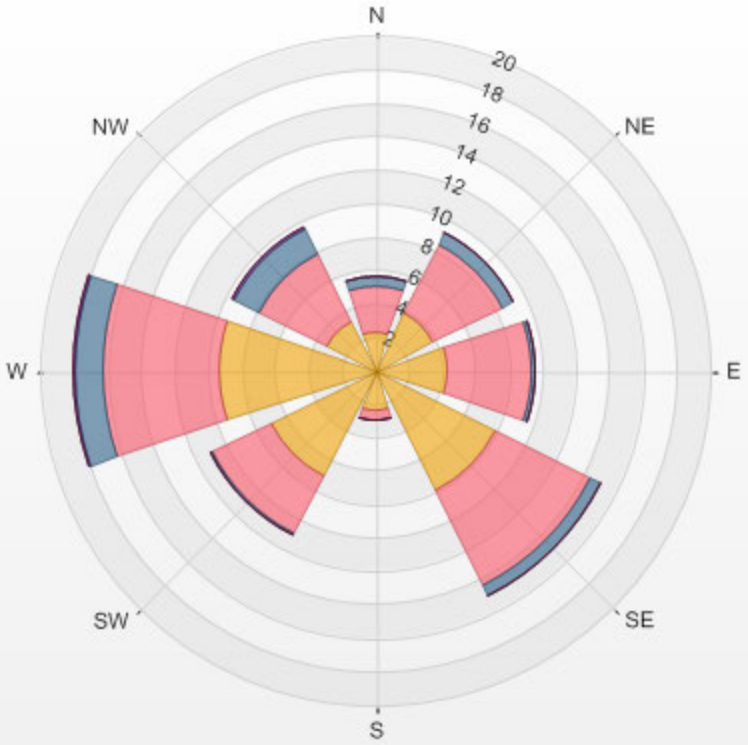
Wind: LICA COLD LAKE SOUTH
Monitor: WSP [kph]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 18.67%

Direction	1.8-6.0	6.0-12.0	12.0-20.0	20.0-29.0	29.0-39.0	>39.0	Total
N	2.3	2.8	0.6	0.0	0.0	0.0	5.7
NE	3.9	4.6	0.8	0.0	0.0	0.0	9.3
E	4.3	5.0	0.3	0.0	0.0	0.0	9.5
SE	8.0	6.3	0.8	0.0	0.0	0.0	15.1
S	2.4	0.6	0.0	0.0	0.0	0.0	3.0
SW	7.0	3.9	0.2	0.0	0.0	0.0	11.0
W	9.3	6.9	1.7	0.1	0.0	0.0	18.1
NW	3.2	4.6	1.7	0.1	0.0	0.0	9.6
Summary	40.5	34.7	6.0	0.2	0.0	0.0	81.3

%	Icon	Classes (kph)											
		40	1.8-6.0	35	6.0-12.0	6	12.0-20.0	0	20.0-29.0	0	29.0-39.0	0	>39.0

LICA COLD LAKE SOUTH 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 18.67% Calm Wind Avg Speed: 0.95(kph)



RELATIVE HUMIDITY

RELATIVE HUMIDITY (RH) 2016 Monthly Data Summary of One Hour Readings

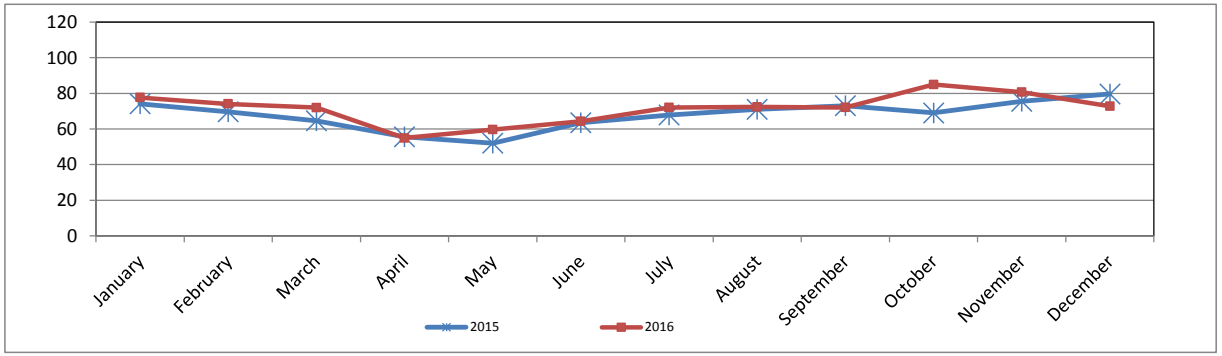
Month	Number of Readings*	Operational Time (%)	Monthly Average (%)	Minimum Hourly Average (%)	Maximum Hourly Average (%)	Maximum Daily Average (%)
January	744	100.0	78	44	93	90.8
February	696	100.0	74	31	98	90.2
March	744	100.0	72	29	99	91.1
April	720	100.0	55	11	98	90.8
May	744	100.0	60	13	**100**	96.2
June	720	100.0	64	17	100	85.6
July	744	100.0	72	30	100	91
August	744	100.0	72	29	100	86
September	720	100.0	72	28	100	87
October	744	100.0	**85**	48	100	100
November	720	100.0	81	28	100	96
December	744	100.0	73	46	98	92

RELATIVE HUMIDITY (RH) 2015 One-Hour Readings vs. 2016 One-Hour Readings in %

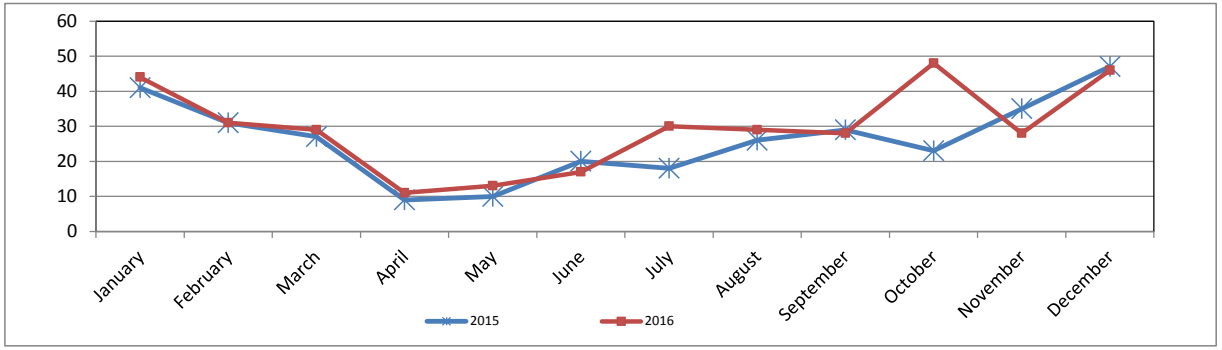
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	74	41	98	78	44	93	-3
February	70	31	96	74	31	98	-5
March	65	27	97	72	29	99	-7
April	56	9	**100**	55	11	98	1
May	52	10	99	60	13	**100**	-8
June	64	20	100	64	17	100	-1
July	68	18	100	72	30	100	-4
August	71	26	100	72	29	100	-1
September	73	29	98	72	28	100	1
October	69	23	98	**85**	48	100	-16
November	76	35	99	81	28	100	-5
December	**80**	47	100	73	46	98	7

*Annual peak is bolded and highlighted.

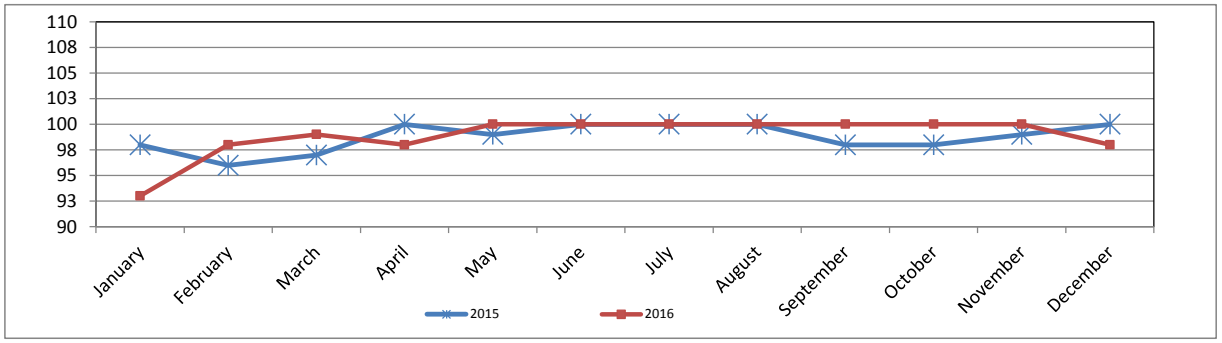
RELATIVE HUMIDITY (RH) 2015 Monthly Mean vs. 2016 Monthly Mean in %



RELATIVE HUMIDITY (RH) 2015 Monthly Minimum vs. 2016 Monthly Minimum in %



RELATIVE HUMIDITY (RH) 2015 Monthly Maximum vs. 2016 Monthly Maximum in %



AMBIENT TEMPERATURE

AMBIENT TEMPERATURE (TPX) 2016 Monthly Data Summary of One Hour Readings

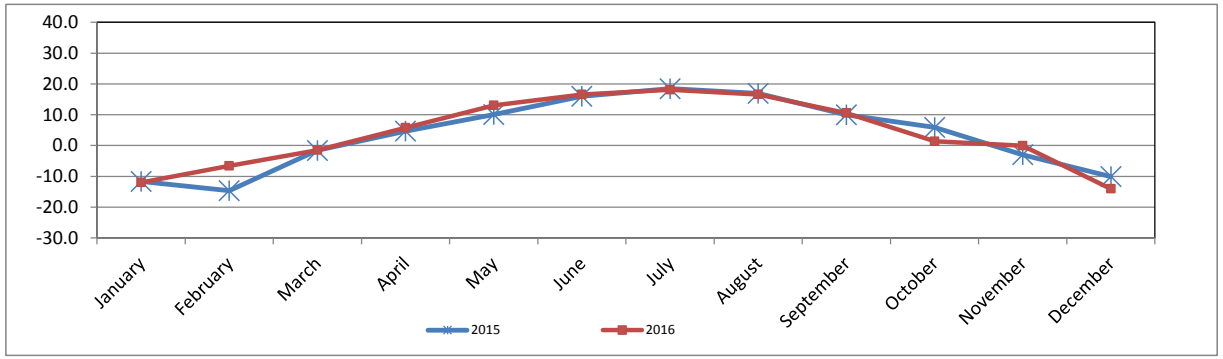
Month	Number of Readings*	Operational Time (%)	Monthly Average (Deg C)	Minimum Hourly Average (Deg C)	Maximum Hourly Average (Deg C)	Maximum Daily Average (Deg C)
January	744	100.0	-12.0	-34.4	5.2	1.9
February	696	100.0	-6.6	-28.5	9.4	3.0
March	744	100.0	-1.5	-16.0	11.1	6.9
April	720	100.0	5.8	-7.7	25.0	17.5
May	744	100.0	13.0	-3.8	30.0	20.3
June	720	100.0	16.6	3.5	28.7	21.2
July	744	100.0	18.1	8.3	28.5	21.9
August	744	100.0	16.6	1.0	29.7	19.8
September	720	100.0	10.6	-1.4	26.0	18.3
October	744	100.0	1.4	-6.1	13.7	8.4
November	720	100.0	-0.1	-10.2	16.5	5.6
December	744	100.0	-14.0	-35.3	2.4	0.1

AMBIENT TEMPERATURE (TPX) 2015 One-Hour Readings vs. 2016 One-Hour Readings in Degrees Celsius

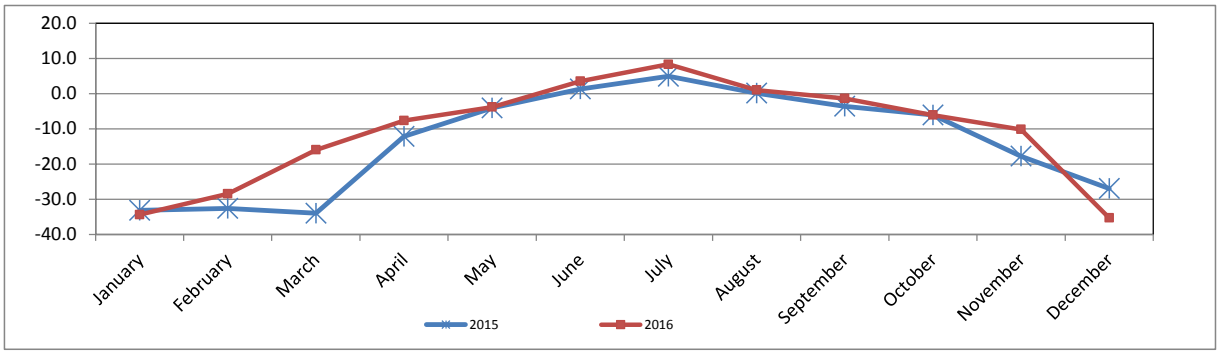
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	-11.6	-33.2	10.1	-12.0	-34.4	5.2	0.3
February	-14.7	-32.6	7.6	-6.6	-28.5	9.4	-8.1
March	-1.6	-34.0	14.8	-1.5	-16.0	11.1	-0.1
April	4.7	-12.2	24.4	5.8	-7.7	25.0	-1.1
May	10.0	-4.1	27.2	13.0	-3.8	**30.0**	-3.0
June	16.0	1.3	31.5	16.6	3.5	28.7	-0.6
July	**18.5**	4.9	30.3	**18.1**	8.3	28.5	0.4
August	16.9	0.1	**31.9**	16.6	1.0	29.7	0.3
September	10.0	-3.6	25.7	10.6	-1.4	26.0	-0.6
October	5.9	-6.1	24.6	1.4	-6.1	13.7	4.5
November	-3.0	-17.8	7.6	-0.1	-10.2	16.5	-2.9
December	-10.0	-27.0	4.7	-14.0	-35.3	2.4	4.0

*Annual peak is bolded and highlighted.

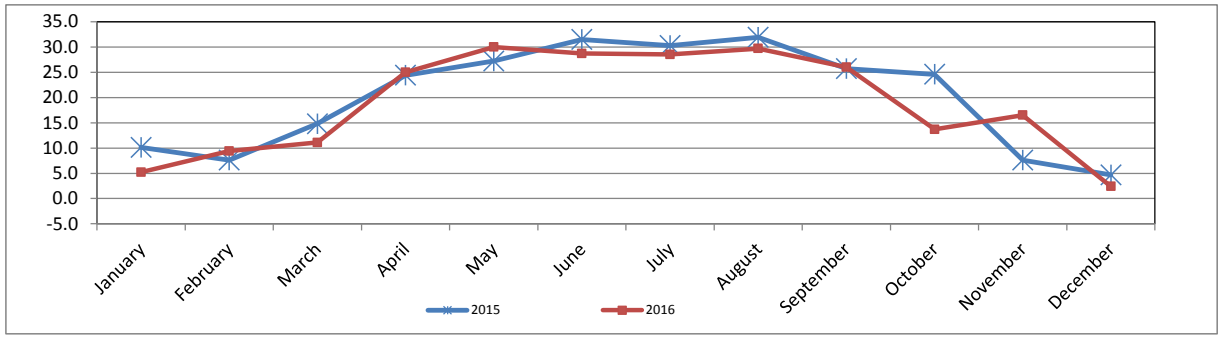
AMBIENT TEMPERATURE (TPX) 2015 Monthly Mean vs. 2016 Monthly Mean in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Minimum vs. 2016 Monthly Minimum in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Maximum vs. 2016 Monthly Maximum in Degrees Celsius



APPENDIX II
ANALYTICAL RESULTS

PASSIVE SAMPLES

PASSIVE AMBIENT AIR MONITORING ANNUAL

LAKELAND INDUSTRY AND COMMUNITY ASSOCIATION		***BONNYVILLE***
Company		Project Number
BONNYVILLE	2015/11/30	2017/01/30
Location	***Date Samples Start***	***Date Sampled End***

SO2 (ppb)

Station	Jan.*	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.**	Average	Maximum
3	0.4	0.4	NA	0.2	NA	0.2	NA	0.1	NA	0.2	NA	0.5	**0.3**	**0.5**
3 DUP	NA	NA	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA	**0.2**	**0.2**
4	0.7	0.5	NA	0.2	NA	0.5	NA	0.3	NA	0.6	NA	1.1	**0.6**	**1.1**
4 DUP	NA	NA	NA	NA	NA	0.4	NA	NA	NA	NA	NA	NA	**0.4**	**0.4**
5	0.5	0.5	NA	0.3	NA	0.4	NA	0.4	NA	0.3	NA	0.6	**0.4**	**0.6**
5 DUP	NA	NA	NA	NA	NA	NA	NA	0.4	NA	NA	NA	NA	**0.4**	**0.4**
6	0.6	0.6	NA	0.2	NA	0.4	NA	0.4	NA	0.3	NA	0.6	**0.4**	**0.6**
6 DUP	NA	NA	NA	NA	NA	NA	NA	0.3	NA	NA	NA	NA	**0.3**	**0.3**
8	0.8	0.5	NA	0.3	NA	0.5	NA	0.2	NA	0.2	NA	0.7	**0.5**	**0.8**
8 DUP	NA	NA	NA	NA	NA	NA	NA	0.2	NA	NA	NA	NA	**0.2**	**0.2**
9	0.6	0.3	NA	0.2	NA	0.3	NA	0.2	NA	0.3	NA	0.6	**0.4**	**0.6**
9 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3	NA	NA	**0.3**	**0.3**
10	0.5	0.4	NA	0.2	NA	0.2	NA	0.2	NA	0.3	NA	0.3	**0.3**	**0.5**
10 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3	NA	NA	**0.3**	**0.3**
11	NA	NA	NA	NA	NA	0.2	NA	<0.1	NA	0.3	NA	NA	**<0.2**	**0.3**
11 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3	NA	NA	**0.3**	**0.3**
12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
13	0.7	0.5	NA	0.3	NA	0.3	NA	0.2	NA	0.4	NA	0.8	**0.5**	**0.8**
13 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.8	**0.8**	**0.8**
14	1.5	1.3	NA	0.9	NA	0.8	NA	1.0	NA	1.1	NA	1.6	**1.2**	**1.6**
14 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.8	**1.8**	**1.8**
15	0.5	0.4	NA	0.2	NA	0.3	NA	0.2	NA	0.3	NA	0.5	**0.3**	**0.5**
15 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5	**0.5**	**0.5**
16	0.5	0.5	NA	0.3	NA	0.2	NA	0.2	NA	0.2	NA	0.5	**0.3**	**0.5**
17	0.6	0.6	NA	0.3	NA	0.3	NA	0.4	NA	0.3	NA	0.7	**0.5**	**0.7**
18	0.5	0.4	NA	0.2	NA	0.2	NA	0.1	NA	0.4	NA	0.3	**0.3**	**0.5**
19	0.6	0.6	NA	0.2	NA	0.2	NA	0.1	NA	0.3	NA	0.6	**0.4**	**0.6**
19 DUP	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.7**	**0.7**
22	0.5	0.4	NA	0.2	NA	0.2	NA	0.2	NA	0.2	NA	0.4	**0.3**	**0.5**
22 DUP	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.7**	**0.7**
23	0.4	0.2	NA	0.2	NA	0.1	NA	0.1	NA	0.1	NA	0.4	**0.2**	**0.4**
23 DUP	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.4**	**0.4**
24	0.6	0.4	NA	0.2	NA	0.2	NA	<0.1	NA	0.2	NA	0.5	**<0.3**	**0.6**
24 DUP	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.4**	**0.4**
25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
26	1.1	1.3	NA	0.6	NA	0.6	NA	0.5	NA	0.4	NA	0.8	**0.8**	**1.3**
26 DUP	NA	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.2**	**1.2**
27	2.0	1.3	NA	0.9	NA	NA	NA	0.8	NA	0.9	NA	1.7	**1.3**	**2.0**
27 DUP	NA	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.3**	**1.3**
28	0.6	0.5	NA	0.3	NA	0.6	NA	0.5	NA	0.3	NA	0.5	**0.5**	**0.6**
28 DUP	NA	NA	NA	0.4	NA	NA	NA	NA	NA	NA	NA	NA	**0.4**	**0.4**
29	0.5	0.4	NA	0.2	NA	0.3	NA	0.2	NA	0.2	NA	0.7	**0.4**	**0.7**
29 DUP	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	**0.3**	**0.3**
32	0.9	0.6	NA	0.2	NA	0.3	NA	0.2	NA	0.3	NA	0.7	**0.5**	**0.9**
32 DUP	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	**0.3**	**0.3**
36	0.5	0.5	NA	0.2	NA	1.5	NA	NA	NA	NA	NA	NA	**0.7**	**1.5**
36 DUP	NA	NA	NA	NA	NA	1.3	NA	NA	NA	NA	NA	NA	**1.3**	**1.3**
38	NA	NA	NA	NA	NA	NA	NA	0.7	NA	0.3	NA	0.6	**0.5**	**0.7**
Average	**0.7**	**0.6**	**NA**	**0.3**	**NA**	**0.4**	**NA**	**<0.3**	**NA**	**0.3**	**NA**	**0.7**		
Maximum	**2.0**	**1.3**	**NA**	**0.9**	**NA**	**1.5**	**NA**	**1.0**	**NA**	**1.1**	**NA**	**1.8**		

*Samples exposed 2015/11/30 - 2016/02/01

**Samples exposed 2016/11/29 - 2017/01/30

PASSIVE AMBIENT AIR MONITORING ANNUAL

LAKELAND INDUSTRY AND COMMUNITY ASSOCIATION		***BONNYVILLE***
Company		Project Number
BONNYVILLE	2015/11/30	2017/01/30
Location	***Date Samples Start***	***Date Sampled End***

O3 (ppb)

Station	Jan.*	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.**	Average	Maximum
3	24.1	41.8	NA	34.5	NA	29.3	NA	14.9	NA	18.2	NA	23.6	**26.6**	**41.8**
3 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.6	NA	NA	**19.6**	**19.6**
4	24.8	47.4	NA	35.1	NA	27.8	NA	17.0	NA	18.2	NA	29.1	**28.5**	**47.4**
4 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26.5	**26.5**	**26.5**
5	23.6	32.8	NA	31.2	NA	28.0	NA	16.0	NA	17.2	NA	26.5	**25.0**	**32.8**
5 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23.2	**23.2**	**23.2**
6	22.7	47.3	NA	27.2	NA	26.1	NA	14.9	NA	18.0	NA	23.1	**25.6**	**47.3**
8	31.5	43.8	NA	36.9	NA	38.8	NA	20.2	NA	19.3	NA	28.4	**31.3**	**43.8**
9	32.2	43.3	NA	29.7	NA	28.5	NA	17.7	NA	20.0	NA	27.4	**28.4**	**43.3**
10	22.3	38.7	NA	26.8	NA	25.8	NA	13.1	NA	16.5	NA	20.3	**23.4**	**38.7**
11	NA	NA	NA	NA	NA	21.5	NA	11.8	NA	NA	NA	NA	**16.6**	**21.5**
12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
13	21.0	37.7	NA	35.9	NA	28.9	NA	16.5	NA	18.8	NA	23.5	**26.0**	**37.7**
14	27.0	40.0	NA	26.9	NA	32.3	NA	17.6	NA	16.9	NA	24.0	**26.4**	**40.0**
15	21.8	39.3	NA	33.1	NA	22.2	NA	14.9	NA	19.2	NA	25.2	**25.1**	**39.3**
16	19.7	35.3	NA	32.2	NA	26.3	NA	13.0	NA	17.2	NA	22.5	**23.7**	**35.3**
16 DUP	21.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**21.7**	**21.7**
17	25.3	49.3	NA	30.9	NA	25.9	NA	22.2	NA	19.4	NA	28.1	**28.7**	**49.3**
17 DUP	25.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**25.9**	**25.9**
18	26.0	41.7	NA	33.0	NA	NA	NA	15.1	NA	17.0	NA	27.4	**26.7**	**41.7**
18 DUP	NA	41.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**41.0**	**41.0**
19	32.7	45.0	NA	28.5	NA	27.7	NA	19.0	NA	22.3	NA	28.2	**29.1**	**45.0**
19 DUP	NA	48.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**48.0**	**48.0**
22	23.4	32.6	NA	31.3	NA	24.3	NA	14.5	NA	21.1	NA	24.4	**24.5**	**32.6**
22 DUP	NA	NA	NA	31.3	NA	NA	NA	NA	NA	NA	NA	NA	**31.3**	**31.3**
23	24.6	33.2	NA	28.6	NA	26.7	NA	12.2	NA	15.3	NA	21.2	**23.1**	**33.2**
23 DUP	NA	NA	NA	25.7	NA	NA	NA	NA	NA	NA	NA	NA	**25.7**	**25.7**
24	27.3	40.8	NA	29.8	NA	24.8	NA	15.9	NA	17.9	NA	22.0	**25.5**	**40.8**
24 DUP	NA	NA	NA	NA	NA	26.9	NA	NA	NA	NA	NA	NA	**26.9**	**26.9**
28	22.9	34.2	NA	30.5	NA	28.8	NA	16.2	NA	16.5	NA	23.4	**24.6**	**34.2**
28 DUP	NA	NA	NA	NA	NA	26.6	NA	NA	NA	NA	NA	NA	**26.6**	**26.6**
29	25.8	36.7	NA	30.2	NA	33.2	NA	17.7	NA	17.5	NA	24.6	**26.5**	**36.7**
29 DUP	NA	NA	NA	NA	NA	NA	NA	14.4	NA	NA	NA	NA	**14.4**	**14.4**
32	29.2	39.1	NA	36.5	NA	34.8	NA	25.8	NA	22.9	NA	34.1	**31.8**	**39.1**
32 DUP	NA	NA	NA	NA	NA	NA	NA	25.6	NA	NA	NA	NA	**25.6**	**25.6**
36	24.3	35.6	NA	41.2	NA	30.8	NA	NA	NA	NA	NA	NA	**33.0**	**41.2**
38	NA	NA	NA	NA	NA	NA	NA	21.5	NA	16.0	NA	21.4	**19.6**	**21.5**
38 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	16.6	NA	NA	**16.6**	**16.6**
Average	**25.2**	**40.2**	**NA**	**31.6**	**NA**	**28.1**	**NA**	**17.0**	**NA**	**18.3**	**NA**	**25.1**		
Maximum	**32.7**	**49.3**	**NA**	**41.2**	**NA**	**38.8**	**NA**	**25.8**	**NA**	**22.9**	**NA**	**34.1**		

*Samples exposed 2015/11/30 - 2016/02/01
**Samples exposed 2016/11/29 - 2017/01/30

PASSIVE AMBIENT AIR MONITORING ANNUAL

LAKELAND INDUSTRY AND COMMUNITY ASSOCIATION		***BONNYVILLE***
Company		Project Number
BONNYVILLE	2015/11/30	2017/01/30
Location	***Date Samples Start***	***Date Sampled End***

NO2 (ppb)

Station	Jan.*	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.**	Average	Maximum
3	4.5	0.5	NA	0.7	NA	0.9	NA	0.8	NA	1.8	NA	2.7	**1.7**	**4.5**
3 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.8	NA	NA	**1.8**	**1.8**
4	3.5	0.3	NA	0.6	NA	0.8	NA	0.6	NA	1.4	NA	2.2	**1.3**	**3.5**
4 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5	**2.5**	**2.5**
5	3.8	0.9	NA	0.6	NA	0.4	NA	0.7	NA	2.2	NA	2.7	**1.6**	**3.8**
5 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1	**2.1**	**2.1**
6	6.5	2.1	NA	2.4	NA	2.8	NA	4.5	NA	5.0	NA	6.1	**4.2**	**6.5**
8	4.0	0.3	NA	0.5	NA	0.4	NA	0.7	NA	1.4	NA	1.8	**1.3**	**4.0**
9	4.8	0.2	NA	0.7	NA	0.7	NA	1.7	NA	2.2	NA	2.6	**1.8**	**4.8**
10	9.0	1.2	NA	1.9	NA	1.5	NA	3.7	NA	2.3	NA	5.7	**3.6**	**9.0**
11	NA	NA	NA	NA	NA	0.3	NA	0.6	NA	1.1	NA	NA	**0.7**	**1.1**
12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
13	2.1	0.2	NA	0.3	NA	0.3	NA	0.7	NA	2.6	NA	1.5	**1.1**	**2.6**
14	5.1	0.5	NA	0.6	NA	0.5	NA	0.9	NA	2.6	NA	4.4	**2.1**	**5.1**
15	3.0	0.3	NA	0.6	NA	0.7	NA	1.4	NA	1.3	NA	2.7	**1.4**	**3.0**
16	4.6	0.5	NA	0.6	NA	0.9	NA	0.9	NA	2.3	NA	3.1	**1.8**	**4.6**
16 DUP	5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.0**	**5.0**
17	3.4	0.6	NA	1.0	NA	1.2	NA	1.3	NA	2.1	NA	2.7	**1.8**	**3.4**
17 DUP	3.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**3.3**	**3.3**
18	3.7	0.2	NA	0.6	NA	0.8	NA	0.9	NA	1.4	NA	2.4	**1.4**	**3.7**
18 DUP	NA	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.5**	**0.5**
19	3.8	<0.1	NA	0.4	NA	0.5	NA	0.6	NA	1.5	NA	2.2	**<1.3**	**3.8**
19 DUP	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**<0.1**	**<0.1**
22	7.0	1.2	NA	0.6	NA	0.5	NA	0.9	NA	2.4	NA	4.1	**2.4**	**7.0**
22 DUP	NA	NA	NA	0.5	NA	NA	NA	NA	NA	NA	NA	NA	**0.5**	**0.5**
23	1.6	<0.1	NA	0.1	NA	0.1	NA	0.2	NA	0.4	NA	1.2	**<0.5**	**1.6**
23 DUP	NA	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	**0.1**	**0.1**
24	7.3	1.6	NA	1.8	NA	2.0	NA	3.7	NA	4.6	NA	6.1	**3.9**	**7.3**
24 DUP	NA	NA	NA	NA	NA	2.3	NA	NA	NA	NA	NA	NA	**2.3**	**2.3**
28	10.7	2.5	NA	1.7	NA	1.3	NA	3.1	NA	4.9	NA	6.9	**4.4**	**10.7**
28 DUP	NA	NA	NA	NA	NA	1.4	NA	NA	NA	NA	NA	NA	**1.4**	**1.4**
29	6.0	0.7	NA	0.6	NA	0.4	NA	0.9	NA	2.3	NA	5.7	**2.4**	**6.0**
29 DUP	NA	NA	NA	NA	NA	NA	NA	0.9	NA	NA	NA	NA	**0.9**	**0.9**
32	4.0	0.4	NA	0.2	NA	0.2	NA	0.4	NA	1.1	NA	2.0	**1.2**	**4.0**
32 DUP	NA	NA	NA	NA	NA	NA	NA	0.3	NA	NA	NA	NA	**0.3**	**0.3**
36	11.2	3.9	NA	1.6	NA	0.8	NA	NA	NA	NA	NA	NA	**4.4**	**11.2**
38	NA	NA	NA	NA	NA	NA	NA	1.3	NA	4.4	NA	6.0	**3.9**	**6.0**
38 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.9	NA	NA	**3.9**	**3.9**
Average	**5.1**	**<0.8**	**NA**	**0.8**	**NA**	**0.9**	**NA**	**1.3**	**NA**	**2.4**	**NA**	**3.5**		
Maximum	**11.2**	**3.9**	**NA**	**2.4**	**NA**	**2.8**	**NA**	**4.5**	**NA**	**5.0**	**NA**	**6.9**		

*Samples exposed 2015/11/30 - 2016/02/01
**Samples exposed 2016/11/29 - 2017/01/30

PASSIVE AMBIENT AIR MONITORING ANNUAL

LAKELAND INDUSTRY AND COMMUNITY ASSOCIATION		***BONNYVILLE***
Company		Project Number
BONNYVILLE	2015/11/30	2017/01/30
Location	***Date Samples Start***	***Date Sampled End***

H2S (ppb)

Station	Jan.*	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.**	Average	Maximum
3	0.13	0.08	NA	0.09	NA	0.17	NA	0.15	NA	0.08	NA	0.14	**0.12**	**0.17**
3 DUP	NA	NA	NA	0.09	NA	NA	NA	NA	NA	NA	NA	NA	**0.09**	**0.09**
5	0.16	0.13	NA	0.17	NA	0.39	NA	0.51	NA	0.24	NA	0.13	**0.25**	**0.51**
5 DUP	NA	NA	NA	NA	NA	0.46	NA	NA	NA	NA	NA	NA	**0.46**	**0.46**
10	0.15	0.11	NA	0.09	NA	0.21	NA	0.19	NA	0.10	NA	0.11	**0.14**	**0.21**
10 DUP	NA	NA	NA	NA	NA	0.22	NA	NA	NA	NA	NA	NA	**0.22**	**0.22**
11	NA	NA	NA	NA	NA	0.05	NA	0.06	NA	0.05	NA	NA	**0.05**	**0.06**
11 DUP	NA	NA	NA	NA	NA	NA	NA	0.06	NA	NA	NA	NA	**0.06**	**0.06**
12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
13	0.14	0.09	NA	0.08	NA	0.09	NA	0.09	NA	0.12	NA	0.09	**0.10**	**0.14**
13 DUP	NA	NA	NA	NA	NA	NA	NA	0.08	NA	NA	NA	NA	**0.08**	**0.08**
14	0.15	0.11	NA	0.10	NA	0.16	NA	0.17	NA	0.15	NA	0.13	**0.14**	**0.17**
14 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.13	NA	NA	**0.13**	**0.13**
16	0.15	0.14	NA	0.09	NA	0.16	NA	0.15	NA	0.10	NA	0.12	**0.13**	**0.16**
16 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	NA	NA	**0.10**	**0.10**
17	0.20	0.14	NA	0.14	NA	0.33	NA	0.32	NA	0.15	NA	0.16	**0.21**	**0.33**
17 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.16	**0.16**	**0.16**
18	0.11	0.11	NA	0.05	NA	0.14	NA	0.12	NA	0.11	NA	0.11	**0.11**	**0.14**
18 DUP	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	**0.10**	**0.10**
19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
22	0.16	0.13	NA	0.06	NA	0.20	NA	0.16	NA	0.09	NA	0.10	**0.13**	**0.20**
24	0.18	0.10	NA	0.09	NA	0.19	NA	0.16	NA	0.11	NA	0.12	**0.14**	**0.19**
25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**	**NA**
26	0.18	0.17	NA	0.16	NA	0.15	NA	0.14	NA	0.14	NA	0.19	**0.16**	**0.19**
26 DUP	0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.17**	**0.17**
27	0.28	0.15	NA	0.16	NA	0.42	NA	0.67	NA	0.55	NA	0.33	**0.37**	**0.67**
27 DUP	0.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.43**	**0.43**
29	0.14	0.12	NA	0.08	NA	0.17	NA	0.17	NA	0.09	NA	0.09	**0.12**	**0.17**
29 DUP	NA	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.10**	**0.10**
32	0.17	0.14	NA	0.08	NA	0.17	NA	0.20	NA	0.11	NA	0.14	**0.14**	**0.20**
32 DUP	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.12**	**0.12**
36	0.18	0.14	NA	0.08	NA	<0.02	NA	NA	NA	NA	NA	NA	**<0.11**	**0.18**
36 DUP	NA	NA	NA	0.08	NA	NA	NA	NA	NA	NA	NA	NA	**0.08**	**0.08**
38	NA	NA	NA	NA	NA	NA	NA	3.61	NA	0.16	NA	0.19	**1.32**	**3.61**
Average	**0.18**	**0.12**	**NA**	**0.10**	**NA**	**<0.21**	**NA**	**0.39**	**NA**	**0.14**	**NA**	**0.14**		
Maximum	**0.43**	**0.17**	**NA**	**0.17**	**NA**	**0.46**	**NA**	**3.61**	**NA**	**0.55**	**NA**	**0.33**		

*Samples exposed 2015/11/30 - 2016/02/01

**Samples exposed 2016/11/29 - 2017/01/30

APPENDIX III
REPORT CERTIFICATION FORM

Report Certification Form

Alberta Airshed (if applicable)	**EPA Approval or Code of Practice Registration #** (if applicable)
YES	**NA**
Company Name (if applicable)	**Industrial Operation Name** (if applicable)
Lakeland Industry & Community Association	**Cold Lake Continuous Monitoring Station**
Name of the Representative of the Person Responsible (Last, First, Middle)	**Position / Title of the Representative of the Person Responsible**
Maram Ghaleb	**Project Manager, Customer Service, Air Services**
Is an External Party Certifying the Report? (If 'Yes', fill in the fields below for the external person.	
☐ **Yes** ■ **No**	
Name of External Person Certifying the Report (Last, First, Middle)	**Position / Title of External Person Certifying the Report**
NA	**NA**
Company Name for the External Person Certifying the Report	**Identification of Qualifications / Professional Designations of the External Person Certifying the Report**
NA	**NA**

I certify that I have reviewed and verified the submitted report. I also certify that the report presented with this certification form is complete, accurate and representative of the monitoring results and timeframe.

Maram Ghaleb

Signature of the Representative of the Person Responsible / External Person Certifying the Report

October 19, 2017

Report Issued Date (dd-mm-yyyy)

[Type here] Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Alberta Environment and Parks (AEP)
Air.Reporting@gov.ab.ca

December 28, 2017

Subject: Annual Report Submission for LICA Maskwa Station

Lakeland Industry & Community Association (LICA) is pleased to submit the ambient air monitoring annual report conducted at the Maskwa Station in the year of 2016.

The air monitoring program consists of continuous air monitoring results for Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Hydrocarbon (THC), Oxides of Nitrogen (NOx), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Relative Humidity (RH), Barometric Pressure (BP), Precipitation, Ambient Temperature (AmbTPX), Wind Speed (WS), Wind Direction (WD) and Standard Deviation Wind Direction (STDWD).

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Review and Prepared By	Electronic Submission Conducted By
Continuous ambient air	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics

Notification of Changes Made After Monthly Report Issuance

- Wind Speed Calculated Averages: calculated averages, in the 2016 monthly reports, were presented as arithmetic averages of the individual hourly data. When comparing averages for 24-Hr, hourly/month and monthly statistics, the arithmetic averages will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.
- July Monthly Report: The operational time for NOx/NO/NO2 was originally reported as 99.9%. During annual review, the operational time was revised to 98.3% as calibration activities on July 25 should be flagged as additional calibration hours (S1 and C1), which should be considered as downtime. Thirteen hours of downtime were recorded in order to remove the LICA-owned analyzer and replace with a Maxxam-supplied unit.
- August Monthly Report: The operational time for NO2 was originally reported as 98.0%. During annual review, the operation time was revised to 98.1% as the scheduled daily span zero/check on August 18 was incorrectly flagged as an additional calibration hour (C1).

As the LICA Environmental Program Manager and Data & Reporting Specialist, we certify that we 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. We also certify all air data that are required by the AMD to be electronically submitted to AEP and Alberta's Ambient Air Quality Data Warehouse have been submitted by the time of this report submission.

Should you have any questions, please don't hesitate to contact us.

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Respectfully,

Michael Bisaga
Technical Program Manager
Lakeland Industry & Community Association
780-266-7068
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Lily Lin
Data & Reporting Specialist
587-225-2248
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AMBIENT AIR MONITORING ANNUAL REPORT

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

MASKWA CONTINUOUS MONITORING STATION

JOB #: 2833-2016-30-A

JANUARY - DECEMBER
2016

Prepared for:

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION
5107 50 ST.
BONNYVILLE, ALBERTA
T9N 2J5

Attention: MIKE BISAGA

DATE: **December 27, 2017**

Prepared by:
Maram Ghaleb
Maram Ghaleb, B.Sc.
Project Manager, Customer Service, Air Services

Reviewed by:
Cheri Sinclair
Cheri Sinclair, B.Sc.
Supervisor, Customer Service, Air Services

SUMMARY

In 2016, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the Maskwa Continuous Monitoring Station Site, near Bonnyville, Alberta. The monitoring station provides continuous meteorological measurements and air quality data for non-compliance parameters, as requested by Lakeland Industry & Community Association.

Data presented in this report has undergone the Post-Final Validation Procedures, which include a cursory inspection of annual charts. If errors or omissions in the data are suspected or discovered after the initial submittal of data (monthly report), the post-validation step serves to re-evaluate the affected data. The report certification form is also included in this report to verify that the annual validation review has been completed, as per the Reporting Chapter (Chapter 9) of the Air Monitoring Directive (AMD).

Statistical summaries for monthly mean, maximum, and minimum values, as well as comparisons to the historical values from 2015 are presented on the following pages.

Any deviations or modifications made to the sampling or analytical methods during the monitoring period are outlined in Section 1.0 Discussion. On this basis, Maxxam is issuing this completed report to Lakeland Industry & Community Association.

Should you have any questions concerning the results or if we can be of further assistance, please contact us at 403-219-3678 or toll-free at 1-800-386-7247.

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1.0 Discussion

This annual validation report consists of data for parameters Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Hydrocarbon (THC), Oxides of Nitrogen (NOx), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Wind Speed (WS), Relative Humidity (RH), Barometer Pressure (BP), Ambient Temperature (AmbTPX) and Precipitation.

The air monitoring trailer was located at 54° 36' 18.612'' N and Longitude 110° 27' 9.719'' W for the monitoring period.

The monitoring methods and equipment met all AMD requirements.

All monitoring analyzers and meteorological systems met the 90% operational uptime requirements during the monitoring period.

All data collected during the monitoring period were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

An external audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.

Notification of Changes Made After Monthly Report Issuance

- **Wind Speed Calculated Averages**: calculated averages, in the 2016 monthly reports, were presented as arithmetic averages of the individual hourly data. When comparing averages for 24-Hr, hourly/month and monthly statistics, the arithmetic averages will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.
- **July Monthly Report**: The operational time for NOx was originally reported as 99.9% in July 2016. During annual review, the operational time was revised to 98.3% as calibration activities on July 25 were not flagged as additional calibration hours (S1 and C1). The thirteen hours of downtime were recorded in order to remove the LICA-owned analyzer and replace with a Maxxam-supplied unit.
- **August Monthly Report**: The operational time for NO_2 was originally reported as 98.0% in August 2016. During annual review, the operation time was revised to 98.1% as the scheduled daily span zero/check on August 18 was incorrectly flagged as an additional calibration hour (C1).

The summaries of the monthly maintenance report for the monitoring period are presented below:

SULPHUR DIOXIDE (SO_2)

January	• No operational issues were identified this month.
February	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An as-found response check was performed on February 23, prior to maintenance and the monthly calibration. Two hours of downtime were recorded.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer was put into "Maintenance" mode on March 24 while the sample manifold was cleaned, resulting in one hour of downtime.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• No operational issues were identified this month.
July	• Operational time was 97.8%, equivalent to 16 hours of downtime. • Annual maintenance was performed on the analyzer between July 20 and July 21. Both the shut-down and post-repair calibration results met AMD requirements. Sixteen hours of data were discarded due to this event. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• Operational time was 98.4%, equivalent to 12 hours of downtime. • To address a zero drift issue, the calibration was repeated on August 12 and August 24 and an additional span verification and as-found response check was completed on August 29. As all calibration results met AMD requirements, no data was discarded due to the drift. However, twelve hours of downtime were recorded due to the additional quality checks.
September	• Operational time was 99.3%, equivalent to 5 hours of downtime. • Downtime was recorded due to an additional calibration performed on September 19 to address a zero drift occurrence.
October	• Operational time was 99.5%, equivalent to 4 hours of downtime. • A repeat calibration was performed on October 19 to address a biased high zero drift, resulting in four hours of downtime.
November	• Operational time was 99.7%, equivalent to 2 hours of downtime. • Downtime was recorded on November 1 due to a scheduled maintenance event.
December	• No operational issues were identified this month.

HYDROGEN SULPHIDE (H_2S)

January	• No operational issues were identified this month.
February	• Operational time was 98.9%, equivalent to 8 hours of downtime. • An additional zero/span check was performed on February 19 for quality assurance purposes, resulting in two hours of downtime. • An as found response check was performed prior on February 23 prior to maintenance and the monthly calibration. Six hours of downtime were recorded.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer was put into "Maintenance" mode on March 24 while the sample manifold was cleaned, resulting in one hour of downtime.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer spanned high on June 14. The span check was repeated on June 15 and the result was within acceptance limits. No data was discarded.
July	• Operational time was 97.6%, equivalent to 18 hours of downtime. • Annual maintenance was performed on the analyzer between July 20 and July 21. Both the shut-down and post-repair calibration results met AMD requirements. Eighteen hours of data were discarded due to this event. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• Operational time was 98.4%, equivalent to 12 hours of downtime. • An additional span verification was performed on August 15 to asses a low zero drift, resulting in one hour of downtime. • An additional span verification and a repeat calibration were performed on August 26 to assess a low zero drift. As the calibration met AMD requirements, no data was discarded due to the drift. However, eleven hours of downtime were recorded due to the additional quality checks.
September	• Operational time was 99.0%, equivalent to 7 hours of downtime. • The analyzer was removed on September 1 for maintenance to address the zero drift occurrence encountered in August. Following a successful shut-down calibration, the LICA-owned API 101E (S/N: 511) analyzer was replaced with a Maxxam-supplied API 101E (S/N: 722) analyzer and an installation calibration was completed afterwards. • A repeat span check was initiated on September 11 to assess a suspect high daily span result, resulting in one hour of downtime. • On September 17, the analyzer spanned high. As a corrective action, the span check was repeated on September 18, followed by a repeat calibration on September 19. The calibration result met AMD requirements, therefore, no data was discarded. Six hours of downtime were recorded due to these events.

HYDROGEN SULPHIDE (H_2S)

October	• Operational time was 99.5%, equivalent to 4 hours of downtime. • A repeat calibration was performed on October 19 to address a biased high zero drift, resulting in four hours of downtime.
November	• Operational time was 99.3%, equivalent to 5 hours of downtime. • Two hours of downtime are a result of a scheduled maintenance event on November 1. • A repeat zero/span check was performed on November 19 to assess a biased low span drift, resulting in one hour of downtime. • An as-found response check was conducted on November 28, to assess a zero drift occurrence, resulting in two hours of downtime.
December	• Operational time was 98.3%, equivalent to 13 hours of downtime. • An additional zero/span check was performed on December 7 to assess a biased high span response. The result was beyond the upper acceptance limit, prompting the need for a repeat calibration on December 8. Seven hours of downtime were recorded. • On December 14 a removal calibration was performed on the Maxxam-supplied API 101E (S/N: 722) analyzer. The LICA-owned API 101E (S/N: 511) analyzer, which had been removed for maintenance in September 2016, was re-installed and a successful installation calibration was performed. Six hours of downtime were recorded due to the replacement event.

TOTAL HYDROCARBONS (THC)

January	• Operational time was 96.4%, equivalent to 27 hours of downtime. • The LICA-owned Thermo 51C (S/N: 436609739) analyzer malfunctioned on January 4. A successful shut down calibration was performed prior to removing the analyzer, resulting in twelve hours of downtime. • The replacement LICA-owned Thermo 51C (S/N: 436609738) analyzer was installed on January 4. The analyzer was allowed time to stabilize overnight prior to conducting the installation calibration on January 5. The LICA-owned zero air generator was also replaced with a Maxxam-supplied unit, in order to address required maintenance. Fourteen hours of downtime were recorded due to this event. • On January 22 one hour of data was invalidated as the analyzer was restarted to reset an alarm notification.
February	• No operational issues were identified this month.
March	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer was put into "Maintenance" mode on March 24 while the sample manifold was cleaned, resulting in one hour of downtime. • The Maxxam-supplied zero air generator was replaced with the LICA-owned zero air generator. The LICA-owned unit was removed in January 2016 for required repairs that were done at the Maxxam shop.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• Operational time was 97.9%, equivalent to 15 hours of downtime. • Thirteen hours of data collected between June 8 and June 9 were invalidated due to low gas pressure. The Hydrogen gas cylinder was replaced on June 9. • Two additional zero/span checks were performed on June 17 and 18 as the span valve was not closed properly following the June 16 monthly calibration. The valve was closed and the issue was fixed, but two hours of downtime were recorded due to the quality checks.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • One hour of data was discarded due to the annual maintenance that was performed on the analyzer on July 20. Both the shut-down and post-repair calibration results met AMD requirements. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• Operational time was 98.5%, equivalent to 11 hours of downtime. • Downtime was recorded on November 19 due to an analyzer flame-out event.
December	• Operational time was 99.1%, equivalent to 7 hours of downtime. • Downtime was recorded on December 20 due to an analyzer flame-out event.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

January	• Operational time was 90.6%, equivalent to 70 hours of downtime. • Between January 11 and 12 additional zero/span checks were performed to assess unstable zero span responses. On January 12, maintenance was performed to repair a leak in the zero air unit. Eight hours of downtime were incurred. • Additional zero/span checks were completed on January 15 and 19 as the analyzer continued to show biased high drift on the zero response. The span results remained within acceptance limits, but five hours of downtime were incurred due to the quality checks. • A repeat calibration was performed on January 20 accounting for eleven hours of downtime. Calibration results met AMD requirements therefore no data was discarded. An additional span verification was triggered on January 21 to assess analyzer performance, incurring two hours of downtime. • The unstable zero/span response persisted, prompting the removal of the LICA-owned API 200E (S/N: 593) following a successful shutdown on January 22. The Maxxam-supplied API 200A (S/N: 1899) was installed and allowed time to stabilize overnight prior to conducting the installation calibration on January 23. Twenty-seven hours of downtime were recorded due to this event. • On January 27, two additional zero/span checks were performed to assess the zero/span unit, resulting in two hours of downtime. An additional three hours of downtime were recorded in order to make adjustments to the zero/span system. • As a precaution, additional zero/span checks and a repeat calibration were performed on January 29 in order to assess the analyzer. On January 30 and 31 an additional span verification was triggered to ensure the analyzer was still functioning properly. Twelve hours of downtime were incurred due to the quality checks.
February	• No operational issues were identified this month.
March	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An additional zero/span check was performed on March 14 in response to a biased high span, resulting in one hour of downtime. • The analyzer was put into "Maintenance" mode on March 24 while the sample manifold was cleaned, resulting in one hour of downtime.
April	• Operational time was 96.4%, equivalent to 26 hours of downtime. • A calibration was attempted on April 14. However, the as-found high point did not meet AMD requirements. Troubleshooting was performed and the problem was traced to the sample filter assembly. Prior to the calibration attempt, the filter was changed. A proper seal was not achieved when the assembly was restored which produced the low as found value. No adjustments were made to the analyzer, so the multi-point calibration was completed on April 15 and met AMD requirements. Twenty-six hours of data collected between April 14 and April 15 were discarded due to this event. Data collection prior to April 14 was not impacted as the initial as-found failure was due to technician error and not analyzer performance. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

May	• Operational time was 99.9%, equivalent to 1 hour of downtime. • The analyzer spanned high on May 14. An additional span check was performed on May 15 to confirm the analyzer's functionality and the result was within acceptance limits.
June	• Operational time was 91.1%, equivalent to 64 hours of downtime. • A removal calibration was performed on the Maxxam-supplied API 200A (S/N: 1899) analyzer on June 15. The LICA-owned analyzer, API 200E (S/N: 592) which had been removed for maintenance in January 2016, was re-installed and allowed time to stabilize overnight. A successful installation calibration was performed on June 16. Eighteen hours of downtime was recorded. • The analyzer spanned low on June 21. Upon arrival at the station on June 22, a warning was found displayed on the analyzer screen. Two zero/span checks and an as found response check were performed and the results met AMD requirements. Five hours of downtime were recorded due to the additional quality checks. • It was determined that the analyzer required further maintenance. A successful removal calibration was performed on the LICA-owned API 200E (S/N: 592) analyzer on June 23. On June 24, a Maxxam-owned API 200A (S/N: 2166) analyzer was installed and a successful installation calibration was performed. A verification repeat multi-point calibration was performed on the same day due to suspect calibrator performance. Thirty-two hours of downtime were recorded. • Another multi-point calibration was completed on June 25 to verify the analyzer's performance. The calibration equipment had been cross-checked with a different zero air generator prior to this calibration. The calibration met AMD requirements. Nine hours of downtime were recorded due to the calibrator cross check and repeat calibration.
July	• Operational time was 98.3%, equivalent to 13 hours of downtime. • A removal calibration was performed on the Maxxam-supplied API 200A (S/N: 2166) analyzer on July 21. The LICA-owned analyzer, API 200E (S/N: 592) which had been removed for maintenance in June 2016, was re-installed and a successful installation calibration was performed. This analyzer swap was coordinated with the monthly calibration visit so no downtime was incurred. • The analyzer spanned high on July 24. Two additional zero/span checks were performed on July 25 and demonstrated the span response was unstable. This prompted an immediate station visit and upon arrival, a warning was found displayed on the analyzer screen. It was determined that the analyzer would require removal again. A stability check was performed with the high point of the GPT sequence to ensure the analyzer had not failed and the response was stable. Following this response check, a successful removal calibration was performed on the LICA-owned API 200E (S/N: 592) and an installation calibration was completed on the Maxxam-owned API 200A (S/N: 2166). Thirteen hours of downtime were recorded due to the additional quality checks. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

August	• Operational time was 98.1%, equivalent to 14 hours of downtime. • The analyzer spanned low on August 12. The span check was repeated but the result was outside acceptance limits. An as-found response check was performed on August 13, confirming analyzer performance. Five hours of downtime were incurred due to the additional quality checks. • Following a successful shut-down calibration on August 17, the Maxxam-supplied API 200A (S/N: 2166) was replaced with the LICA-owned API 200A (S/N: 2051) which was retrieved from the Bonnyville station on August 16. A new permeation tube was installed as this was the suspected source of the unstable span responses. Nine hours of downtime were incurred.
September	• No operational issues were identified this month.
October	• Operational time was 91.9%, equivalent to 60 hours of downtime. • The analyzer was observed to have elevated readings in the hour following the daily zero/span cycle. These elevated readings were caused by a delay of the reaction cell purging with ambient air and re-stabilizing at ambient baseline levels. Thirty-three hours of data were invalidated due to this issue. • Following a successful shut-down calibration on October 12, the LICA-owned API 200A (S/N: 2051) analyzer was replaced with the Maxxam-supplied API 200A (S/N: 1899) analyzer. The analyzer was allowed time to stabilize overnight and an installation calibration was completed on October 13. Seventeen hours of downtime were recorded due to analyzer replacement. • On October 17, an additional span check was performed to assess a biased high span drift, accounting for one hour of downtime. • A repeat calibration was performed on October 19 to update the expected span value, accounting for six hours of downtime. • On October 31 a repeat zero/span check and an as-found response check were performed to assess a high span drift. Three hours of downtime were attributed to these additional quality checks.
November	• Operational time was 99.0%, equivalent to 7 hours of downtime. • On November 6, an additional zero/span check was performed to assess a biased high span drift, accounting for one hour of downtime. • A repeat calibration was performed on November 16 to address the biased high span drift, accounting for six hours of downtime.
December	• No operational issues were identified this month.

WIND SPEED (WS)

January	• No operational issues were identified this month.
February	• No operational issues were identified this month.
March	• Operational time was 99.7%, equivalent to 2 hours of downtime. • The Met One wind system (S/N: H10703) was removed on March 24 and sent to the manufacturer for verification and calibration. A Maxxam-supplied RM Young (S/N: 110980) replacement was temporarily installed. Two hours of downtime were incurred.
April	• Operational time was 99.6%, equivalent to 3 hours of downtime. • On April 18 the Maxxam-supplied RM Young (S/N: 110980) was removed in order to install the LICA-owned Met One wind system (S/N: H10703). The Met One unit was verified and calibrated by the manufacturer on March 30, 2016. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• No operational issues were identified this month.
July	• No operational issues were identified this month. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• No operational issues were identified this month.
December	• Operational time was 99.9%, equivalent to 1 hour of downtime. • One hour of data collected on December 17 was invalidated as the data was anomalous. Review of the minute data bracketing the value does not support the validity of the data.

RELATIVE HUMIDITY (RH)

January	• No operational issues were identified this month.
February	• No operational issues were identified this month.
March	• No operational issues were identified this month.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• No operational issues were identified this month.
July	• No operational issues were identified this month. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• No operational issues were identified this month.
December	• No operational issues were identified this month.

BAROMETRIC PRESSURE (BP)

January	• No operational issues were identified this month.
February	• No operational issues were identified this month.
March	• No operational issues were identified this month.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• No operational issues were identified this month. • A barometer verification audit was performed on June 15.
July	• No operational issues were identified this month. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• No operational issues were identified this month.
December	• No operational issues were identified this month.

AMBIENT TEMPERATURE (TPX)

January	• No operational issues were identified this month.
February	• No operational issues were identified this month.
March	• No operational issues were identified this month.
April	• No operational issues were identified this month. • A temperature sensor audit was completed on April 18. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• No operational issues were identified this month.
June	• No operational issues were identified this month.
July	• No operational issues were identified this month. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• No operational issues were identified this month.
December	• No operational issues were identified this month.

PRECIPITATION

January	• No operational issues were identified this month.
February	• No operational issues were identified this month. • A quarterly precipitation sensor audit was completed on February 26.
March	• No operational issues were identified this month.
April	• No operational issues were identified this month. • An external station audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report.
May	• Operational time was 99.9%, equivalent to 1 hour of downtime. • A quarterly precipitation sensor audit was completed on May 17.
June	• No operational issues were identified this month.
July	• No operational issues were identified this month. • An internal station audit was performed on July 14. The audit report was included in the July 2016 monthly report.
August	• No operational issues were identified this month. • A quarterly precipitation sensor audit was completed on August 15.
September	• No operational issues were identified this month.
October	• No operational issues were identified this month.
November	• No operational issues were identified this month. • A quarterly precipitation sensor audit was completed on November 14.
December	• No operational issues were identified this month.

2.0 Project Personnel

Mike Bisaga was the contact for Lakeland Industry & Community Association and the Maxxam field sampling team consisted of Alexander Yakupov, Limin Li, Michael Espiritu and Chris Wesson.

3.0 Plant Monthly Required AMD Summary

All data collected during the monitoring period were within the objectives as outlined in the AAAQOs.

The operational uptime for all analyzers and meteorological system were above the 90% requirement.

4.0 Calculations and Results

All calculations and reporting of results follow the methods described in the Air Monitoring Directive, 1989, 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) as well as AMD 2015 and 2016.

5.0 Methods and Procedures

Met One Instruments: Operation Manual Document No. 50.5-9800
Maxxam AIR SOP-00208: RM Young Monitor Calibration
Maxxam AIR SOP-00209: Ambient Sulphur Monitoring
Maxxam AIR SOP-00211: Ambient SO_2 Monitoring
Maxxam AIR SOP-00213: Ambient NO/NO_2/NOx Monitoring
Maxxam AIR SOP-00214: Ambient Hydrocarbon (THC) Monitoring
Maxxam AIR SOP-00242: Precipitation Collector Installation /Maintenance

There were no deviations from the prescribed methods.

The following instruments were used to perform the test program:

Sulphur Dioxide - API 100A UV Flourescent Analyzer
Hydrogen Sulphide - API 101E UV Flourescent Analyzer
Total Hydrocarbons - Thermo 51C FID Analyzer
Oxides of Nitrogen - API 200E and API 200A Chemiluminescent Analyzer
Wind System - Met One Unit and RM Young
Relative Humidity - Met One Unit
Barometric Pressure - Met One Unit
Ambient Temperature - Met One Unit
Precipitation - Met One Unit
Datalogger - ESC 8832

APPENDIX I
CONTINUOUS MONITORING DATA RESULTS

SULPHUR DIOXIDE

SULPHUR DIOXIDE (SO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB SO_2)						OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 20	20 < C ≤ 60	60 < C ≤ 110	110 < C ≤ 170	170 < C ≤ 340	> 340	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0
February	658	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.7
March	707	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.4
April	679	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.4
May	709	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.3
June	684	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
July	689	97.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
August	696	98.4	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.4
September	678	99.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
October	704	99.5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.3
November	681	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
December	706	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	1.0
											ANNUAL AVERAGE		0.4

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

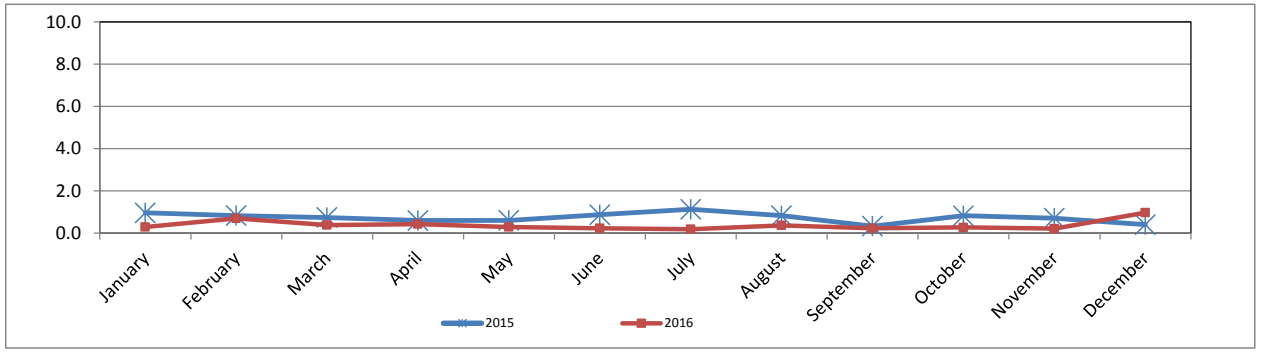
Alberta Ambient Air Quality Objectives Annual Average**	8.0	PPB
Annual Average for 2016	0.4	PPB

SULPHUR DIOXIDE (SO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

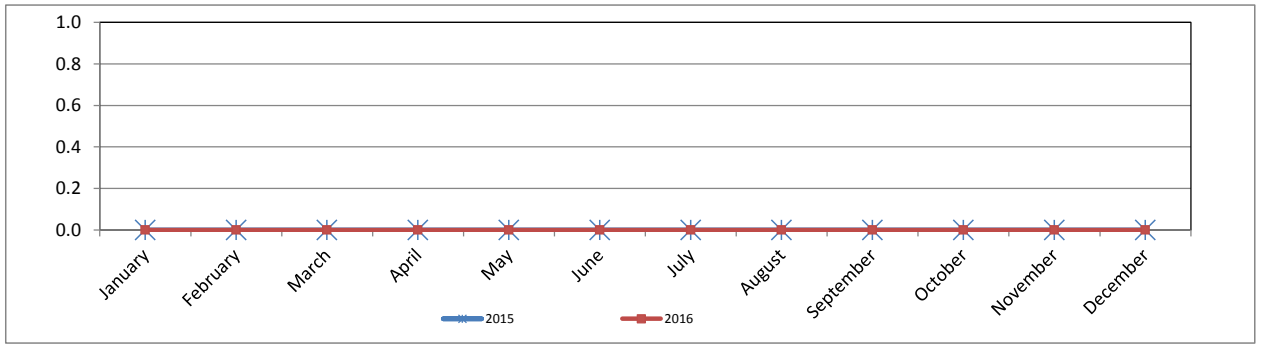
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**1**	0	14	0	0	10	1
February	1	0	17	0.7	0.0	13.4	0.1
March	1	0	**18**	0.4	0.0	11.1	0.4
April	1	0	8	0.4	0.0	**18.3**	0.2
May	1	0	9	0.3	0.0	11.1	0.3
June	1	0	8	0.2	0.0	8.9	0.6
July	**1**	0	10	0.2	0.0	4.8	0.9
August	1	0	11	0.4	0.0	9.5	0.4
September	0	0	5	0.2	0.0	11.3	0.1
October	1	0	12	0.3	0.0	10.8	0.6
November	1	0	7	0.2	0.0	8.1	0.5
December	0	0	14	**1.0**	0.0	14.7	-0.6

*Annual peak is bolded and highlighted.

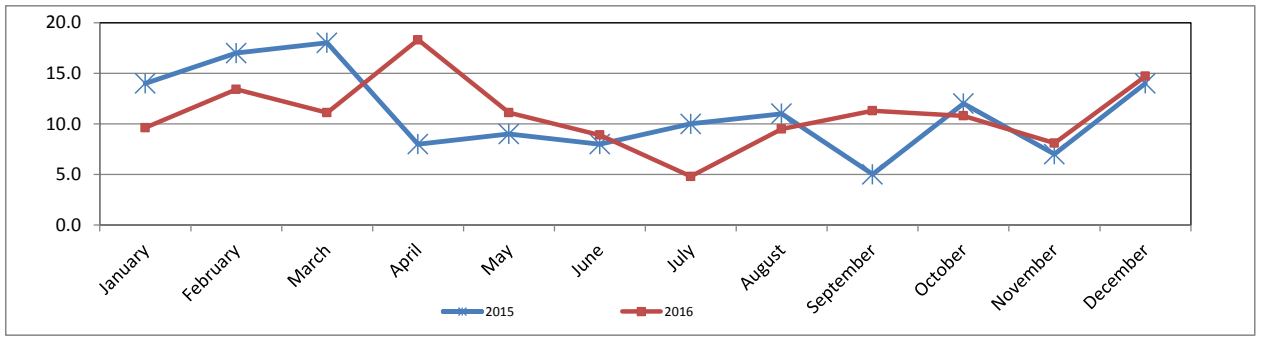
SULPHUR DIOXIDE (SO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



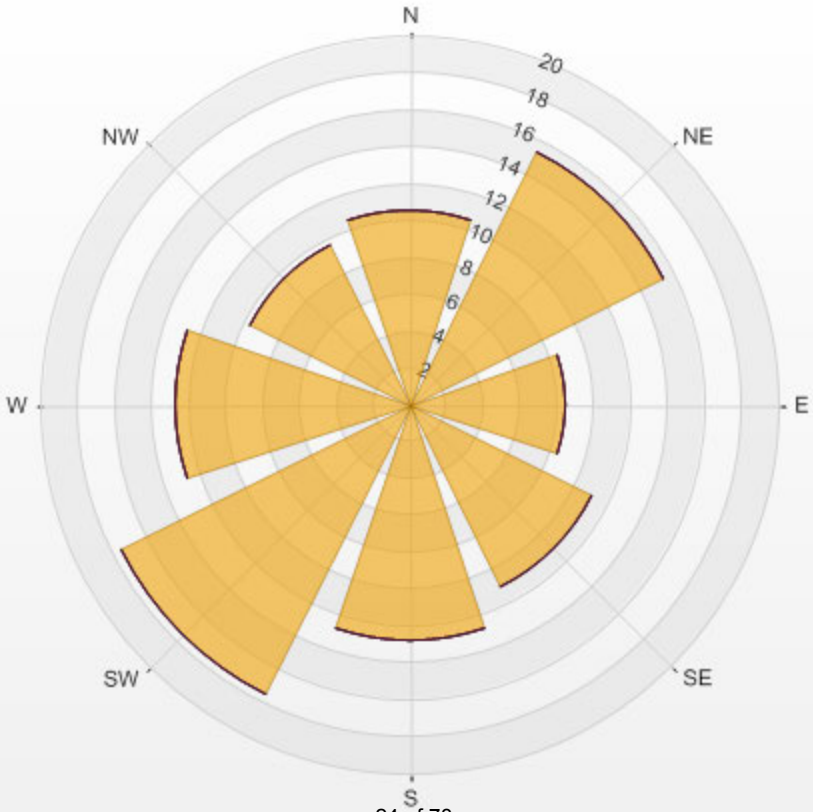
Wind: LICA MASKWA
Poll.: LICA MASKWA-SO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.80% Calm Avg: 0.07 [ppb]

Direction	0-20	20-60	60-110	110-170	170-340	>340.0	Total
N	10.5	0.0	0.0	0.0	0.0	0.0	10.5
NE	15.4	0.0	0.0	0.0	0.0	0.0	15.4
E	8.5	0.0	0.0	0.0	0.0	0.0	8.5
SE	11.1	0.0	0.0	0.0	0.0	0.0	11.1
S	12.7	0.0	0.0	0.0	0.0	0.0	12.7
SW	17.5	0.0	0.0	0.0	0.0	0.0	17.5
W	12.7	0.0	0.0	0.0	0.0	0.0	12.7
NW	9.7	0.0	0.0	0.0	0.0	0.0	9.7
Summary	98.2	0.0	0.0	0.0	0.0	0.0	98.2

% Icon Classes (ppb)	98 0-20	0 20-60	0 60-110	0 110-170	0 170-340	0 >340.0

LICA MASKWA Poll.: LICA MASKWA-SO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.80% Calm Poll Avg: 0.07[ppb]



HYDROGEN SULPHIDE

HYDROGEN SULPHIDE (H_2S) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB H_2S)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 3	4 < C ≤ 10	11 < C ≤ 50	> 50	1-HR	24-HR	1-HR	24-HR	
January	707	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0
February	652	98.9	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.4
March	708	99.9	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
April	682	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
May	709	100.0	99.7%	0.3%	0.0%	0.0%	10	3	0	0	0.1
June	683	99.9	99.9%	0.1%	0.0%	0.0%	10	3	0	0	0.1
July	683	97.6	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.2
August	695	98.4	99.6%	0.4%	0.0%	0.0%	10	3	0	0	0.4
September	674	99.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
October	704	99.5	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
November	678	99.3	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
December	694	98.3	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
									ANNUAL AVERAGE		0.1

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

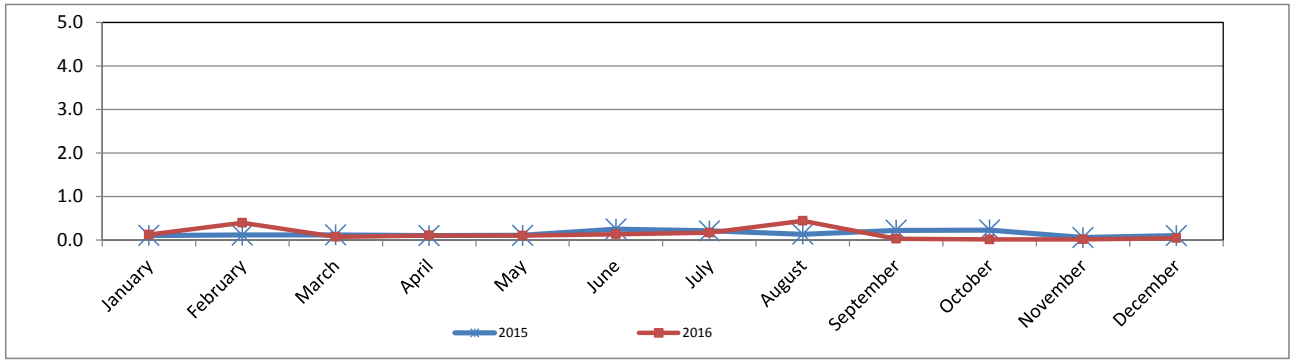
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.1	PPB

HYDROGEN SULPHIDE (H_2S) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

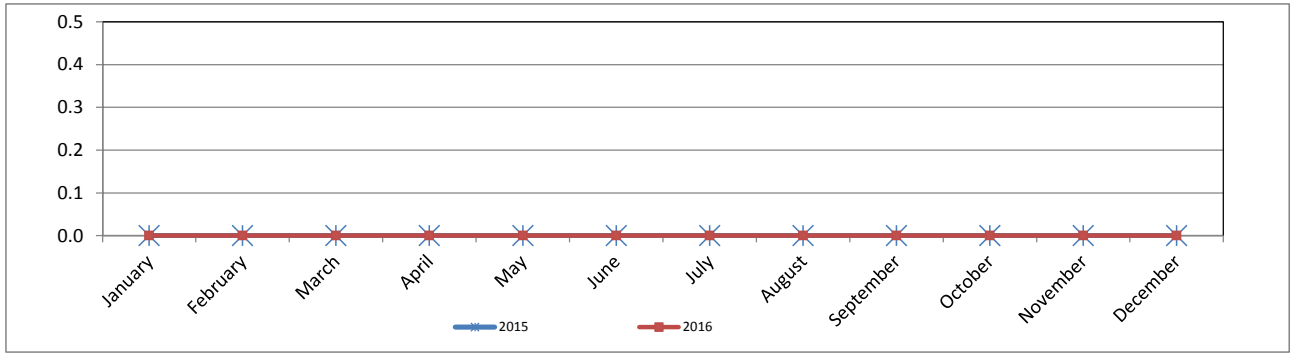
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0**	0	2	0	0	1	0
February	0	0	1	**0.4**	0.0	1.4	-0.3
March	0	0	1	0.1	0.0	1.4	0.0
April	0	0	1	0.1	0.0	2.8	0.0
May	0	0	4	0.1	0.0	**5.4**	0.0
June	0	0	**8**	0.1	0.0	4.2	0.1
July	0	0	3	0.2	0.0	2.4	0.0
August	0	0	5	0.4	0.0	4.0	-0.3
September	0	0	3	0.0	0.0	2.1	0.2
October	0	0	7	0.0	0.0	1.3	0.2
November	0	0	1	0.0	0.0	0.9	0.0
December	0	0	1	0.0	0.0	1.2	0.1

*Annual peak is bolded and highlighted.

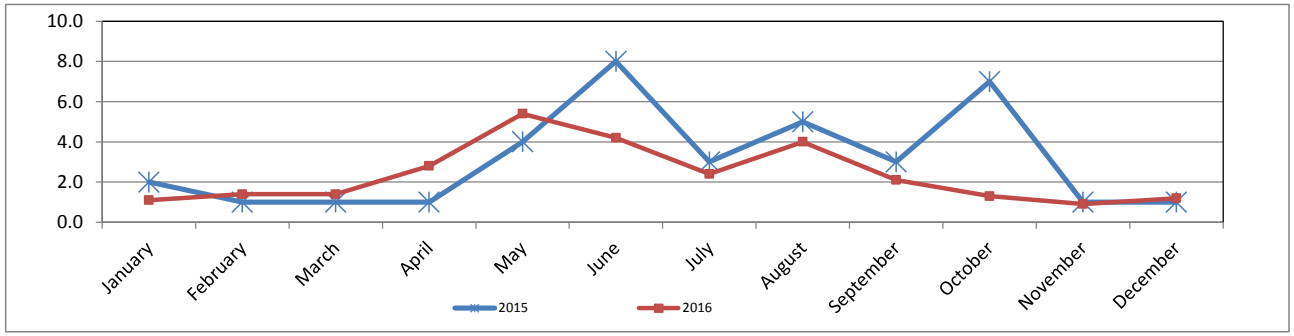
HYDROGEN SULPHIDE (H_2S) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



HYDROGEN SULPHIDE (H_2S) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



HYDROGEN SULPHIDE (H_2S) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



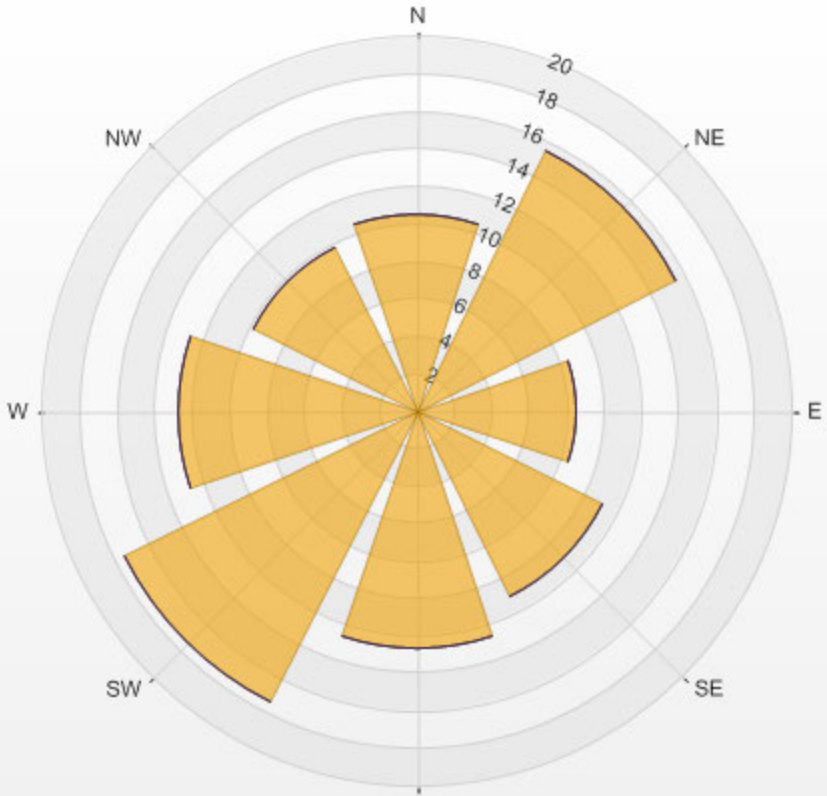
Wind: LICA MASKWA
Poll.: LICA MASKWA-H2S[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.79% Calm Avg: 0.21 [ppb]

Direction	0-3	3-10	10-50	>50.0	Total
N	10.5	0.0	0.0	0.0	10.5
NE	15.5	0.0	0.0	0.0	15.5
E	8.5	0.0	0.0	0.0	8.5
SE	11.1	0.0	0.0	0.0	11.1
S	12.7	0.0	0.0	0.0	12.7
SW	17.4	0.0	0.0	0.0	17.4
W	12.8	0.0	0.0	0.0	12.8
NW	9.7	0.0	0.0	0.0	9.7
Summary	98.2	0.1	0.0	0.0	98.2

%	Icon	Classes (ppb)	98	0-3	0	3-10	0	10-50	0	>50.0

LICA MASKWA Poll.: LICA MASKWA-H2S[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.79% Calm Poll Avg: 0.21[ppb]



TOTAL HYDROCARBON

TOTAL HYDROCARBONS (THC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM THC)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
January	677	96.4	99.9%	0.1%	0.0%	0.0%	-	-	-	-	2.27
February	662	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.20
March	705	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.20
April	682	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.16
May	709	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.08
June	669	97.9	99.9%	0.1%	0.0%	0.0%	-	-	-	-	2.04
July	704	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.07
August	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.06
September	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.12
October	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.15
November	676	98.5	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.21
December	700	99.1	98.6%	1.4%	0.0%	0.0%	-	-	-	-	2.26
									ANNUAL AVERAGE		2.15

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

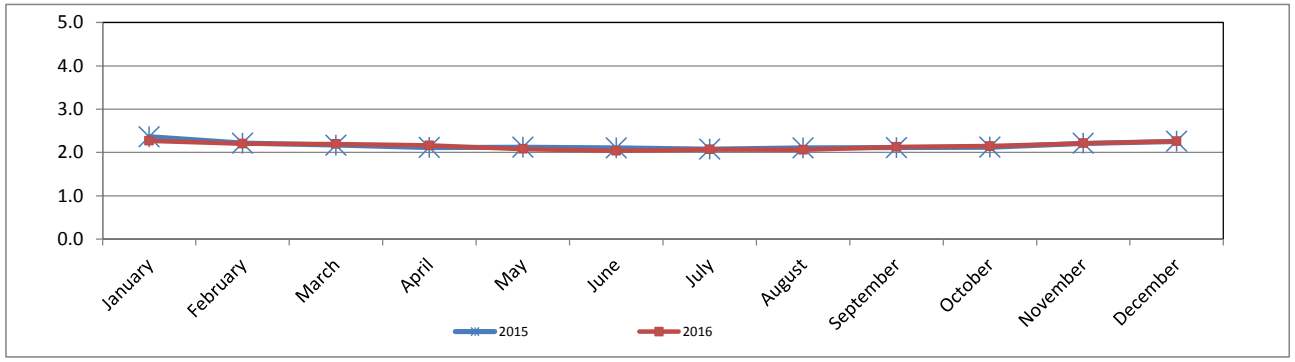
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.15	PPM

TOTAL HYDROCARBONS (THC) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

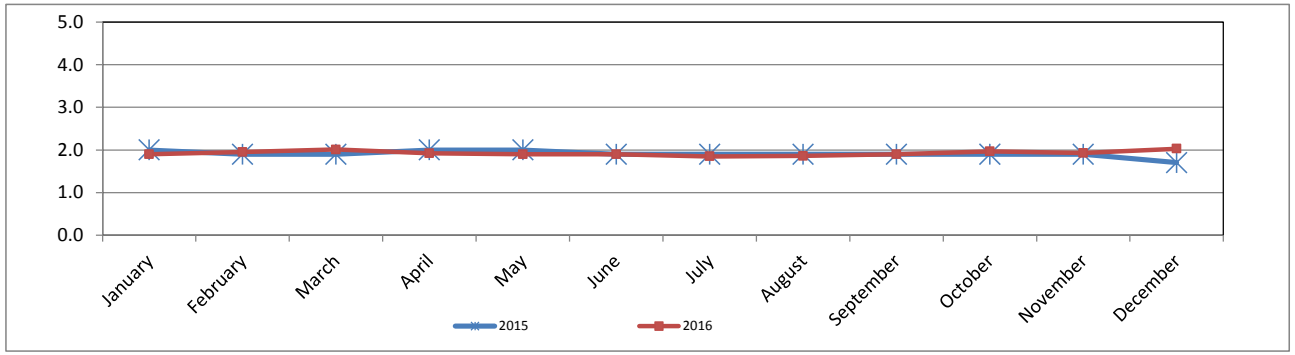
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**2.4**	2.0	5.1	**2.27**	1.90	3.30	0.09
February	2.2	1.9	**8.5**	2.20	1.95	2.71	0.01
March	2.2	1.9	2.9	2.20	2.01	2.65	-0.03
April	2.1	2.0	2.6	2.16	1.92	2.51	-0.05
May	2.1	2.0	2.7	2.08	1.90	2.91	0.04
June	2.1	1.9	5.3	2.04	1.90	**4.17**	0.06
July	2.1	1.9	2.7	2.07	1.85	2.81	0.01
August	2.1	1.9	2.9	2.06	1.86	2.64	0.04
September	2.1	1.9	2.6	2.12	1.90	2.61	-0.01
October	2.1	1.9	2.8	2.15	1.97	2.79	-0.03
November	2.2	1.9	4.0	2.21	1.93	3.55	0.00
December	2.3	1.7	4.2	2.26	2.03	3.45	0.00

*Annual peak is bolded and highlighted.

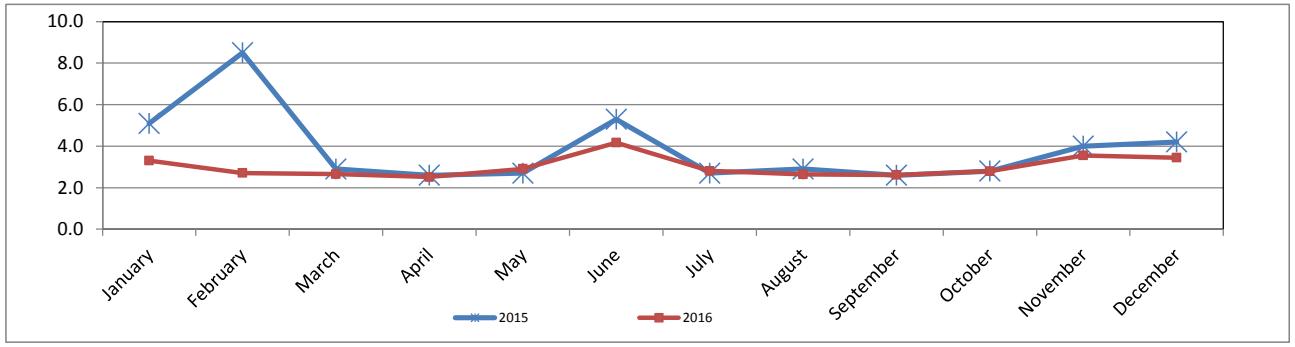
TOTAL HYDROCARBONS (THC) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM

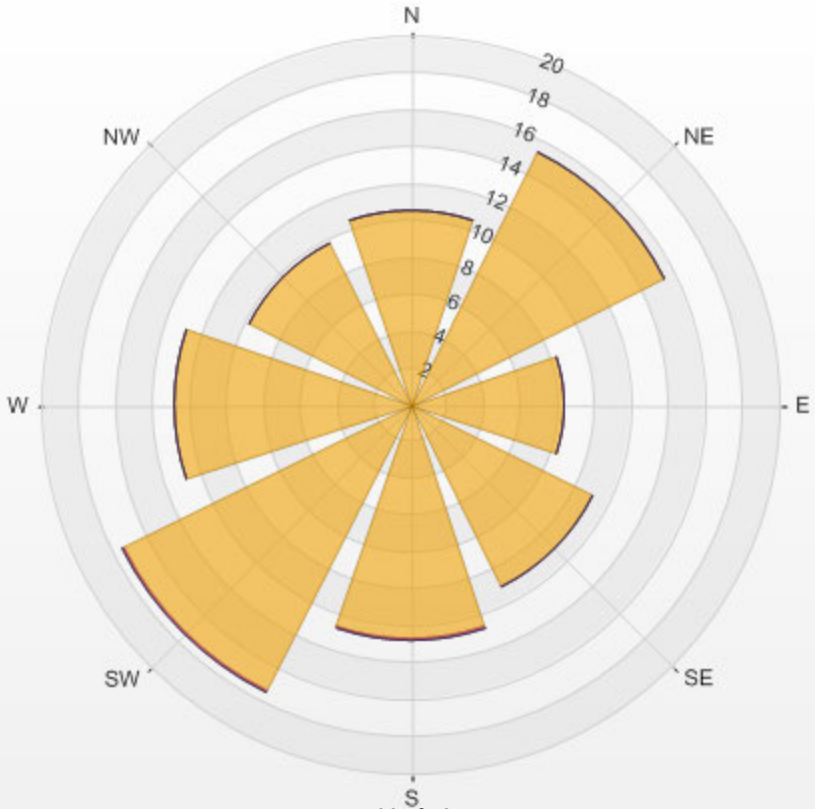


Wind: LICA MASKWA
Poll.: LICA MASKWA-THC[ppm]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.73% Calm Avg: 2.31 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	10.6	0.0	0.0	0.0	10.6
NE	15.4	0.0	0.0	0.0	15.4
E	8.3	0.0	0.0	0.0	8.3
SE	11.1	0.0	0.0	0.0	11.1
S	12.7	0.1	0.0	0.0	12.8
SW	17.4	0.1	0.0	0.0	17.5
W	12.8	0.0	0.0	0.0	12.8
NW	9.8	0.0	0.0	0.0	9.8
Summary	98.1	0.2	0.0	0.0	98.3

LICA MASKWA Poll.: LICA MASKWA-THC[ppm] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.73% Calm Poll Avg: 2.31[ppm]



OXIDES OF NITROGEN

OXIDES OF NITROGEN (NOx) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NOx)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	636	90.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.2
February	661	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.8
March	704	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.5
April	653	96.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.8
May	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.6
June	613	91.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.4
July	688	98.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.5
August	689	98.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.1
September	680	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.7
October	641	91.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.4
November	674	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.6
December	704	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.6
									ANNUAL AVERAGE		3.2

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

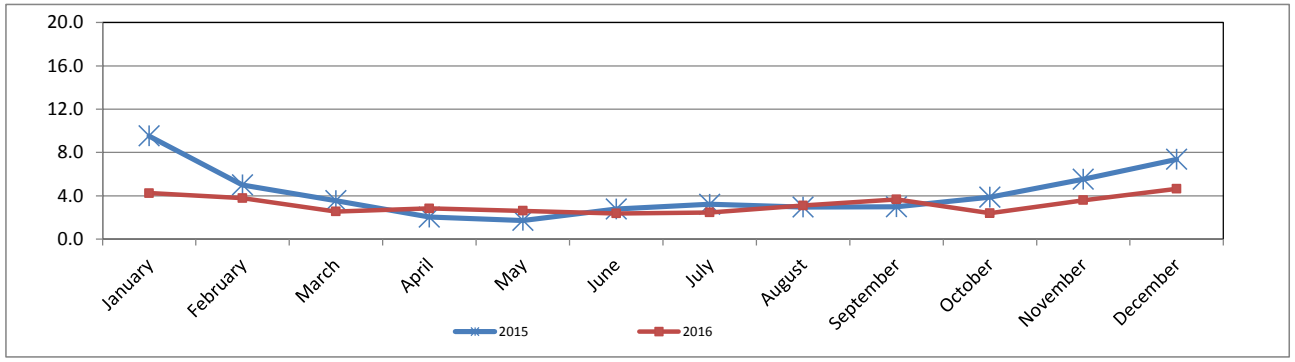
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	3.2	PPB

OXIDES OF NITROGEN (NOx) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

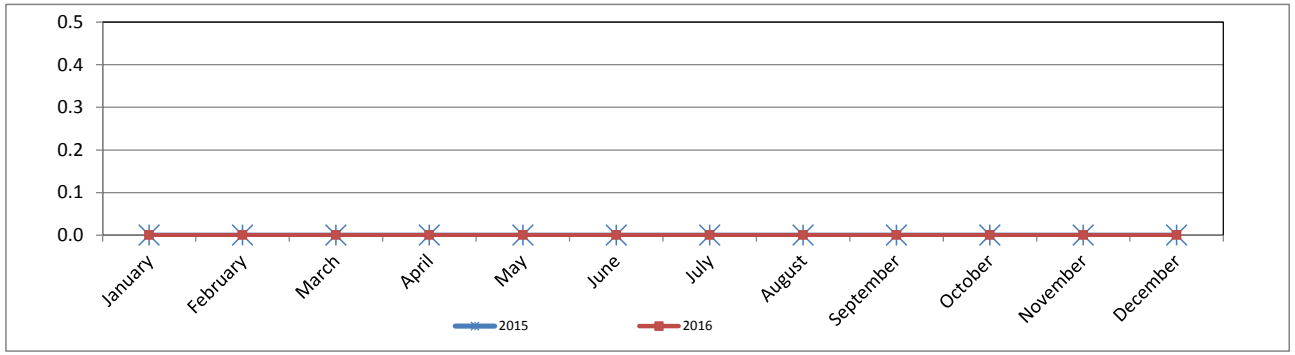
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**9.5**	0.0	**68.2**	4.2	0.0	29.0	5.3
February	5.0	0.0	32.0	3.8	0.0	27.8	1.2
March	3.5	0.0	36.9	2.5	0.0	26	1.0
April	2.0	0.0	26.0	2.8	0.0	32.9	-0.8
May	1.7	0.0	17.7	2.6	0.0	29.8	-0.9
June	2.8	0.0	24.1	2.4	0.0	19.5	0.4
July	3.2	0.0	28.3	2.5	0.0	**46.5**	0.8
August	3.0	0.0	36.3	3.1	0.0	35.3	-0.1
September	3.0	0.0	26.2	3.7	0.0	38.9	-0.7
October	3.9	0.0	29.2	2.4	0.0	22.3	1.5
November	5.5	0.0	40.8	3.6	0.0	20.8	1.9
December	7.4	0.0	53.0	**4.6**	0.0	20.3	2.7

*Annual peak is bolded and highlighted.

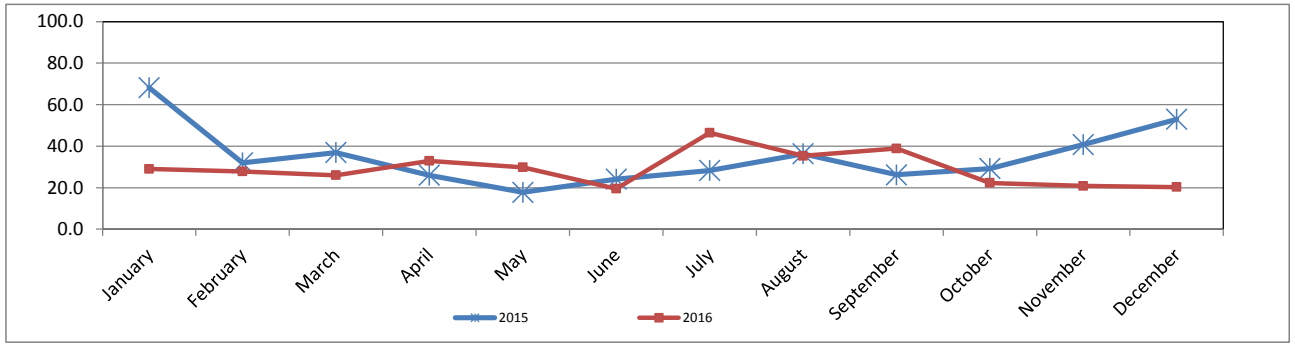
OXIDES OF NITROGEN (NOx) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OXIDES OF NITROGEN (NOx) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



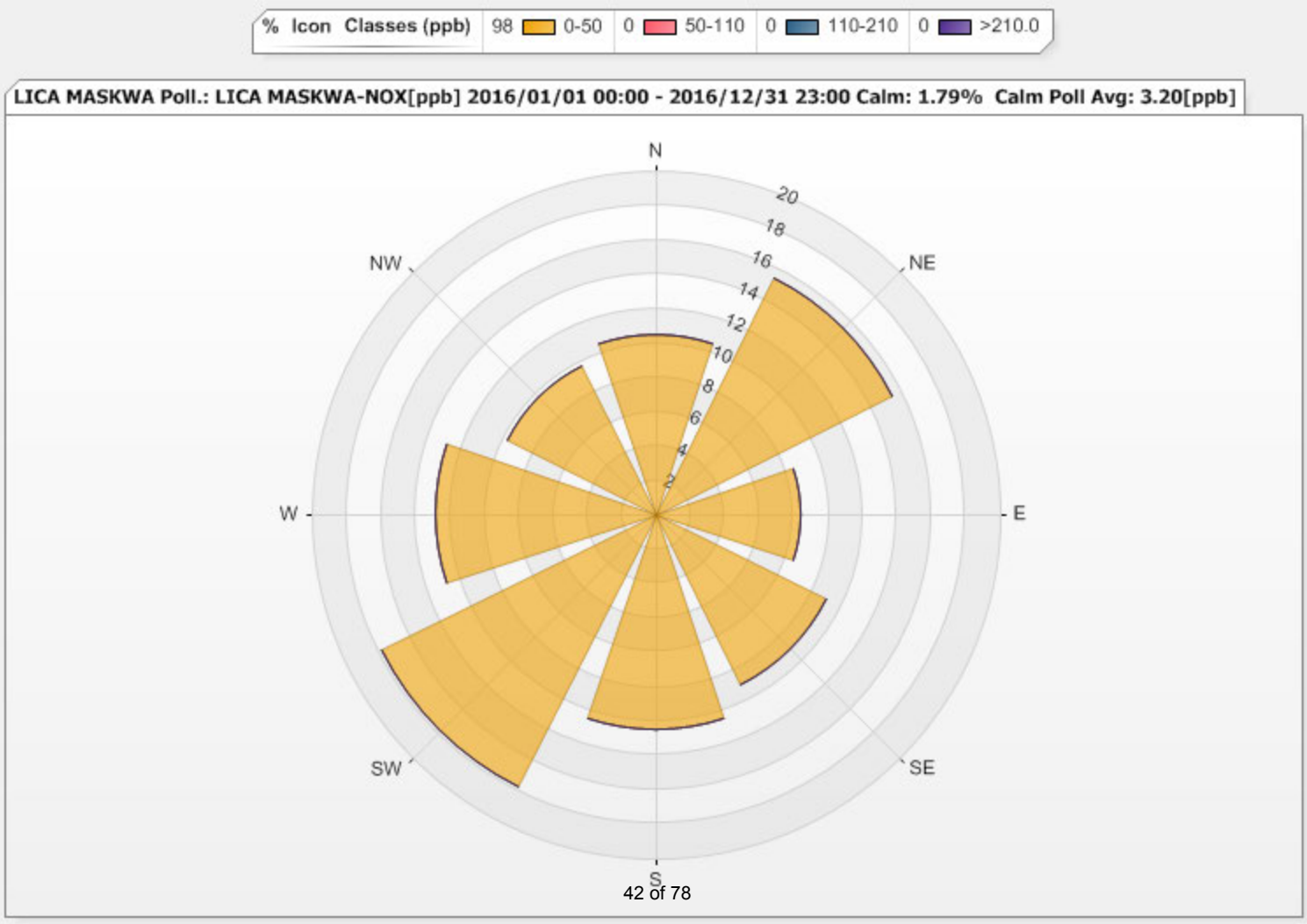
OXIDES OF NITROGEN (NOx) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA MASKWA
Poll.: LICA MASKWA-NOX[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.79% Calm Avg: 3.20 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	10.5	0.0	0.0	0.0	10.5
NE	15.4	0.0	0.0	0.0	15.4
E	8.5	0.0	0.0	0.0	8.5
SE	11.2	0.0	0.0	0.0	11.2
S	12.5	0.0	0.0	0.0	12.5
SW	17.8	0.0	0.0	0.0	17.8
W	12.8	0.0	0.0	0.0	12.8
NW	9.7	0.0	0.0	0.0	9.7
Summary	98.2	0.0	0.0	0.0	98.2


% Icon Classes (ppb)
98 0-50
0 50-110
0 110-210
0 >210.0
LICA MASKWA Poll.: LICA MASKWA-NOX[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.79% Calm Poll Avg: 3.20[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

NITRIC OXIDES

NITRIC OXIDE (NO) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	636	90.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
February	661	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.5
March	704	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
April	653	96.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
May	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
June	613	91.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
July	688	98.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
August	689	98.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.9
September	680	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.8
October	641	91.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.5
November	674	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
December	704	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
									ANNUAL AVERAGE		0.6

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

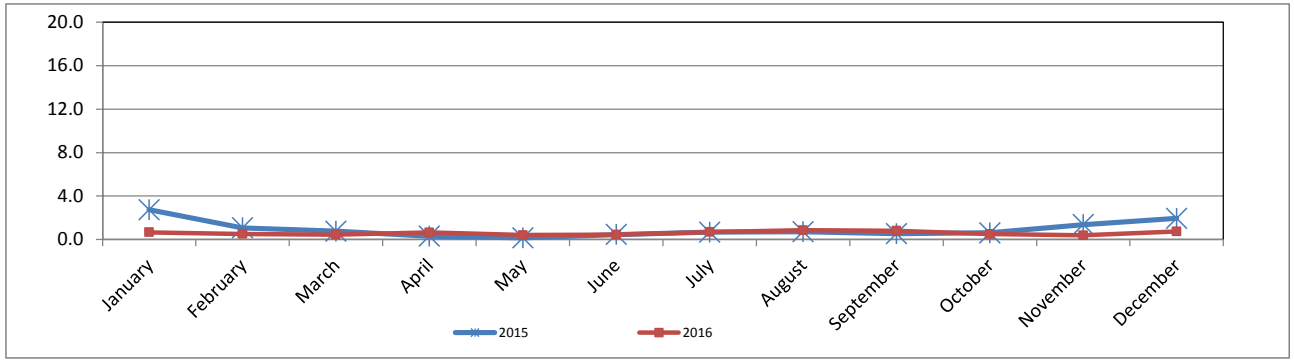
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.6	PPB

NITRIC OXIDE (NO) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

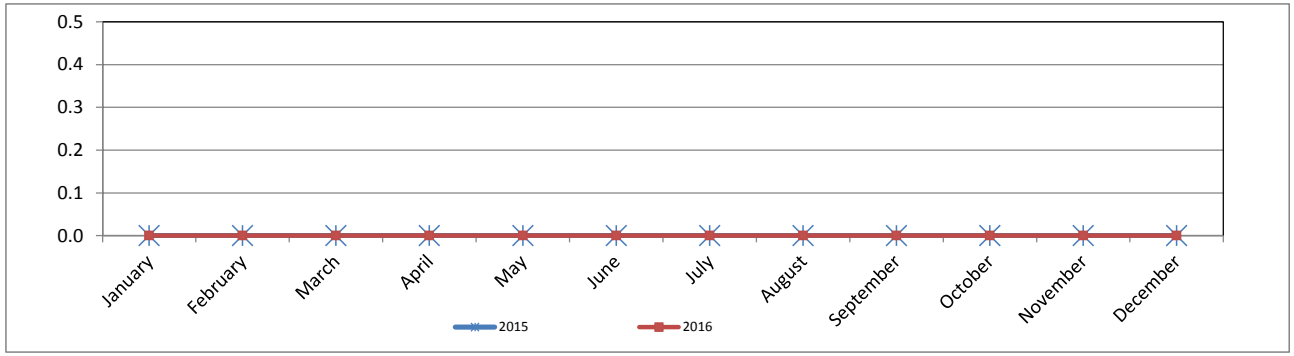
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**2.7**	0.0	**43.1**	0.7	0.0	16.2	2.1
February	1.1	0.0	13.6	0.5	0.0	11.7	0.6
March	0.8	0.0	16.7	0.4	0.0	12.3	0.3
April	0.3	0.0	9.6	0.7	0.0	17.5	-0.3
May	0.2	0.0	4.9	0.4	0.0	15.2	-0.2
June	0.5	0.0	12.1	0.4	0.0	5.6	0.0
July	0.7	0.0	16.0	0.7	0.0	**32.9**	0.0
August	0.7	0.0	20.9	**0.9**	0.0	23.6	-0.1
September	0.5	0.0	12.2	0.8	0.0	23.5	-0.3
October	0.6	0.0	13.0	0.5	0.0	11.3	0.1
November	1.4	0.0	27.2	0.4	0.0	7.1	1.0
December	2.0	0.0	36.0	0.7	0.0	8.3	1.2

*Annual peak is bolded and highlighted.

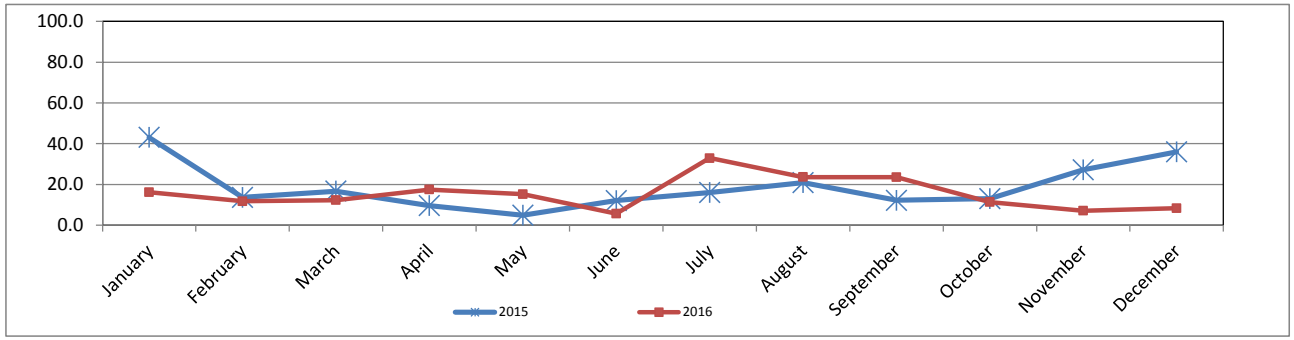
NITRIC OXIDE (NO) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITRIC OXIDE (NO) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



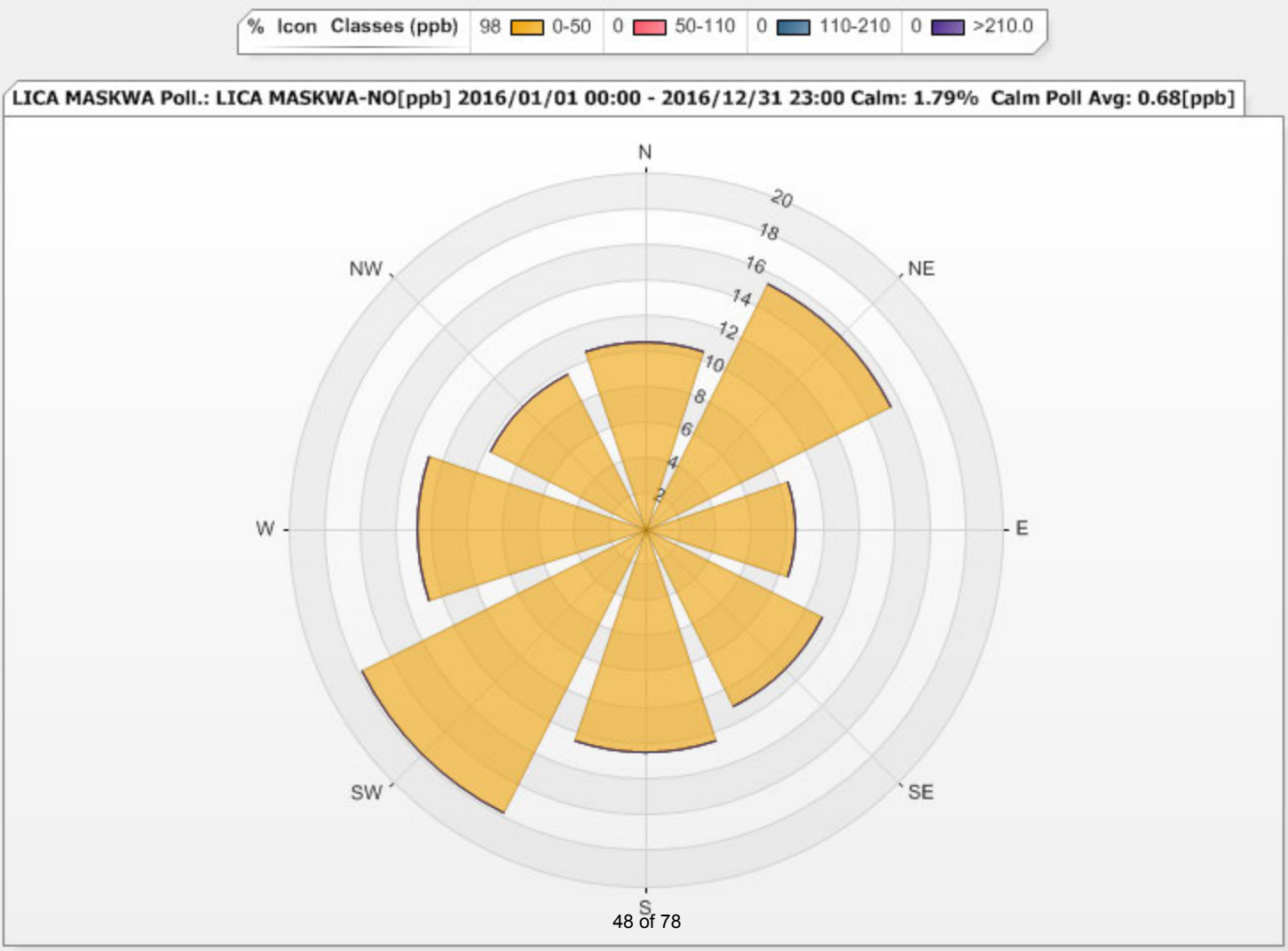
NITRIC OXIDE (NO) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA MASKWA
Poll.: LICA MASKWA-NO[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.79% Calm Avg: 0.68 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	10.5	0.0	0.0	0.0	10.5
NE	15.4	0.0	0.0	0.0	15.4
E	8.5	0.0	0.0	0.0	8.5
SE	11.2	0.0	0.0	0.0	11.2
S	12.5	0.0	0.0	0.0	12.5
SW	17.8	0.0	0.0	0.0	17.8
W	12.8	0.0	0.0	0.0	12.8
NW	9.7	0.0	0.0	0.0	9.7
Summary	98.2	0.0	0.0	0.0	98.2


% Icon Classes (ppb)
98 0-50
0 50-110
0 110-210
0 >210.0
LICA MASKWA Poll.: LICA MASKWA-NO[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.79% Calm Poll Avg: 0.68[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

NITROGEN DIOXIDE

NITROGEN DIOXIDE (NO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO_2)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	636	90.6	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.6
February	661	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.3
March	704	99.7	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.1
April	653	96.4	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.2
May	706	99.9	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.2
June	613	91.1	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.9
July	688	98.3	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.8
August	689	98.1	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.2
September	680	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.8
October	641	91.9	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.9
November	674	99.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.2
December	704	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.9
									ANNUAL AVERAGE		2.6

'*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

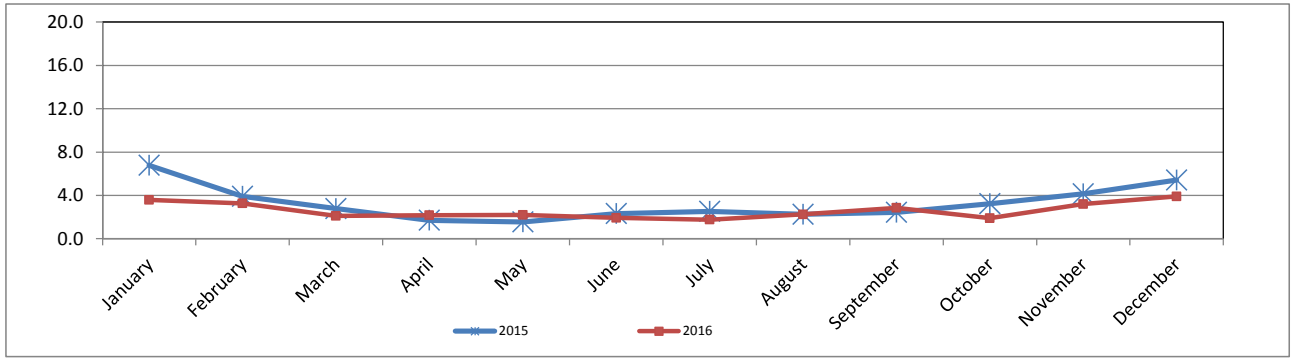
Alberta Ambient Air Quality Objectives Annual Average**	24	PPB
Annual Average for 2016	2.6	PPB

NITROGEN DIOXIDE (NO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

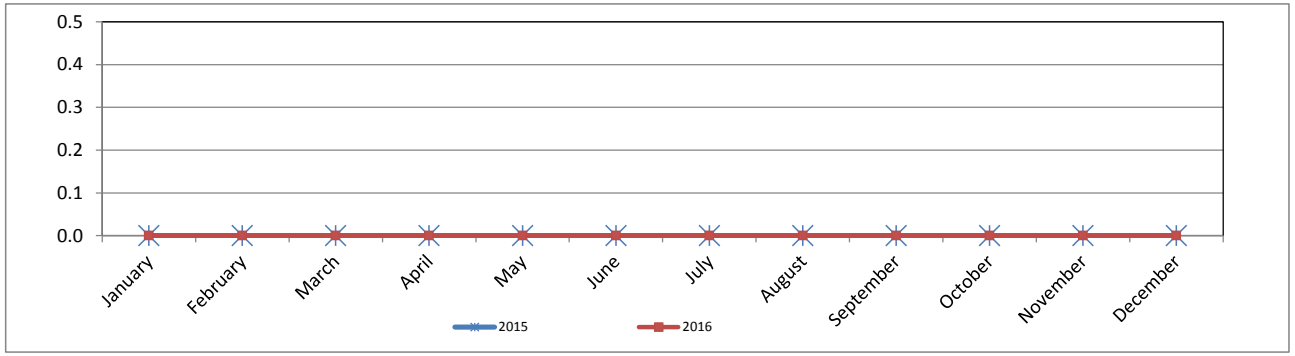
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**6.8**	0.0	**31.7**	3.6	0.0	19.7	3.2
February	3.9	0.0	20.2	3.3	0.0	19.9	0.7
March	2.8	0.0	26.5	2.1	0.0	25.3	0.7
April	1.7	0.0	16.4	2.2	0.0	**28.5**	-0.5
May	1.6	0.0	15.2	2.2	0.0	15.8	-0.6
June	2.3	0.0	16.0	1.9	0.0	14.9	0.4
July	2.5	0.0	19.6	1.8	0.0	13.6	0.8
August	2.2	0.0	22.1	2.2	0.0	12.5	0.0
September	2.4	0.0	15.3	2.8	0.0	19.8	-0.4
October	3.2	0.0	20.7	1.9	0.0	11.9	1.3
November	4.2	0.0	29.8	3.2	0.0	15.5	1.0
December	5.4	0.0	31.1	**3.9**	0.0	16.4	1.5

*Annual peak is bolded and highlighted.

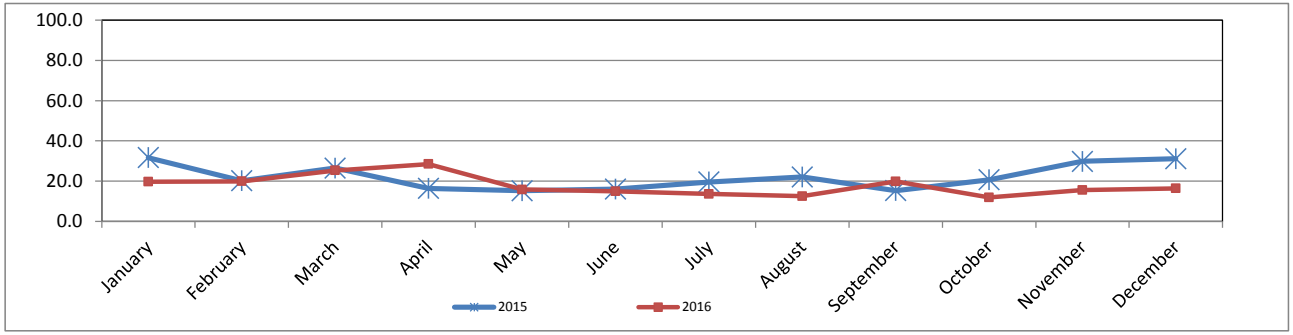
NITROGEN DIOXIDE (NO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



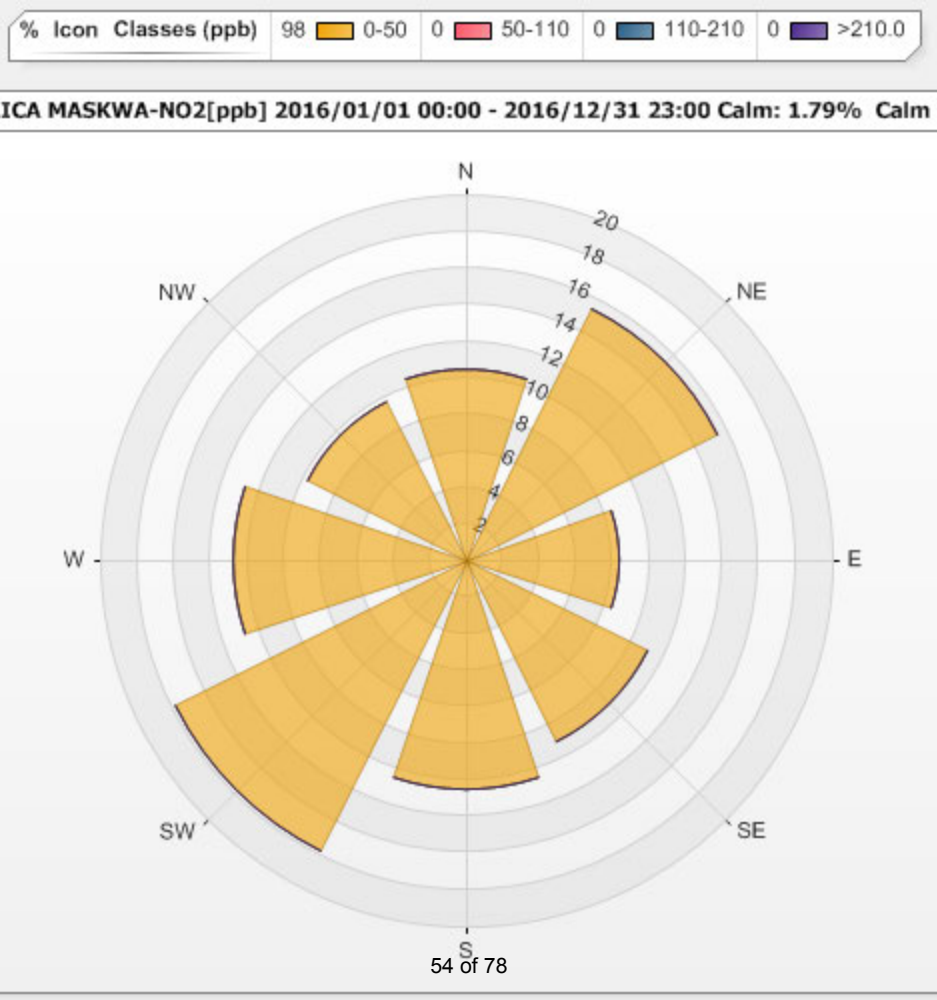
NITROGEN DIOXIDE (NO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA MASKWA
Poll.: LICA MASKWA-NO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.79% Calm Avg: 2.51 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	10.5	0.0	0.0	0.0	10.5
NE	15.4	0.0	0.0	0.0	15.4
E	8.5	0.0	0.0	0.0	8.5
SE	11.2	0.0	0.0	0.0	11.2
S	12.5	0.0	0.0	0.0	12.5
SW	17.8	0.0	0.0	0.0	17.8
W	12.8	0.0	0.0	0.0	12.8
NW	9.7	0.0	0.0	0.0	9.7
Summary	98.2	0.0	0.0	0.0	98.2


% Icon Classes (ppb)
98 0-50
0 50-110
0 110-210
0 >210.0
LICA MASKWA Poll.: LICA MASKWA-NO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 1.79% Calm Poll Avg: 2.51[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

WIND SPEED

WIND SPEED (WS) 2016 Monthly Data Summary of One Hour Readings

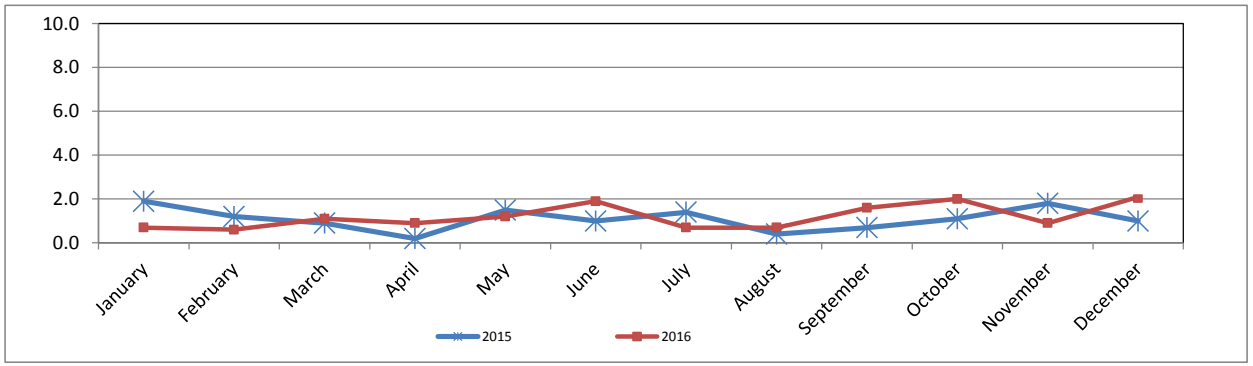
Month	Number of Readings*	Operational Time (%)	Monthly Average (KPH)	Minimum Hourly Average (KPH)	Maximum Hourly Average (KPH)	Maximum Daily Average (KPH)
January	744	100.0	0.7	0.1	15.9	9.0
February	696	100.0	0.6	0.0	19.7	9.5
March	742	99.7	1.1	0.0	14.2	8.9
April	717	99.6	0.9	0.1	18.4	8.9
May	744	100.0	1.2	0.0	18.0	11.5
June	720	100.0	1.9	0.0	17.0	11.7
July	744	100.0	0.7	0.1	12.6	6.4
August	744	100.0	0.7	0.1	20.2	11.3
September	720	100.0	1.6	0.2	14.1	9.2
October	744	100.0	2.0	0.1	15.5	11.0
November	720	100.0	0.9	0.1	12.1	7.3
December	743	99.9	2.0	0.1	14.8	8.3

WIND SPEED (WS) 2015 One-Hour Readings vs. 2016 One-Hour Readings in km/hr

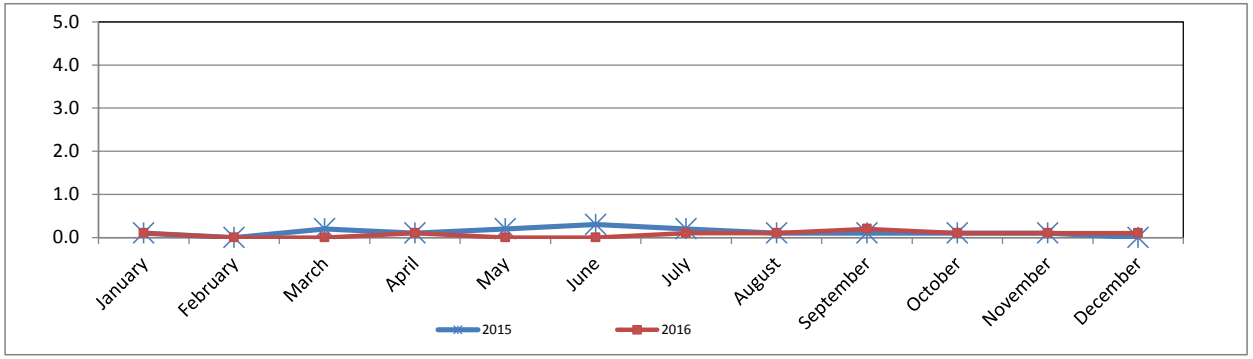
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**1.9**	0.1	18.4	0.7	0.1	15.9	1.2
February	1.2	0.0	12.7	0.6	0.0	19.7	0.6
March	0.9	0.2	**22.4**	1.1	0.0	14.2	-0.2
April	0.2	0.1	17.3	0.9	0.1	18.4	-0.7
May	1.5	0.2	19.2	1.2	0.0	18.0	0.3
June	1.0	0.3	13.9	1.9	0.0	17.0	-0.9
July	1.4	0.2	14.9	0.7	0.1	12.6	0.7
August	0.4	0.1	13.0	0.7	0.1	**20.2**	-0.3
September	0.7	0.1	15.5	1.6	0.2	14.1	-0.9
October	1.1	0.1	15.6	2.0	0.1	15.5	-0.9
November	1.8	0.1	13.2	0.9	0.1	12.1	0.9
December	1.0	0.0	9.3	**2.0**	0.1	14.8	-1.0

*Annual peak is bolded and highlighted.

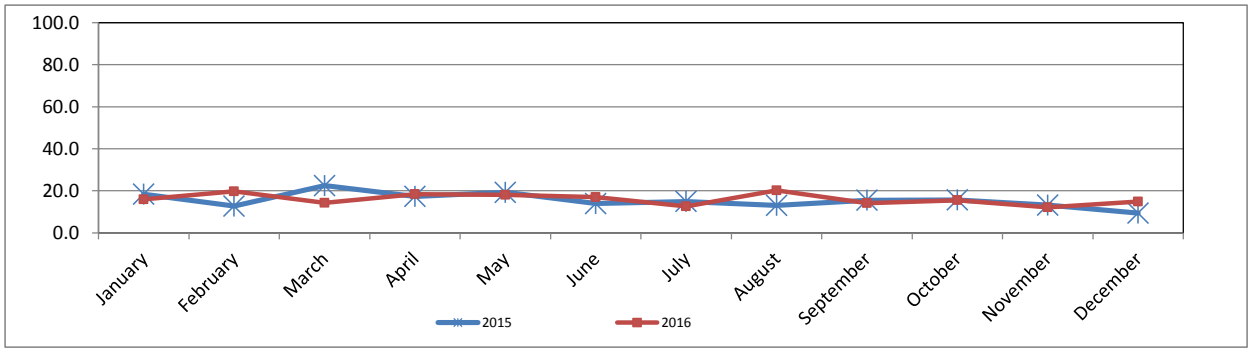
WIND SPEED (WS) 2015 Monthly Mean vs. 2016 Monthly Mean in km/hr



WIND SPEED (WS) 2015 Monthly Minimum vs. 2016 Monthly Minimum in km/hr



WIND SPEED (WS) 2015 Monthly Maximum vs. 2016 Monthly Maximum in km/hr



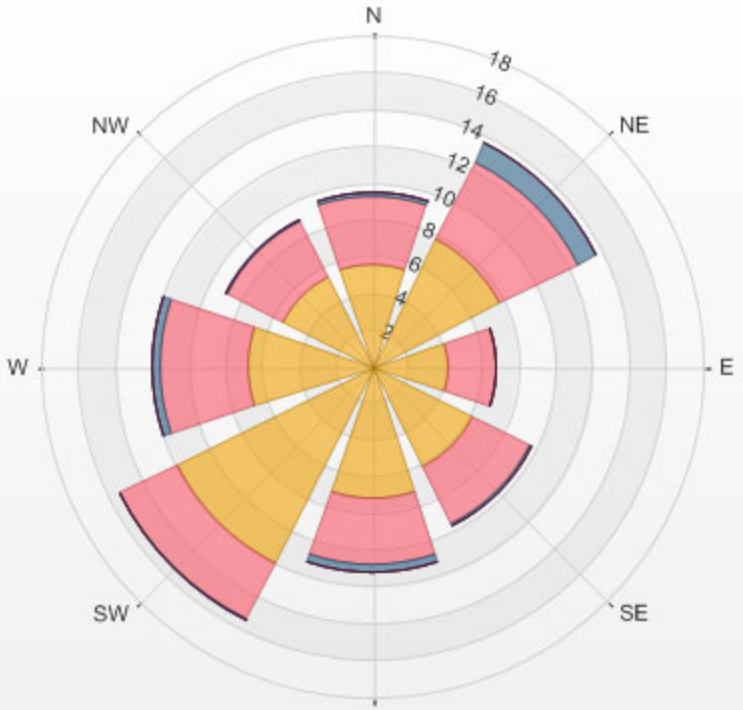
Wind: LICA MASKWA
Monitor: WSP [kph]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 12.79%

Direction	1.8-6.0	6.0-12.0	12.0-20.0	20.0-29.0	29.0-39.0	>39.0	Total
N	5.6	3.7	0.3	0.0	0.0	0.0	9.6
NE	7.8	4.7	1.1	0.0	0.0	0.0	13.6
E	4.1	2.6	0.0	0.0	0.0	0.0	6.7
SE	6.1	3.6	0.1	0.0	0.0	0.0	9.7
S	7.2	3.6	0.5	0.0	0.0	0.0	11.3
SW	11.9	3.4	0.1	0.0	0.0	0.0	15.4
W	6.8	4.8	0.4	0.0	0.0	0.0	12.0
NW	5.5	3.3	0.2	0.0	0.0	0.0	9.0
Summary	54.9	29.7	2.6	0.0	0.0	0.0	87.2

% Icon Classes (kph)	55 1.8-6.0	30 6.0-12.0	3 12.0-20.0	0 20.0-29.0	0 29.0-39.0	0 >39.0

LICA MASKWA 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 12.79% Calm Wind Avg Speed: 1.07(kph)



RELATIVE HUMIDITY

RELATIVE HUMIDITY (RH) 2016 Monthly Data Summary of One Hour Readings

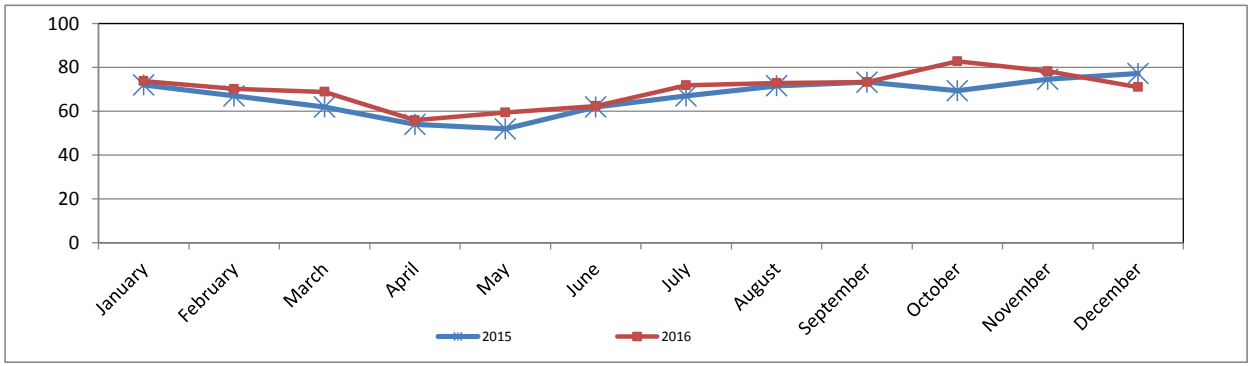
Month	Number of Readings*	Operational Time (%)	Monthly Average (%)	Minimum Hourly Average (%)	Maximum Hourly Average (%)	Maximum Daily Average (%)
January	744	100.0	74	42	88	84
February	696	100.0	70	34	89	86
March	744	100.0	69	25	90	86
April	720	100.0	56	10	91	85
May	744	100.0	59	10	93	89
June	720	100.0	62	16	93	83
July	744	100.0	72	29	94	85
August	744	100.0	73	28	94	89
September	720	100.0	73	31	93	87
October	744	100.0	83	49	93	92
November	720	100.0	78	32	92	89
December	744	100.0	71	46	89	86

RELATIVE HUMIDITY (RH) 2015 One-Hour Readings vs. 2016 One-Hour Readings in %

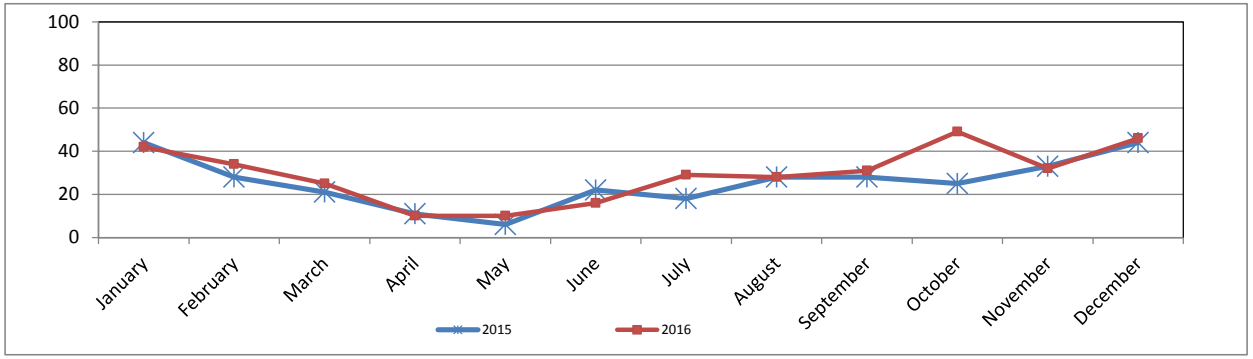
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	72	44	90	74	42	88	-2
February	67	28	88	70	34	89	-3
March	62	21	91	69	25	90	-7
April	54	11	91	56	10	91	-2
May	52	6	93	59	10	93	-7
June	62	22	**94**	62	16	93	0
July	67	18	94	72	29	**94**	-5
August	72	28	94	73	28	94	-1
September	73	28	93	73	31	93	0
October	69	25	92	**83**	49	93	-13
November	75	33	91	78	32	92	-4
December	**77**	44	90	71	46	89	6

*Annual peak is bolded and highlighted.

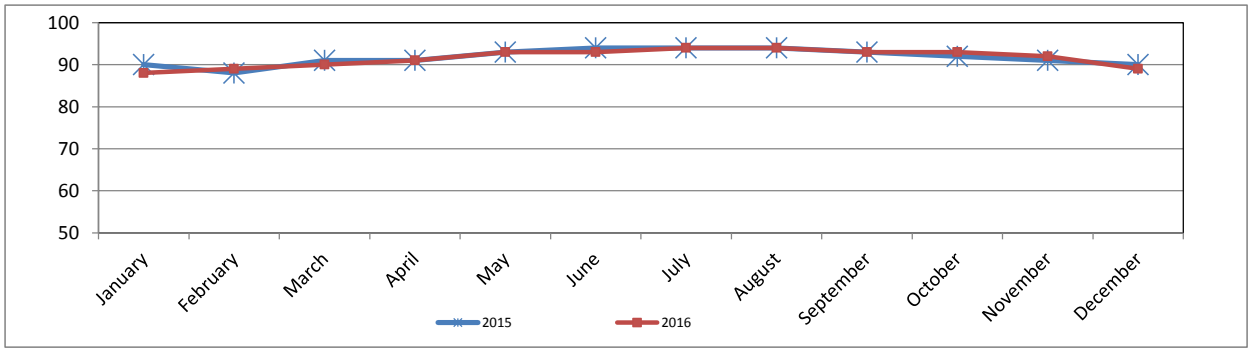
RELATIVE HUMIDITY (RH) 2015 Monthly Mean vs. 2016 Monthly Mean in %



RELATIVE HUMIDITY (RH) 2015 Monthly Minimum vs. 2016 Monthly Minimum in %



RELATIVE HUMIDITY (RH) 2015 Monthly Maximum vs. 2016 Monthly Maximum in %



BAROMETRIC PRESSURE

BAROMETRIC PRESSURE (BP) 2016 Monthly Data Summary of One Hour Readings

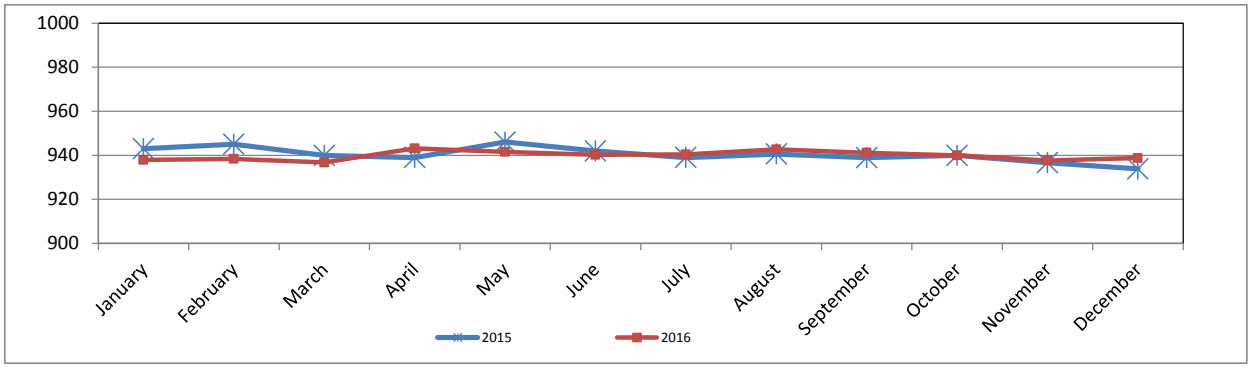
Month	Number of Readings*	Operational Time (%)	Monthly Average (millibar)	Minimum Hourly Average (millibar)	Maximum Hourly Average (millibar)	Maximum Daily Average (millibar)
January	744	100.0	938	917	951	950
February	696	100.0	938	914	958	951
March	744	100.0	937	915	954	953
April	720	100.0	943	922	955	954
May	744	100.0	941	921	959	956
June	720	100.0	940	925	952	951
July	744	100.0	940	933	951	949
August	744	100.0	943	928	954	952
September	720	100.0	941	924	955	953
October	744	100.0	940	920	953	951
November	720	100.0	938	920	955	953
December	744	100.0	939	916	965	964

BAROMETRIC PRESSURE (BP) 2015 One-Hour Readings vs. 2016 One-Hour Readings in millibar

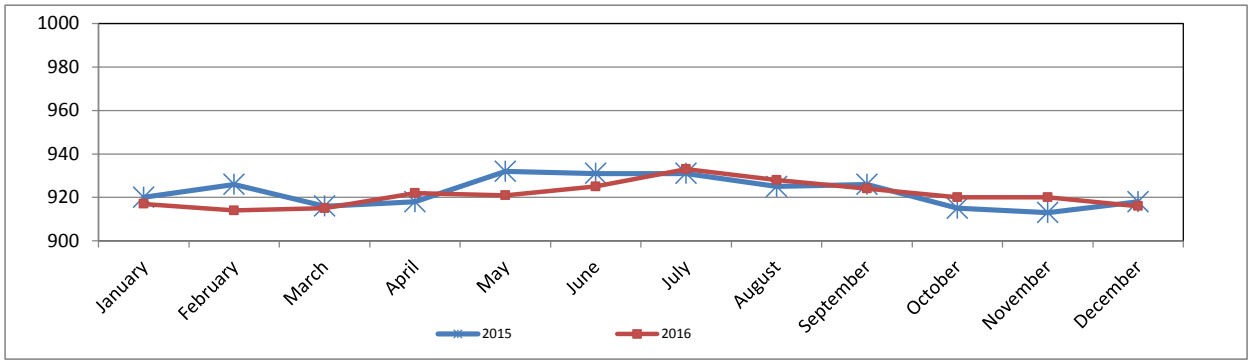
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	943	920	**971**	938	917	951	5
February	945	926	965	938	914	958	7
March	940	916	956	937	915	954	3
April	939	918	950	**943**	922	955	-4
May	**946**	932	959	941	921	959	5
June	942	931	951	940	925	952	2
July	939	931	949	940	933	951	-1
August	941	925	950	943	928	954	-2
September	939	926	949	941	924	955	-2
October	940	915	957	940	920	953	0
November	937	913	953	938	920	955	-1
December	934	918	955	939	916	**965**	-5

*Annual peak is bolded and highlighted.

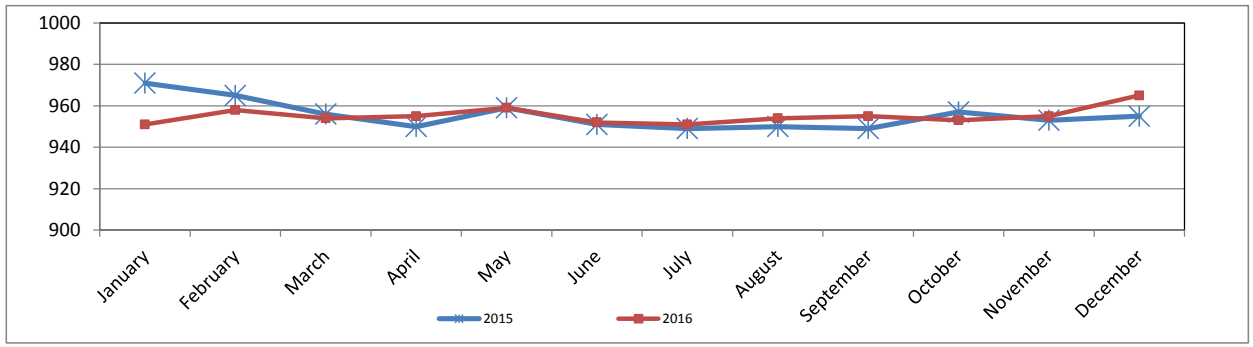
BAROMETRIC PRESSURE (BP) 2015 Monthly Mean vs. 2016 Monthly Mean in millibar



BAROMETRIC PRESSURE (BP) 2015 Monthly Minimum vs. 2016 Monthly Minimum in millibar



BAROMETRIC PRESSURE (BP) 2015 Monthly Maximum vs. 2016 Monthly Maximum in millibar



AMBIENT TEMPERATURE

AMBIENT TEMPERATURE (TPX) 2016 Monthly Data Summary of One Hour Readings

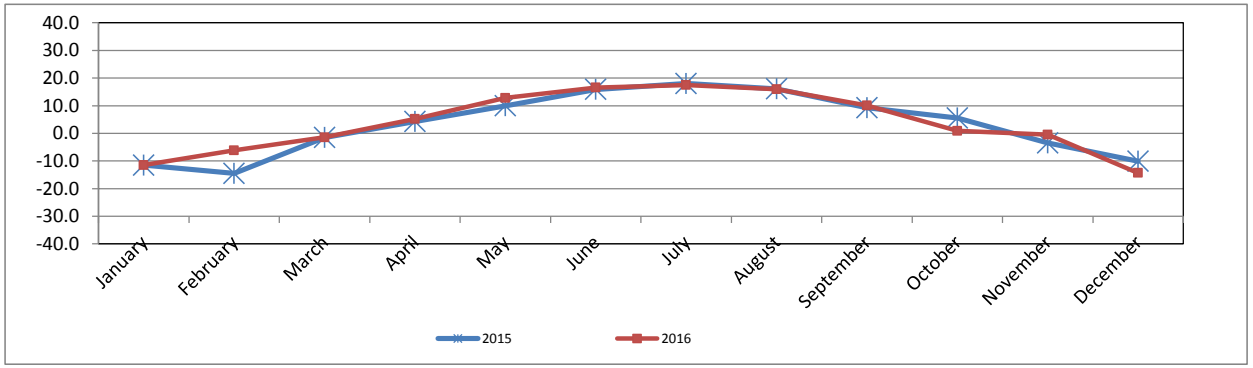
Month	Number of Readings*	Operational Time (%)	Monthly Average (Deg C)	Minimum Hourly Average (Deg C)	Maximum Hourly Average (Deg C)	Maximum Daily Average (Deg C)
January	744	100.0	-11.5	-33.7	5.8	1.8
February	696	100.0	-6.2	-30.9	12.3	4.4
March	744	100.0	-1.5	-18.2	14.3	6.9
April	720	100.0	5.2	-11.3	25.0	16.8
May	744	100.0	12.8	-5.8	30.6	20.6
June	720	100.0	16.6	2.6	28.9	21.3
July	744	100.0	17.5	6.7	28.8	20.6
August	744	100.0	16.0	1.2	29.7	19.1
September	720	100.0	10.1	-2.4	25.5	17.5
October	744	100.0	0.9	-5.8	14.6	7.7
November	720	100.0	-0.5	-12.3	16.4	7.6
December	744	100.0	-14.4	-35.1	2.9	-0.9

AMBIENT TEMPERATURE (TPX) 2015 One-Hour Readings vs. 2016 One-Hour Readings in Degrees Celsius

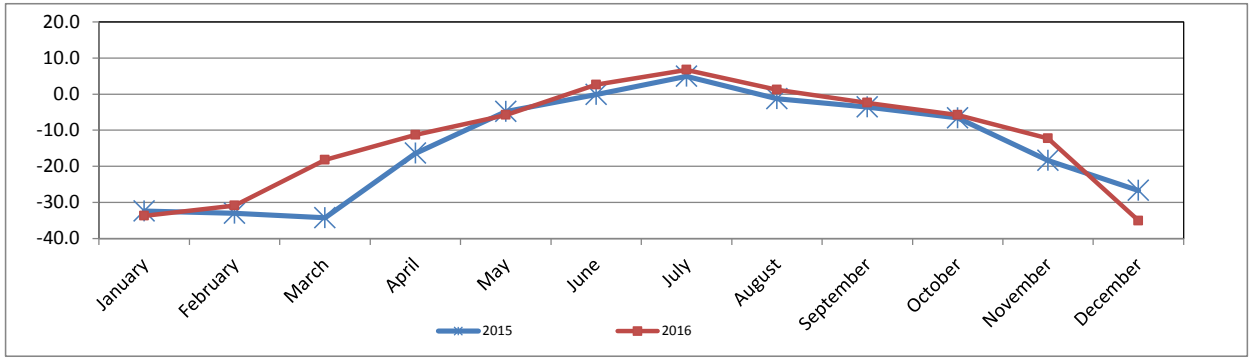
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	-11.5	-32.4	10.3	-11.5	-33.7	5.8	0.0
February	-14.5	-33.0	9.3	-6.2	-30.9	12.3	-8.3
March	-1.5	-34.3	14.9	-1.5	-18.2	14.3	0.0
April	4.3	-16.4	23.9	5.2	-11.3	25.0	-0.9
May	10.0	-4.8	28.2	12.8	-5.8	**30.6**	-2.8
June	15.9	-0.1	**32.5**	16.6	2.6	28.9	-0.7
July	**18.0**	4.9	31.1	**17.5**	6.7	28.8	0.5
August	16.1	-1.3	30.9	16.0	1.2	29.7	0.2
September	9.3	-3.6	25.7	10.1	-2.4	25.5	-0.8
October	5.6	-6.6	24.2	0.9	-5.8	14.6	4.7
November	-3.5	-18.4	7.4	-0.5	-12.3	16.4	-3.0
December	-10.1	-26.7	4.5	-14.4	-35.1	2.9	4.3

*Annual peak is bolded and highlighted.

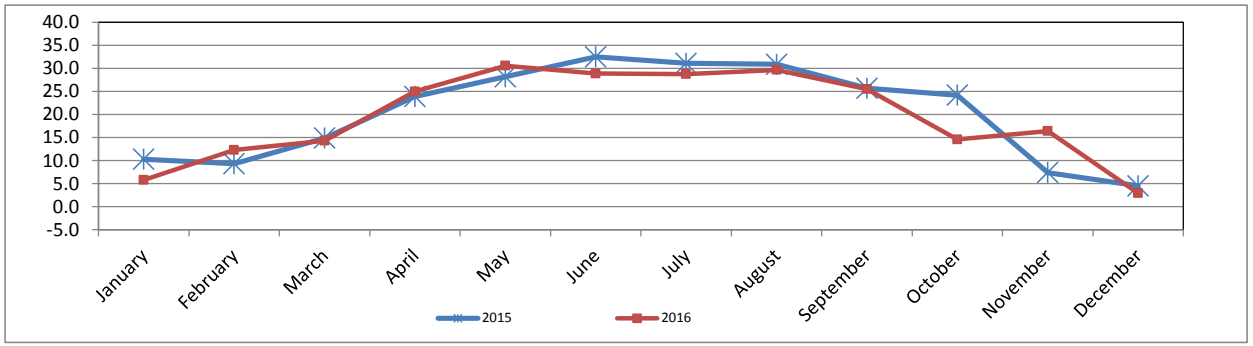
AMBIENT TEMPERATURE (TPX) 2015 Monthly Mean vs. 2016 Monthly Mean in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Minimum vs. 2016 Monthly Minimum in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Maximum vs. 2016 Monthly Maximum in Degrees Celsius



PRECIPITATION

PRECIPITATION 2016 Monthly Data Summary of One Hour Readings

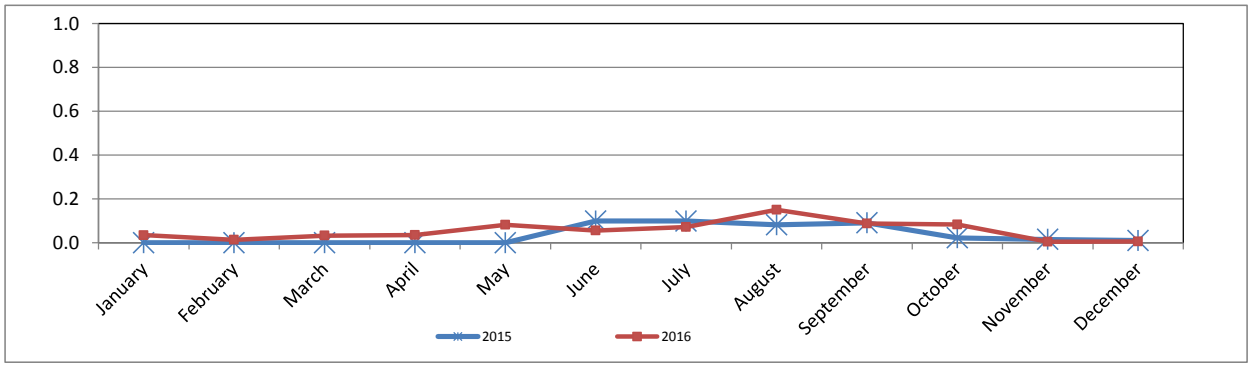
Month	Number of Readings*	Operational Time (%)	Monthly Average (MM)	Monthly Total (MM)	Maximum Hourly Average (MM)	Maximum Daily Average (MM)
January	744	100.0	0.0	26.1	1.6	0.4
February	696	100.0	0.0	9.6	0.6	0.1
March	744	100.0	0.0	24.6	2.6	0.4
April	720	100.0	0.0	26.0	4.5	0.5
May	743	99.9	0.1	61.6	7.0	1.0
June	720	100.0	0.1	40.6	4.3	0.2
July	744	100.0	0.1	54.1	6.2	0.5
August	744	100.0	0.2	112.3	24.2	2.9
September	720	100.0	0.1	63.5	13.3	1.2
October	744	100.0	0.1	62.6	6.2	0.8
November	720	100.0	0.0	3.4	1.1	0.1
December	744	100.0	0.0	4.9	0.3	0.1

PRECIPITATION 2015 One-Hour Readings vs. 2016 One-Hour Readings in MM

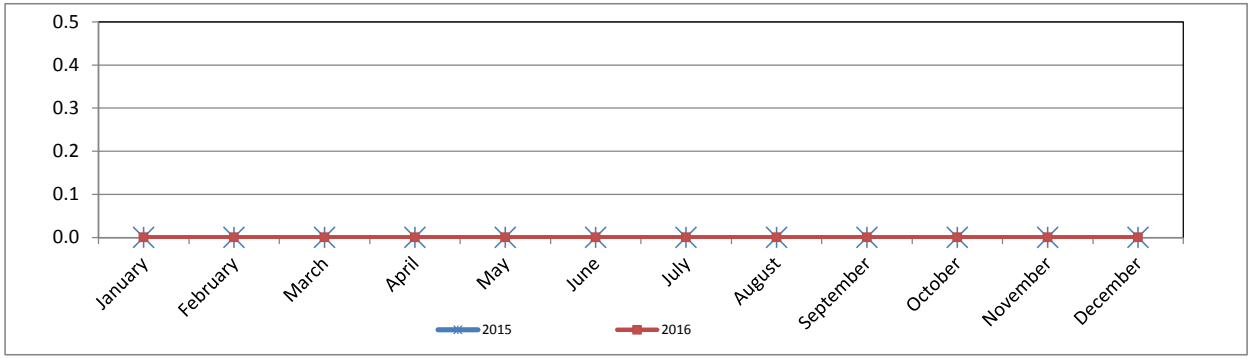
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	0.0	0.0	1.6	0.0	0.0	1.6	0.0
February	0.0	0.0	1.0	0.0	0.0	0.6	0.0
March	0.0	0.0	0.6	0.0	0.0	2.6	0.0
April	0.0	0.0	4.6	0.0	0.0	4.5	0.0
May	0.0	0.0	3.3	0.1	0.0	7.0	-0.1
June	**0.1**	0.0	7.4	0.1	0.0	4.3	0.0
July	0.1	0.0	5.4	0.1	0.0	6.2	0.0
August	0.1	0.0	**7.6**	**0.2**	0.0	**24.2**	-0.1
September	0.1	0.0	6.9	0.1	0.0	13.3	0.0
October	0.0	0.0	2.1	0.1	0.0	6.2	-0.1
November	0.0	0.0	2.1	0.0	0.0	1.1	0.0
December	0.0	0.0	0.8	0.0	0.0	0.3	0.0

*Annual peak is bolded and highlighted.

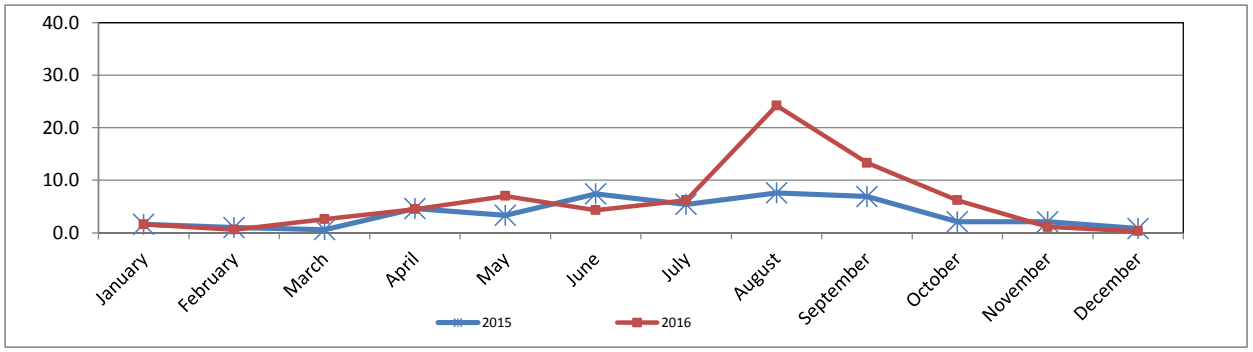
PRECIPITATION 2015 Monthly Mean vs. 2016 Monthly Mean in MM



PRECIPITATION 2015 Monthly Minimum vs. 2016 Monthly Minimum in MM



PRECIPITATION 2015 Monthly Maximum vs. 2016 Monthly Maximum in MM



APPENDIX II
REPORT CERTIFICATION FORM

Report Certification Form

Alberta Airshed (if applicable)	**EPA Approval or Code of Practice Registration #** (if applicable)
YES	NA
Company Name (if applicable)	**Industrial Operation Name** (if applicable)
Lakeland Industry & Community Association	Maskwa Continuous Monitoring Station
Name of the Representative of the Person Responsible (Last, First, Middle)	**Position / Title of the Representative of the Person Responsible**
Maram Ghaleb	Project Manager, Customer Service, Air Services
Is an External Party Certifying the Report? (If 'Yes', fill in the fields below for the external person.	
☐ **Yes** ☒ **No**	
Name of External Person Certifying the Report (Last, First, Middle)	**Position / Title of External Person Certifying the Report**
NA	NA
Company Name for the External Person Certifying the Report	**Identification of Qualifications / Professional Designations of the External Person Certifying the Report**
NA	NA

I certify that I have reviewed and verified the submitted report. I also certify that the report presented with this certification form is complete, accurate and representative of the monitoring results and timeframe.

Maram Ghaleb

Signature of the Representative of the Person Responsible / External Person Certifying the Report

October 24, 2017

Report Issued Date (dd-mm-yyyy)

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Alberta Environment and Parks (AEP)
Air.Reporting@gov.ab.ca

January 2, 2018

Subject: Annual Report Submission for LICA St. Lina Station

Lakeland Industry & Community Association (LICA) is pleased to submit the ambient air monitoring annual report conducted at the St. Lina Station in the year of 2016.

The air monitoring program consists of continuous air monitoring results for Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Hydrocarbon (THC), Oxides of Nitrogen (NOx), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter 2.5 ($PM_{2.5}$), Relative Humidity (RH), Barometric Pressure (BP), Precipitation, Ambient Temperature (AmbTPX), Wind Speed (WS), Wind Direction (WD) and Standard Deviation Wind Direction (STDWD).

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Review and Prepared By	Electronic Submission Conducted By
Continuous ambient air	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics

Notification of Changes Made After Monthly Report Issuance

- Wind Speed Calculated Averages: calculated averages, in the 2016 monthly reports, were presented as arithmetic averages of the individual hourly data. When comparing averages for 24-Hr, hourly/month and monthly statistics, the arithmetic averages will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.
- May Monthly Report: The operational time for PM2.5 was originally reported as 95.2%. During annual review, the operation time was revised to 95.8% due to changes in how data was flagged on May 9 and 11, between the hours of 07:00 and 16:00. The monthly average was originally reported as 9.5ug/m3 rather than 9.3ug/m3. The hourly average for May 15, hour 23:00 was originally reported as 99.0ug/m3. The average was revised to 68.4ug/m3, reverting one recorded exceedance to zero events.
- September Monthly Report: The operational time for Wind Direction was originally reported as 99.7%. During annual review this was revised to 100.0% as the removal of the Met One wind system occurred during scheduled calibration time.

As the LICA Environmental Program Manager and Data & Reporting Specialist, we certify that we 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. We also certify all air data that are required by the AMD to be electronically submitted to AEP and Alberta's Ambient Air Quality Data Warehouse have been submitted by the time of this report submission.

Should you have any questions, please don't hesitate to contact us.

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Respectfully,

Michael Bisaga
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AMBIENT AIR MONITORING ANNUAL REPORT

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

ST. LINA SITE

JOB #: 2833-2016-31-A

JANUARY - DECEMBER
2016

Prepared for:

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION
5107 50 ST.
BONNYVILLE, ALBERTA
T9N 2J5

Attention: MIKE BISAGA

DATE: **January 2, 2018**

Prepared by: Maram Ghaleb

Maram Ghaleb BSc.
Project Manager, Customer Service - Air Services

Reviewed by: Cheri Sinclair

Cheri Sinclair, B.Sc.
Supervisor, Customer Service - Air Services

SUMMARY

In 2016, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the St. Lina Continuous Monitoring Station, near Bonnyville, Alberta. The monitoring station provides continuous meteorological measurements and air quality data for non-compliance parameters, as requested by Lakeland Industry & Community Association.

Data presented in this report has undergone the Post-Final Validation Procedures, which includes a cursory inspection of annual charts. If errors or omissions in the data are suspected or discovered after the initial submittal of data (monthly report), the post-validation step serves to re-evaluate the affected data. The report certification form is also included in this report to verify that the annual validation review has been completed, as per the Reporting Chapter (Chapter 9) of the Air Monitoring Directive (AMD).

Statistical summaries for monthly mean, maximum, and minimum values, as well as comparisons to the historical values from 2015 are presented on the following pages.

Any deviations or modifications made to the sampling or analytical methods during the monitoring period are outlined in Section 1.0 Discussion. On this basis, Maxxam is issuing this completed report to Lakeland Industry & Community Association.

Should you have any questions concerning the results or if we can be of further assistance, please contact us at 403-219-3678 or toll-free at 1-800-386-7247.

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1.0 Discussion

This annual validation report consists of data for parameters Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Hydrocarbon (THC), Oxides of Nitrogen (NOx), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter 2.5 ($PM_{2.5}$), Relative humidity (RH), Barometric Pressure (BP), Ambient Temperature (AmbTXP), Precipitation, and Wind Speed (WS).

The air monitoring trailer was located at Latitude 54°13'00.0"N and Longitude 111°30'08.3"W during the monitoring period.

The monitoring methods and equipment met all AMD requirements.

All monitoring analyzers and meteorological systems met the 90% operational uptime requirements during the monitoring period.

All data collected during the monitoring period were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

An external audit was conducted by AEMERA on April 25 and 28. The audit report was included in the April 2016 monthly report.

Notification of Changes Made After Monthly Report Issuance

• **Wind Speed Calculated Averages**: calculated averages, in the 2016 monthly reports, were presented as arithmetic averages of the individual hourly data. When comparing averages for 24-Hr, hourly/month and monthly statistics, the arithmetic averages will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.

• **May Monthly Report**: The operational time for $PM_{2.5}$ was originally reported as 95.2% rather than 95.8%. The monthly average was originally reported as 9.5 ug/m3 rather than 9.3 ug/m3. During annual review these revisions were made due to changes in how data was flagged on May 9 and 11, between the hours of 07:00 and 16:00. May 9 was incorrectly flagged as power failures that occurred on May 11. The hourly average for May 15, hour 23:00 was originally reported as 99.0 ug/m3 rather than 68.4 ug/m3, reverting one recorded exceedance to zero events.

• **September Monthly Report**: The operational time for Wind Direction was originally reported as 99.7%. During annual review this was revised to 100.0% as the removal of the Met One wind system occurred during scheduled calibration time.

The monthly maintenance activities, for the monitoring period, are summarized below:

SULPHUR DIOXIDE (SO_2)

January	• Operational time was 99.9%, equivalent to 1 hour of downtime. • An additional zero/span check was conducted on January 15 for quality assurance purposes, resulting in one hour of downtime.
February	• Operational time was 99.3%, equivalent to 5 hours of downtime. • An additional zero/span check was conducted on February 12 for quality assurance purposes, resulting in one hour of downtime. • A repeat calibration was performed on February 19, in response to a biased high zero drift, resulting in four hours of downtime.
March	• Operational time was 91.7%, equivalent to 62 hours of downtime. • An additional zero/span check was conducted on March 6 to assess a biased high span drift, resulting in one hour of downtime. • On March 7 the sample pump was rebuilt, resulting in one hour of downtime. • A repeat calibration was performed on March 16 to assess the analyzer's functionality, resulting in four hours of downtime. • The Ozone and SO_2 span programs are designed to run concurrently. On March 17 the channel was put into the "Maintenance" mode for two hours, while the Ozone analyzer being calibrated. • The analyzer failed on March 29. The LICA-owned API100E (S/N 468) analyzer was removed and the Maxxam-supplied API100A (S/N 838) analyzer was installed on March 30. The API100E was brought back to Maxxam's shop for repair. Data was invalidated back to the last valid daily calibration, which was March 28. Fifty-three hours of downtime was recorded due to this event. • An additional zero/span check was conducted on March 30 for quality assurance purposes, resulting in one hour of downtime.
April	• Operational time was 97.4%, equivalent to 19 hours of downtime. • The Maxxam-supplied API100A (S/N 838) analyzer was removed following a removal calibration on April 12. The LICA-owned API100E (S/N 468) was re-installed as it had been removed for maintenance in March 2016. The analyzer was allowed time to stabilize and an installation calibration was completed on April 13. Nineteen hours of downtime were recorded. • An external audit was conducted by AEMERA on April 25. The audit report was included in the April 2016 monthly report.
May	• Operational time was 97.4%, equivalent to 19 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19. • An additional zero/span check was conducted on May 12 for quality assurance purposes, resulting in one hour of downtime.

SULPHUR DIOXIDE (SO_2)

June	• Operational time was 99.2%, equivalent to 6 hours of downtime. • The Ozone and SO_2 span programs are designed to run concurrently. The channel was placed in "Maintenance" mode for five hours on June 20 and June 29 while calibration and maintenance activities was being done on the Ozone channel. • An additional zero/span check was conducted on June 29 for quality assurance purposes, resulting in one hour of downtime.
July	• Operational time was 96.9%, equivalent to 23 hours of downtime. • Annual maintenance was performed on the analyzer following a shut-down calibration on July 19. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on July 20. Twenty-two hours of downtime was recorded due to this event. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified. • The Ozone and SO_2 span programs are designed to run concurrently. An additional quality check was recorded on the SO_2 channel on September 7 during the monthly calibration of the Ozone analyzer.
October	• No issues were identified. • The Ozone and SO_2 span programs are designed to run concurrently. An additional quality check was recorded on the SO_2 channel, on October 21, during the post-calibration zero/span check on the Ozone analyzer.
November	• No issues were identified.
December	• No issues were identified. • The Ozone and SO_2 span programs are designed to run concurrently. An additional quality check was recorded on the SO_2 channel, on December 20, during the post-calibration zero-span check on the Ozone analyzer.

HYDROGEN SULPHIDE (H_2S)

January	• No issues were identified.
February	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An additional zero/span check was conducted on February 19 for quality assurance purposes, resulting in two hours of downtime.
March	• Operational time was 99.6%, equivalent to 3 hours of downtime. • Additional zero/span checks were conducted on March 11 and 14, for quality assurance purposes, resulting in three hours of downtime.
April	• No issues were identified. • An external audit was conducted by AEMERA on April 25. The audit report was included in the April 2016 monthly report.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.

HYDROGEN SULPHIDE (H_2S)

June	• No issues were identified. • An internal quality audit was conducted on June 21. The audit report was included in the June 2016 monthly report.
July	• Operational time was 97.2%, equivalent to 21 hours of downtime. • Annual maintenance was performed on the analyzer following a shut-down calibration on July 19. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on July 20. Twenty hours of downtime was recorded due to this event. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

TOTAL HYDROCARBONS (THC)

January	• Operational time was 99.9%, equivalent to 1 hour of downtime. • An additional zero/span check was conducted on January 8 for quality assurance purposes, resulting in one hour of downtime.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified. • An external audit was conducted by AEMERA on April 25. The audit report was included in the April 2016 monthly report.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• Operational time was 94.6%, equivalent to 39 hours of downtime. • The analyzer started recording concentrations lower than historical readings on June 8. The Hydrogen and span gas cylinders were replaced on June 10, resulting in one hour of downtime. A successful zero/span check was performed after the cylinders were replaced, resulting in one hour of downtime. Thirty-seven hours of data collected between June 8 and June 10 were invalidated due to this event.
July	• Operational time was 97.4%, equivalent to 19 hours of downtime. • Annual maintenance was performed on the analyzer following a shut-down calibration on July 19. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on July 20. Seventeen hours of downtime was recorded due to this event. • On July 28, two hours of data were invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

January	• No issues were identified.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified. • An external audit was conducted by AEMERA on April 25. The audit report was included in the April 2016 monthly report.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• Operational time was 98.3%, equivalent to 12 hours of downtime. •The channel was placed in "Maintenance" mode for three hours on June 21 for a calibrator cross-check. There were suspicions about the calibrator that was used for the June 17 monthly calibration. As a precaution, a repeat calibration was performed on June 28 using a different calibrator, resulting in nine hours of downtime. As the calibration met AMD requirements, no data was discarded.
July	• Operational time was 97.7%, equivalent to 17 hours of downtime. • An additional zero/span check was conducted on July 17 due to a biased high span drift, resulting in one hour of downtime. • A scheduled annual maintenance was performed on the analyzer following a shut-down calibration on July 18. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on July 19. Fifteen hours of data are missing due to this event. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

OZONE (O_3)

January	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An additional zero/span check was conducted on January 14 for quality assurance purposes, resulting in two hours of downtime.
February	• Operational time was 99.9%, equivalent to 1 hour of downtime. • An additional zero/span check was conducted on February 11 for quality assurance purposes, resulting in one hour of downtime.

OZONE (O_3)

March	• Operational time was 98.3%, equivalent to 12 hours of downtime. • Additional zero/span checks were conducted on March 6 and March 29 for quality assurance purposes, resulting in two hours of downtime. • The Ozone and SO_2 span programs are designed to run concurrently. The channel was put into the "Maintenance" mode during the time calibration activities were being performed on the SO_2 analyzer on March 7, March 16 and March 30. Ten hours of downtime were recorded.
April	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An additional zero/span check was conducted on April 12 for quality assurance purposes, resulting in two hours of downtime. • An external audit was conducted by AEMERA on April 25. The audit report was included in the April 2016 monthly report.
May	• Operational time was 97.4%, equivalent to 19 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19. • An additional zero/span check was conducted on May 12 for quality assurance purposes, resulting in one hour of downtime.
June	• Operational time was 99.2%, equivalent to 6 hours of downtime. • The Ozone and SO_2 span programs are designed to run concurrently. The channel was placed in "Maintenance" mode for two hours on June 17 while work was being done on the SO_2 channel. • The analyzer spanned high on June 28 as the pump for the zero/span system required maintenance. The pump was rebuilt on June 29, followed by a zero-span check, resulting in four hours of downtime. No data was discarded.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified. • The Ozone and SO_2 span programs are designed to run concurrently. An additional quality check was recorded on the O_3 channel, on October 14, during the post-calibration zero/span check on the SO_2 analyzer.
November	• No issues were identified.
December	• No issues were identified. • The Ozone and SO_2 span programs are designed to run concurrently. An additional quality check was recorded on the Ozone channel, on December 21, during the post-calibration zero-span check on the SO_2 analyzer.

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$)

January	• Operational time was 96.5%, equivalent to 26 hours of downtime. • Twenty-six hours of data were invalidated this month as they were below -3 $\mu g/m^3$.

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$)

February	• Operational time was 91.8%, equivalent to 57 hours of downtime. • Fifty-seven hours of data were invalidated as the data were below –3 µg/m^3 this month.
March	• Operational time was 96.0%, equivalent to 30 hours of downtime. • Thirty hours of data were invalidated as the data were below –3 µg/m^3 this month.
April	• Operational time was 95.7%, equivalent to 31 hours of downtime. • The Teom unit malfunctioned after a short power outage that occurred on April 13. Sixteen hours of data collected between April 13 and April 14 were discarded due to this issue. • An external audit was conducted by AEMERA on April 28. The audit report was included in the April 2016 monthly report. • Fifteen hours of data were invalidated as the data was below –3 µg/m^3 this month.
May	• Operational time was 95.8%, equivalent to 31 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19. • Thirteen hours of data were invalidated this month as the data was below –3 µg/m^3 .
June	• Operational time was 97.1%, equivalent to 21 hours of downtime. • Twenty-one hours of data were invalidated as the data was below –3 µg/m^3 this month.
July	• Operational time was 95.3%, equivalent to 35 hours of downtime. • The TEOM unit failed to recover from a thunderstorm induced power outage on July 3. A station visit was made on July 4. Troubleshooting/maintenance was performed to resolve the issue and a successful post-repair audit was completed afterwards. Twenty hours of data are missing due to this issue. • On July 28, one hour of data was invalidated due to a brief power failure. • Fourteen hours of data were invalidated as the data was below –3 µg/m^3 this month.
August	• Operational time was 97.0%, equivalent to 22 hours of downtime. • The TEOM unit was found electronically locked up upon arrival at the station on August 22. The unit was restarted and the scheduled routine audit was completed. Eight hours of data were discarded due to this event. • Fourteen hours of data were invalidated as the data was below –3 µg/m³ this month.
September	• Operational time was 96.5%, equivalent to 25 hours of downtime. • Twenty-five hours of data were invalidated as the data was below –3 µg/m^3 this month.
October	• Operational time was 97.6%, equivalent to 18 hours of downtime. • Eighteen hours of data were invalidated as the data was below –3 µg/m^3 this month.
November	• Operational time was 98.1%, equivalent to 14 hours of downtime. • Fourteen hours of data were invalidated as the data was below –3 µg/m^3 this month.
December	• Operational time was 98.3%, equivalent to 13 hours of downtime. • Thirteen hours of data were invalidated as the data was below –3 µg/m^3 this month.

WIND SPEED (WS)

January	• No issues were identified.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• The Met One wind system (S/N H12635) was removed from site on August 24 and sent to the manufacturer for scheduled maintenance. The RM Young (S/N 124638) was temporarily installed. These events occurred during monthly calibration so no data was lost.
September	• No issues were identified.
October	• Operational time was 99.7%, equivalent to 2 hours of downtime. • The Met One wind system (S/N H12635) was sent to the manufacturer in August 2016for annual calibration and was re-installed on October 27. The RM Young wind system (S/N 124638) was successfully removed. Two hours of downtime were recorded due to the installation event.
November	• Operational time was 94.6%, equivalent to 39 hours of downtime. • Thirty-nine hours of data, collected between November 20 and November 22, were invalidated due to an ice/snow build-up that affected the functionality of the wind system.
December	• No issues were identified.

RELATIVE HUMIDITY (RH)

January	• No issues were identified.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

BAROMETRIC PRESSURE (BP)

January	• No issues were identified.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

PRECIPITATION

January	• No issues were identified.
February	• No issues were identified. • A quarterly precipitation sensor audit was conducted on February 29.
March	• No issues were identified.
April	• No issues were identified.
May	• Operational time was 97.3%, equivalent to 20 hours of downtime. • Two hours of data collected on May 5 were invalidated as the rain gauge system was recovering from a short power outage. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19. • A quarterly precipitation sensor audit was conducted on May 12.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified. • A quarterly precipitation sensor audit was conducted on August 16.
September	• No issues were identified.
October	• No issues were identified.
November	• No issues were identified. • A quarterly precipitation sensor audit was conducted on November 22.
December	• No issues were identified.

AMBIENT TEMPERATURE (TPX)

January	• No issues were identified.
February	• No issues were identified.
March	• No issues were identified.
April	• No issues were identified.
May	• Operational time was 97.6%, equivalent to 18 hours of downtime. • A total of eighteen hours of data are missing due to power failures on May 11 and May 19.
June	• No issues were identified.
July	• Operational time was 99.9%, equivalent to 1 hour of downtime. • On July 28, one hour of data was invalidated due to a brief power failure.
August	• No issues were identified.
September	• No issues were identified. • The ambient temperature sensor was audited on September 6.
October	• No issues were identified.
November	• No issues were identified.
December	• No issues were identified.

2.0 Project Personnel

Mike Bisaga was the contact for Lakeland Industry & Community Association and the Maxxam field sampling team consisted of Alexander Yakupov and Christopher Wesson.

3.0 Plant Monthly Required AMD Summary

All data collected during the monitoring period were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

The operational uptime for all analyzers and meteorological system were above the 90% requirement.

4.0 Calculations and Results

All calculations and reporting of results follow the method described in the Air Monitoring Directive, 1989, 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) as well as AMD 2015 and 2016.

5.0 Methods and Procedures

The following methods and procedures were used to complete the test program:

Met One Instruments: Operation Manual Document No. 50.5-9800
Maxxam AIR SOP-00208: RM Young Monitor Calibration
Maxxam AIR SOP-00209: Ambient H_2S Monitoring
Maxxam AIR SOP-00211: Ambient SO_2 Monitoring
Maxxam AIR SOP-00212: Ambient O_3 Monitoring
Maxxam AIR SOP-00213: Ambient $NO/NO_2/NOx$ Monitoring
Maxxam AIR SOP-00214: Ambient Hydrocarbon (THC) Monitoring
Maxxam AIR SOP-00215: Teom Operation
Maxxam AIR SOP-00242: Precipitation Collector Installation /Maintenance

There were no deviations from the prescribed methods.

The following instruments were used to perform the test program:

Sulphur Dioxide - API 100E and API 100A UV Flourescent Analyzer
Hydrogen Sulphide - API 101E UV Flourescent Analyzer
Total Hydrocarbons - Thermo 51C FID Analyzer
Oxides of Nitrogen - API 200E Chemiluminescent Analyzer
Ozone - Thermo 49i Photometric Analyzer
Particulate Matter ($PM_{2.5}$) - R&P 1405F Teom Unit
Wind System - Met One Unit & RM Young
Relative Humidity - Met One Unit
Barometric Pressure - Met One Unit
Ambient Temperature - Met One Unit
Precipitation - Met One Unit
Datalogger - ESC 8832

APPENDIX I
CONTINUOUS MONITORING DATA RESULTS

SULPHUR DIOXIDE

SULPHUR DIOXIDE (SO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB SO_2)						OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 20	20 < C ≤ 60	60 < C ≤ 110	110 < C ≤ 170	170 < C ≤ 340	> 340	1-HR	24-HR	1-HR	24-HR	
January	706	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0
February	657	99.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.3
March	646	91.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
April	659	97.4	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
May	689	97.4	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
June	677	99.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
July	680	96.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
August	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
September	683	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
October	706	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
November	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
December	704	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.3
											ANNUAL AVERAGE		0.1

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

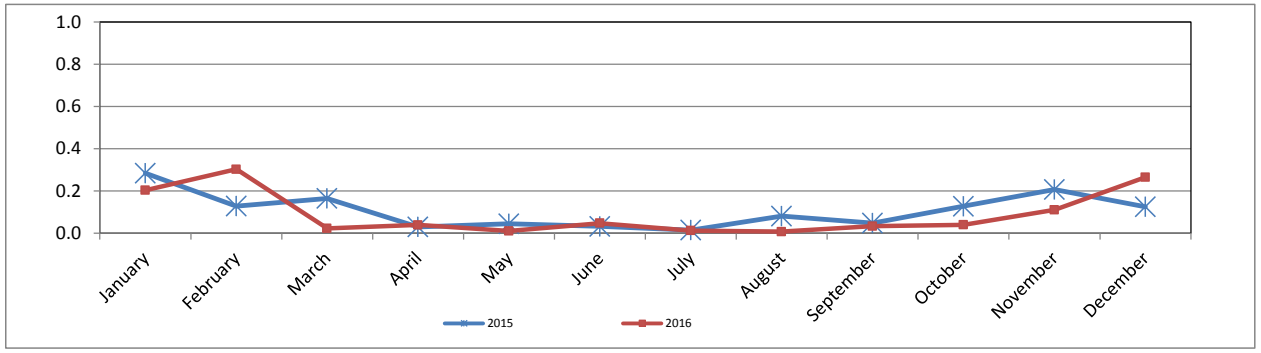
Alberta Ambient Air Quality Objectives Annual Average**	8.0	PPB
Annual Average for 2016	0.1	PPB

SULPHUR DIOXIDE (SO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

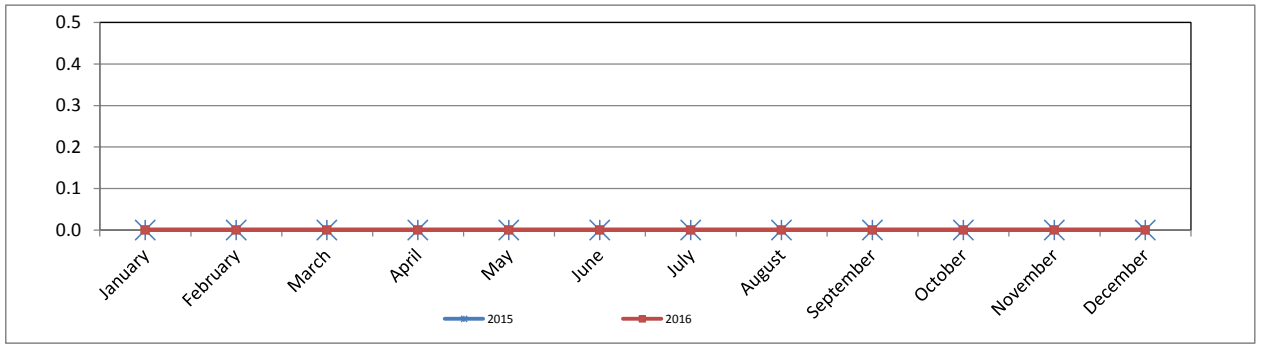
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0**	0	4	0	0	4	0
February	0	0	3	**0.3**	0.0	**5.0**	-0.2
March	0	0	4	0.0	0.0	0.9	0.1
April	0	0	2	0.0	0.0	0.8	0.0
May	0	0	1	0.0	0.0	1.5	0.0
June	0	0	2	0.0	0.0	1.9	0.0
July	0	0	1	0.0	0.0	2.2	0.0
August	0	0	2	0.0	0.0	1.3	0.1
September	0	0	3	0.0	0.0	2.2	0.0
October	0	0	**6**	0.0	0.0	3.0	0.1
November	0	0	3	0.1	0.0	2.2	0.1
December	0	0	3	0.3	0.0	3.3	-0.1

*Annual peak is bolded and highlighted.

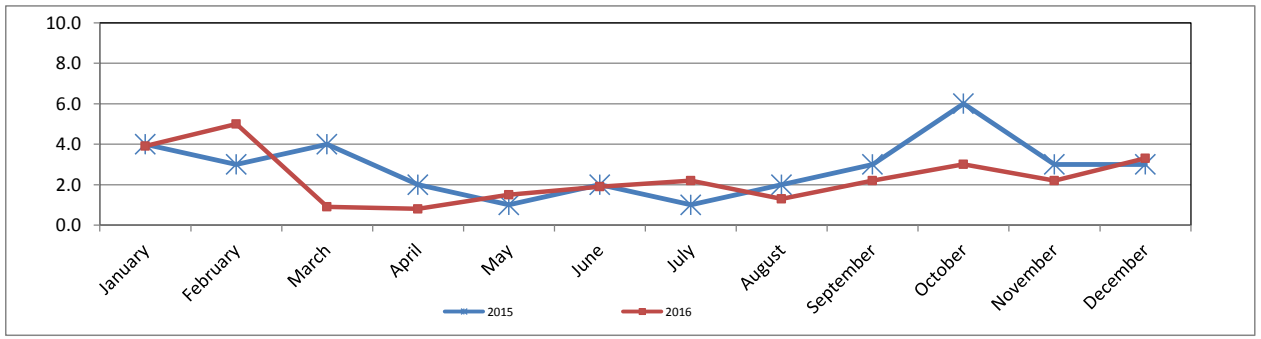
SULPHUR DIOXIDE (SO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



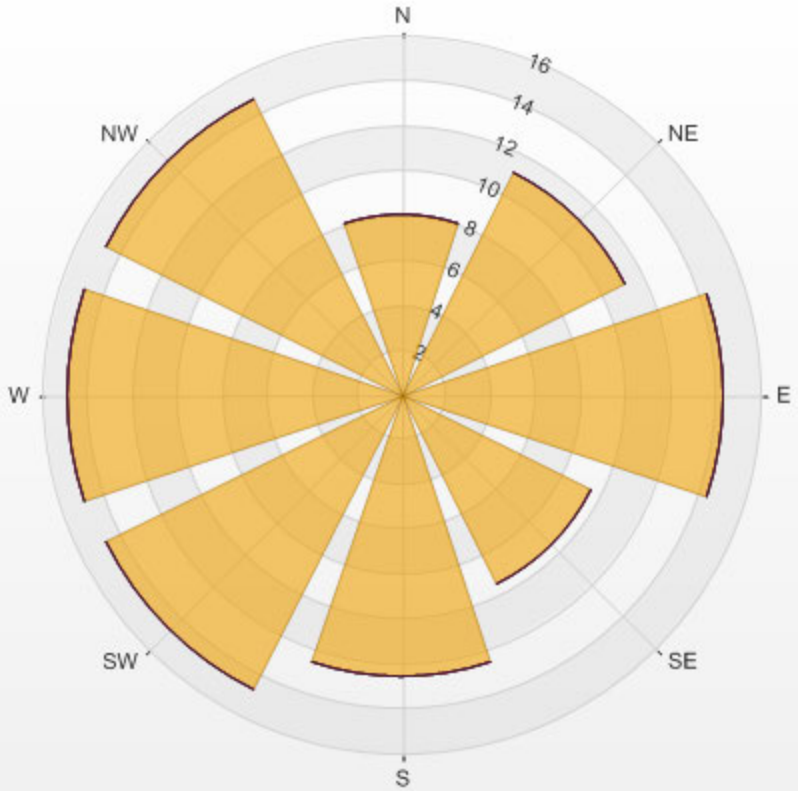
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-SO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 0.00 [ppb]

Direction	0-20	20-60	60-110	110-170	170-340	>340.0	Total
N	8.1	0.0	0.0	0.0	0.0	0.0	8.1
NE	11.1	0.0	0.0	0.0	0.0	0.0	11.1
E	14.3	0.0	0.0	0.0	0.0	0.0	14.3
SE	9.4	0.0	0.0	0.0	0.0	0.0	9.4
S	12.6	0.0	0.0	0.0	0.0	0.0	12.6
SW	14.7	0.0	0.0	0.0	0.0	0.0	14.7
W	14.9	0.0	0.0	0.0	0.0	0.0	14.9
NW	14.7	0.0	0.0	0.0	0.0	0.0	14.7
Summary	100.0	0.0	0.0	0.0	0.0	0.0	100.0

% Icon Classes (ppb)	100 0-20	0 20-60	0 60-110	0 110-170	0 170-340	0 >340.0

LICA ST. LINA Poll.: LICA ST. LINA-SO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 0.00[ppb]



HYDROGEN SULPHIDE

HYDROGEN SULPHIDE (H_2S) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB H_2S)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 3	4 < C ≤ 10	11 < C ≤ 50	> 50	1-HR	24-HR	1-HR	24-HR	
January	708	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0
February	660	99.7	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.3
March	706	99.6	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
April	683	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
May	690	97.6	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
June	680	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
July	683	97.2	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
August	707	100.0	99.9%	0.1%	0.0%	0.0%	10	3	0	0	0.1
September	684	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
October	707	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
November	685	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
December	706	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
									ANNUAL AVERAGE		0.1

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

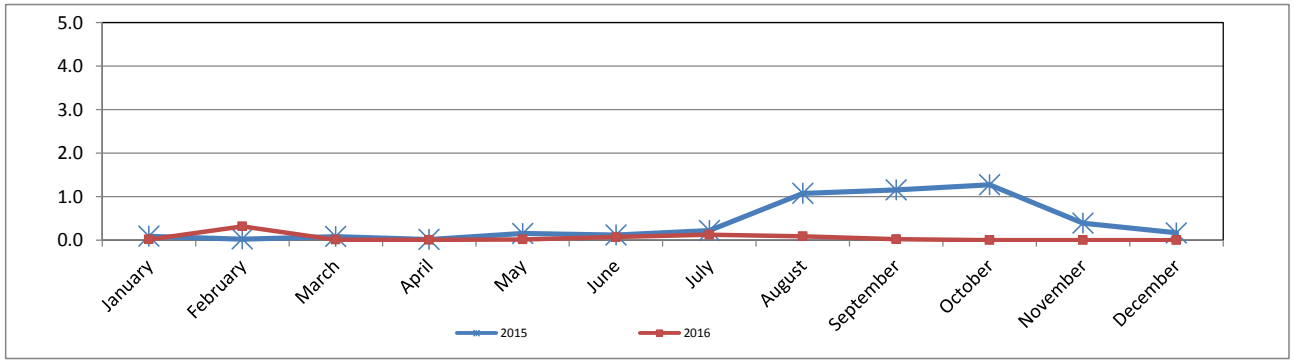
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.1	PPB

HYDROGEN SULPHIDE (H_2S) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

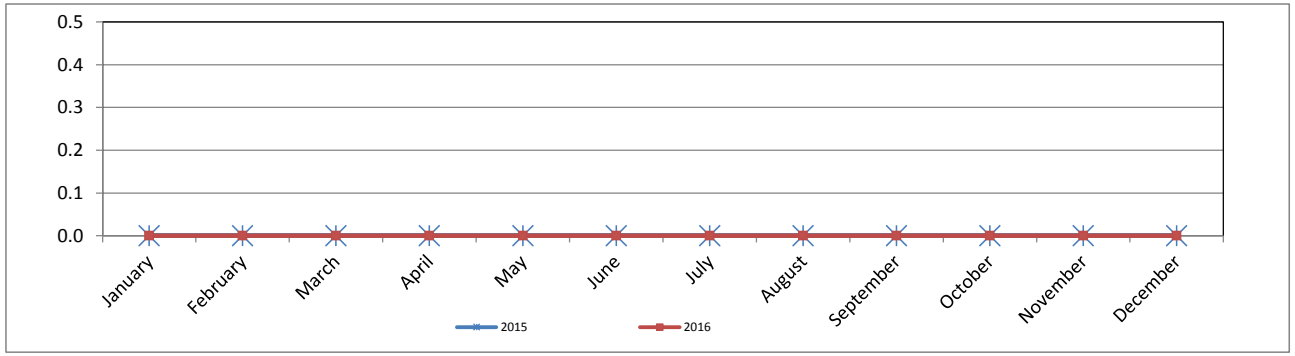
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	0	0	1	0	0	1	0
February	0	0	1	**0.3**	0.0	0.9	-0.3
March	0	0	1	0.0	0.0	0.5	0.1
April	0	0	1	0.0	0.0	0.7	0.0
May	0	0	2	0.0	0.0	0.6	0.1
June	0	0	3	0.1	0.0	1.3	0.0
July	0	0	**4**	0.1	0.0	2.4	0.1
August	1	0	4	0.1	0.0	**3.7**	1.0
September	1	0	2	0.0	0.0	0.6	1.1
October	**1**	0	3	0.0	0.0	0.3	1.3
November	0	0	2	0.0	0.0	0.0	0.4
December	0	0	1	0.0	0.0	0.1	0.2

*Annual peak is bolded and highlighted.

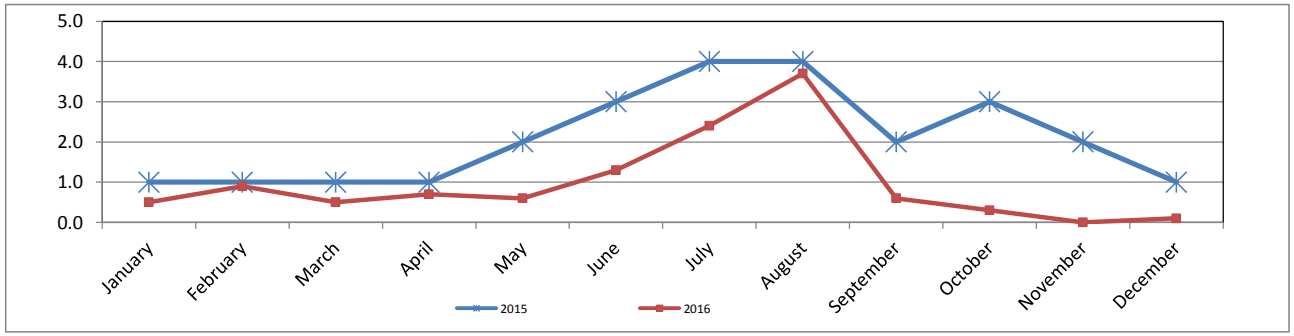
HYDROGEN SULPHIDE (H_2S) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



HYDROGEN SULPHIDE (H_2S) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



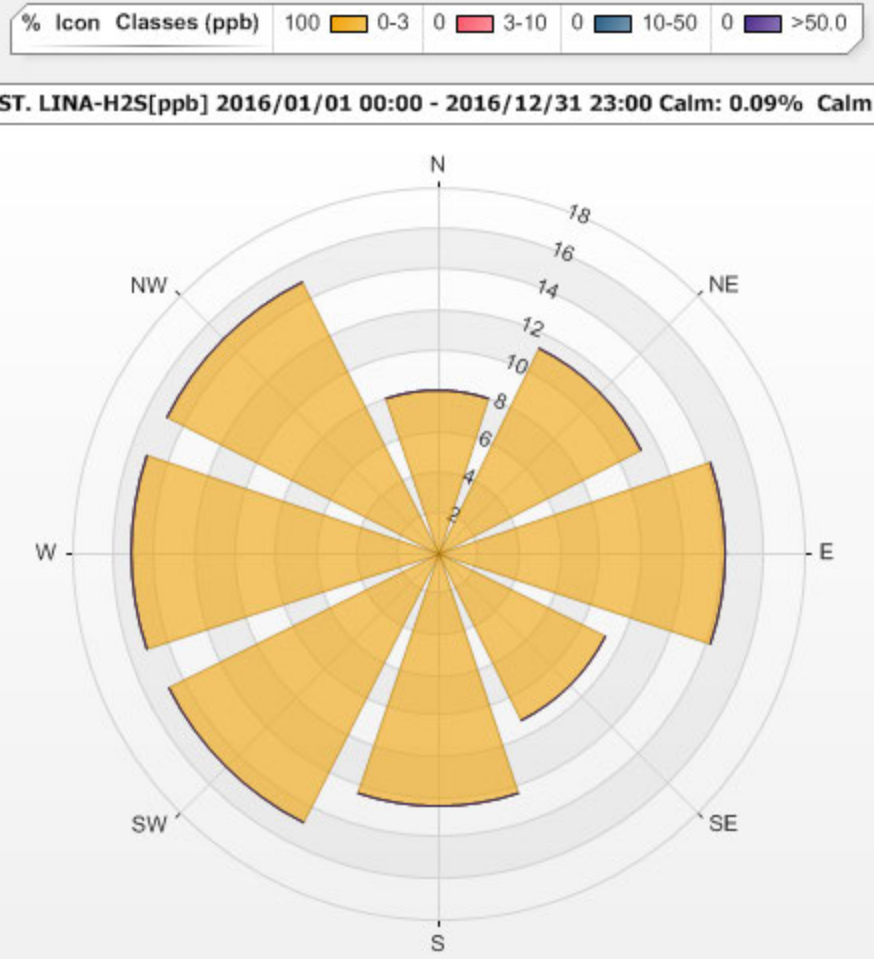
HYDROGEN SULPHIDE (H_2S) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA ST. LINA
Poll.: LICA ST. LINA-H2S[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 0.10 [ppb]

Direction	0-3	3-10	10-50	>50.0	Total
N	8.0	0.0	0.0	0.0	8.0
NE	11.2	0.0	0.0	0.0	11.2
E	14.2	0.0	0.0	0.0	14.2
SE	9.3	0.0	0.0	0.0	9.3
S	12.5	0.0	0.0	0.0	12.5
SW	14.8	0.0	0.0	0.0	14.9
W	15.1	0.0	0.0	0.0	15.1
NW	14.9	0.0	0.0	0.0	14.9
Summary	100.0	0.0	0.0	0.0	100.0


% Icon Classes (ppb)
100 0-3
0 3-10
0 10-50
0 >50.0
LICA ST. LINA Poll.: LICA ST. LINA-H2S[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 0.10[ppb]
N
NE
E
SE
S
SW
W
NW
18
16
14
12
10
8
6
4
2

TOTAL HYDROCARBON

TOTAL HYDROCARBONS (THC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM THC)				OBJECTIVES** (PPM)		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
January	707	99.9	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.1
February	663	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.0
March	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.04
April	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.97
May	691	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.91
June	648	94.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.89
July	687	97.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.88
August	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.82
September	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.81
October	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.95
November	686	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.06
December	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.14
									ANNUAL AVERAGE		1.97

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

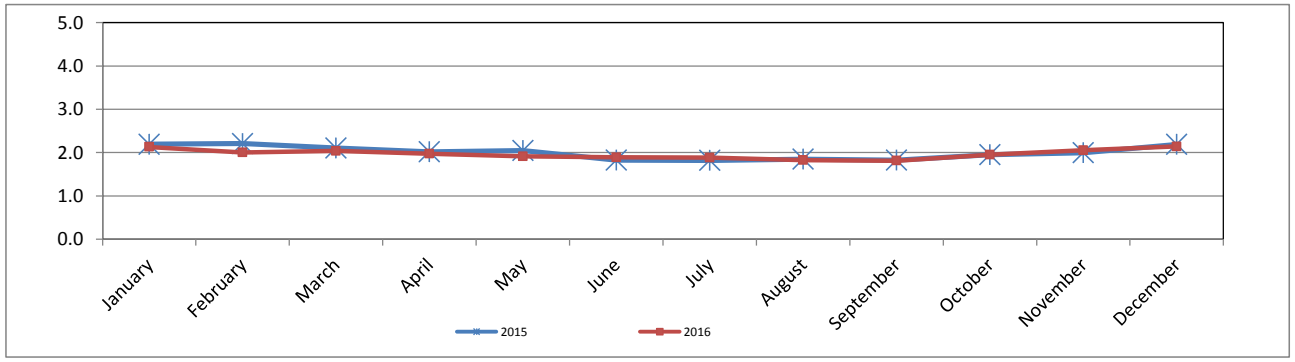
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	1.97	PPM

TOTAL HYDROCARBONS (THC) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

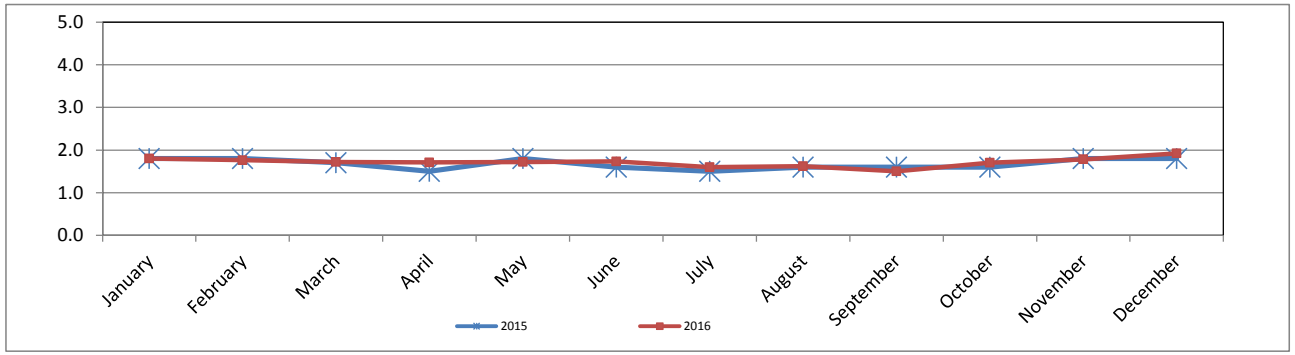
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	2.2	1.8	3.6	2.1	1.8	**3.3**	0.1
February	**2.2**	1.8	3.1	2.0	1.8	2.6	0.2
March	2.1	1.7	3.1	2.04	1.72	2.72	0.07
April	2.0	1.5	3.3	1.97	1.71	2.36	0.05
May	2.0	1.8	2.8	1.91	1.72	2.31	0.14
June	1.8	1.6	2.7	1.89	1.73	2.35	-0.06
July	1.8	1.5	3.0	1.88	1.60	2.28	-0.06
August	1.8	1.6	2.5	1.82	1.62	2.37	0.02
September	1.8	1.6	2.6	1.81	1.50	2.34	0.01
October	1.9	1.6	3.2	1.95	1.70	2.54	0.00
November	2.0	1.8	**4.7**	2.06	1.78	2.47	-0.06
December	2.2	1.8	4.5	**2.14**	1.92	2.93	0.05

*Annual peak is bolded and highlighted.

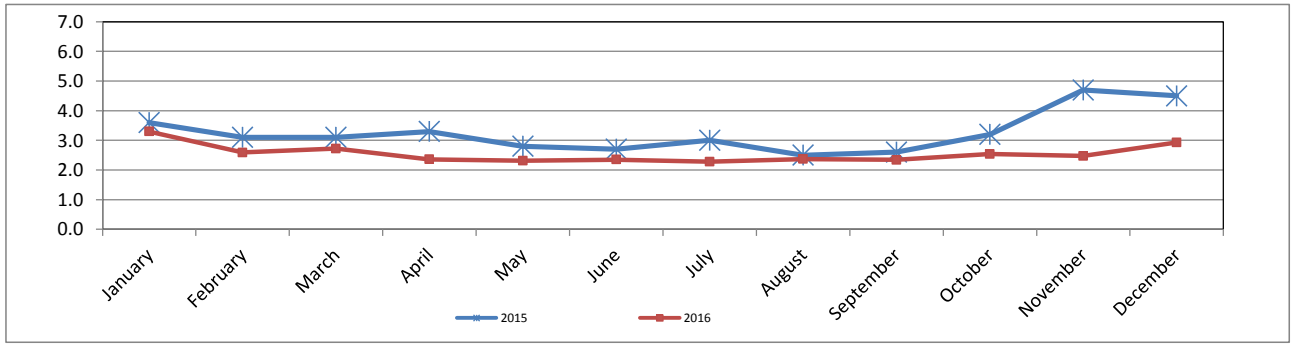
TOTAL HYDROCARBONS (THC) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM



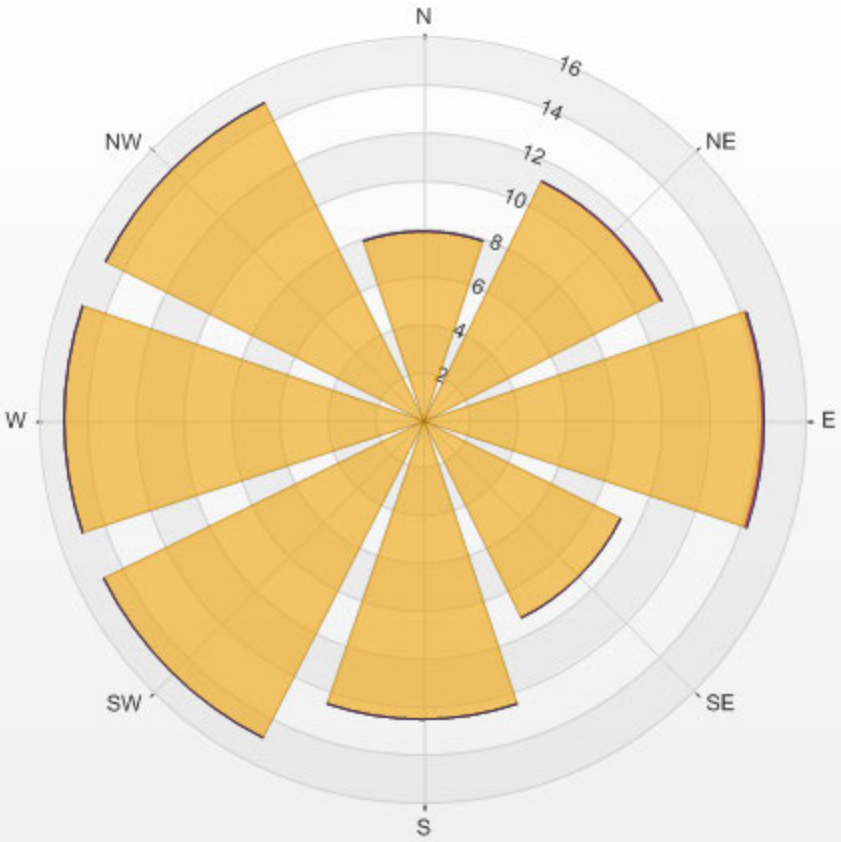
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-THC[ppm]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 1.99 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	7.9	0.0	0.0	0.0	7.9
NE	11.1	0.0	0.0	0.0	11.2
E	14.2	0.1	0.0	0.0	14.3
SE	9.3	0.0	0.0	0.0	9.3
S	12.6	0.0	0.0	0.0	12.6
SW	14.9	0.0	0.0	0.0	14.9
W	15.0	0.0	0.0	0.0	15.0
NW	14.9	0.0	0.0	0.0	14.9
Summary	100.0	0.1	0.0	0.0	100.0

% Icon Classes (ppm)	100 0-3	0 3-10	0 10-50	0 >50.0

LICA ST. LINA Poll.: LICA ST. LINA-THC[ppm] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 1.99[ppm]



OXIDES OF NITROGEN

OXIDES OF NITROGEN (NOx) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NOx)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	705	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.5
February	661	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.6
March	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.8
April	679	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.0
May	687	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.0
June	669	98.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.3
July	683	97.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.0
August	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.8
September	682	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.1
October	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.6
November	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.4
December	704	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.5
									ANNUAL AVERAGE		1.8

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

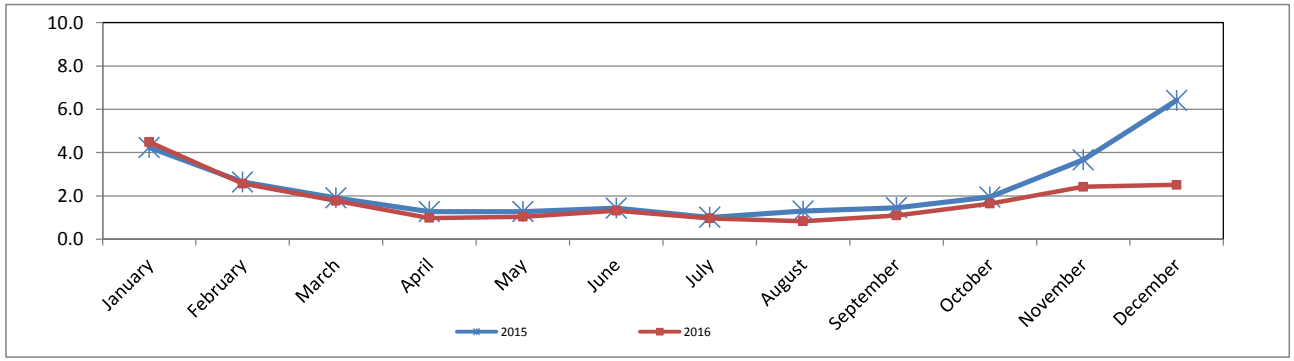
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	1.8	PPB

OXIDES OF NITROGEN (NOx) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

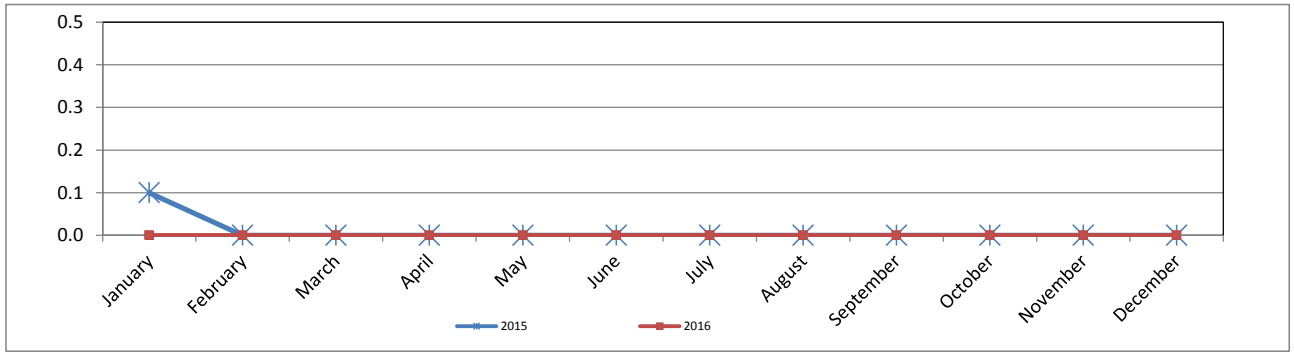
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	4.2	0.1	37.2	**4.5**	0.0	**34.7**	-0.3
February	2.6	0.0	17.7	2.6	0.0	24.5	0.1
March	1.9	0.0	14.3	1.8	0.0	9.4	0.1
April	1.3	0.0	16.3	1.0	0.0	6.4	0.3
May	1.3	0.0	11.7	1.0	0.0	8.2	0.2
June	1.4	0.0	7.3	1.3	0.0	6.6	0.1
July	1.0	0.0	6.7	1.0	0.0	7.0	0.0
August	1.3	0.0	10.5	0.8	0.0	6.8	0.5
September	1.5	0.0	8.7	1.1	0.0	6.3	0.4
October	1.9	0.0	16.7	1.6	0.0	14.2	0.3
November	3.7	0.0	31.5	2.4	0.0	13.4	1.2
December	**6.4**	0.0	**50.5**	2.5	0.0	14.3	3.9

*Annual peak is bolded and highlighted.

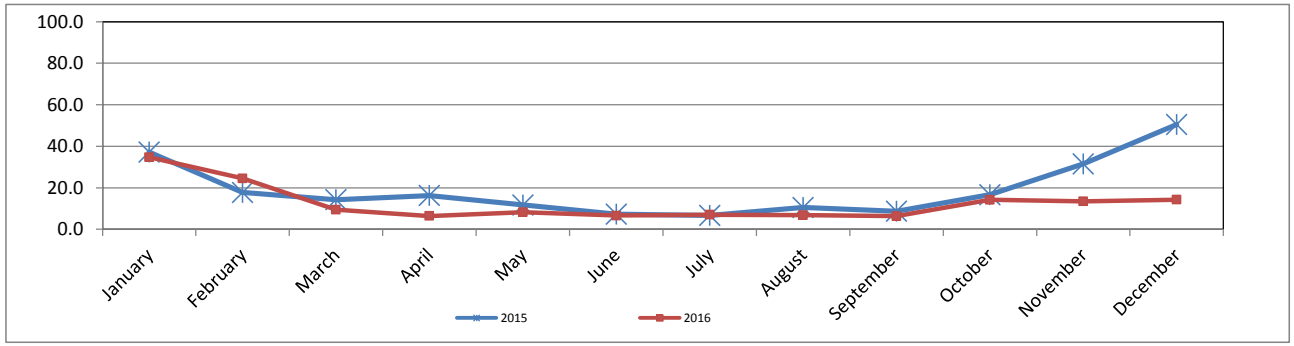
OXIDES OF NITROGEN (NOx) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OXIDES OF NITROGEN (NOx) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OXIDES OF NITROGEN (NOx) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



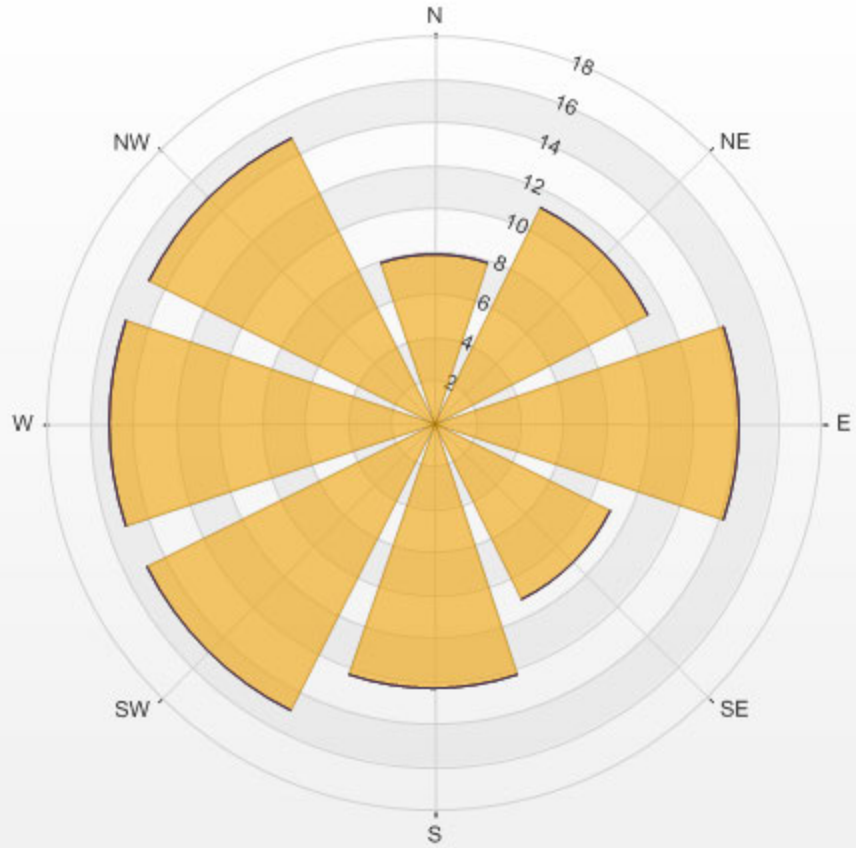
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-NOX[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 1.64 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	7.9	0.0	0.0	0.0	7.9
NE	11.2	0.0	0.0	0.0	11.2
E	14.2	0.0	0.0	0.0	14.2
SE	9.2	0.0	0.0	0.0	9.2
S	12.4	0.0	0.0	0.0	12.4
SW	15.0	0.0	0.0	0.0	15.0
W	15.2	0.0	0.0	0.0	15.2
NW	14.9	0.0	0.0	0.0	14.9
Summary	100.0	0.0	0.0	0.0	100.0

% Icon Classes (ppb)	100 0-50	0 50-110	0 110-210	0 >210.0

LICA ST. LINA Poll.: LICA ST. LINA-NOX[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 1.64[ppb]



NITRIC OXIDES

NITRIC OXIDE (NO) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	705	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.4
February	661	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
March	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
April	679	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.0
May	687	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
June	669	98.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
July	683	97.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.0
August	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
September	682	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
October	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.1
November	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
December	704	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.2
									ANNUAL AVERAGE		0.1

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

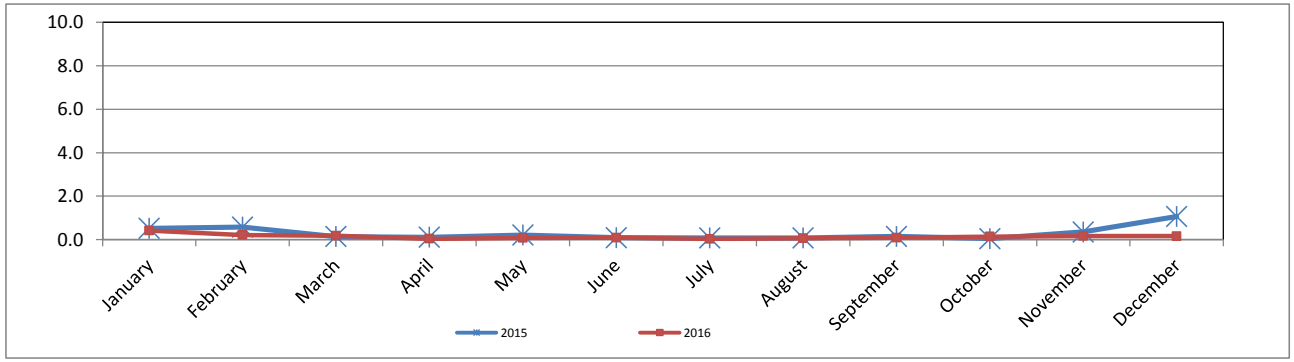
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.1	PPB

NITRIC OXIDE (NO) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

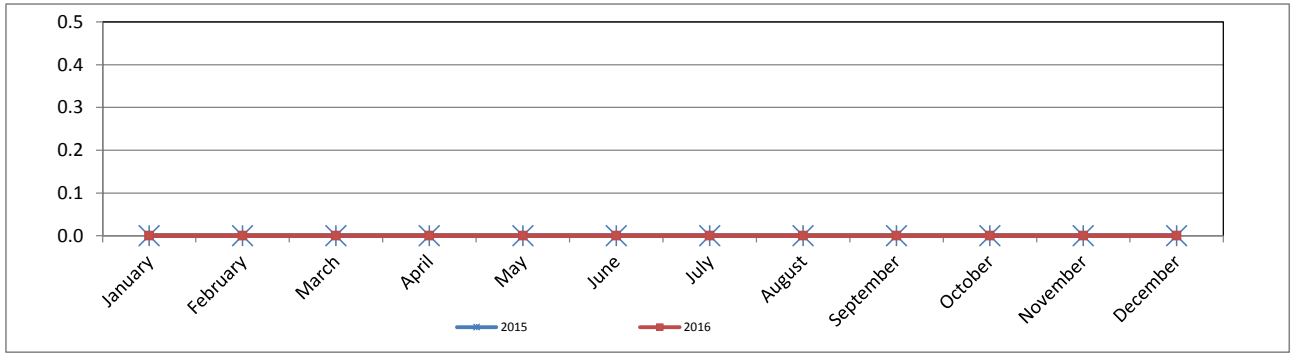
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	0.5	0.0	10.1	**0.4**	0.0	**9.1**	0.1
February	0.6	0.0	6.6	0.2	0.0	3.1	0.4
March	0.1	0.0	3.4	0.2	0.0	4.2	0.0
April	0.1	0.0	6.6	0.0	0.0	1.0	0.1
May	0.2	0.0	1.9	0.1	0.0	1.6	0.1
June	0.1	0.0	2.3	0.1	0.0	1.5	0.0
July	0.1	0.0	2.7	0.0	0.0	1.5	0.0
August	0.1	0.0	1.5	0.1	0.0	2.0	0.0
September	0.1	0.0	2.6	0.1	0.0	1.7	0.1
October	0.0	0.0	1.5	0.1	0.0	3.8	-0.1
November	0.4	0.0	11.0	0.2	0.0	4.2	0.2
December	**1.1**	0.0	**28.5**	0.2	0.0	5.1	0.9

*Annual peak is bolded and highlighted.

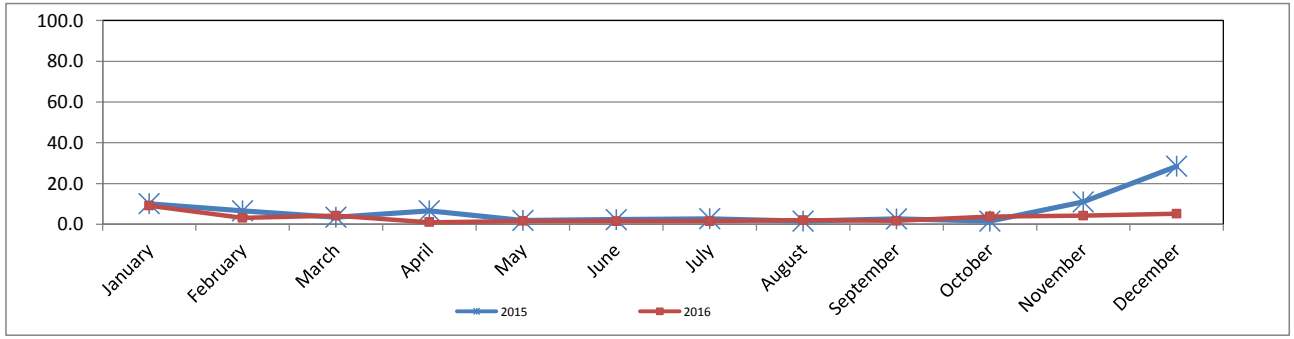
NITRIC OXIDE (NO) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITRIC OXIDE (NO) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



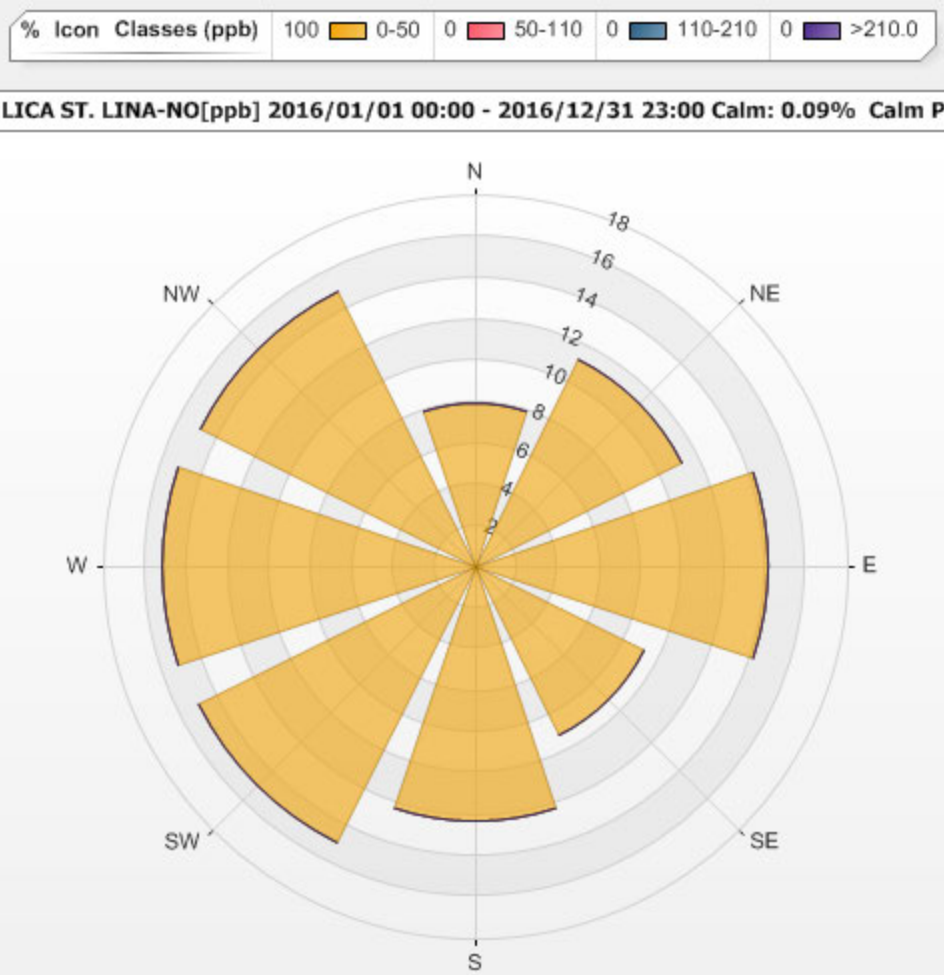
NITRIC OXIDE (NO) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA ST. LINA
Poll.: LICA ST. LINA-NO[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 0.28 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	7.9	0.0	0.0	0.0	7.9
NE	11.2	0.0	0.0	0.0	11.2
E	14.2	0.0	0.0	0.0	14.2
SE	9.2	0.0	0.0	0.0	9.2
S	12.4	0.0	0.0	0.0	12.4
SW	15.0	0.0	0.0	0.0	15.0
W	15.2	0.0	0.0	0.0	15.2
NW	14.9	0.0	0.0	0.0	14.9
Summary	100.0	0.0	0.0	0.0	100.0


% Icon Classes (ppb)
100 0-50
0 50-110
0 110-210
0 >210.0
LICA ST. LINA Poll.: LICA ST. LINA-NO[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 0.28[ppb]
N
NE
E
SE
S
SW
W
NW
2
4
6
8
10
12
14
16
18

NITROGEN DIOXIDE

NITROGEN DIOXIDE (NO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO_2)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	705	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.1
February	661	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.3
March	703	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.6
April	679	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	0.9
May	687	97.6	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.0
June	669	98.3	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.2
July	683	97.7	100.0%	0.0%	0.0%	0.0%	159	-	0	-	0.9
August	706	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	0.8
September	682	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.0
October	706	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	1.5
November	683	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.2
December	704	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.3
									ANNUAL AVERAGE		1.7

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

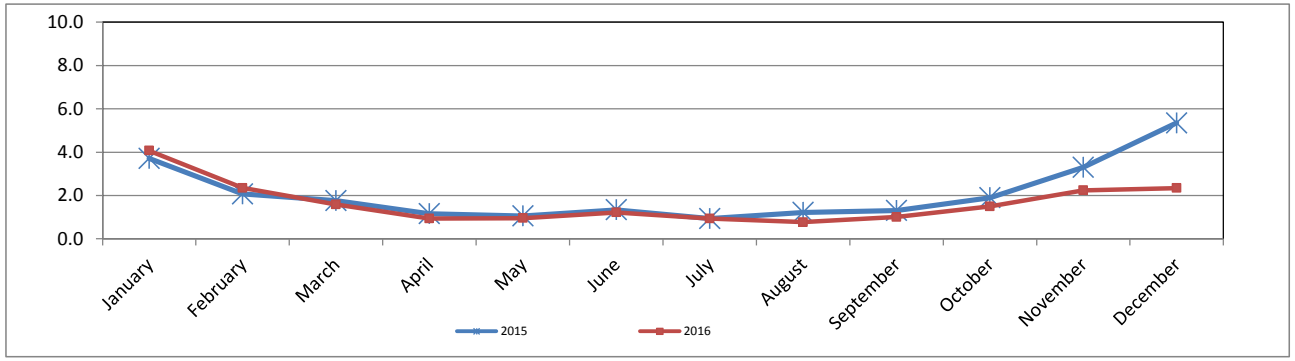
Alberta Ambient Air Quality Objectives Annual Average**	24	PPB
Annual Average for 2016	1.7	PPB

NITROGEN DIOXIDE (NO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

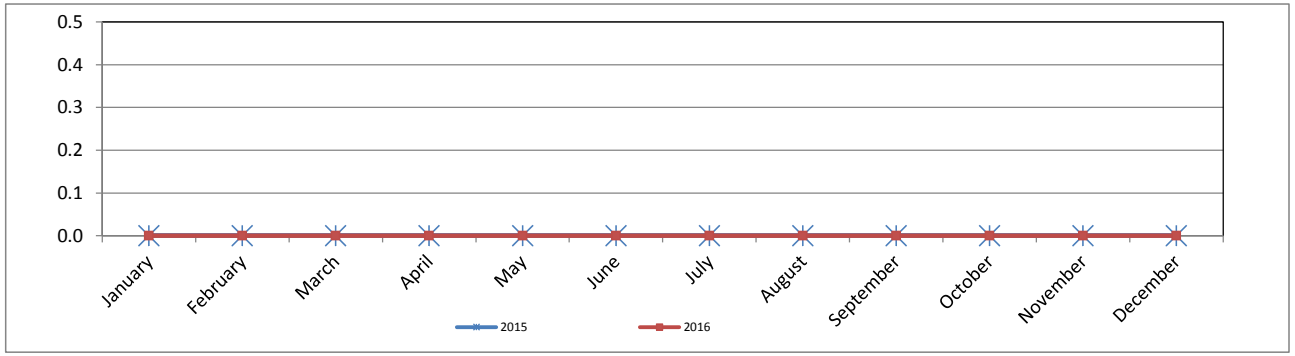
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	3.7	0.0	31.4	**4.1**	0.0	**25.6**	-0.4
February	2.1	0.0	17.4	2.3	0.0	24.3	-0.3
March	1.8	0.0	14.3	1.6	0.0	9.1	0.2
April	1.2	0.0	9.7	0.9	0.0	5.9	0.2
May	1.1	0.0	10.3	1.0	0.0	7.8	0.1
June	1.3	0.0	7.0	1.2	0.0	6.2	0.1
July	0.9	0.0	4.6	0.9	0.0	7.0	0.0
August	1.2	0.0	10.5	0.8	0.0	6.5	0.5
September	1.3	0.0	8.7	1.0	0.0	6.2	0.3
October	1.9	0.0	16.7	1.5	0.0	12.0	0.4
November	3.3	0.0	28.0	2.2	0.0	13.3	1.1
December	**5.3**	0.0	**39.0**	2.3	0.0	14.2	3.0

*Annual peak is bolded and highlighted.

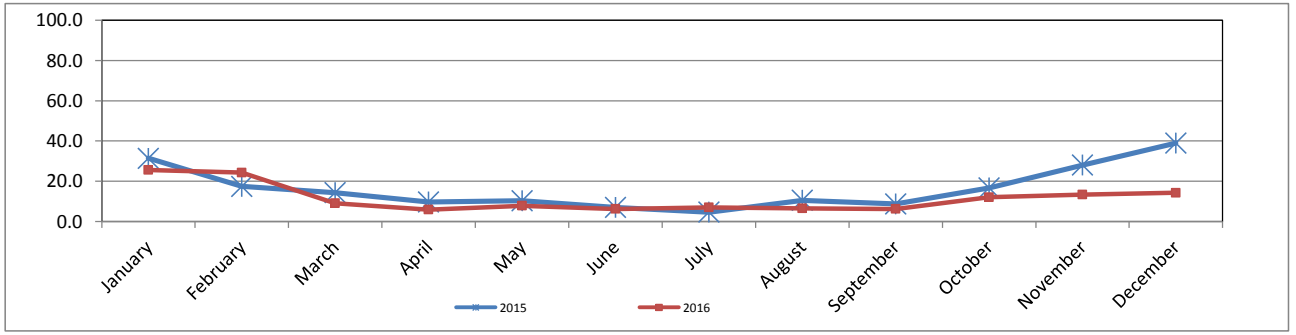
NITROGEN DIOXIDE (NO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



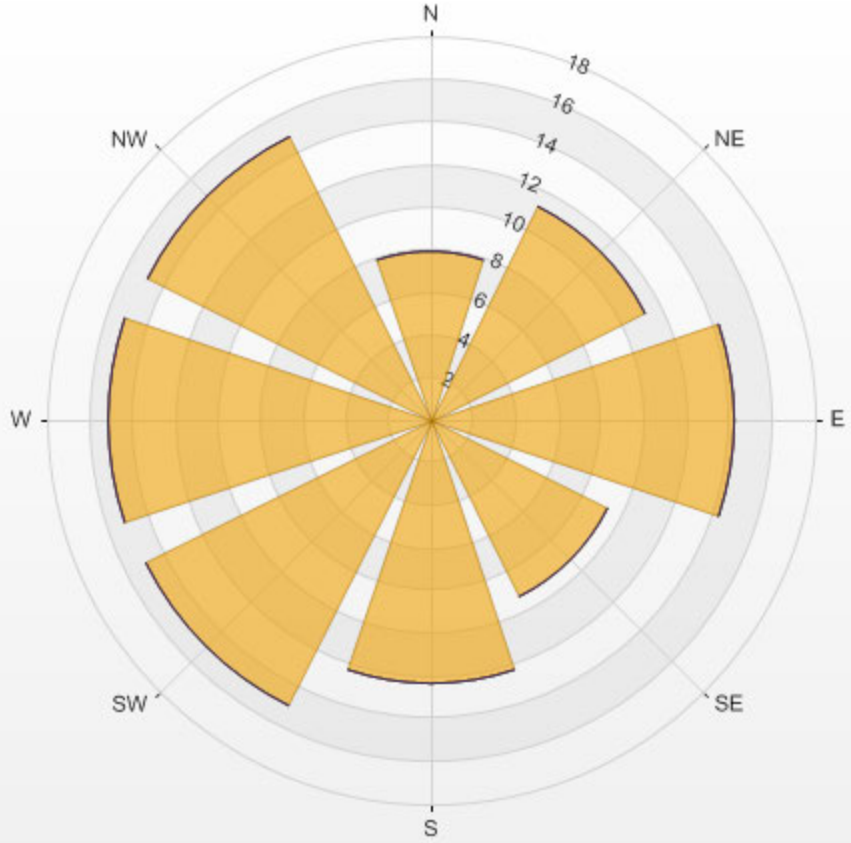
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-NO2[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 1.36 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	7.9	0.0	0.0	0.0	7.9
NE	11.2	0.0	0.0	0.0	11.2
E	14.2	0.0	0.0	0.0	14.2
SE	9.3	0.0	0.0	0.0	9.3
S	12.4	0.0	0.0	0.0	12.4
SW	15.0	0.0	0.0	0.0	15.0
W	15.2	0.0	0.0	0.0	15.2
NW	14.9	0.0	0.0	0.0	14.9
Summary	100.0	0.0	0.0	0.0	100.0

% Icon Classes (ppb)	100 0-50	0 50-110	0 110-210	0 >210.0

LICA ST. LINA Poll.: LICA ST. LINA-NO2[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 1.36[ppb]



OZONE

OZONE (O_3) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB O_3)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	706	99.7	100.0%	0.0%	0.0%	0.0%	82	-	0	-	28
February	661	99.9	100.0%	0.0%	0.0%	0.0%	82	-	0	-	33.1
March	695	98.3	99.6%	0.4%	0.0%	0.0%	82	-	0	-	35.5
April	676	99.7	92.2%	7.8%	0.0%	0.0%	82	-	0	-	37.7
May	689	97.4	90.4%	9.6%	0.0%	0.0%	82	-	0	-	34.3
June	678	99.2	92.6%	7.4%	0.0%	0.0%	82	-	0	-	34.9
July	706	99.9	100.0%	0.0%	0.0%	0.0%	82	-	0	-	26.1
August	708	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	21.9
September	683	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	22.5
October	706	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	19.2
November	685	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	20.9
December	706	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	27.3
									ANNUAL AVERAGE		28.4

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

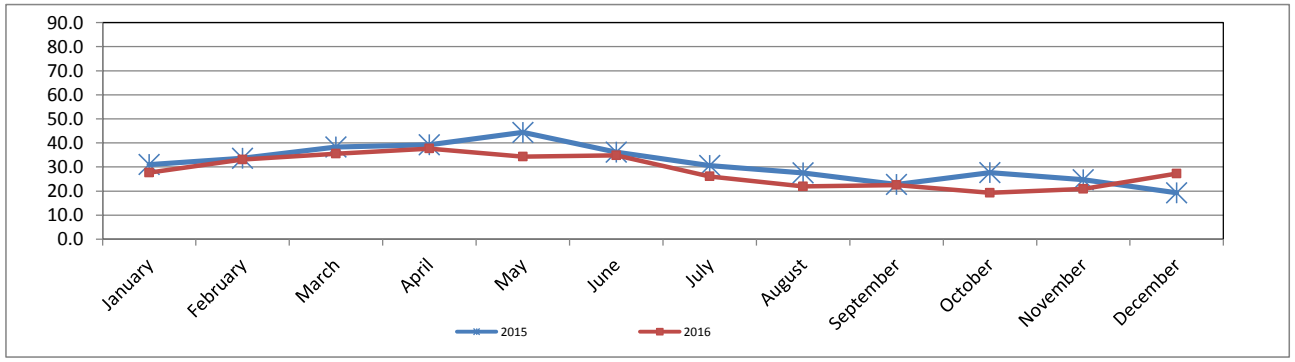
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	28.4	PPB

OZONE (O_3) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

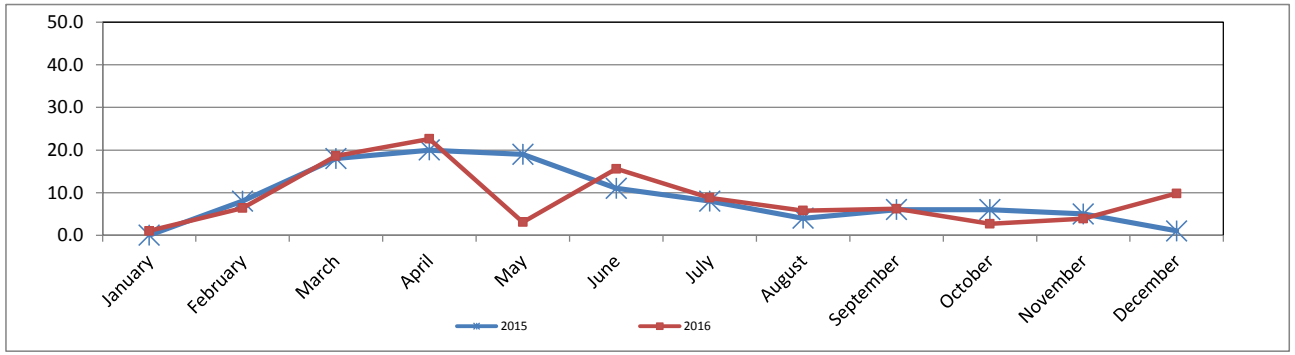
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	31	0	46	28	1	43	3
February	34	8	45	33.1	6.4	48.5	0.5
March	38	18	51	35.5	18.6	52.2	2.8
April	39	20	54	**37.7**	22.6	59.4	1.5
May	**44**	19	**74**	34.3	3.1	61.8	10.1
June	36	11	64	34.9	15.6	**64.6**	1.3
July	31	8	71	26.1	8.8	47.1	4.5
August	28	4	60	21.9	5.8	48.7	5.7
September	23	6	47	22.5	6.2	41.5	0.2
October	28	6	45	19.2	2.7	33.1	8.4
November	25	5	40	20.9	3.9	37.6	3.8
December	19	1	40	27.3	9.8	39.0	-8.0

*Annual peak is bolded and highlighted.

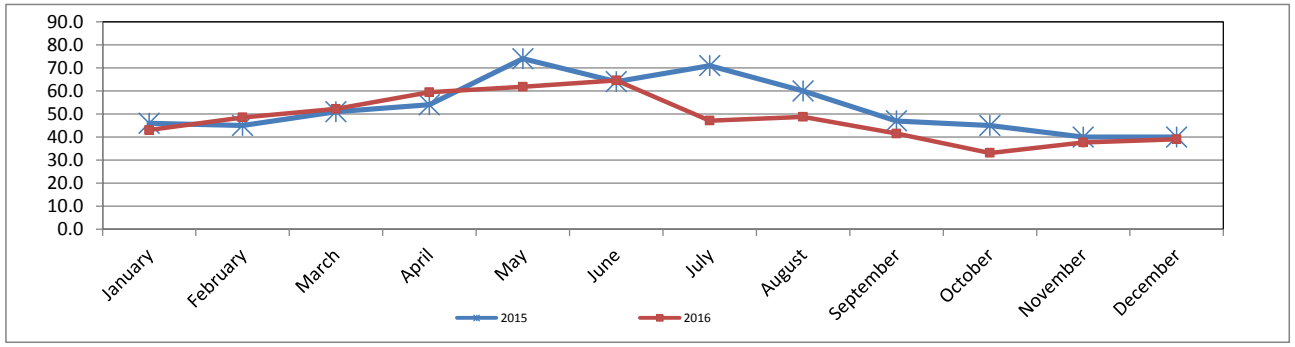
OZONE (O_3) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OZONE (O_3) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OZONE (O_3) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



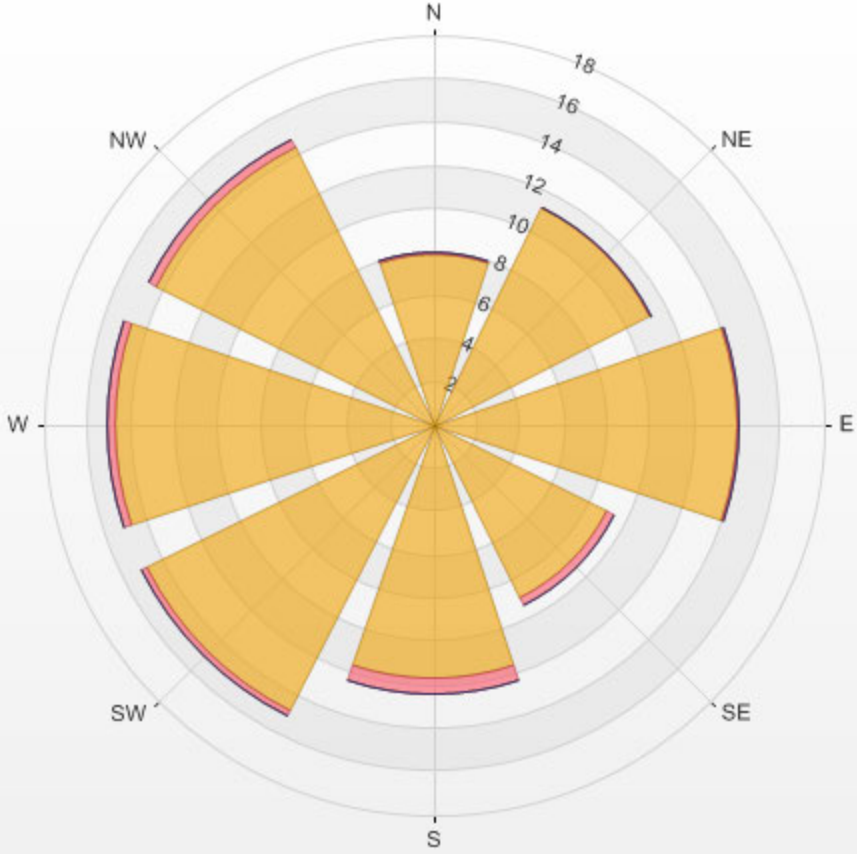
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-O3[ppb]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.09% Calm Avg: 28.12 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	7.9	0.0	0.0	0.0	7.9
NE	11.2	0.0	0.0	0.0	11.2
E	14.0	0.1	0.0	0.0	14.2
SE	9.0	0.3	0.0	0.0	9.3
S	11.8	0.7	0.0	0.0	12.5
SW	14.8	0.2	0.0	0.0	15.1
W	14.7	0.4	0.0	0.0	15.1
NW	14.4	0.3	0.0	0.0	14.7
Summary	97.8	2.1	0.0	0.0	100.0

% Icon	Classes (ppb)							
	98	0-50	2	50-110	0	110-210	0	>210.0

LICA ST. LINA Poll.: LICA ST. LINA-O3[ppb] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.09% Calm Poll Avg: 28.12[ppb]



PARTICULATE MATTER 2.5

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (µg/m³ $PM_{2.5}$)						OBJECTIVES** (µg/m³)		EXCEEDANCES		MONTHLY AVERAGE (µg/m³)
			≤ 30	31 < C ≤ 60	61 < C ≤ 80	81 < C ≤ 120	121 < C ≤ 240	> 240	1-HR	24-HR	1-HR	24-HR	
January	715	96.5	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	7
February	637	91.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	4.7
March	712	96.0	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	4.4
April	684	95.7	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	3.1
May	711	95.8	96.9%	2.5%	0.6%	0.0%	0.0%	0.0%	80	30	0	0	9.3
June	696	97.1	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	4.1
July	701	95.3	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	5.5
August	716	97.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	3.8
September	690	96.5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	2.7
October	724	97.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	3.1
November	704	98.1	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	4.4
December	727	98.3	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	80	30	0	0	5.5
											ANNUAL AVERAGE		4.8

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

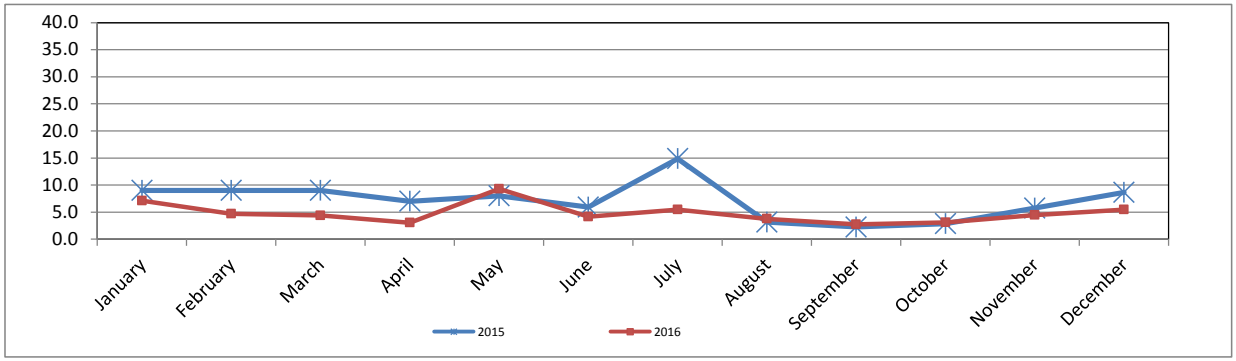
Alberta Ambient Air Quality Objectives Annual Average**	-	µg/m³
Annual Average for 2016	4.8	µg/m³

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 One-Hour Readings vs. 2016 One-Hour Readings in $\mu g/m^3$

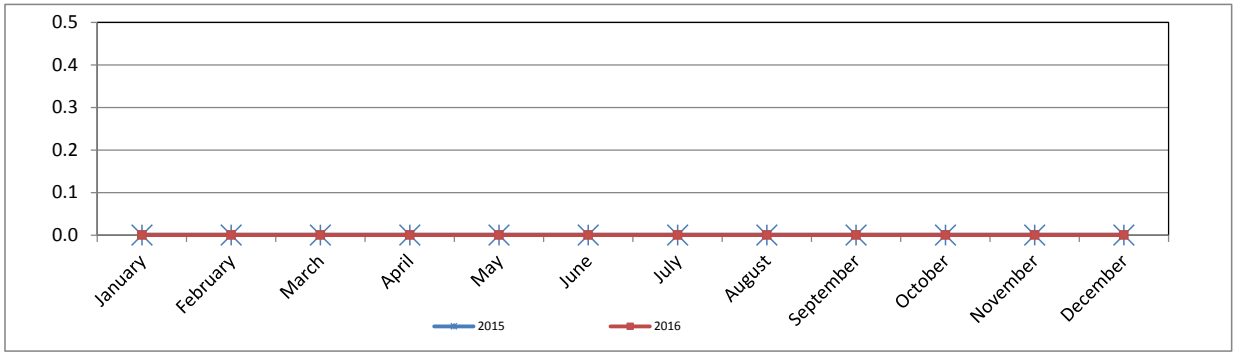
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	9	0	39	7	0	43	2
February	9	0	36	4.7	0.0	29.4	4.3
March	9	0	36	4.4	0.0	37.4	4.6
April	7	0	64	3.1	0.0	34.9	3.9
May	8	0	169	**9.3**	0.0	**68.4**	-1.3
June	6	0	75	4.1	0.0	18.9	1.8
July	**15**	0	**216**	5.5	0.0	52.9	9.4
August	3	0	118	3.8	0.0	18.4	-0.6
September	2	0	15	2.7	0.0	21.9	-0.5
October	3	0	13	3.1	0.0	14.9	-0.2
November	6	0	25	4.4	0.0	25.9	1.3
December	9	0	33	5.5	0.0	33.9	3.2

*Annual peak is bolded and highlighted.

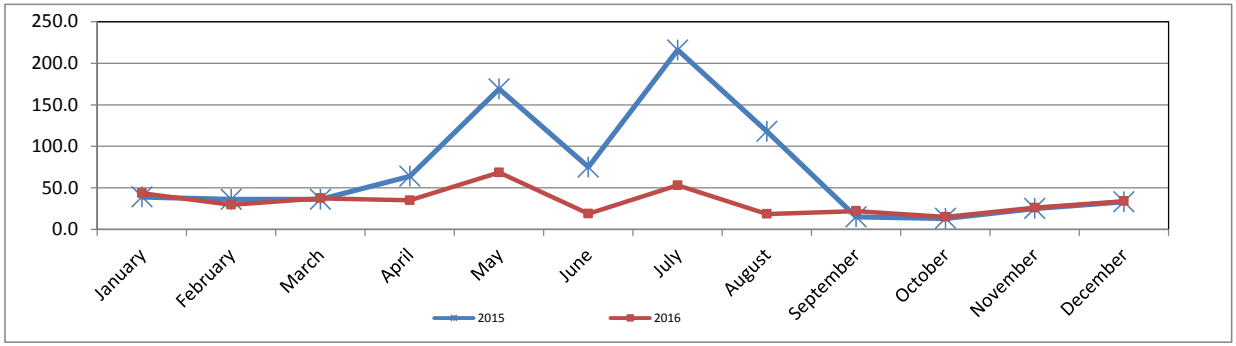
PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Mean vs. 2016 Monthly Mean in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Minimum vs. 2016 Monthly Minimum in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Maximum vs. 2016 Monthly Maximum in µg/m^3



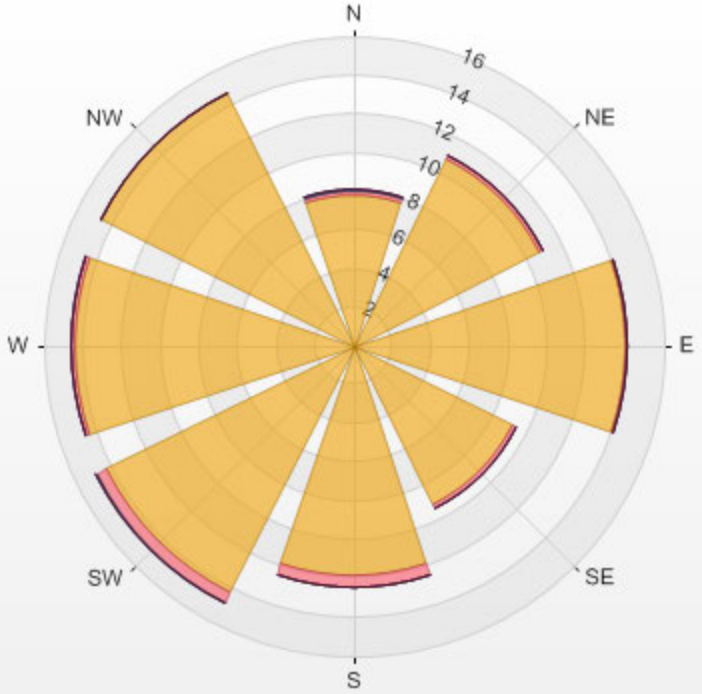
Wind: LICA ST. LINA
Poll.: LICA ST. LINA-PM25[ug/m3(L)]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.89% Calm Avg: 6.82 [µg/m^3]

Direction	0.0-19.8	19.8-39.6	39.6-59.5	59.5-79.3	79.3-99.1	>99.1	Total
N	7.8	0.3	0.0	0.0	0.0	0.0	8.1
NE	10.7	0.2	0.0	0.0	0.0	0.0	11.0
E	14.0	0.1	0.0	0.0	0.0	0.0	14.1
SE	9.2	0.2	0.0	0.0	0.0	0.0	9.4
S	11.9	0.5	0.0	0.0	0.0	0.0	12.5
SW	14.3	0.6	0.1	0.0	0.0	0.0	14.9
W	14.4	0.2	0.0	0.0	0.0	0.0	14.6
NW	14.6	0.1	0.0	0.0	0.0	0.0	14.6
Summary	96.9	2.1	0.1	0.0	0.0	0.0	99.1

%	Icon	Classes (ug/m3(L))	97	0.0-19.8	2	19.8-39.6	0	39.6-59.5	0	59.5-79.3	0	79.3-99.1	0	>99.1

LICA ST. LINA Poll.: LICA ST. LINA-PM25[ug/m3(L)] 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.89% Calm Poll Avg: 6.82[ug/m3(L)]



WIND SPEED

WIND SPEED (WS) 2016 Monthly Data Summary of One Hour Readings

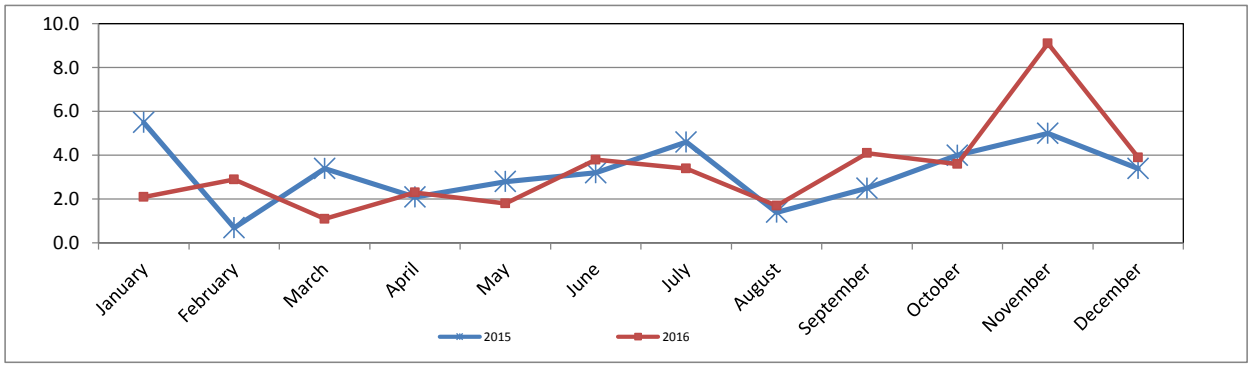
Month	Number of Readings*	Operational Time (%)	Monthly Average (KPH)	Minimum Hourly Average (KPH)	Maximum Hourly Average (KPH)	Maximum Daily Average (KPH)
January	744	100.0	2.1	0.3	30.2	17.9
February	696	100.0	2.9	0.7	35.9	19.3
March	744	100.0	1.1	0.3	28.5	17.4
April	720	100.0	2.3	1.0	28.3	17.8
May	726	97.6	1.8	0.4	41.3	14.7
June	720	100.0	3.8	0.9	27.3	17.0
July	743	99.9	3.4	0.4	24.9	12.9
August	744	100.0	1.7	0.0	23.9	13.1
September	720	100.0	4.1	0.7	26.9	16.8
October	742	99.7	3.6	1.4	26.7	17.3
November	681	94.6	9.1	2.3	100.7	20.6
December	744	100.0	3.9	3.4	30.1	22.1

WIND SPEED (WS) 2015 One-Hour Readings vs. 2016 One-Hour Readings in km/hr

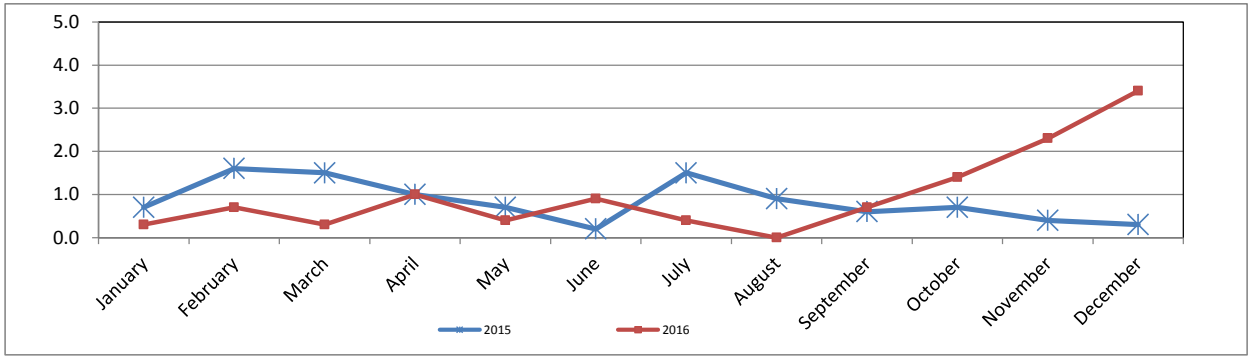
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**5.5**	0.7	28.8	2.1	0.3	30.2	3.4
February	0.7	1.6	26.6	2.9	0.7	35.9	-2.2
March	3.4	1.5	**34.5**	1.1	0.3	28.5	2.3
April	2.1	1.0	31.4	2.3	1.0	28.3	-0.2
May	2.8	0.7	32.5	1.8	0.4	41.3	1.0
June	3.2	0.2	22.7	3.8	0.9	27.3	-0.6
July	4.6	1.5	22.9	3.4	0.4	24.9	1.2
August	1.4	0.9	17.3	1.7	0.0	23.9	-0.3
September	2.5	0.6	29.0	4.1	0.7	26.9	-1.6
October	4.0	0.7	27.5	3.6	1.4	26.7	0.4
November	5.0	0.4	26.4	**9.1**	2.3	**100.7**	-4.1
December	3.4	0.3	24.4	3.9	3.4	30.1	-0.5

*Annual peak is bolded and highlighted.

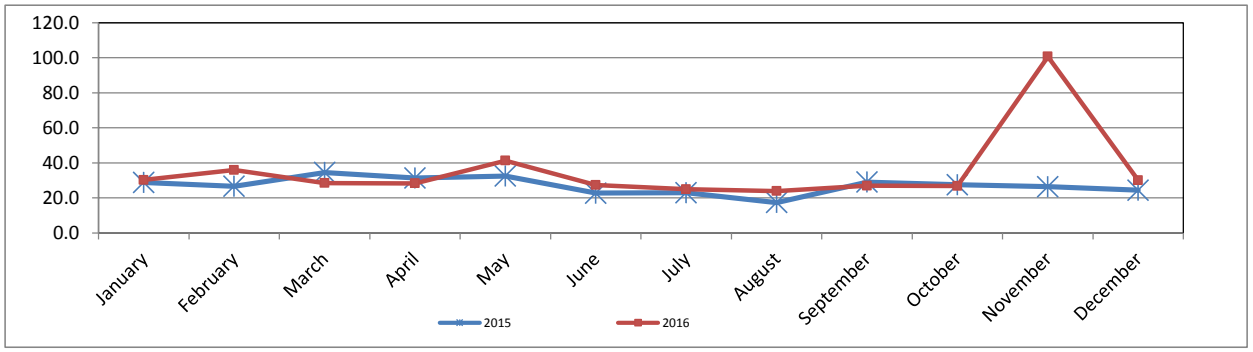
WIND SPEED (WS) 2015 Monthly Mean vs. 2016 Monthly Mean in km/hr



WIND SPEED (WS) 2015 Monthly Minimum vs. 2016 Monthly Minimum in km/hr



WIND SPEED (WS) 2015 Monthly Maximum vs. 2016 Monthly Maximum in km/hr



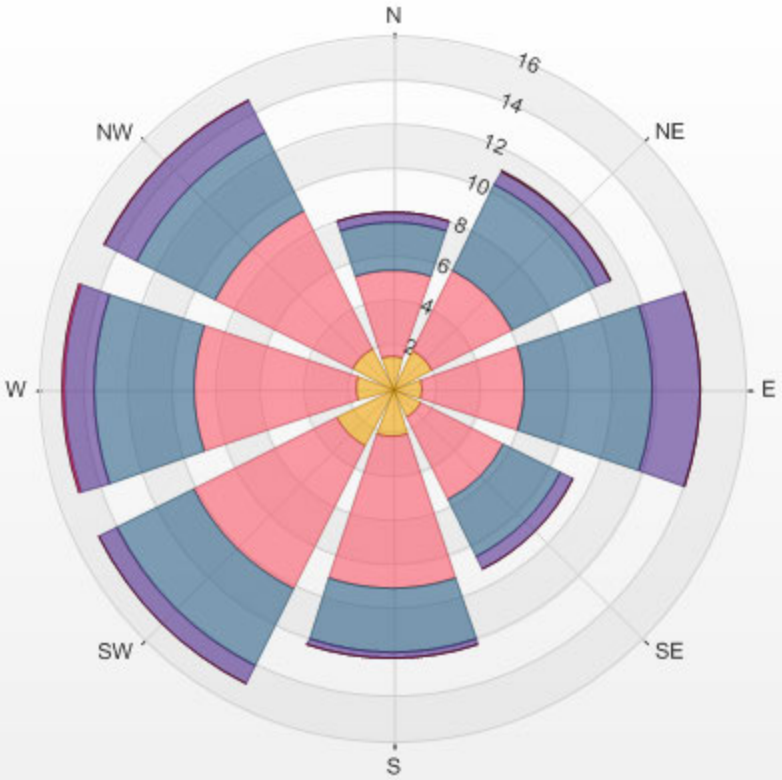
Wind: LICA ST. LINA
Monitor: WSP [kph]
Periodically: 2016/01/01 00:00-2016/12/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.87%

Direction	1.8-6.0	6.0-12.0	12.0-20.0	20.0-29.0	29.0-39.0	>39.0	Total
N	1.5	3.9	2.2	0.4	0.0	0.0	8.1
NE	2.0	4.1	4.3	0.7	0.0	0.1	11.1
E	1.4	4.6	5.8	2.1	0.0	0.0	14.0
SE	1.5	4.2	2.9	0.6	0.0	0.0	9.2
S	2.2	6.9	2.8	0.3	0.0	0.0	12.3
SW	2.9	7.3	3.9	0.9	0.0	0.0	14.9
W	1.6	7.3	4.6	1.3	0.1	0.0	15.0
NW	2.0	7.0	4.0	1.6	0.1	0.0	14.7
Summary	15.0	45.3	30.7	7.9	0.2	0.1	99.1

% Icon Classes (kph)	15 1.8-6.0	45 6.0-12.0	31 12.0-20.0	8 20.0-29.0	0 29.0-39.0	0 >39.0

LICA ST. LINA 2016/01/01 00:00 - 2016/12/31 23:00 Calm: 0.87% Calm Wind Avg Speed: 1.08(kph)



RELATIVE HUMIDITY

RELATIVE HUMIDITY (RH) 2016 Monthly Data Summary of One Hour Readings

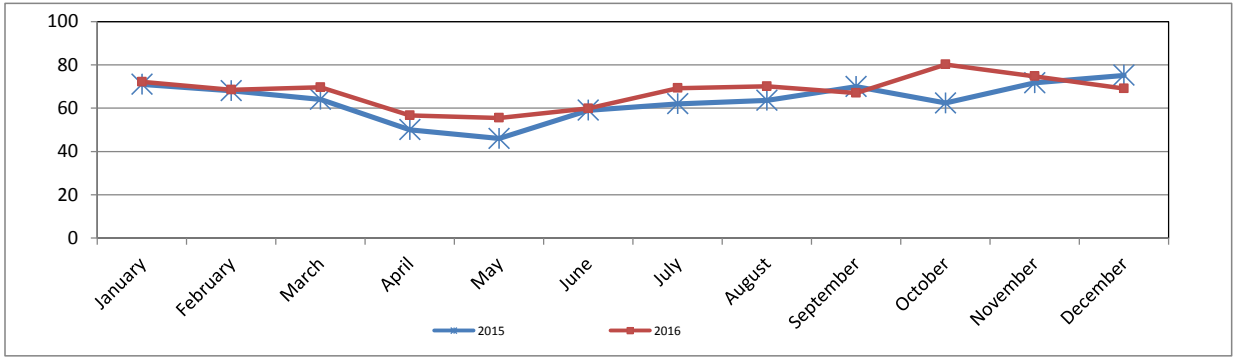
Month	Number of Readings*	Operational Time (%)	Monthly Average (%)	Minimum Hourly Average (%)	Maximum Hourly Average (%)	Maximum Daily Average (%)
January	744	100.0	72	37	86	83
February	696	100.0	68	31	88	85
March	744	100.0	70	23	89	85
April	720	100.0	57	4	90	87
May	726	97.6	55	11	92	91
June	720	100.0	60	15	91	87
July	743	99.9	69	32	92	85
August	744	100.0	70	31	91	85
September	720	100.0	67	29	91	82
October	744	100.0	80	50	91	90
November	720	100.0	75	30	90	87
December	744	100.0	69	41	87	86

RELATIVE HUMIDITY (RH) 2015 One-Hour Readings vs. 2016 One-Hour Readings in %

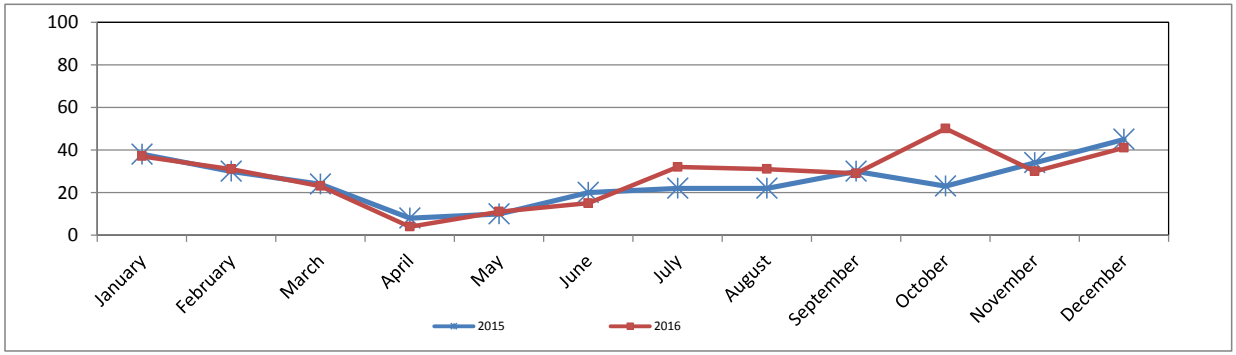
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	71	38	89	72	37	86	-1
February	68	30	89	68	31	88	0
March	64	24	89	70	23	89	-6
April	50	8	90	57	4	90	-7
May	46	10	90	55	11	**92**	-9
June	59	20	91	60	15	91	-1
July	62	22	91	69	32	92	-7
August	64	22	**92**	70	31	91	-6
September	70	30	91	67	29	91	3
October	62	23	91	**80**	50	91	-18
November	72	34	90	75	30	90	-3
December	**75**	45	88	69	41	87	6

*Annual peak is bolded and highlighted.

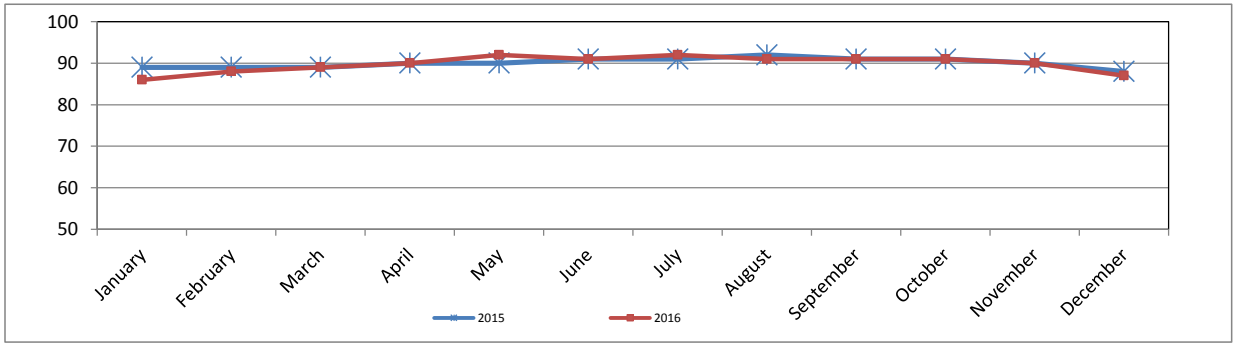
RELATIVE HUMIDITY (RH) 2015 Monthly Mean vs. 2016 Monthly Mean in %



RELATIVE HUMIDITY (RH) 2015 Monthly Minimum vs. 2016 Monthly Minimum in %



RELATIVE HUMIDITY (RH) 2015 Monthly Maximum vs. 2016 Monthly Maximum in %



BAROMETRIC PRESSURE

BAROMETRIC PRESSURE (BP) 2016 Monthly Data Summary of One Hour Readings

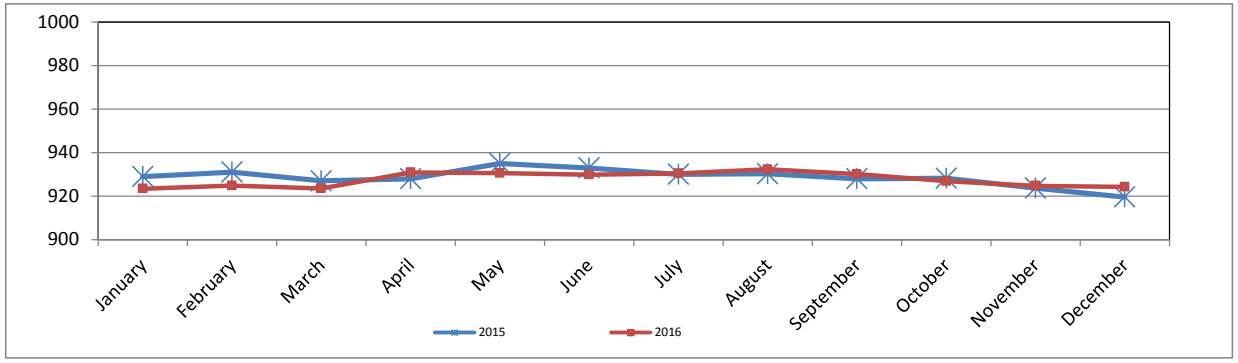
Month	Number of Readings*	Operational Time (%)	Monthly Average (millibar)	Minimum Hourly Average (millibar)	Maximum Hourly Average (millibar)	Maximum Daily Average (millibar)
January	744	100.0	923	905	935	934
February	696	100.0	925	900	940	937
March	744	100.0	924	904	941	939
April	720	100.0	931	910	945	943
May	726	97.6	931	911	947	945
June	720	100.0	930	914	942	941
July	743	99.9	931	922	941	939
August	744	100.0	932	915	942	940
September	720	100.0	930	914	943	941
October	744	100.0	927	907	939	937
November	720	100.0	925	908	942	939
December	744	100.0	924	905	948	947

BAROMETRIC PRESSURE (BP) 2015 One-Hour Readings vs. 2016 One-Hour Readings in millibar

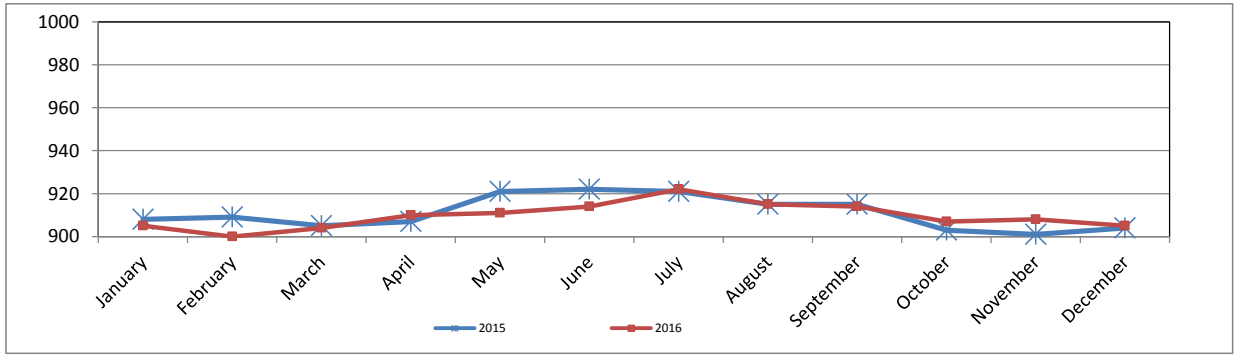
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	929	908	**954**	923	905	935	6
February	931	909	946	925	900	940	6
March	927	905	943	924	904	941	3
April	928	907	939	931	910	945	-3
May	**935**	921	947	931	911	947	4
June	933	922	941	930	914	942	3
July	930	921	941	931	922	941	-1
August	930	915	939	**932**	915	942	-2
September	928	915	938	930	914	943	-2
October	928	903	945	927	907	939	1
November	924	901	938	925	908	942	-1
December	920	904	939	924	905	**948**	-5

*Annual peak is bolded and highlighted.

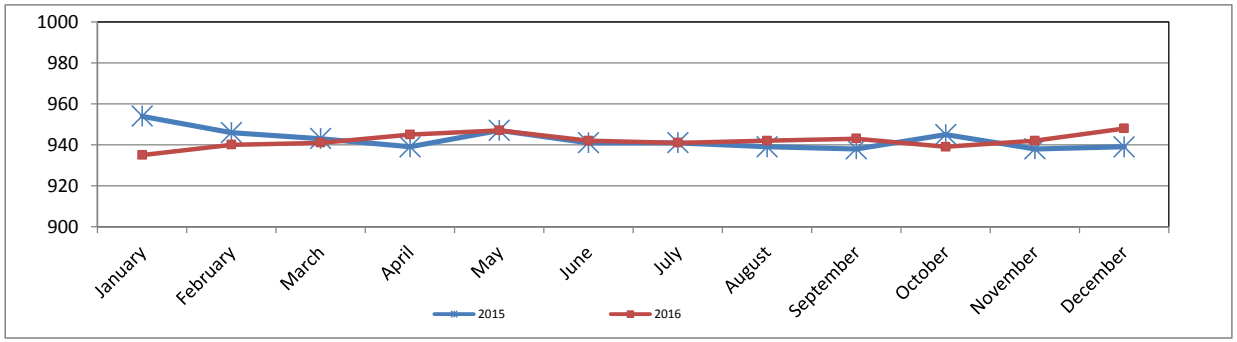
BAROMETRIC PRESSURE (BP) 2015 Monthly Mean vs. 2016 Monthly Mean in millibar



BAROMETRIC PRESSURE (BP) 2015 Monthly Minimum vs. 2016 Monthly Minimum in millibar



BAROMETRIC PRESSURE (BP) 2015 Monthly Maximum vs. 2016 Monthly Maximum in millibar



AMBIENT TEMPERATURE

AMBIENT TEMPERATURE (TPX) 2016 Monthly Data Summary of One Hour Readings

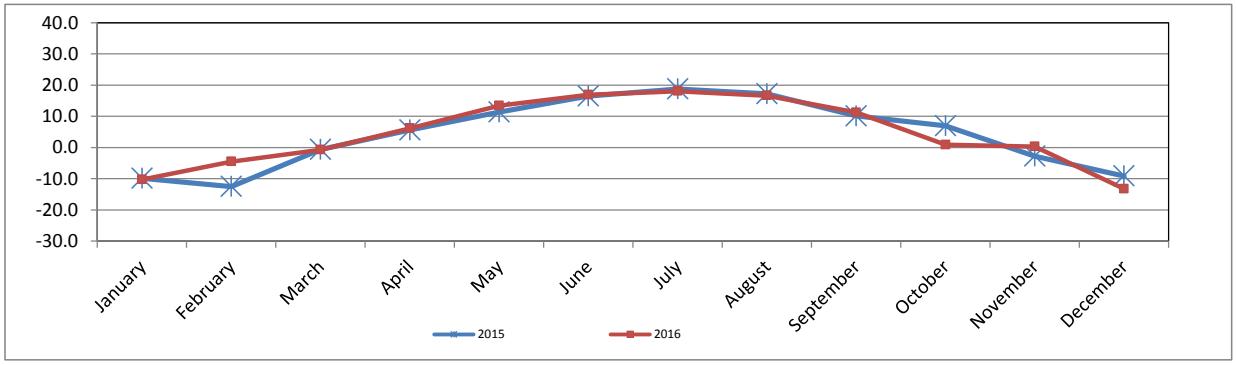
Month	Number of Readings*	Operational Time (%)	Monthly Average (Deg C)	Minimum Hourly Average (Deg C)	Maximum Hourly Average (Deg C)	Maximum Daily Average (Deg C)
January	744	100.0	-10.3	-28.0	7.1	2.1
February	696	100.0	-4.5	-23.7	10.1	4.0
March	744	100.0	-0.7	-12.8	12.2	6.7
April	720	100.0	6.1	-6.4	25.6	17.4
May	726	97.6	13.5	-0.9	30.4	22.3
June	720	100.0	16.9	5.1	30.9	22.0
July	743	99.9	18.1	10.3	28.5	22.4
August	744	100.0	16.6	4.4	29.5	20.4
September	720	100.0	11.2	1.2	25.3	17.5
October	744	100.0	0.9	-4.8	14.3	7.8
November	720	100.0	0.3	-10.3	16.6	9.1
December	744	100.0	-13.2	-28.2	3.1	-0.1

AMBIENT TEMPERATURE (TPX) 2015 One-Hour Readings vs. 2016 One-Hour Readings in Degrees Celsius

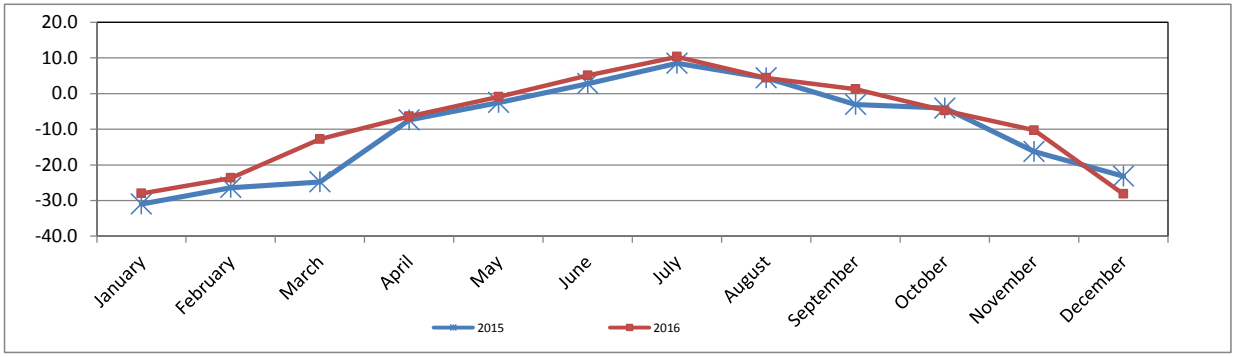
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	-9.9	-31.0	10.4	-10.3	-28.0	7.1	0.4
February	-12.5	-26.4	8.9	-4.5	-23.7	10.1	-8.0
March	-0.6	-24.8	14.9	-0.7	-12.8	12.2	0.1
April	5.6	-7.4	23.7	6.1	-6.4	25.6	-0.5
May	11.4	-2.5	27.8	13.5	-0.9	30.4	-2.1
June	16.5	2.8	31.3	16.9	5.1	**30.9**	-0.4
July	**18.8**	8.5	**33.0**	**18.1**	10.3	28.5	0.7
August	17.3	4.4	30.9	16.6	4.4	29.5	0.6
September	10.1	-3.1	26.8	11.2	1.2	25.3	-1.1
October	7.0	-4.1	24.8	0.9	-4.8	14.3	6.1
November	-2.8	-16.3	9.4	0.3	-10.3	16.6	-3.1
December	-9.1	-23.2	4.6	-13.2	-28.2	3.1	4.1

*Annual peak is bolded and highlighted.

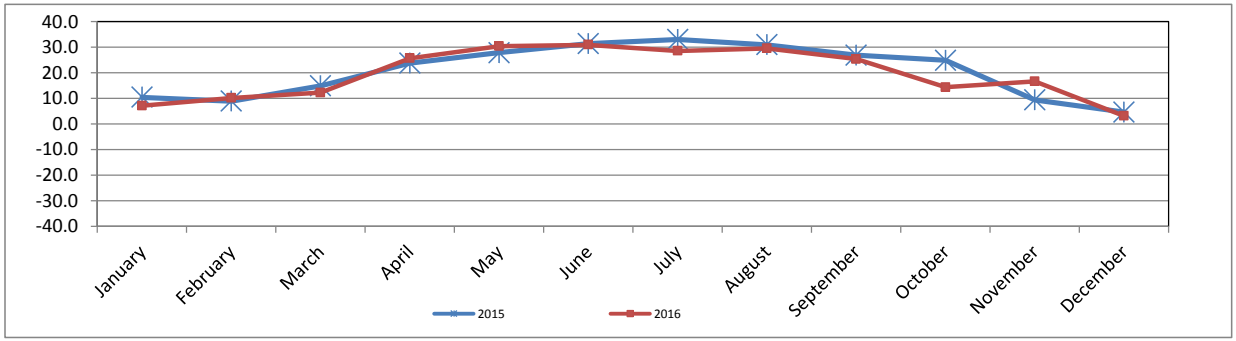
AMBIENT TEMPERATURE (TPX) 2015 Monthly Mean vs. 2016 Monthly Mean in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Minimum vs. 2016 Monthly Minimum in Degrees Celsius



AMBIENT TEMPERATURE (TPX) 2015 Monthly Maximum vs. 2016 Monthly Maximum in Degrees Celsius



PRECIPITATION

PRECIPITATION 2016 Monthly Data Summary of One Hour Readings

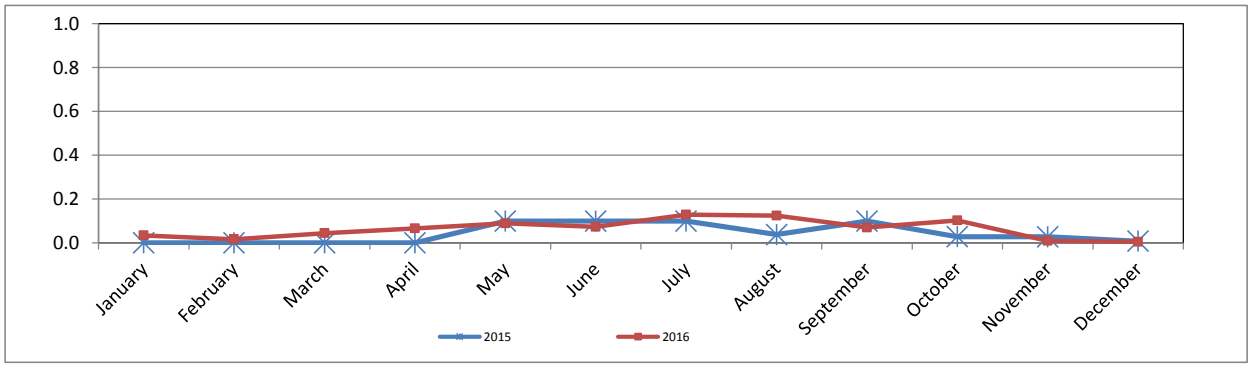
Month	Number of Readings*	Operational Time (%)	Monthly Average (MM)	Monthly Total (MM)	Maximum Hourly Average (MM)	Maximum Daily Average (MM)
January	744	100.0	0.0	25.6	2.9	0.3
February	696	100.0	0.0	12.1	1.1	0.2
March	744	100.0	0.0	33.2	1.5	0.4
April	720	100.0	0.1	48.0	3.9	0.6
May	724	97.3	0.1	64.5	5.0	0.7
June	720	100.0	0.1	53.1	3.8	0.5
July	743	99.9	0.1	95.6	20.8	1.2
August	744	100.0	0.1	92.7	10.0	0.9
September	720	100.0	0.1	50.5	12.8	1.0
October	744	100.0	0.1	76.9	5.1	0.9
November	720	100.0	0.0	6.7	1.3	0.1
December	744	100.0	0.0	3.5	0.3	0.1

PRECIPITATION 2015 One-Hour Readings vs. 2016 One-Hour Readings in MM

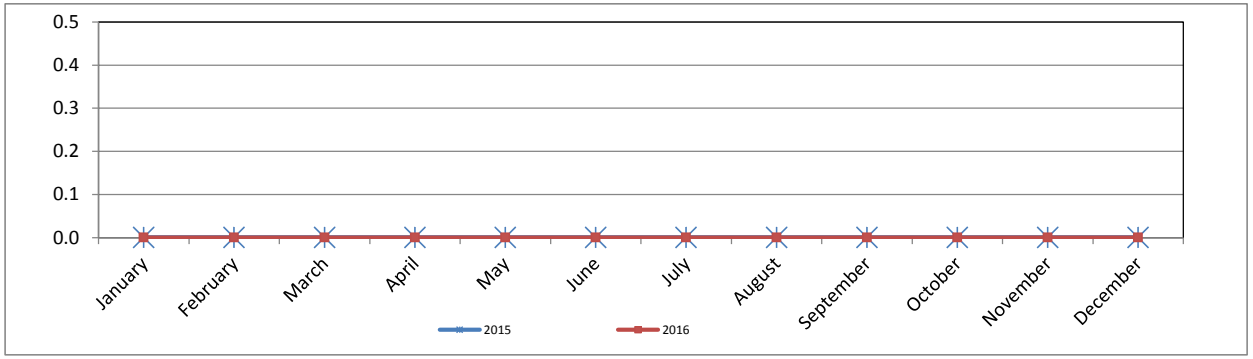
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	0.0	0.0	2.1	0.0	0.0	2.9	0.0
February	0.0	0.0	1.2	0.0	0.0	1.1	0.0
March	0.0	0.0	4.0	0.0	0.0	1.5	0.0
April	0.0	0.0	3.7	**0.1**	0.0	3.9	-0.1
May	**0.1**	0.0	12.7	0.1	0.0	5.0	0.0
June	0.1	0.0	**12.9**	0.1	0.0	3.8	0.0
July	0.1	0.0	7.5	0.1	0.0	**20.8**	0.0
August	0.0	0.0	2.8	0.1	0.0	10.0	-0.1
September	0.1	0.0	5.6	0.1	0.0	12.8	0.0
October	0.0	0.0	2.4	0.1	0.0	5.1	-0.1
November	0.0	0.0	2.2	0.0	0.0	1.3	0.0
December	0.0	0.0	0.8	0.0	0.0	0.3	0.0

*Annual peak is bolded and highlighted.

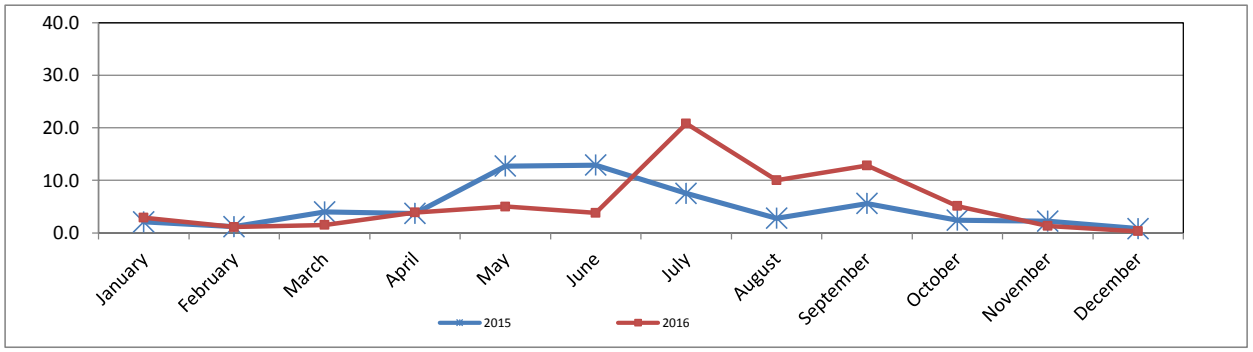
PRECIPITATION 2015 Monthly Mean vs. 2016 Monthly Mean in MM



PRECIPITATION 2015 Monthly Minimum vs. 2016 Monthly Minimum in MM



PRECIPITATION 2015 Monthly Maximum vs. 2016 Monthly Maximum in MM



APPENDIX II
REPORT CERTIFICATION FORM

Report Certification Form

Alberta Airshed (if applicable)	**EPA Approval or Code of Practice Registration #** (if applicable)
YES	**NA**
Company Name (if applicable)	**Industrial Operation Name** (if applicable)
Lakeland Industry & Community Association	**St. Lina Continuous Monitoring Station**
Name of the Representative of the Person Responsible (Last, First, Middle)	**Position / Title of the Representative of the Person Responsible**
Maram Ghaleb	**Project Manager, Customer Service - Air Services**
Is an External Party Certifying the Report? (If 'Yes', fill in the fields below for the external person.	
☐ **Yes** ■ **No**	
Name of External Person Certifying the Report (Last, First, Middle)	**Position / Title of External Person Certifying the Report**
NA	**NA**
Company Name for the External Person Certifying the Report	**Identification of Qualifications / Professional Designations of the External Person Certifying the Report**
NA	**NA**

I certify that I have reviewed and verified the submitted report. I also certify that the report presented with this certification form is complete, accurate and representative of the monitoring results and timeframe.

Maram Ghaleb

Signature of the Representative of the Person Responsible / External Person Certifying the Report

October 23, 2017

Report Issued Date (dd-mm-yyyy)

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Alberta Environment and Parks (AEP)
Air.Reporting@gov.ab.ca

December 29, 2017

Subject: Annual Report Submission for LICA Elk Point Station

Lakeland Industry & Community Association (LICA) is pleased to submit the ambient air monitoring annual report conducted at the Elk Point Station in the year of 2016.

The air monitoring program consists of continuous air monitoring, intermittent sampling, including both VOC and PAH sampling program, and VOC canister sampling program. All the air monitoring activities were conducted by contractors. The air monitoring program at the Elk Point site was completed on May 16.

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Review and Prepared By	Electronic Submission Conducted By
Continuous ambient air	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics
Intermittent	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable
VOC Canister	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable

Notification of Changes Made After Monthly Report Issuance

- Wind Speed Calculated Averages: In the 2016 monthly reports and 2015 annual report, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages for both 2015 and 2016 were derived using vector averaging.

As the LICA Environmental Program Manager and Data & Reporting Specialist, we certify that we 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. We also certify all air data that are required by the AMD to be electronically submitted to Alberta's Ambient Air Quality Data Warehouse have been submitted by the time of this report submission, with the exception of electronic submission for the results of intermittent samples and VOC canister samples. The results for both intermittent samples and VOC canister samples is scheduled to be submitted by the end of January 2018.

Should you have any questions, please don't hesitate to contact us.

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Respectfully,

Michael Bisaga
Technical Program Manager
Lakeland Industry & Community Association
780-266-7068
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AMBIENT AIR MONITORING ANNUAL REPORT

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

ELK POINT AIRPORT SITE

JOB #: 2833-2016-35-A

JANUARY - MAY
2016

Prepared for:

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION
5107 50 ST.
BONNYVILLE, ALBERTA
T9N 2J5

Attention: MIKE BISAGA

DATE: **December 28, 2017**

Prepared by:

Wunmi Adekanmbi, M.Sc., EPt
Project Manager, Customer Service, Air Services

Reviewed by:

Cheri Sinclair, B.Sc.
Supervisor, Customer Service, Air Services

SUMMARY

In January - May 2016, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the Elk Point Continuous Monitoring Station, near Bonnyville, Alberta. The monitoring station provides continuous meteorological measurements and air quiality data for non-compliance parameters, as reqested by Lakeland Industry & Community Association.

Data presented in this report has undergone the Post-Final Validation Procedures, which includes a cursory inspection of annual charts. If errors or omissions in the data are suspected or discovered after the initial submittal of data (monthly report), the post-validation step serves to re-evaluate the affected data. The report certification form is also included in this report to verify that the annual validation review has been completed, as per the Reporting Chapter (Chapter 9) of the Air Monitoring Directive (AMD).

Statistical summaries for monthly mean, maximum and minimum values, as well as comparisons to historical values from 2015 are presented on the following pages.

Any deviations or modifications made to the sampling or analytical methods during the monitoring period are outlined in Section 1.0 Discussion. On this basis, Maxxam is issuing this completed report to Lakeland Industry & Community Association.

Should you have any questions concerning the results or if we can be of further assistance, please contact us at 403-219-3661 or toll-free at 1-800-386-7247.

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1.0 Discussion

This annual validation report consists of data for parameters Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2S), Total Hydrocarbon (THC), Methane (CH_4), Non-Methane Hydrocarbon (NMHC), Oxides of Nitrogen (NO_x), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter 2.5 ($PM_{2.5}$), and Wind Speed (WS).

The air monitoring trailer was located at 53°53'28.8" N and 110°45'51.0" W during the monitoring period.

All data collected during the monitoring period, with the exception of Particulate Matter$_{2.5}$, were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary, 2016 (AAAQOs). One

1-hr exceedance was recorded for $PM_{2.5}$ during the monitoring period, at a concentration of 99 µg/m^3 on May 15, at hour 21:00. This was reported to AEP under reference number 313403.

The operational uptime for all analyzers and meteorological systems were above the 90% requirement, except in May, when the monitoring program ended.

An external station audit was conducted by AEMERA on April 27. The audit report was included in the monthly report for April 2016.

As per client request, the monitoring program was aborted following a removal calibration on May 16. The trailer was relocated to Bonnyville, Alberta in June 2017.

Notification of Changes Made After Monthly Report Issuance

• **Wind Speed Calculated Averages:** In the 2016 monthly reports and 2015 annual report, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages for both 2015 and 2016 were derived using vector averaging.

The summaries of the monthly maintenance report for the monitoring period are presented below:

SULPHUR DIOXIDE (SO_2)

January	• Operational time was 98.1%, equivalent to 14 hours of downtime. • Nine hours of data are missing from January 5 to 6, due to a power failure. A zero/span check was triggered after power was restored, causing one more hour of downtime. • An as-found response check was completed on January 28 to assess a biased high zero response, resulting in four hours of downtime.
February	• Operational time was 99.9%, equivalent to 1 hour of downtime. • One hour of data collected on February 1 was discarded due to a power failure.
March	• Operational time was 99.5%, equivalent to 4 hours of downtime. • Four hours of data are missing on March 1 due to a power failure and analyzer recovery.
April	• Operational time was 100%. No issues were identified. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 50.0% equivalent to 372 hours of downtime. As per client request, the monitoring program was aborted following a removal calibration on May 16.

HYDROGEN SULPHIDE (H_2S)

January	• Operational time was 98.7%, equivalent to 10 hours of downtime. • Nine hours of data are missing from January 5 to 6, due to a power failure. A zero/span check was triggered after power was restored, causing one more hour of downtime.
February	• Operational time was 99.9% equivalent to 1 hour of downtime. • One hour of data collected on February 1 was discarded due to a power failure.
March	• Operational time was 95.3% equivalent to 35 hours of downtime. • Four hours of data are missing on March 1 due to a power failure and analyzer recovery. • The sample pump failed on March 26. The pump was rebuilt on March 27 and was followed by a post-repair calibration. Data was invalidated back to the last valid daily calibration before the pump failed which was on March 26, at hour 07:00. Thirty-one hours downtime were recorded due to this event.
April	• Operational time was 100%. No issues were identified. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 50.0%, equivalent to 372 hours of downtime. As per client request, the monitoring program was aborted following a removal calibration on May 16.

TOTAL HYDROCARBONS (THC), METHANE (CH_4), and NON-METHANE HYDROCARBONS (NMHC)

January	• Operational time was 97.2%, equivalent to 21 hours of downtime. • A power failure occurred on January 5. The analyzer flamed out after the power failure and it was re-lit onsite on January 6, followed by the monthly calibration. Eighteen hours of data were discarded due to this event. • A repeat zero/span check and an as-found response check were completed on January 28 to assess a zero drift, resulting in three hours of downtime.
February	• Operational time was 98.6%, equivalent to 10 hours of downtime. • One hour of data collected on February 1 was discarded due to a power failure. • The Nitrogen and Hydrogen gas cylinders were replaced on February 24, causing one hour of downtime. • Following a shut-down calibration on February 29, the LICA-owned TEI 55i analyzer (S/N: 1236656107) was removed for required maintenance. A Maxxam-supplied TEI 55i analyzer (S/N: 1433563261) was stationed for overnight column conditioning and stabilization. Eight hours of downtime were recorded due to this event.
March	• Operational time was 95.6%, equivalent to 33 hours of downtime. • The LICA-owned Thermo 55i analyzer (S/N: 1236656107) was removed on February 29 for required maintenance. A Maxxam-supplied replacement Thermo 55i analyzer (S/N: 1433563261) was stationed for column conditioning and stabilization overnight. A power failure on March 1 postponed the installation calibration until March 2. Thirty-three hours of downtime were recorded due to this event.
April	• Operational time was 97.6%, equivalent to 17 hours of downtime. • Following a shut-down calibration on April 4, the Maxxam-supplied replacement analyzer, Thermo 55i (S/N: 1433563261) was removed. The LICA-owned Thermo 55i analyzer (S/N: 1236656107) was re-installed after it had undergone maintenance in March 2016. The analyzer was allowed time to stabilize overnight and the installation calibration was completed on April 5. Seventeen hours of downtime were recorded due to this event. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 50.1%, equivalent to 371 hours of downtime. As per client request, the monitoring program was aborted following a removal calibration on May 16.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

January	• Operational time was 98.7%, equivalent to 10 hours of downtime. • Nine hours of data are missing from January 5 to 6, due to a power failure. A zero/span check was triggered after power was restored, causing one more hour of downtime.
February	• Operational time was 98.4%, equivalent to 11 hours of downtime. • One hour of data collected on February 1 was discarded due to a power failure. • Following an as found points check on February 24, the slope and the output voltage were adjusted and the analog output configuration was changed from 10 volts to 1 volt. A full calibration was then completed. Ten hours of downtime were recorded due to this event.
March	• Operational time was 97.8%, equivalent to 16 hours of downtime. • Following a shut-down calibration on March 10, the LICA owned API 200E analyzer (S/N: 592) was removed for maintenance purposes. An installation calibration was then completed on another LICA-owned, API 200E replacement analyzer (S/N: 593). Nine hours of downtime were recorded due to this analyzer replacement event. • The channels were placed in "maintenance" mode on March 11, while reference points were being generated for Ozone calibration, accounting for four hours of downtime. • Three hours of data are missing on March 1 due to a power failure.
April	• Operational time was 99.7%, equivalent to 2 hours of downtime. • An additional zero/span check was performed on April 12 to address a biased high span response, resulting in two hours of downtime. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 50.0% equivalent to 372 hours of downtime. As per client request, the monitoring program was aborted following a removal calibration on May 16.

OZONE (O_3)

January	• Operational time was 96.1%, equivalent to 29 hours of downtime. • Nine hours of data are missing from January 5 to 6, due to a power failure. A zero/span check was triggered after power was restored, causing one more hour of downtime. • The zero/span valve became stuck following the daily zero/span check on January 12. The valve was reset remotely on January 13, followed by a zero/span check. Sixteen hours of data were discarded due to this event. • Three hours of data collected on January 28 were invalidated due to an analyzer malfunction.
February	• Operational time was 99.7%, equivalent to 2 hours of downtime. • One hour of data collected on February 1 was discarded due to a power failure. • An additional zero/span check was performed on February 5 to assess span response, accounting for one hour of downtime.

March	• Operational time was 99.6%, equivalent to 3 hours of downtime. • Three hours of data are missing on March 1 due to a power failure.
April	• Operational time was 100%. No issues were identified. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 50.5% equivalent to 368 hours of downtime. As per client request, the monitoring program was aborted following a removal calibration on May 16.

PARTICULATE MATTER $_{2.5}$

January	• Operational time was 95.8%, equivalent to 31 hours of downtime. • The Teom unit malfunctioned on January 2. Troubleshooting/maintenance was performed on January 3 and a post-repair audit was completed afterwards. Sixteen hours of data were discarded due to this event. • Six hours of data were recorded at concentrations lower than –3 µg/m^3 this month, rendering the data invalid. • Nine hours of data are missing from January 5 to 6, due to a power failure.
February	• Operational time was 98.1%, equivalent to 13 hours of downtime. • One hour of data collected on February 1 was discarded due to a power failure. • Twelve hours of data were recorded at concentrations lower than –3 µg/m^3 this month, rendering the data invalid.
March	• Operational time was 98.3%, equivalent to 13 hours of downtime. • Ten hours of data were recorded at concentrations lower than –3 µg/m^3 this month, rendering the data invalid. • Three hours of data are missing on March 1 due to a power failure.
April	• Operational time was 99.2% equivalent to 6 hours of downtime. These were incurred as concentrations were recorded lower than –3 µg/m^3, rendering the data invalid. • An external audit was conducted by AEMERA on April 27. The audit report was included in the April 2016 monthly report.
May	• Operational time was 49.5% equivalent to 376 hours of downtime. • As per client request, the monitoring program was aborted following a removal audit on May 16. • Three hours of data were recorded at concentrations lower than –3 µg/m^3 this month, rendering the data invalid. • One 1-HR exceedance was recorded on May 15, at hour 21:00, at a concentration of 99 µg/m^3. This was reported to AEP under reference number 313403.

WIND DATA

January	• Operational time was 98.8%, equivalent to 9 hours of downtime. These were incurred due to a power failure that occurred between January 5 to 6.
February	• Operational time was 99.6%, equivalent to 3 hours of downtime. • One hour of data collected on February 1 was discarded due to a power failure. • The LICA-owned RM Young (S/N: 56589) wind system was installed on site on February 25 following maintenance at Maxxam shop. The Maxxam-supplied RM Young (S/N: 110980) wind system was removed and brought back to the Maxxam shop. Two hours of downtime were recorded due to this event.
March	• Operational time was 99.6%, equivalent to 3 hours of downtime. These were incurred due to a power failure that occurred on March 1.
April	• Operational time was 100%. No issues were identified.
May	• Operational time was 49.7% equivalent to 374 hours of downtime. • As per client request, the monitoring program was aborted following a removal audit on May 16. • One hour of downtime was recorded on May 6 as the data quality was impacted after a brief power outage.

2.0 Project Personnel

Mike Bisaga was the contact for Lakeland Industry & Community Association and the Maxxam field sampling team consisted of Alexander Yakupov, Michael Espiritu and Chris Wesson.

3.0 Plant Monthly Required AMD Summary

All data collected during the monitoring period, with the exception of Particulate Matter$_{2.5}$, were within the objectives outlined in the AAAQOs. One 1-hr exceedance was recorded for $PM_{2.5}$ during the monitoring period: concentration of 99 µg/m^3 on May 15, at hour 21:00. This was reported to AEP under reference number 313403.

The operational uptime for all analyzers and meteorological systems were above the 90% requirement, except in May, when the monitoring program ended.

4.0 Calculations and Results

All calculations and reporting of results follow the method described in the Air Monitoring Directive, 1989, 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) as well as AMD 2015 and 2016.

5.0 Methods and Procedures

The following methods and procedures were used to complete the test program:

Maxxam AIR SOP-00001 - Methane, Non-Methane Hydrocarbon Analyzer Monitoring
Maxxam AIR SOP-00208: RM Young Monitor Calibration
Maxxam AIR SOP-00209: Ambient H_2S Monitoring
Maxxam AIR SOP-00211: Ambient SO_2 Monitoring
Maxxam AIR SOP-00212: Ambient O_3 Monitoring
Maxxam AIR SOP-00213: Ambient $NO/NO_2/NOx$ Monitoring
Maxxam AIR SOP-00215: Teom Operation

There were no deviations from the prescribed methods.

The following instruments were used to perform the test program:

Sulphur Dioxide - API 100E UV Flourescent Analyzer
Hydrogen Sulphide - API 101E UV Flourescent Analyzer
Methane, Non-Methane Hydrocarbon - Thermo 55i FID Analyzer
Oxides of Nitrogen - API 200E Chemiluminescent Analyzer
Ozone - Thermo 49i Photometric Analyzer
Particulate Matter ($PM_{2.5}$) - R&P 1405F Teom Unit
Wind System - RM Young Unit
Datalogger - ESC 8832

APPENDIX I
CONTINUOUS MONITORING DATA RESULTS

SULPHUR DIOXIDE

SULPHUR DIOXIDE (SO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB SO_2)						OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 20	20 < C ≤ 60	60 < C ≤ 110	110 < C ≤ 170	170 < C ≤ 340	> 340	1-HR	24-HR	1-HR	24-HR	
January	694	98.1	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0
February	660	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.2
March	701	99.5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
April	679	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
May	352	50.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
											ANNUAL AVERAGE		0.0

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

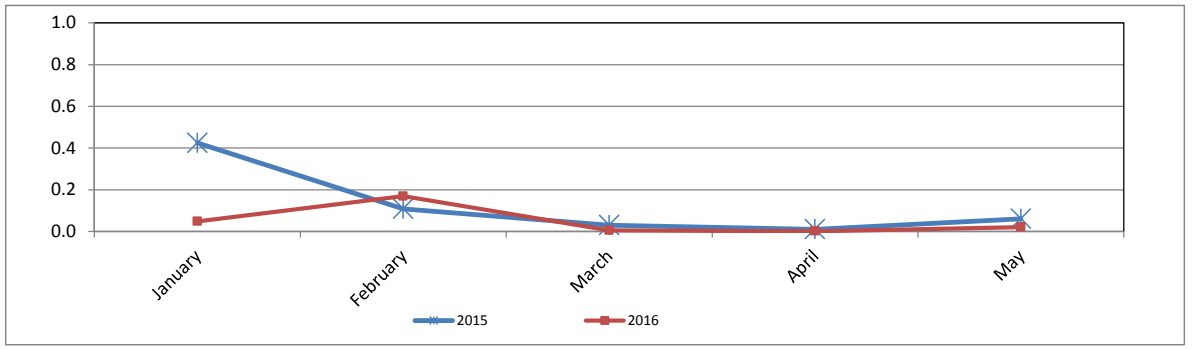
Alberta Ambient Air Quality Objectives Annual Average**	8.0	PPB
Annual Average for 2016	0.0	PPB

SULPHUR DIOXIDE (SO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

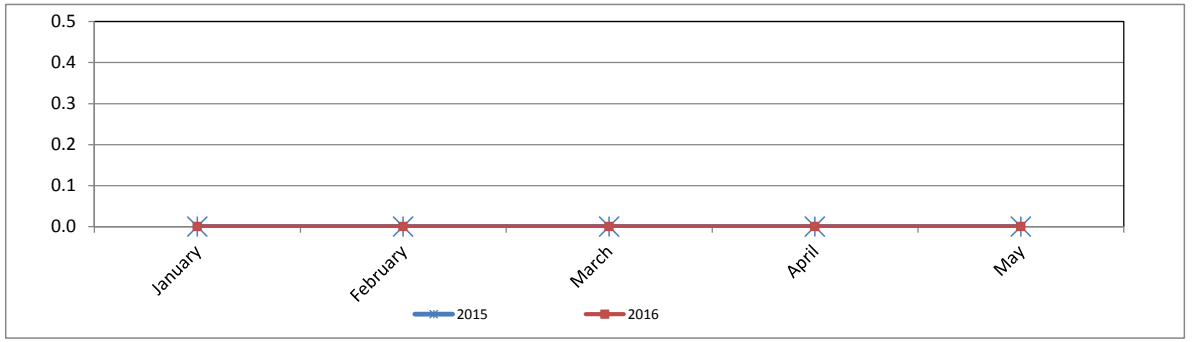
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0**	0	3	0	0	**4**	0
February	0	0	**4**	**0.2**	0.0	1.5	-0.1
March	0	0	2	0.0	0.0	0.6	0.0
April	0	0	1	0.0	0.0	0.3	0.0
May	0	0	2	0.0	0.0	1.0	0.0

*Annual peak is bolded and highlighted.

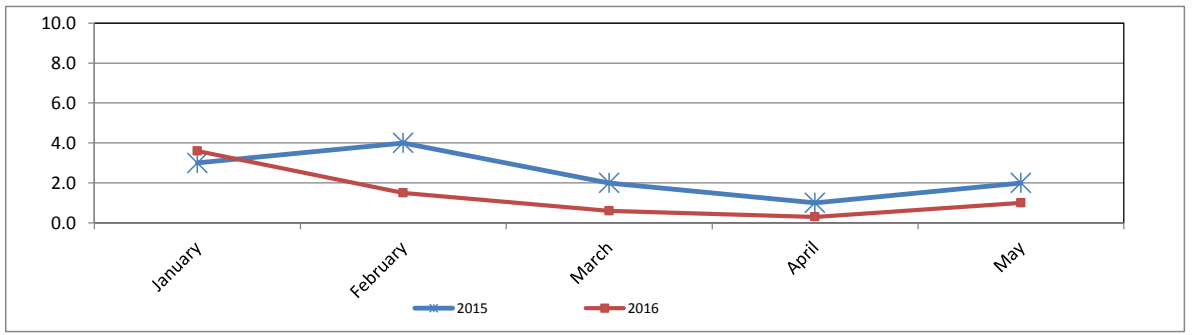
SULPHUR DIOXIDE (SO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



SULPHUR DIOXIDE (SO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-SO2[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

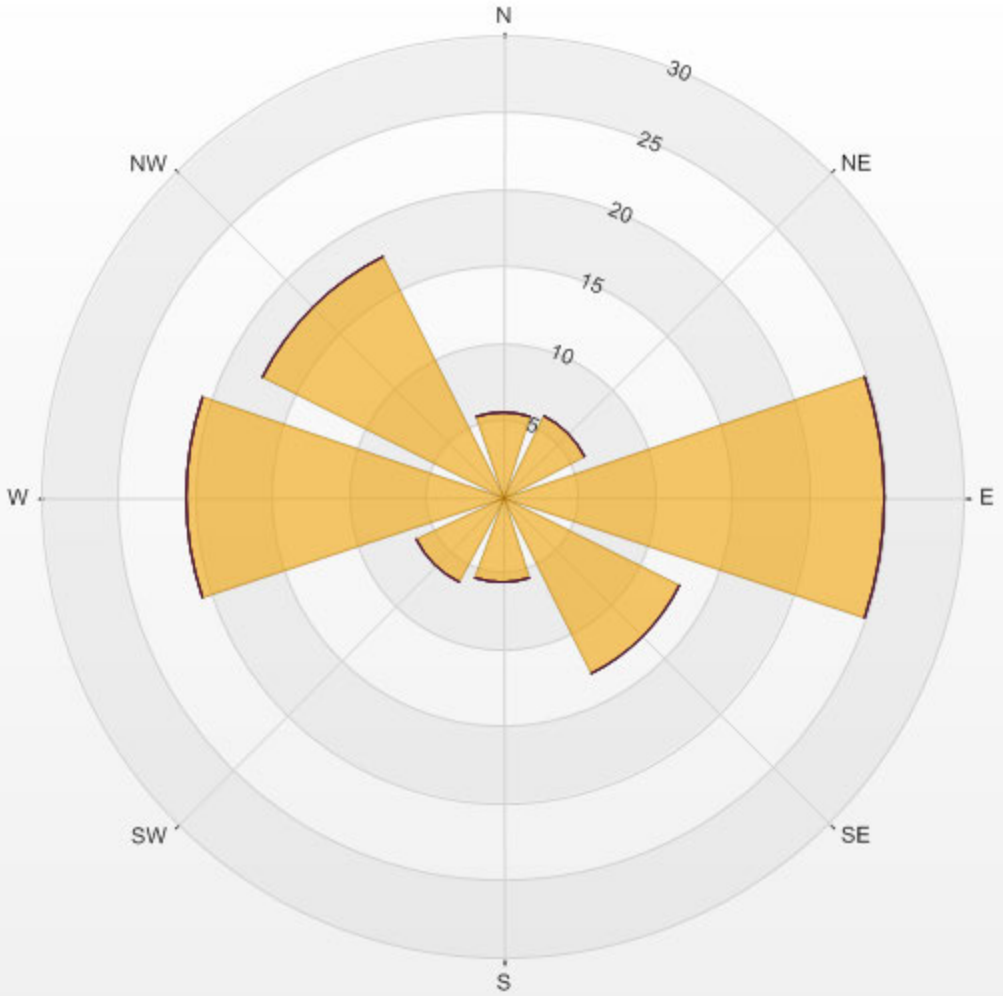
Calm: 0.65%

Calm Avg: 0.13 [ppb]

Direction	0-20	20-60	60-110	110-170	170-340	>340.0	Total
N	5.6	0.0	0.0	0.0	0.0	0.0	5.6
NE	6.0	0.0	0.0	0.0	0.0	0.0	6.0
E	24.8	0.0	0.0	0.0	0.0	0.0	24.8
SE	12.9	0.0	0.0	0.0	0.0	0.0	12.9
S	5.7	0.0	0.0	0.0	0.0	0.0	5.7
SW	6.3	0.0	0.0	0.0	0.0	0.0	6.3
W	20.7	0.0	0.0	0.0	0.0	0.0	20.7
NW	17.5	0.0	0.0	0.0	0.0	0.0	17.5
Summary	99.4	0.0	0.0	0.0	0.0	0.0	99.4

% Icon Classes (ppb)	99 0-20	0 20-60	0 60-110	0 110-170	0 170-340	0 >340.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-SO2[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.65% Calm Poll Avg: 0.13[ppb]



HYDROGEN SULPHIDE

HYDROGEN SULPHIDE (H_2S) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB H_2S)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 3	4 < C ≤ 10	11 < C ≤ 50	> 50	1-HR	24-HR	1-HR	24-HR	
January	698	98.7	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0
February	661	99.9	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.2
March	675	95.3	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
April	680	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.0
May	352	50.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.2
									ANNUAL AVERAGE		0.2

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

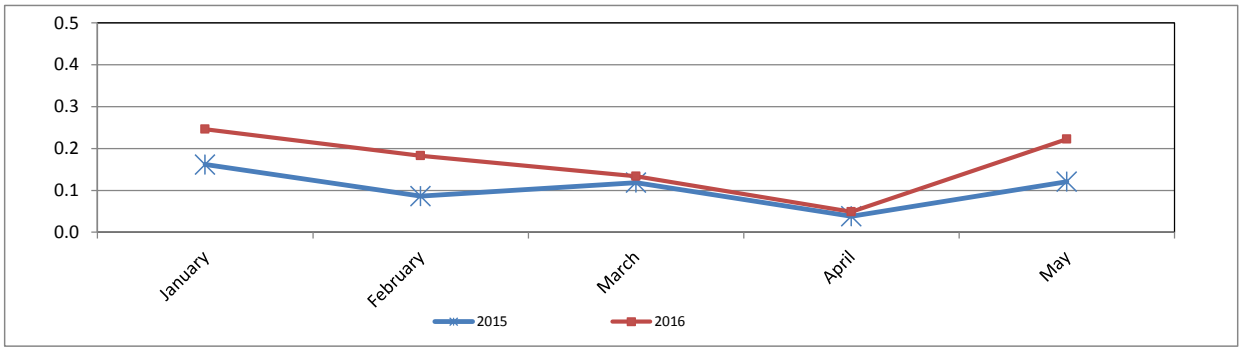
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	0.2	PPB

HYDROGEN SULPHIDE (H_2S) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

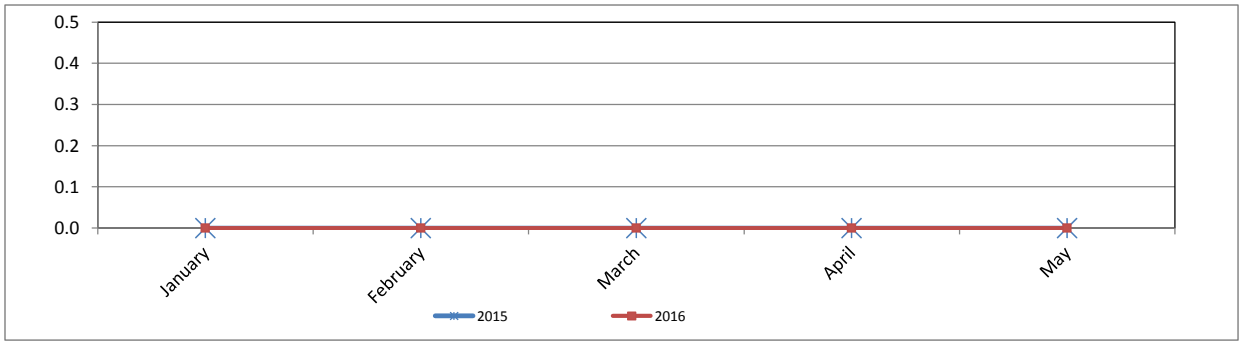
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0**	0	**2**	**0**	0	2	0
February	0	0	1	0.2	0.0	1.9	-0.1
March	0	0	1	0.1	0.0	1.5	0.0
April	0	0	1	0.0	0.0	0.7	0.0
May	0	0	2	0.2	0.0	**2.4**	-0.1

*Annual peak is bolded and highlighted.

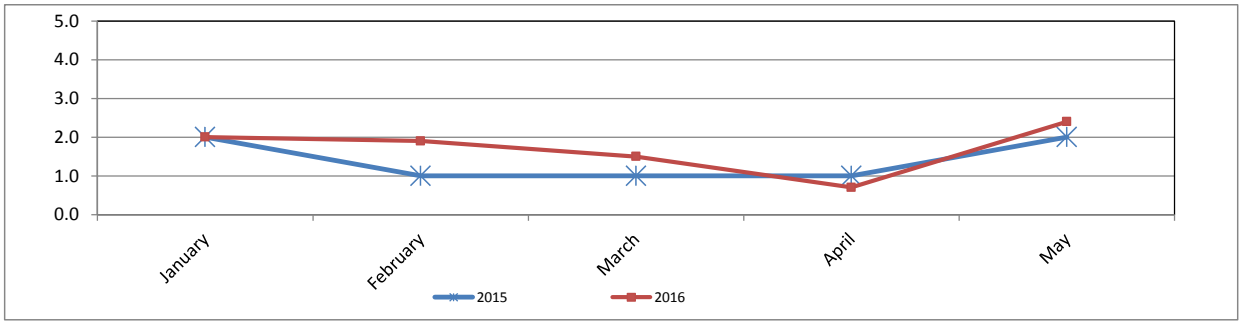
HYDROGEN SULPHIDE (H_2S) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



HYDROGEN SULPHIDE (H_2S) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



HYDROGEN SULPHIDE (H_2S) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



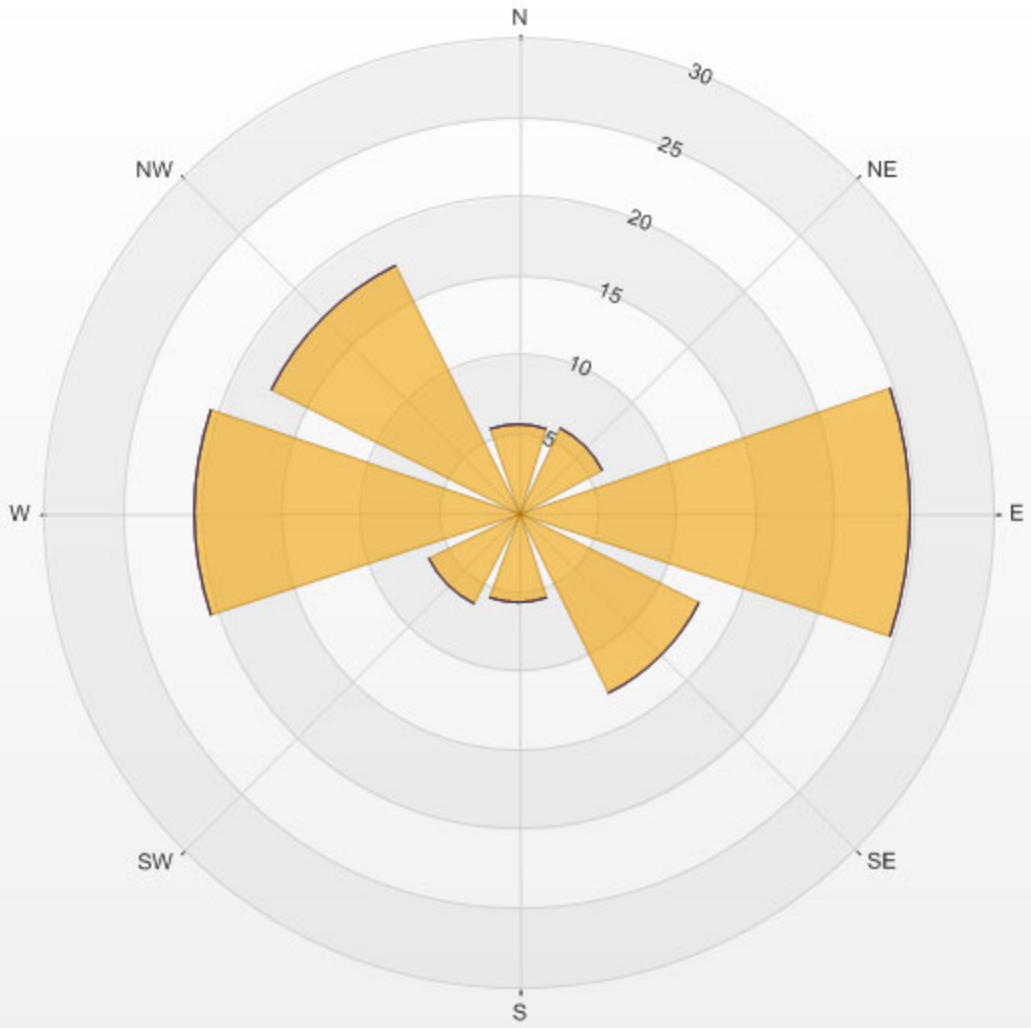
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-H2S[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.65% Calm Avg: 0.55 [ppb]

Direction	0-3	3-10	10-50	>50.0	Total
N	5.6	0.0	0.0	0.0	5.6
NE	6.0	0.0	0.0	0.0	6.0
E	24.8	0.0	0.0	0.0	24.8
SE	12.8	0.0	0.0	0.0	12.8
S	5.7	0.0	0.0	0.0	5.7
SW	6.4	0.0	0.0	0.0	6.4
W	20.5	0.0	0.0	0.0	20.5
NW	17.5	0.0	0.0	0.0	17.5
Summary	99.3	0.0	0.0	0.0	99.3

% Icon Classes (ppb)	99 0-3	0 3-10	0 10-50	0 >50.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-H2S[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.65% Calm Poll Avg: 0.55[ppb]



TOTAL HYDROCARBON

TOTAL HYDROCARBONS (THC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM THC)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
January	687	97.2	75.1%	24.9%	0.0%	0.0%	-	-	-	-	2.8
February	653	98.6	79.8%	20.2%	0.0%	0.0%	-	-	-	-	2.5
March	677	95.6	91.4%	8.6%	0.0%	0.0%	-	-	-	-	2.30
April	661	97.6	93.2%	6.8%	0.0%	0.0%	-	-	-	-	2.29
May	354	50.1	81.6%	18.4%	0.0%	0.0%	-	-	-	-	2.45
									ANNUAL AVERAGE		2.46

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

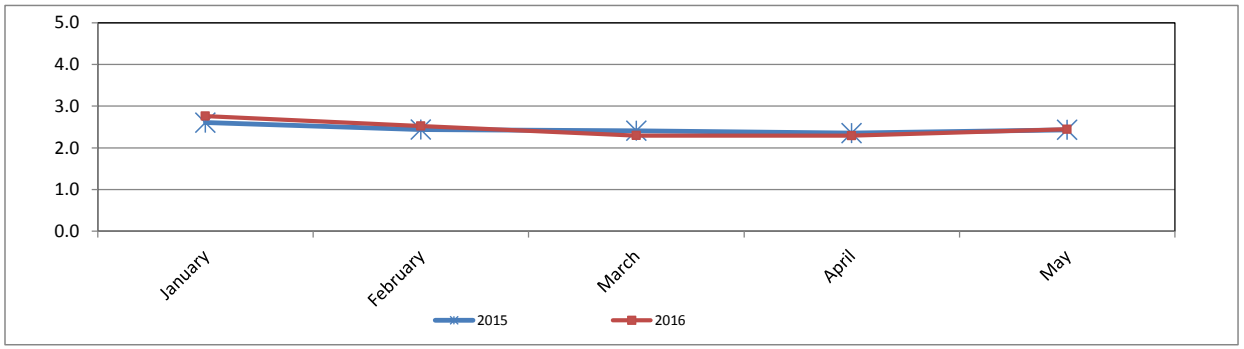
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.46	PPM

TOTAL HYDROCARBONS (THC) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

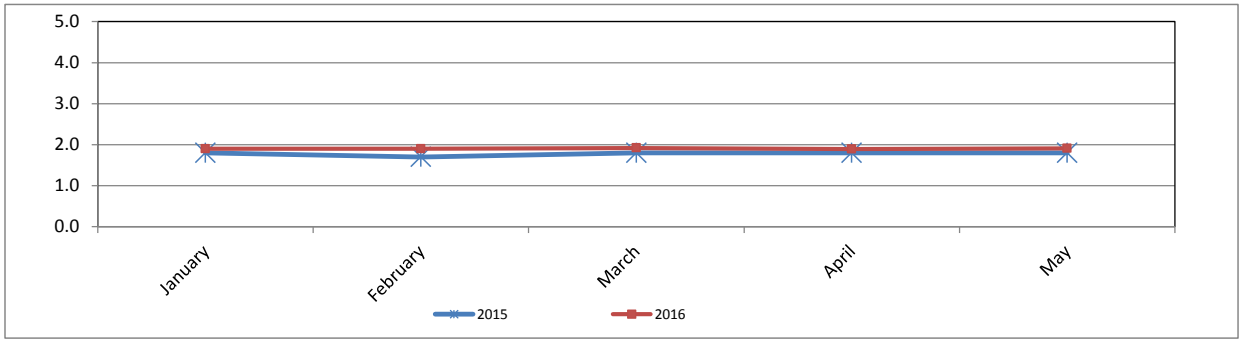
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**2.6**	1.8	**8.8**	**2.8**	1.9	**8.2**	-0.2
February	2.4	1.7	7.1	2.5	1.9	6.7	-0.1
March	2.4	1.8	5.4	2.30	1.92	5.19	0.12
April	2.4	1.8	6.4	2.29	1.89	4.53	0.06
May	2.4	1.8	7.2	2.45	1.91	6.13	-0.01

*Annual peak is bolded and highlighted.

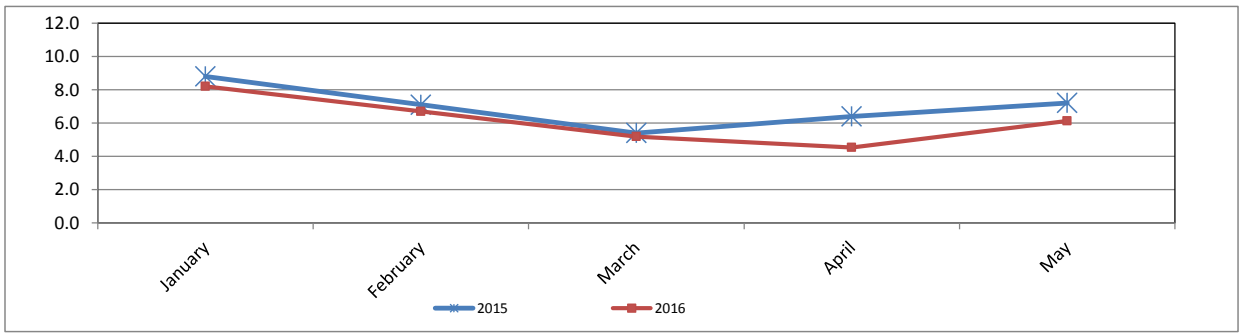
TOTAL HYDROCARBONS (THC) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



TOTAL HYDROCARBONS (THC) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM



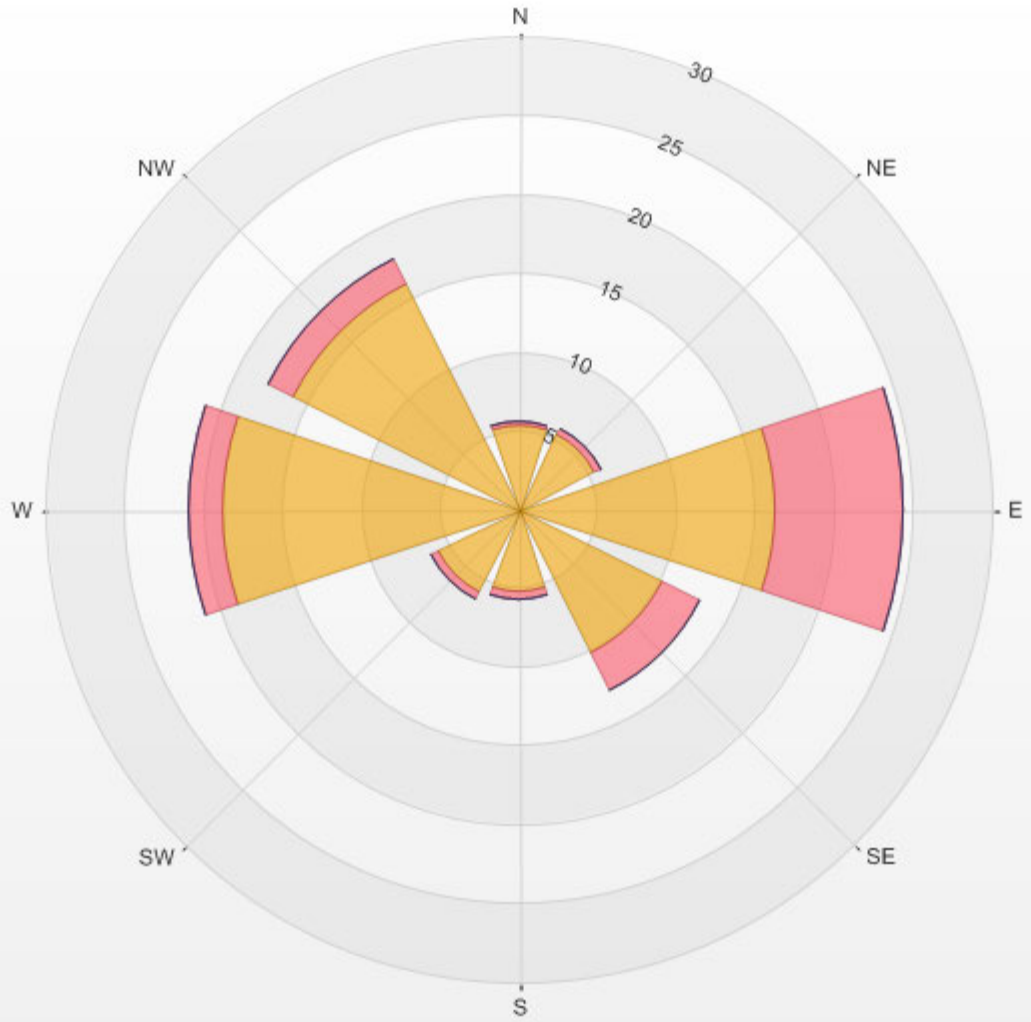
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-THC55[ppm]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.59% Calm Avg: 3.17 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	5.4	0.2	0.0	0.0	5.6
NE	5.4	0.4	0.0	0.0	5.8
E	16.3	8.1	0.0	0.0	24.4
SE	10.1	2.6	0.0	0.0	12.8
S	5.3	0.5	0.0	0.0	5.8
SW	5.8	0.6	0.0	0.0	6.3
W	18.9	2.2	0.0	0.0	21.0
NW	16.0	1.8	0.0	0.0	17.8
Summary	83.1	16.3	0.0	0.0	99.4

% Icon Classes (ppm)	83 0-3	16 3-10	0 10-50	0 >50.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-THC55[ppm] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.59% Calm Poll Avg: 3.17[ppm]



METHANE

METHANE (CH_4) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM CH_4)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
January	687	97.2	75.5%	24.5%	0.0%	0.0%	-	-	-	-	2.8
February	653	98.6	79.8%	20.2%	0.0%	0.0%	-	-	-	-	2.5
March	677	95.6	92.9%	7.1%	0.0%	0.0%	-	-	-	-	2.25
April	661	97.6	93.6%	6.4%	0.0%	0.0%	-	-	-	-	2.28
May	354	50.1	82.2%	17.8%	0.0%	0.0%	-	-	-	-	2.44
									ANNUAL AVERAGE		2.45

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

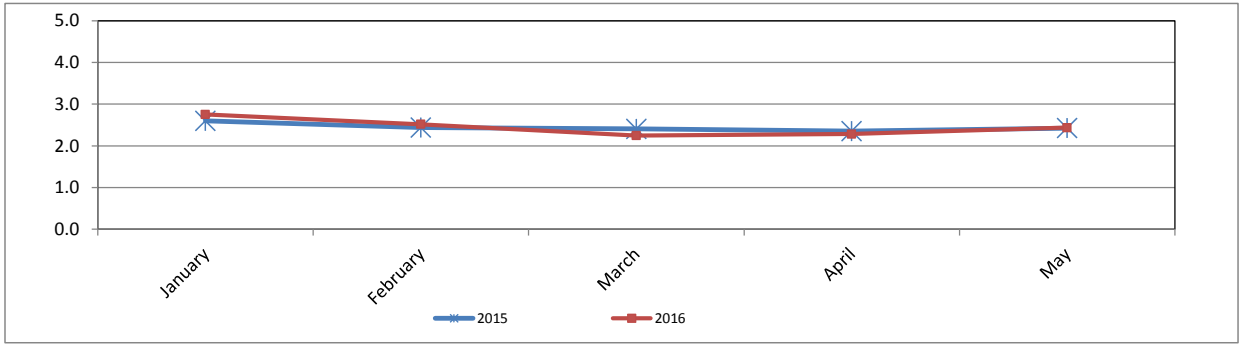
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.45	PPM

METHANE (CH_4) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

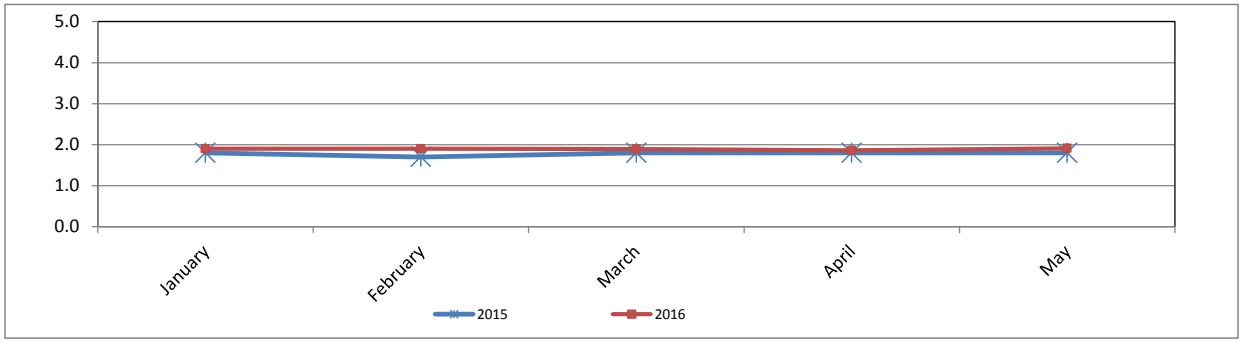
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**2.6**	1.8	**8.6**	**2.8**	1.9	**8.1**	-0.2
February	2.4	1.7	6.9	2.5	1.9	6.6	-0.1
March	2.4	1.8	5.4	2.25	1.89	4.89	0.16
April	2.4	1.8	6.4	2.28	1.86	4.45	0.07
May	2.4	1.8	7.0	2.44	1.91	6.03	-0.01

*Annual peak is bolded and highlighted.

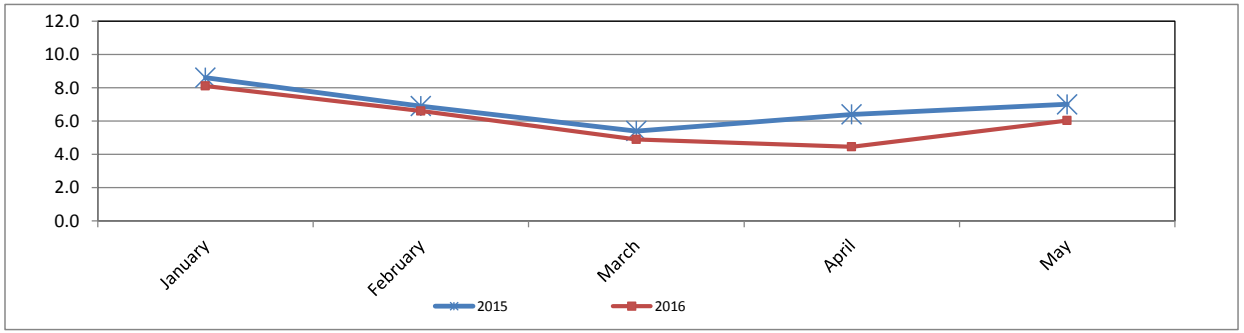
METHANE (CH_4) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



METHANE (CH_4) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



METHANE (CH_4) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM

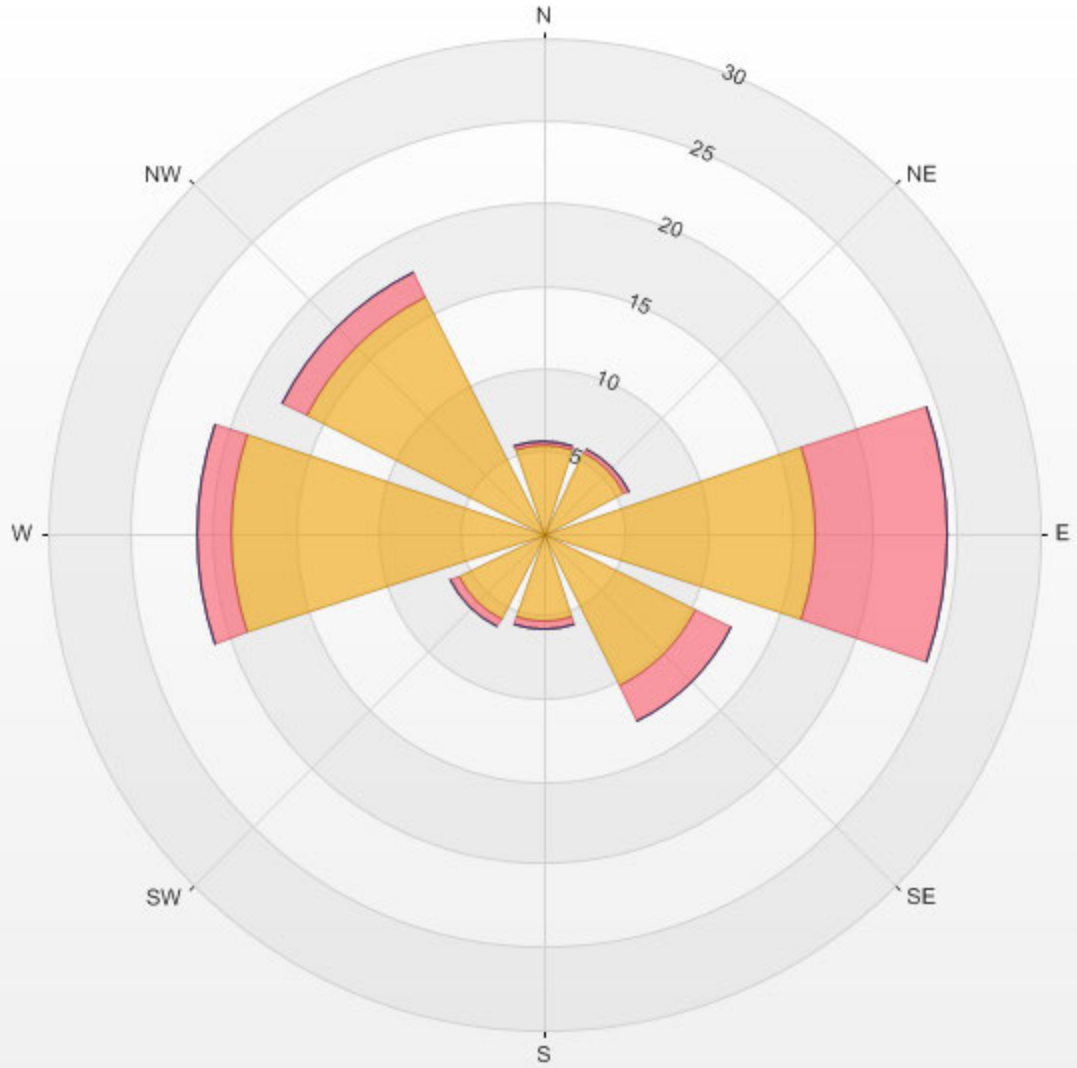


Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-CH4[ppm]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.59% Calm Avg: 3.11 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	5.4	0.2	0.0	0.0	5.6
NE	5.5	0.3	0.0	0.0	5.8
E	16.5	7.9	0.0	0.0	24.4
SE	10.2	2.5	0.0	0.0	12.8
S	5.3	0.4	0.0	0.0	5.8
SW	5.8	0.6	0.0	0.0	6.3
W	18.9	2.1	0.0	0.0	21.0
NW	16.0	1.8	0.0	0.0	17.8
Summary	83.6	15.8	0.0	0.0	99.4

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-CH4[ppm] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.59% Calm Poll Avg: 3.11[ppm]



NON-METHANE HYDROCARBON

NON-METHANE HYDROCARBONS (NMHC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM NMHC)						OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 0.20	0.21 < C ≤ 0.50	0.51 < C ≤ 1.00	1.01 < C ≤ 2.00	2.01 < C ≤ 4.00	> 4.00	1-HR	24-HR	1-HR	24-HR	
January	687	97.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.0
February	653	98.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.0
March	677	95.6	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.05
April	661	97.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.01
May	354	50.1	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.01
											ANNUAL AVERAGE		0.02

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

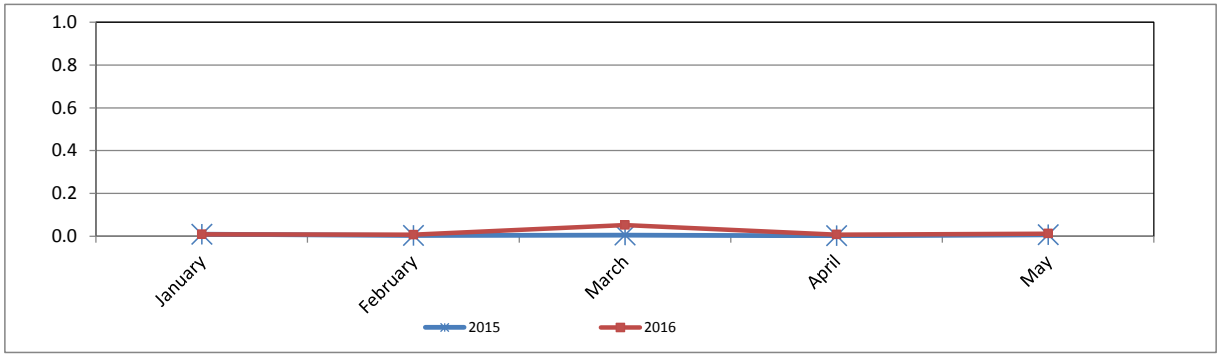
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	0.02	PPM

NON-METHANE HYDROCARBONS (NMHC) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPM

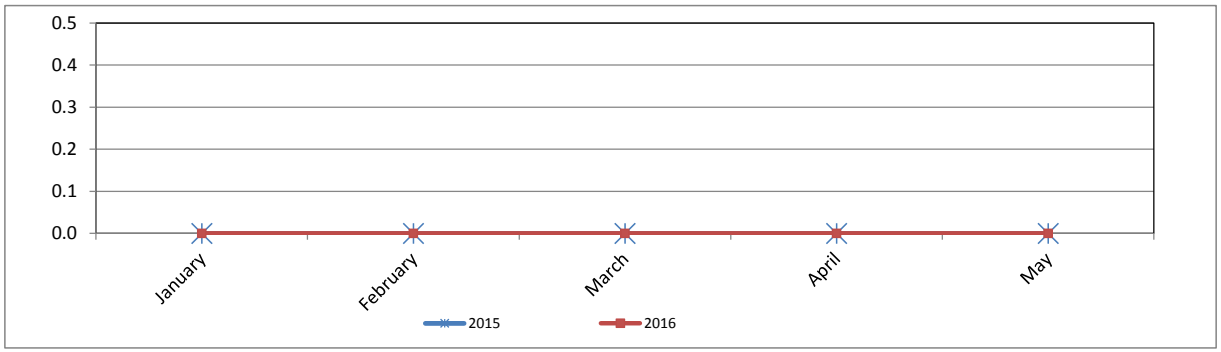
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**0.0**	0.0	**0.3**	0.0	0.0	0.2	0.0
February	0.0	0.0	0.2	0.0	0.0	0.2	0.0
March	0.0	0.0	0.2	**0.05**	0.00	0.30	-0.05
April	0.0	0.0	0.1	0.01	0.00	0.17	-0.01
May	0.0	0.0	0.3	0.01	0.00	**0.36**	-0.01

*Annual peak is bolded and highlighted.

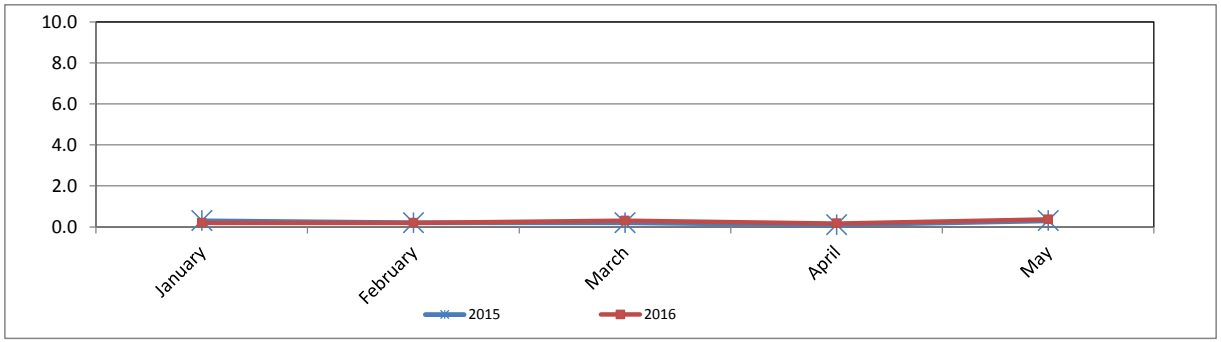
NON-METHANE HYDROCARBONS (NMHC) 2015 Monthly Mean vs. 2016 Monthly Mean in PPM



NON-METHANE HYDROCARBONS (NMHC) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPM



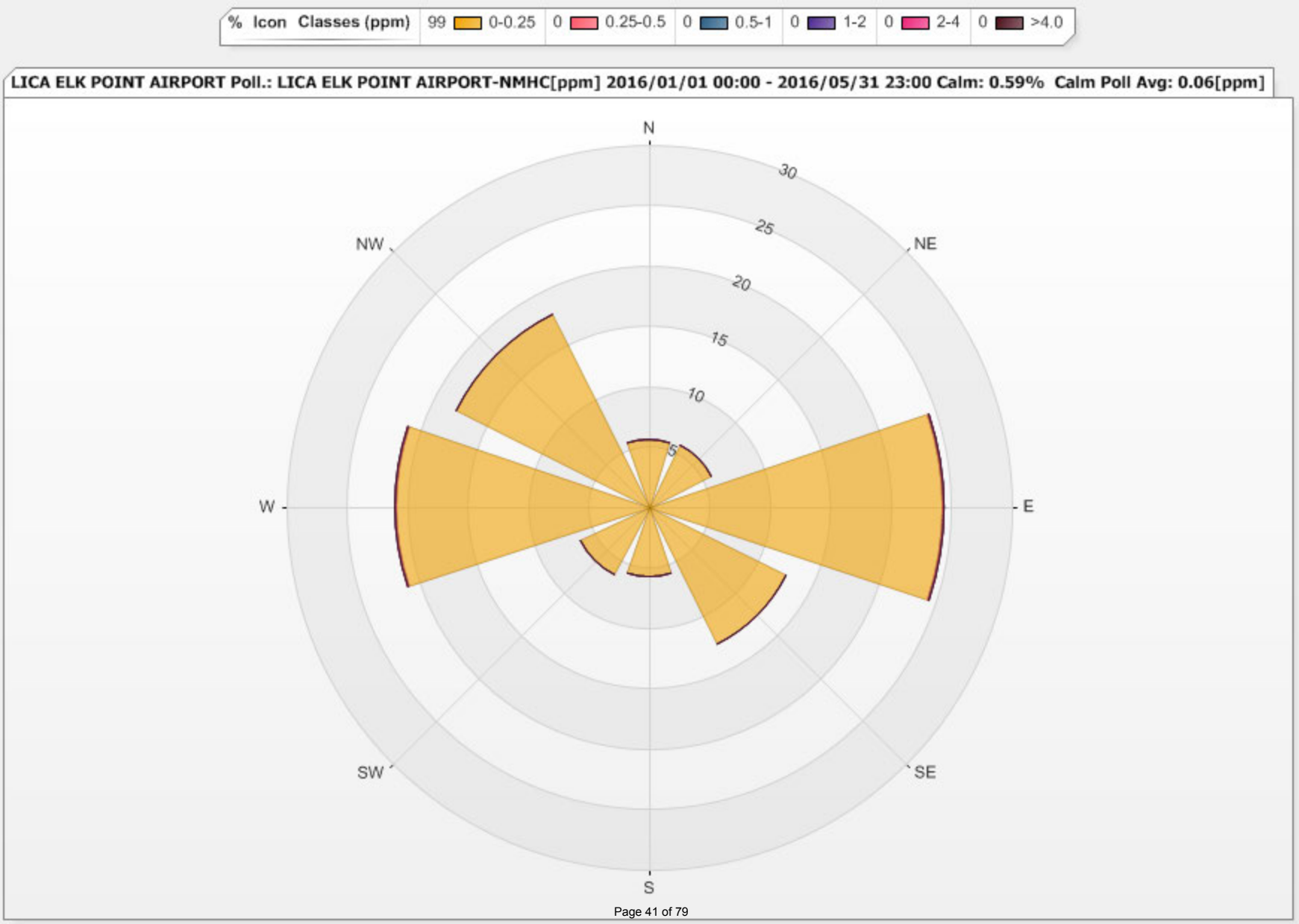
NON-METHANE HYDROCARBONS (NMHC) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPM



Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-NMHC[ppm]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.59% Calm Avg: 0.06 [ppm]

Direction	0-0.25	0.25-0.5	0.5-1	1-2	2-4	>4.0	Total
N	5.6	0.0	0.0	0.0	0.0	0.0	5.6
NE	5.8	0.0	0.0	0.0	0.0	0.0	5.8
E	24.3	0.1	0.0	0.0	0.0	0.0	24.4
SE	12.8	0.0	0.0	0.0	0.0	0.0	12.8
S	5.8	0.0	0.0	0.0	0.0	0.0	5.8
SW	6.4	0.0	0.0	0.0	0.0	0.0	6.4
W	20.9	0.1	0.0	0.0	0.0	0.0	21.0
NW	17.8	0.0	0.0	0.0	0.0	0.0	17.8
Summary	99.2	0.2	0.0	0.0	0.0	0.0	99.4


% Icon Classes (ppm)
99 0-0.25
0 0.25-0.5
0 0.5-1
0 1-2
0 2-4
0 >4.0
LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-NMHC[ppm] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.59% Calm Poll Avg: 0.06[ppm]
N
NE
E
SE
S
SW
W
NW
30
25
20
15
10
5

OXIDES OF NITROGEN

OXIDES OF NITROGEN (NOx) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NOx)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	696	98.7	94.8%	5.1%	0.1%	0.0%	-	-	-	-	16.1
February	649	98.4	96.3%	3.5%	0.2%	0.0%	-	-	-	-	13.8
March	691	97.8	99.1%	0.9%	0.0%	0.0%	-	-	-	-	7.3
April	671	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.7
May	350	50.0	96.9%	2.9%	0.3%	0.0%	-	-	-	-	9.5
									ANNUAL AVERAGE		10.3

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

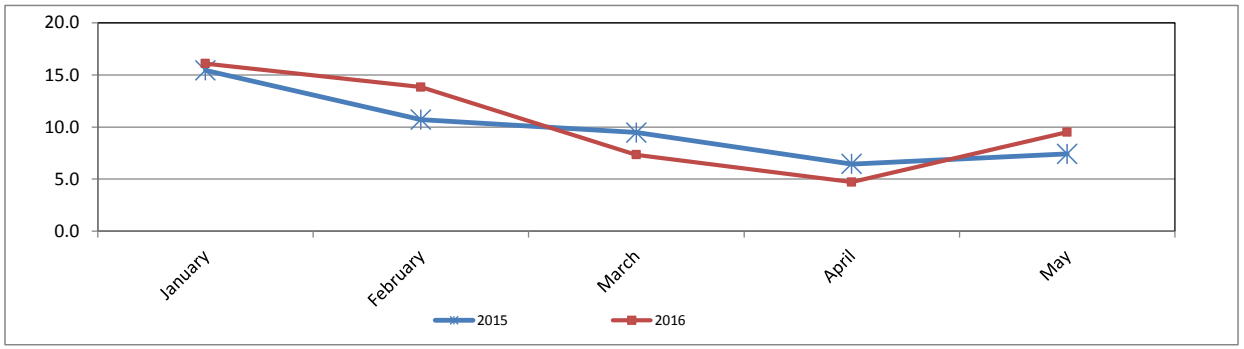
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	10.3	PPB

OXIDES OF NITROGEN (NOx) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

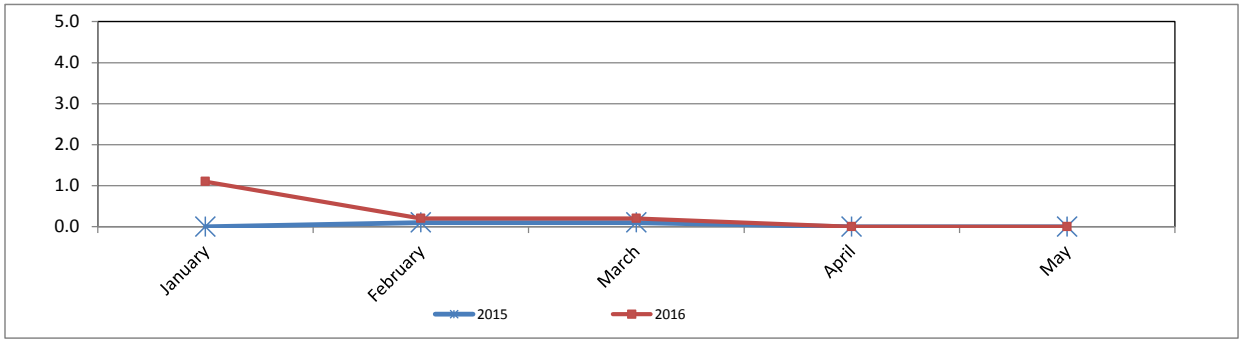
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**15.4**	0.0	88.1	**16.1**	1.1	113.2	-0.7
February	10.7	0.1	**96.3**	13.8	0.2	112.2	-3.1
March	9.5	0.1	61.5	7.3	0.2	63.9	2.1
April	6.5	0.0	79.0	4.7	0.0	39.1	1.7
May	7.4	0.0	85.5	9.5	0.0	**123.3**	-2.1

*Annual peak is bolded and highlighted.

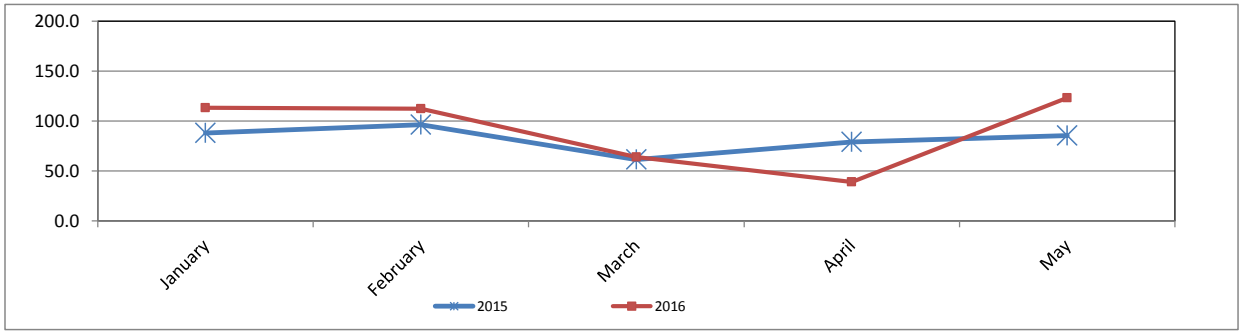
OXIDES OF NITROGEN (NOx) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OXIDES OF NITROGEN (NOx) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OXIDES OF NITROGEN (NOx) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



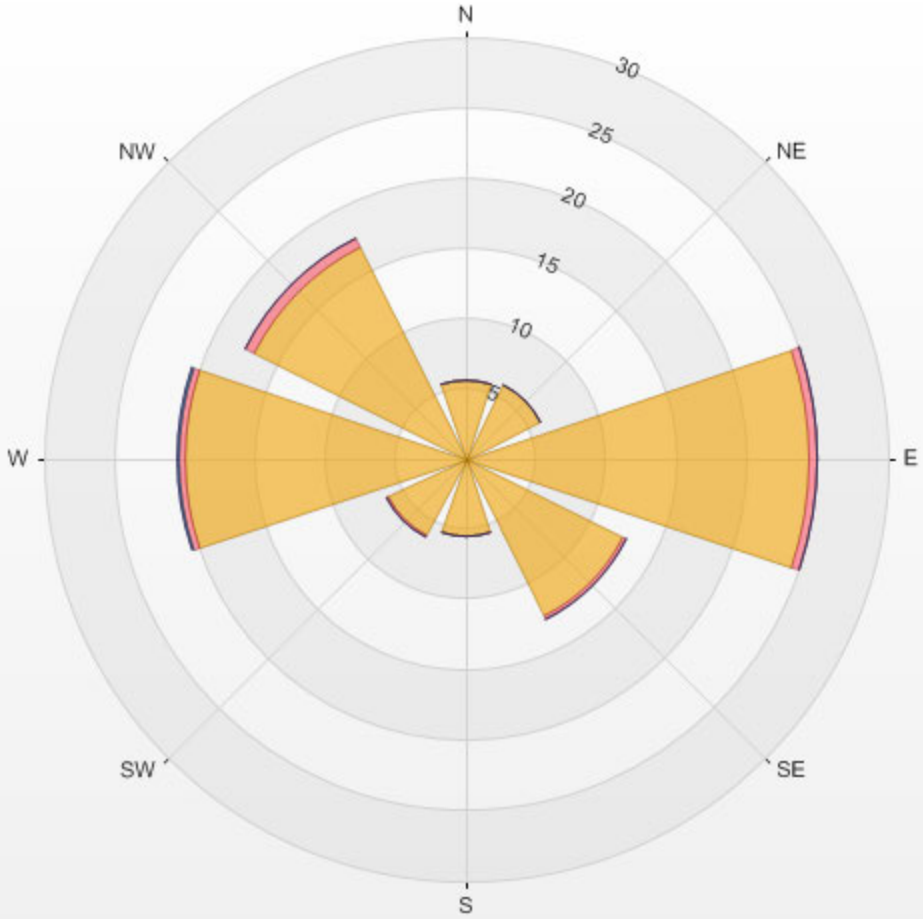
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-NOX[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.62% Calm Avg: 26.43 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	5.6	0.0	0.0	0.0	5.6
NE	5.9	0.0	0.0	0.0	6.0
E	24.4	0.6	0.0	0.0	25.0
SE	12.5	0.4	0.0	0.0	12.8
S	5.5	0.0	0.0	0.0	5.5
SW	6.2	0.1	0.0	0.0	6.3
W	20.0	0.5	0.1	0.0	20.5
NW	16.9	0.7	0.0	0.0	17.6
Summary	97.0	2.3	0.1	0.0	99.4

%	Icon	Classes (ppb)	97	0-50	2	50-110	0	110-210	0	>210.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-NOX[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.62% Calm Poll Avg: 26.43[ppb]



NITRIC OXIDES

NITRIC OXIDE (NO) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	696	98.7	98.4%	1.6%	0.0%	0.0%	-	-	-	-	3.9
February	649	98.4	99.4%	0.6%	0.0%	0.0%	-	-	-	-	2.9
March	691	97.8	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.9
April	671	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.6
May	350	50.0	98.6%	1.4%	0.0%	0.0%	-	-	-	-	2.9
									ANNUAL AVERAGE		2.4

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

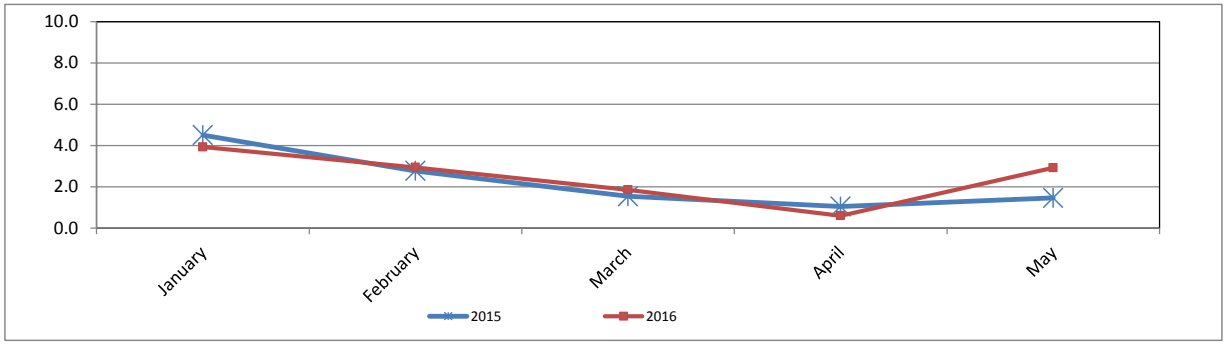
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	2.4	PPB

NITRIC OXIDE (NO) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

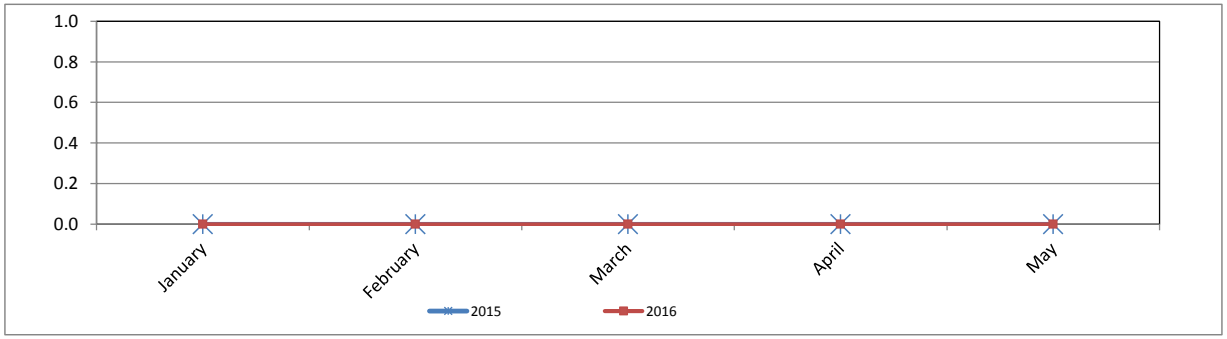
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**4.5**	0.0	55.5	**3.9**	0.0	85.1	0.6
February	2.8	0.0	58.9	2.9	0.0	81.1	-0.2
March	1.5	0.0	35.8	1.9	0.0	40.1	-0.3
April	1.0	0.0	**59.1**	0.6	0.0	19.2	0.4
May	1.5	0.0	57.7	2.9	0.0	**97.2**	-1.5

*Annual peak is bolded and highlighted.

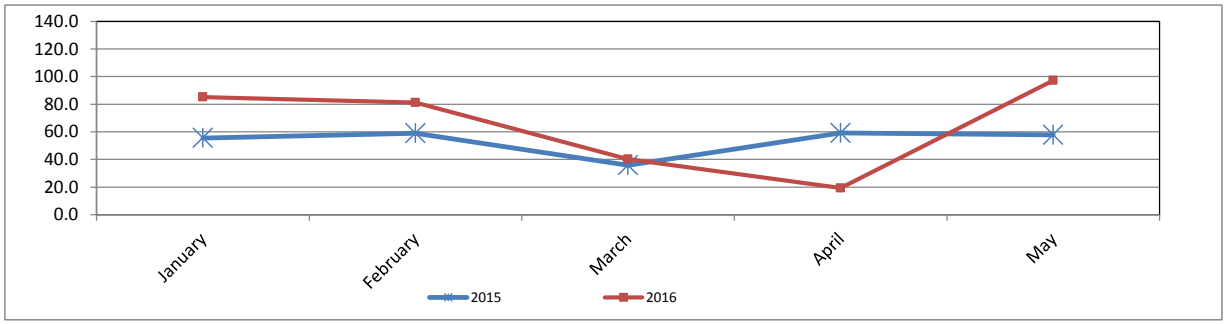
NITRIC OXIDE (NO) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITRIC OXIDE (NO) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



NITRIC OXIDE (NO) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



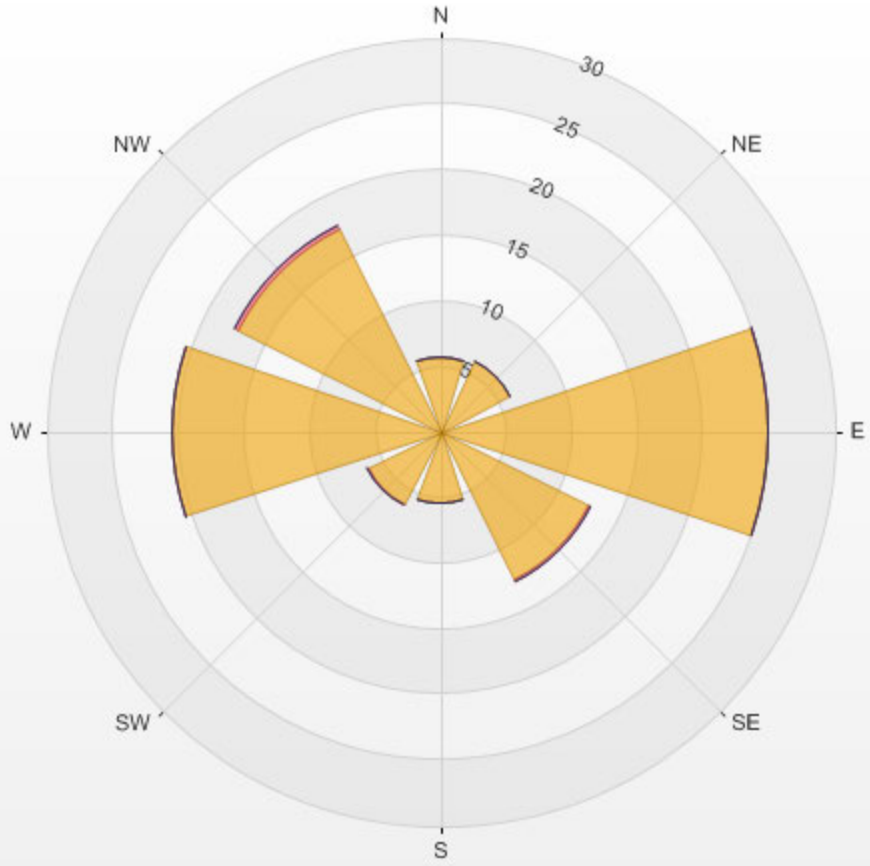
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-NO[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.62% Calm Avg: 10.57 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	5.6	0.0	0.0	0.0	5.6
NE	6.0	0.0	0.0	0.0	6.0
E	25.0	0.1	0.0	0.0	25.0
SE	12.7	0.1	0.0	0.0	12.8
S	5.5	0.0	0.0	0.0	5.5
SW	6.2	0.0	0.0	0.0	6.3
W	20.4	0.1	0.0	0.0	20.5
NW	17.3	0.3	0.0	0.0	17.6
Summary	98.8	0.6	0.0	0.0	99.4

%	Icon	Classes (ppb)	99	0-50	1	50-110	0	110-210	0	>210.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-NO[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.62% Calm Poll Avg: 10.57[ppb]



NITROGEN DIOXIDE

NITROGEN DIOXIDE (NO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO_2)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	696	98.7	100.0%	0.0%	0.0%	0.0%	159	-	0	-	12.2
February	649	98.4	100.0%	0.0%	0.0%	0.0%	159	-	0	-	10.9
March	691	97.8	100.0%	0.0%	0.0%	0.0%	159	-	0	-	5.5
April	671	99.7	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.1
May	350	50.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	6.6
									ANNUAL AVERAGE		7.8

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

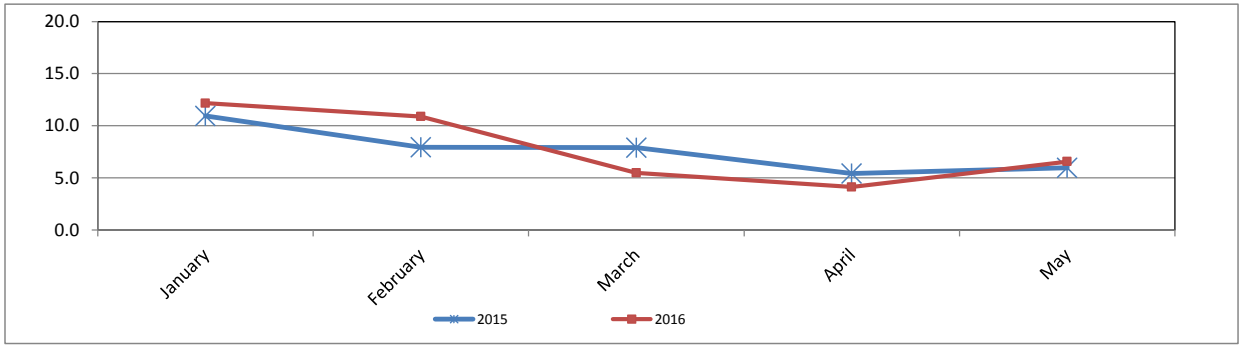
Alberta Ambient Air Quality Objectives Annual Average**	24	PPB
Annual Average for 2016	7.8	PPB

NITROGEN DIOXIDE (NO_2) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

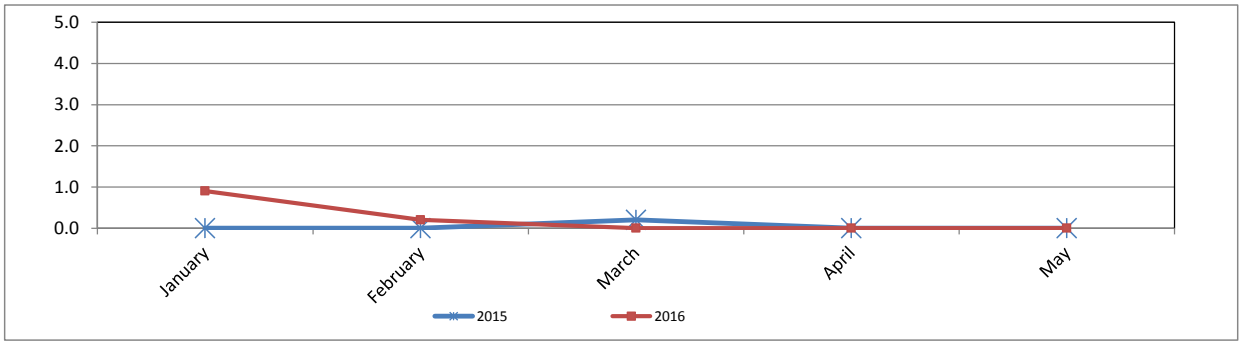
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**10.9**	0.0	36.3	**12.2**	0.9	31.0	-1.2
February	7.9	0.0	**41.4**	10.9	0.2	**39.1**	-2.9
March	7.9	0.2	35.3	5.5	0.0	33.3	2.4
April	5.4	0.0	26.0	4.1	0.0	28.4	1.3
May	6.0	0.0	34.4	6.6	0.0	31.1	-0.6

*Annual peak is bolded and highlighted.

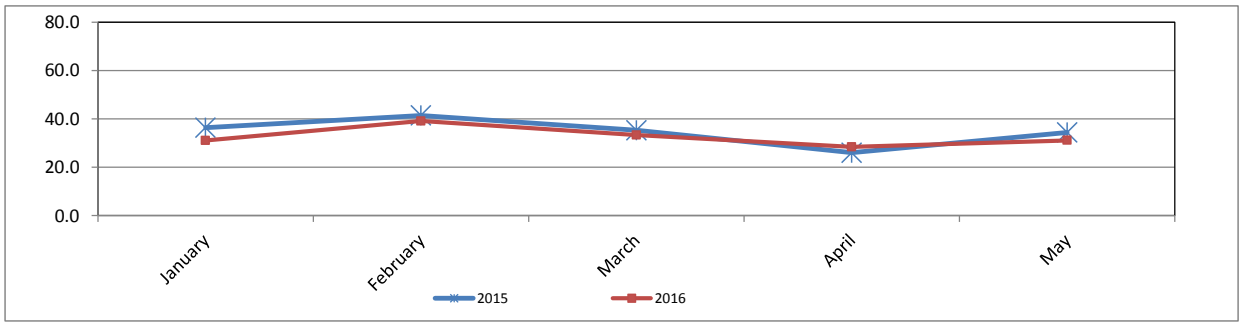
NITROGEN DIOXIDE (NO_2) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



NITROGEN DIOXIDE (NO_2) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



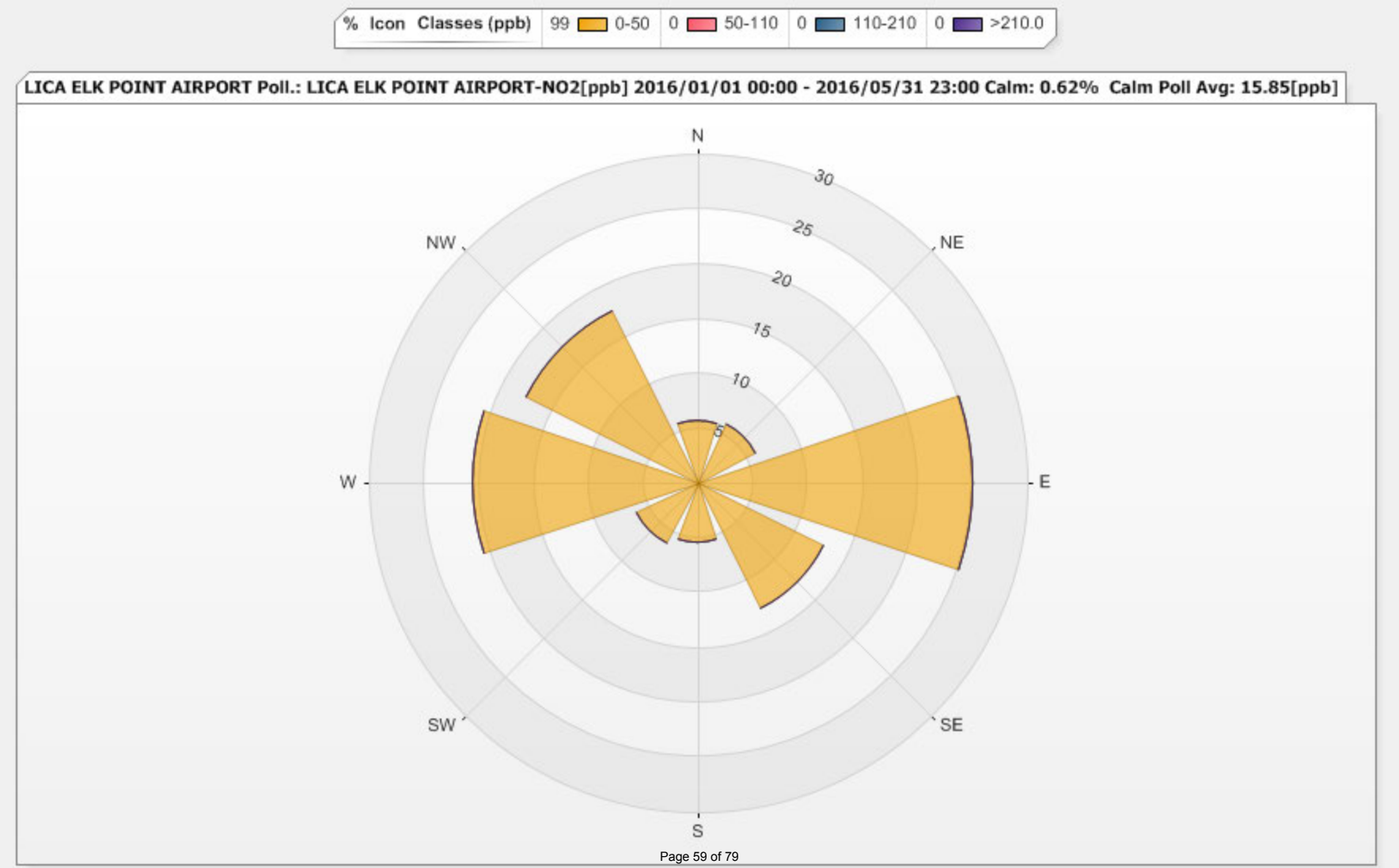
NITROGEN DIOXIDE (NO_2) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-NO2[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.62% Calm Avg: 15.85 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	5.6	0.0	0.0	0.0	5.6
NE	6.0	0.0	0.0	0.0	6.0
E	25.0	0.0	0.0	0.0	25.0
SE	12.8	0.0	0.0	0.0	12.8
S	5.5	0.0	0.0	0.0	5.5
SW	6.3	0.0	0.0	0.0	6.3
W	20.5	0.0	0.0	0.0	20.5
NW	17.6	0.0	0.0	0.0	17.6
Summary	99.4	0.0	0.0	0.0	99.4


% Icon Classes (ppb)
99 0-50
0 50-110
0 110-210
0 >210.0
LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-NO2[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.62% Calm Poll Avg: 15.85[ppb]
N
NE
E
SE
S
SW
W
NW
30
25
20
15
10
5

OZONE

OZONE (O_3) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB O_3)				OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
January	679	96.1	100.0%	0.0%	0.0%	0.0%	82	-	0	-	15
February	660	99.7	100.0%	0.0%	0.0%	0.0%	82	-	0	-	19.4
March	705	99.6	100.0%	0.0%	0.0%	0.0%	82	-	0	-	29.5
April	681	100.0	96.8%	3.2%	0.0%	0.0%	82	-	0	-	32.1
May	357	50.5	89.6%	10.4%	0.0%	0.0%	82	-	0	-	31.5
									ANNUAL AVERAGE		25.5

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

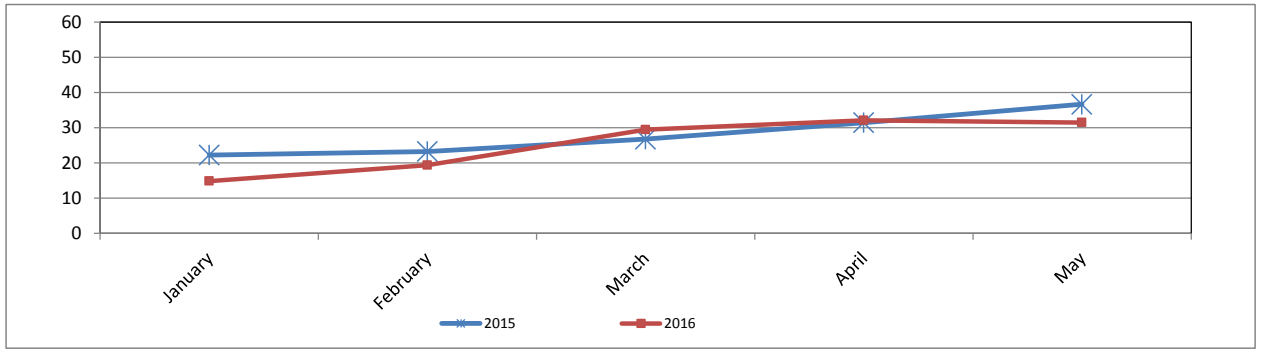
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	25.5	PPB

OZONE (O_3) 2015 One-Hour Readings vs. 2016 One-Hour Readings in PPB

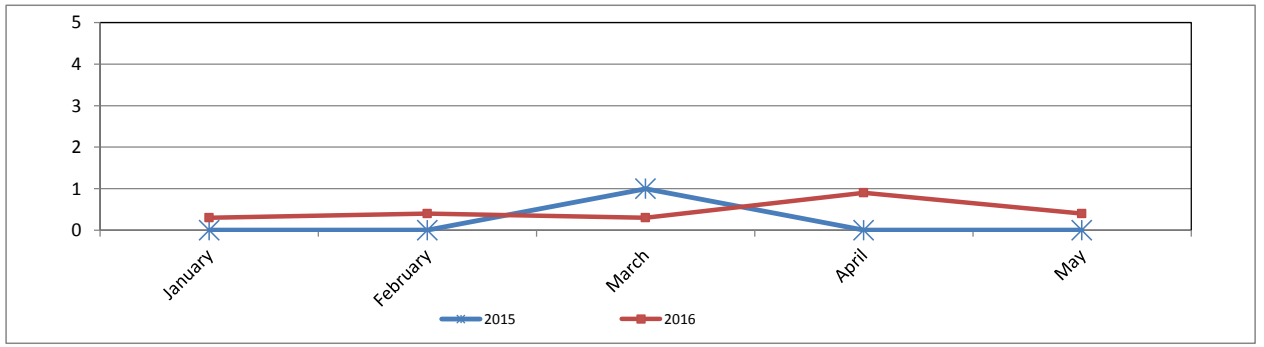
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	22	0	40	15	0	32	7
February	23	0	41	19.4	0.4	43.9	3.8
March	27	1	47	29.5	0.3	47.0	-2.7
April	31	0	55	**32.1**	0.9	54.7	-0.7
May	**37**	0	**70**	31.5	0.4	**58.9**	5.2

*Annual peak is bolded and highlighted.

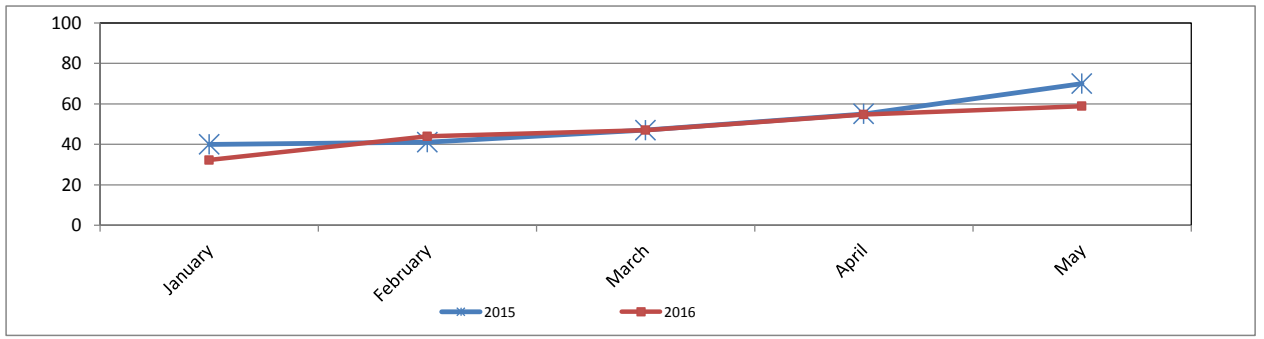
OZONE (O_3) 2015 Monthly Mean vs. 2016 Monthly Mean in PPB



OZONE (O_3) 2015 Monthly Minimum vs. 2016 Monthly Minimum in PPB



OZONE (O_3) 2015 Monthly Maximum vs. 2016 Monthly Maximum in PPB



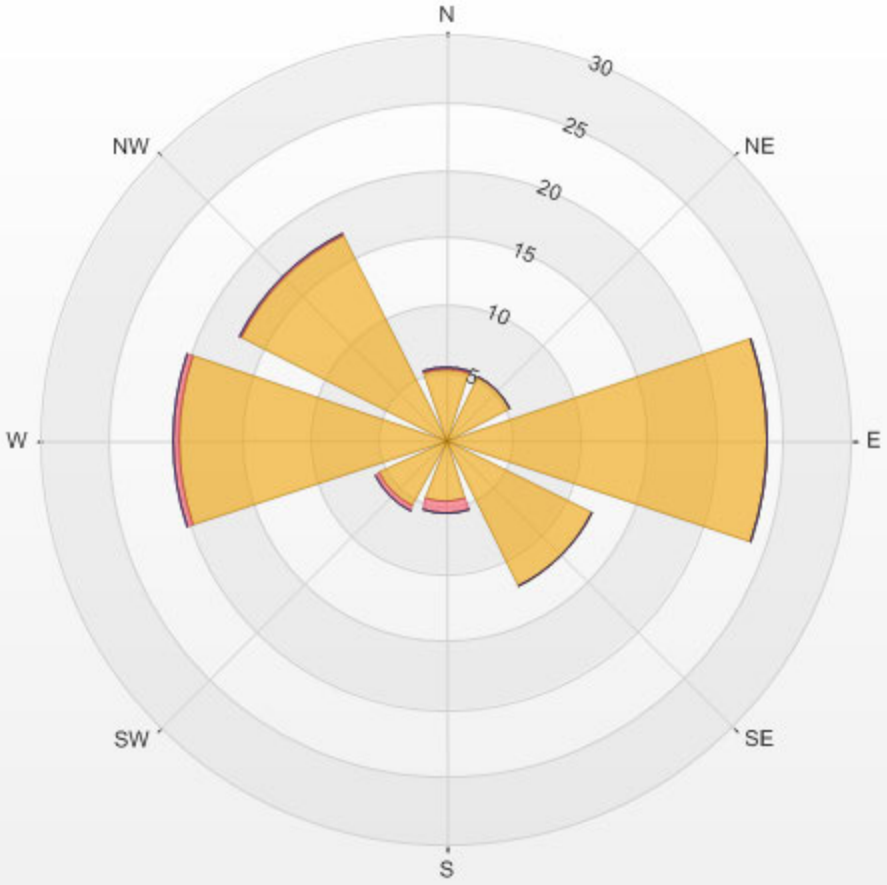
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-O3[ppb]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 4.59% Calm Avg: 12.31 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	5.3	0.1	0.0	0.0	5.4
NE	5.3	0.0	0.0	0.0	5.3
E	23.8	0.0	0.0	0.0	23.8
SE	12.2	0.0	0.0	0.0	12.2
S	4.6	0.9	0.0	0.0	5.5
SW	5.5	0.4	0.0	0.0	5.9
W	19.8	0.4	0.0	0.0	20.2
NW	16.9	0.1	0.0	0.0	17.1
Summary	93.6	1.9	0.0	0.0	95.4

% Icon Classes (ppb)	94 0-50	2 50-110	0 110-210	0 >210.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-O3[ppb] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 4.59% Calm Poll Avg: 12.31[ppb]



PARTICULATE MATTER 2.5

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (µg/m³ $PM_{2.5}$)						OBJECTIVES**		EXCEEDANCES		MONTHLY AVERAGE µg/m³
			≤ 30	31 < C ≤ 60	61 < C ≤ 80	81 < C ≤ 120	121 < C ≤ 240	> 240	1-HR	24-HR	1-HR	24-HR	
January	711	95.8	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	7
February	679	98.1	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	5.4
March	728	98.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	4.8
April	705	99.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	3.3
May	366	49.5	94.0%	5.7%	0.0%	0.3%	0.0%	0.0%	82	30	0	0	9.1
											ANNUAL AVERAGE		6.0

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

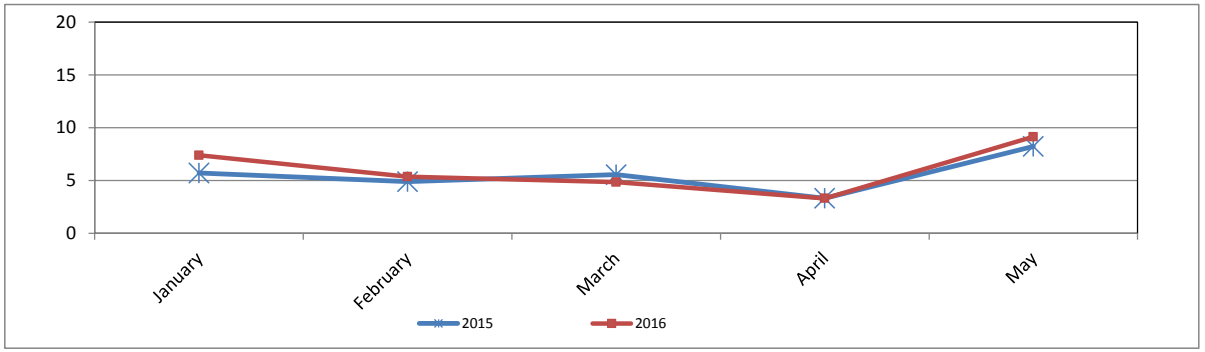
Alberta Ambient Air Quality Objectives Annual Average**	-	µg/m³
Annual Average for 2016	6.0	µg/m³

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 One-Hour Readings vs. 2016 One-Hour Readings in µg/m^3

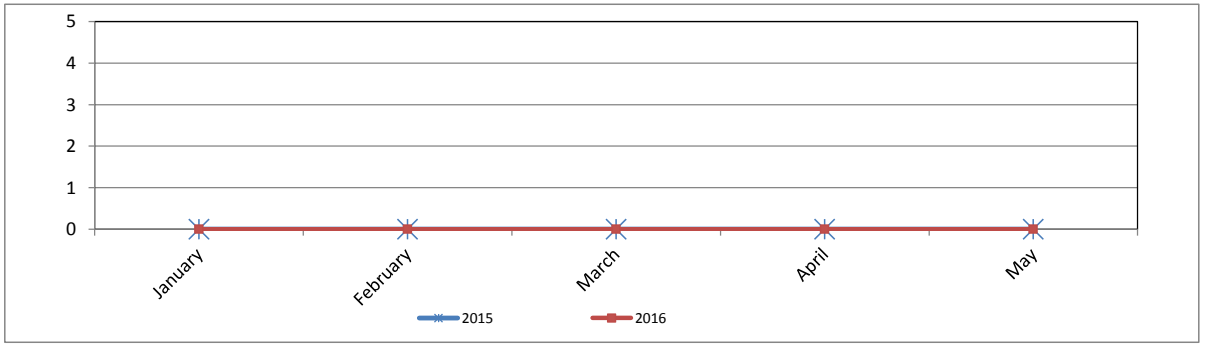
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	6	0	65	7	0	37	-2
February	5	0	27	5.4	0.0	38.6	-0.5
March	6	0	23	4.8	0.0	20.6	0.7
April	3	0	22	3.3	0.0	28.7	0.0
May	**8**	0	**269**	**9.1**	0.0	**99.0**	-0.9

*Annual peak is bolded and highlighted.

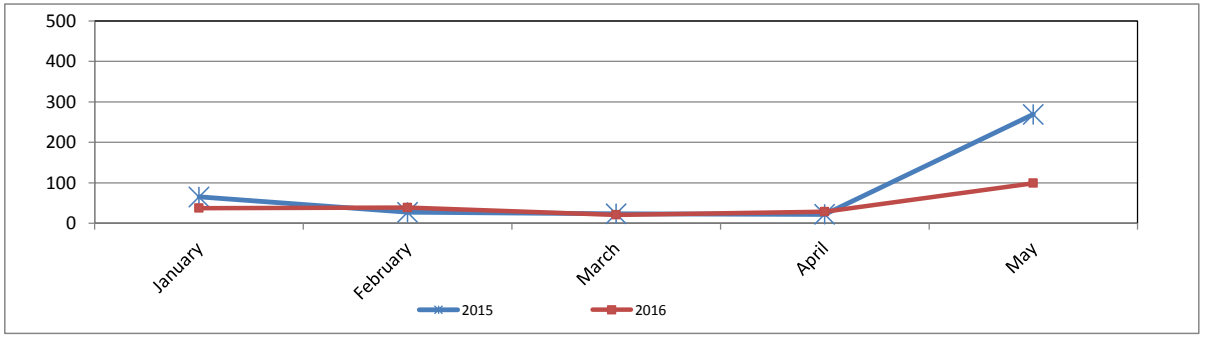
PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Mean vs. 2016 Monthly Mean in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Minimum vs. 2016 Monthly Minimum in µg/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2015 Monthly Maximum vs. 2016 Monthly Maximum in µg/m^3



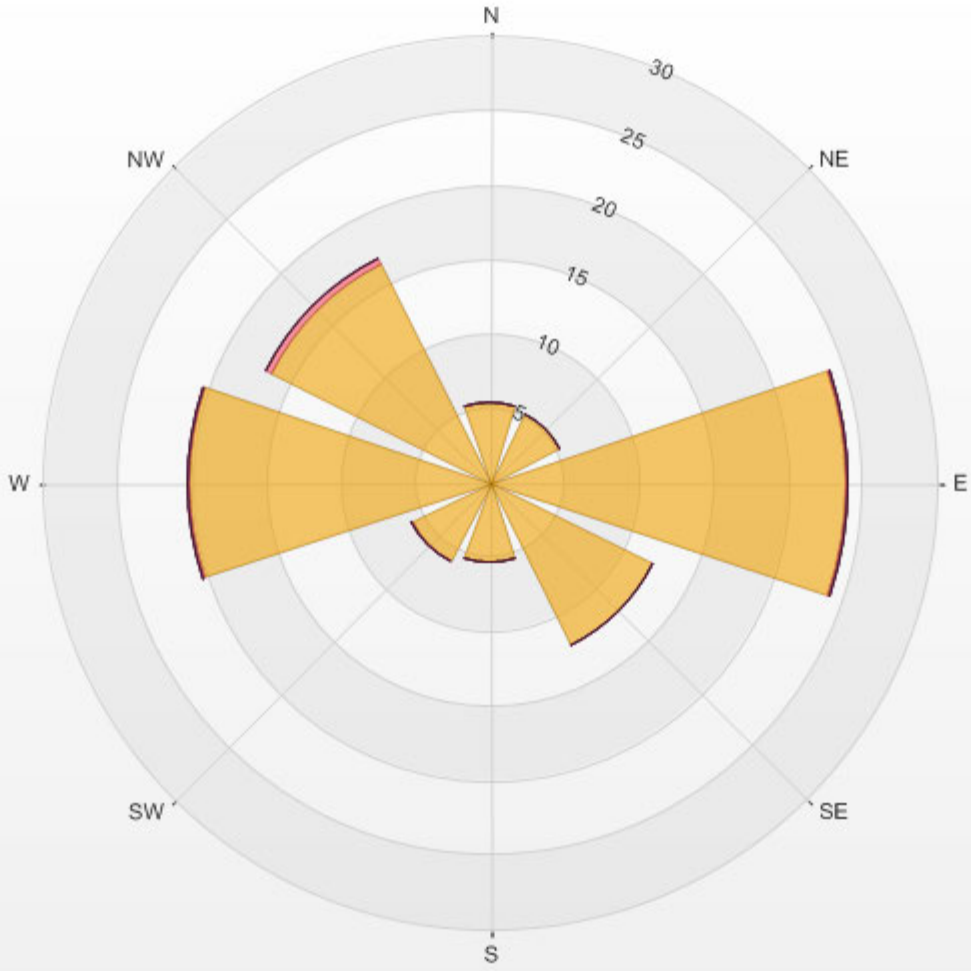
Wind: LICA ELK POINT AIRPORT
Poll.: LICA ELK POINT AIRPORT-PM_{25} [µg/m^3]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 4.62% Calm Avg: 8.48 [µg/m^3]

Direction	0-30	30-60	60-80	80-120	120-240	>240.0	Total
N	5.4	0.0	0.0	0.0	0.0	0.0	5.4
NE	5.2	0.0	0.0	0.0	0.0	0.0	5.2
E	23.9	0.1	0.0	0.0	0.0	0.0	24.0
SE	12.3	0.0	0.0	0.0	0.0	0.0	12.3
S	5.4	0.0	0.0	0.0	0.0	0.0	5.4
SW	5.8	0.1	0.0	0.0	0.0	0.0	6.0
W	20.2	0.2	0.0	0.0	0.0	0.0	20.4
NW	16.5	0.4	0.0	0.0	0.0	0.0	16.8
Summary	94.6	0.8	0.0	0.0	0.0	0.0	95.4

% Icon Classes (ug/m3(L))	95 0-30	1 30-60	0 60-80	0 80-120	0 120-240	0 >240.0

LICA ELK POINT AIRPORT Poll.: LICA ELK POINT AIRPORT-PM25 [ug/m3(L)] 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 4.62% Calm Poll Avg: 8.48[ug/m3(L)]



WIND SPEED

WIND SPEED (WS) 2016 Monthly Data Summary of One Hour Readings

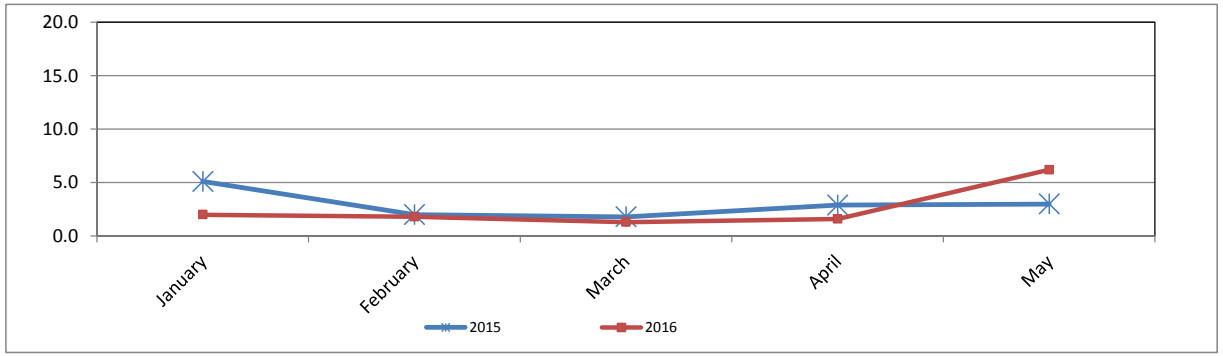
Month	Number of Readings*	Operational Time (%)	Monthly Average (KPH)	Minimum Hourly Average (KPH)	Maximum Hourly Average (KPH)	Maximum Daily Average (KPH)
January	735	98.8	2.0	0.1	48.7	24.7
February	693	99.6	1.8	0.0	52.4	26.3
March	741	99.6	1.3	0.0	35.3	18.9
April	720	100.0	1.6	0.2	42.2	23.8
May	370	49.7	6.2	0.2	38.1	20.0

WIND SPEED (WS) 2015 One-Hour Readings vs. 2016 One-Hour Readings in km/hr

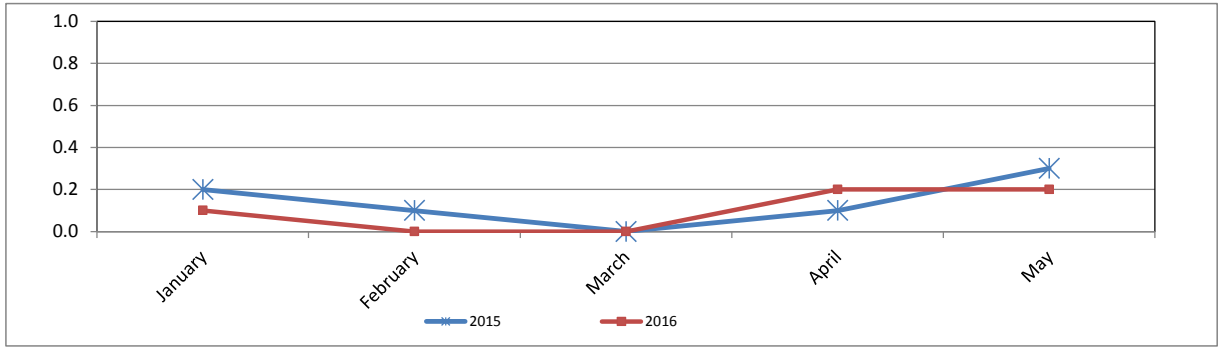
	2015			2016			
Month	**MEAN**	**MINIMUM**	**MAXIMUM**	**MEAN**	**MINIMUM**	**MAXIMUM**	**Difference**
January	**5.1**	0.2	38.4	2.0	0.1	48.7	3.1
February	2.0	0.1	36.0	1.8	0.0	**52.4**	0.2
March	1.8	0.0	**48.6**	1.3	0.0	35.3	0.5
April	2.9	0.1	42.5	1.6	0.2	42.2	1.3
May	3.0	0.3	33.9	**6.2**	0.2	38.1	-3.2

*Annual peak is bolded and highlighted.

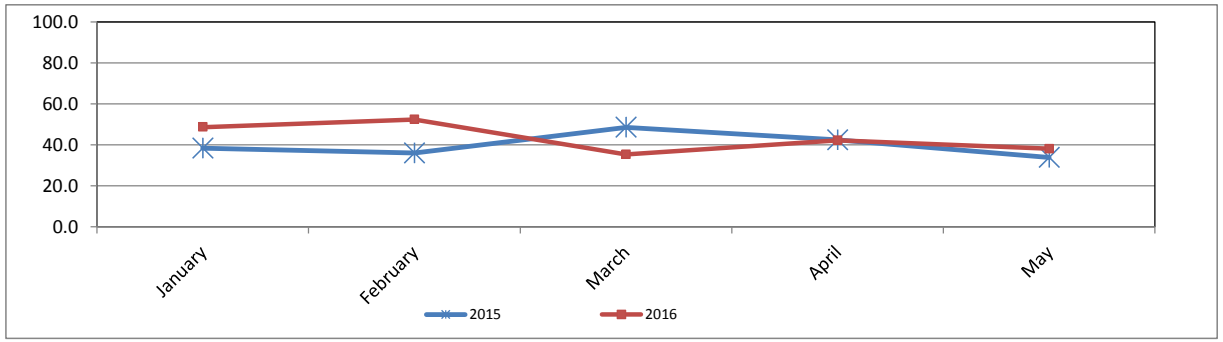
WIND SPEED (WS) 2015 Monthly Mean vs. 2016 Monthly Mean in km/hr



WIND SPEED (WS) 2015 Monthly Minimum vs. 2016 Monthly Minimum in km/hr



WIND SPEED (WS) 2015 Monthly Maximum vs. 2016 Monthly Maximum in km/hr



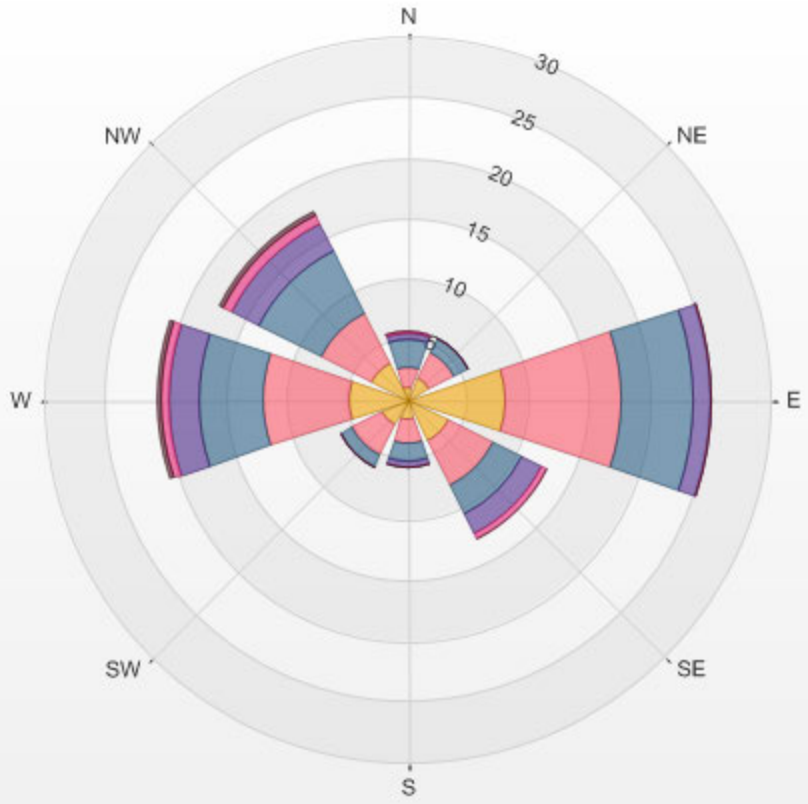
Wind: LICA ELK POINT AIRPORT
Monitor: WSP [kph]
Periodically: 2016/01/01 00:00-2016/05/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 0.64%

Direction	0.5-6.0	6.0-12.0	12.0-20.0	20.0-29.0	29.0-39.0	>39.0	Total
N	1.0	1.8	2.4	0.5	0.1	0.0	5.7
NE	2.0	2.4	1.4	0.0	0.0	0.0	5.7
E	8.0	9.7	5.9	1.5	0.1	0.0	25.2
SE	3.8	4.2	2.6	1.8	0.5	0.0	12.9
S	1.7	1.9	1.5	0.4	0.0	0.0	5.6
SW	2.3	2.8	1.1	0.0	0.0	0.0	6.3
W	4.9	7.0	5.3	2.5	0.6	0.3	20.7
NW	3.5	4.5	5.9	2.3	0.9	0.3	17.4
Summary	27.3	34.2	26.0	9.0	2.3	0.5	99.3

%	Icon	Classes (kph)											
27		0.5-6.0	34		6.0-12.0	26		12.0-20.0	9		20.0-29.0	2		29.0-39.0	1		>39.0

LICA ELK POINT AIRPORT 2016/01/01 00:00 - 2016/05/31 23:00 Calm: 0.64% Calm Wind Avg Speed: 0.24(kph)



APPENDIX II
REPORT CERTIFICATION FORM

Report Certification Form

Alberta Airshed (if applicable)	**EPA Approval or Code of Practice Registration #** (if applicable)
YES	**NA**
Company Name (if applicable)	**Industrial Operation Name** (if applicable)
Lakeland Industry & Community Association	**Elk Point Airport Site**
Name of the Representative of the Person Responsible (Last, First, Middle)	**Position / Title of the Representative of the Person Responsible**
Adekanmbi, Wunmi	**Project Manager, Customer Service, Air Services**
Is an External Party Certifying the Report? (If 'Yes', fill in the fields below for the external person.	
☐ **Yes** ■ **No**	
Name of External Person Certifying the Report (Last, First, Middle)	**Position / Title of External Person Certifying the Report**
NA	**NA**
Company Name for the External Person Certifying the Report	**Identification of Qualifications / Professional Designations of the External Person Certifying the Report**
NA	**NA**

I certify that I have reviewed and verified the submitted report. I also certify that the report presented with this certification form is complete, accurate and representative of the monitoring results and timeframe.

Signature of the Representative of the Person Responsible / External Person Certifying the Report

October 25, 2017

Report Issued Date (dd-mm-yyyy)

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

Alberta Environment and Parks (AEP)
Air.Reporting@gov.ab.ca

December 31, 2017

Subject: Annual Report Submission for LICA Bonnyville Station

Lakeland Industry & Community Association (LICA) is pleased to submit the ambient air monitoring annual report conducted at the Bonnyville Station in the year of 2016.

The air monitoring program consists of continuous air monitoring, intermittent sampling, including both VOC and PAH sampling program, and VOC canister sampling program. All the air monitoring activities were conducted by contractors. The air monitoring program at the Bonnyville site was started on June 1.

Sampling Program	Monitoring Activities Conducted By	Sample Analysis Conducted By	Data/Report Review and Prepared By	Electronic Submission Conducted By
Continuous ambient air	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics	Maxxam Analytics
Intermittent	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable
VOC Canister	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable

Notification of Changes Made After Monthly Report Issuance

- Wind Speed Calculated Averages: In the 2016 monthly reports, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.
- Wind Direction Data Correction: During a station visit on January 31, 2017 it was discovered that the wind system was misaligned to magnetic north, rather than true north. All wind direction data collected between June 2, hour 12:00 until December 31, hour 23:00 had a +13° correction applied.
- June Monthly Report: The operational time for PM2.5 was originally reported as 89.5%. During annual review this was revised to 84.3% as one of the two routine monthly audits was marked as downtime in error. The original monthly report listed fifty-two 1-Hour and eight 24-Hour H2S exceedance events on the Exceedance Summary Report. During annual review this was revised to fifty 1-Hour and five 24-Hour H2S exceedance events.
- July Monthly Report: The original monthly report listed forty-six 1-Hour H2S exceedance events on the Exceedance Summary Report. During annual review this was revised to forty-five 1-Hour H2S exceedance events.
- August Monthly Report: The original monthly report listed thirty-two 1-Hour and six 24-Hour H2S exceedance events on the Exceedance Summary Report. During annual review this was revised to thirty-one 1-Hour and four 24-Hour H2S exceedance events.

Lakeland Industry & Community Association
5107W-50th Street
Bonnyville, AB

- September Monthly Report: The operational time for PM2.5 was originally reported as 93.8%. During annual review this was revised to 93.5% as the data at hour 09:00 and 10:00 on September 26 were not invalidated during a filter change. Data on September 26, at hour 08:00 was incorrectly reported as 0.0 and has been revised to 7.7 µg/m3.

As the LICA Environmental Program Manager and Data & Reporting Specialist, we certify that we 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. We also certify all air data that are required by the AMD to be electronically submitted to Alberta's Ambient Air Quality Data Warehouse have been submitted by the time of this report submission, with the exception of electronic submission for the results of intermittent samples and VOC canister samples. The results for both intermittent samples and VOC canister samples is scheduled to be submitted by the end of January 2018.

Should you have any questions, please don't hesitate to contact us.

Respectfully,

Michael Bisaga
Technical Program Manager
Lakeland Industry & Community Association
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AMBIENT AIR MONITORING ANNUAL REPORT

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION

BONNYVILLE CONTINUOUS MONITORING STATION

JOB #: 2833-2016-37-A

JUNE - DECEMBER
2016

Prepared for:

LAKELAND INDUSTRY & COMMUNITY ASSOCIATION
5107 50 ST.
BONNYVILLE, ALBERTA
T9N 2J5

Attention: MIKE BISAGA

DATE: **December 31, 2017**

Prepared by:

Wunmi Adekanmbi, M.Sc., EPt.
Project Manager, Customer Service, Air Services

Reviewed by:

Cheri Sinclair, B.Sc.
Supervisor, Customer Service, Air Services

SUMMARY

In June - December 2016, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the Bonnyville Continuous Monitoring Station, near Bonnyville, Alberta. The monitoring station provides continuous meteorological measurements and air quality data for non-compliance parameters, as requested by Lakeland Industry & Community Association.

Data presented in this report has undergone the Post-Final Validation Procedures, which include a cursory inspection of annual charts. If errors or omissions in the data are suspected or discovered after the initial submittal of data (monthly report), the post-validation step serves to re-evaluate the affected data. The report certification form is also included in this report to verify that the annual validation review has been completed, as per the Reporting Chapter (Chapter 9) of the Air Monitoring Directive (AMD).

Statistical summaries for monthly mean, maximum and minimum values are presented on the following pages. Historical data is not available for comparison as this station was commissioned for the first time in 2016.

Any deviations or modifications made to the sampling or analytical methods during the monitoring period are outlined in Section 1.0 Discussion. On this basis, Maxxam is issuing this completed report to Lakeland Industry & Community Association.

Should you have any questions concerning the results or if we can be of further assistance, please contact us at 403-219-3661 or toll-free at 1-800-386-7247.

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1.0 Discussion

This annual validation report consists of data for parameters Sulphur Dioxide (SO_2), Hydrogen Sulphide (H_2 S), Total Hydrocarbon (THC), Methane (CH_4), Non-Methane Hydrocarbon (NMHC), Oxides of Nitrogen (NO_x), Nitric Oxides (NO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter $_{2.5}$ ($PM_{2.5}$), and Wind Speed (WS).

The air monitoring trailer was located at 54° 16' 0.516" N and 110° 44' 39.444" W during the monitoring period.

With the exception of $PM_{2.5}$, the monitoring methods and equipment met all AMD requirements. The TEOM Particulate Unit was not installed until June 3 and unexpected equipment maintenance was required to yield stable readings.

All monitoring analyzers and meteorological systems, with the exception of $PM_{2.5}$ in June (84.3%), met the 90% operational uptime requirements during the monitoring period. This was reported to AEP under reference number 312799.

All data collected during the monitoring period, with the exception of H_2S and $PM_{2.5}$, were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

Notification of Changes Made After Monthly Report Issuance

• **Wind Speed Calculated Averages:** In the 2016 monthly reports, calculated averages for wind speed and wind direction were presented as arithmetic averages of the individual hourly data. When comparing monthly statistics, the arithmetic averages for wind speed will be higher than vector-averages, calculated from the same hourly data. In this annual report, the 24-Hr and monthly wind speed averages were derived using vector averaging.

• **Wind Direction Data Correction**: During a station visit on January 31, 2017 it was discovered that the wind system was misaligned to magnetic north, rather than true north. All wind direction data collected between June 2, hour 12:00 until December 31, hour 23:00 had a +13° correction applied.

• **June Monthly Report**: The operational time for $PM_{2.5}$ was originally reported as 89.5%. During annual review this was revised to 84.3% as one of the two routine monthly audits was marked as downtime in error. The original monthly report listed fifty-two 1-Hr and eight 24-Hr events on the Exceedance Summary Report. During annual review this was revised to fifty 1-Hr and five 24-Hr events. An event on June 20, at hour 22:00 was removed from the Exceedance Summary Report as 10.1 ppb is not an exceedance and was not reported to AEP. An event on June 22, at hour 00:00 was removed from the Exceedance Summary Report as 10.0 ppb is not an exceedance and was not reported to AEP. The event on June 7, at hour 06:00 was not directly reported to AEP but occurred between events that were reported on June 7 and June 8. AEP typically assigns a single reference number for all events reported during a single phone communication. This event should have been reported by Maxxam on June 7, along with the other early morning readings; accordingly, this event would have been assigned reference number 312372. Three 24-Hr concentrations were removed from the Exceedance Summary Report for June 4 (3.3 ppb), June 21 (3.1 ppb) and June 23 (3.0 ppb) as they are not considered exceedances, nor were they reported to AEP. The 24-Hr exceedance event on June 5 was not directly reported to AEP but occurred between 1-Hr exceedance events that were reported on June 5 and 6. AEP typically assigns a single reference number for all events reported during a single phone communication. This event should have been reported by Maxxam on June 6, along with the other early morning readings; accordingly, this event would have been assigned reference number 312317.

• **July Monthly Report**: The original monthly report listed forty-six 1-Hr events on the Exceedance Summary Report. During annual review this was revised to forty-five 1-Hr events. An event on July 15, at hour 23:00 was removed from the Exceedance Summary Report as 10.4 ppb is not an exceedance and was not reported to AEP. The event on July 17, at hour 23:00 was not directly reported to AEP but occurred between events that were reported on July 16 and July 18. AEP typically assigns a single reference number for all events reported during a single phone communication. This event should have been reported by Maxxam on July 18, along with the other early morning readings; accordingly, this event would have been assigned reference number 313944.

• **August Monthly Report**: The original monthly report listed thirty-two 1-Hr and six 24-Hr events on the Exceedance Summary Report. During annual review this was revised to thirty-one 1-Hr and four 24-Hr events. An event on August 27, at hour 05:00 was removed from the Exceedance Summary Report as 10.3 ppb is not considered an exceedance and was not reported to AEP. Two 24-Hr concentrations were removed from the Exceedance Summary Report for August 7 (3.3 ppb) and August 9 (3.2 ppb) as they are not considered exceedances, nor were they reported to AEP.

Notification of Changes Made After Monthly Report Issuance

• **September Monthly Report**: The operational time for $PM_{2.5}$ was originally reported as 93.8%. During annual review this was revised to 93.5% as the data at hour 09:00 and 10:00 on September 26 were not invalidated during a filter change. Data on September 26, at hour 08:00 was incorrectly reported as 0.0 and has been revised to 7.7 µg/m^3.

The summaries of the monthly maintenance report for the monitoring period are presented below:

SULPHUR DIOXIDE (SO_2)

June	• Operational time was 95.3% equivalent to 34 hours of downtime. • The analyzer was installed on June 1 following the installation of the trailer on May 30, as per client's request. As valid data collection commenced on June 2, thirty-three hours of data were not collected and are therefore accounted for as downtime. • The analyzer was allowed time to stabilize overnight and an installation calibration was completed on June 2. • One hour of data collected on June 17 was invalidated due to a power failure.
July	• Operational time was 100%. No issues were identified.
August	• Operational time was 96.9% equivalent to 23 hours of downtime. • Annual maintenance was performed on August 2 following a shut-down calibration. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on August 3. Eighteen hours of downtime were recorded due to this maintenance event. • Five hours of downtime were recorded due to a repeat calibration that was completed on August 23 to address a zero drift issue.
September	• Operational time was 100%. No issues were identified.
October	• Operational time was 100%. No issues were identified.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 99.5% equivalent to 4 hours of downtime. • The analyzer did not span correctly on December 23. A successful multipoint calibration was completed the same day. During the site visit, the oven temperature of the zero/span system was adjusted in order to meet the requirement for expected span values to fall within 40-80% of analyzer full scale. As the calibration results met AMD requirements, no data was discarded due to this event. However, four hours of downtime were recorded due to the additional calibration.

HYDROGEN SULPHIDE (H_2S)

June	• Operational time was 94.2% equivalent to 42 hours of downtime. • The analyzer was installed on June 1 following the installation of the trailer on May 30, as per client's request. As valid data collection commenced on June 2, thirty-three hours of data were not collected and are therefore accounted for as downtime. • Two additional zero/span checks were performed between June 4 and June 9 to address a drift in span response. • Following a successful shut-down calibration on June 9, the sample pump was rebuilt. A post-repair calibration was then completed. Six hours of downtime were recorded due to this maintenance event. • One hour of data collected on June 17 was invalidated due to a power failure. • Between June 3 and June 30, there were fifty 1-Hr exceedances, ranging from 10.3 to 58.1 ppb and five 24-Hr exceedances, ranging from 4.6 to 10.4 ppb. The various exceedances events are summarized in the H_2S Exceedance Summary Report.
July	• Operational time was 100%. • An internal audit was completed on July 13. The audit report was included in the July 2016 monthly report. • Routine maintenance was completed on July 14 following a shut-down calibration. A successful post-repair calibration was completed afterwards. This event did not constitute downtime. • Between July 15 and July 30, there were forty-five 1-Hr exceedances, ranging from 10.5 to 35.7 ppb and nine 24-Hr exceedances, ranging from 3.3 to 7.4 ppb. The various exceedances events are summarized in the H_2S Exceedance Summary Report.
August	• Operational time was 94.4% equivalent to 42 hours of downtime. • Annual maintenance was performed on August 2 following a shut-down calibration. The analyzer was allowed time to stabilize and a post-repair calibration was completed on August 4. Thirty-six hours of downtime were recorded due to this maintenance event. • An additional zero/span check was performed on August 8 following a zero drift on August 7. A repeat calibration was completed on August 29 to address the recurring zero drift issue. The results met AMD requirements. Six hours of downtime were recorded due to the additional quality checks. • Between August 5 and August 19, there were thirty-one 1-Hr exceedances, ranging from 10.7 to 24.5 ppb and four 24-Hr exceedances, ranging from 3.3 to 6.0 ppb. The various exceedances events are summarized in the H_2S Exceedance Summary Report.

HYDROGEN SULPHIDE (H_2S)

September	• Operational time was 100%. No issues were identified.
October	• Operational time was 99.9% equivalent to 1 hour of downtime. • On October 5, the analyzer recorded suspect negative data between hours 03:00 and 05:00. A repeat span check was initiated at hour 06:00 to assess analyzer performance and the result was within acceptance limits. No further action was required. One hour of downtime was recorded due to this event.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 100%. No issues were identified.

June 2016 H_2S Exceedance Summary

Report H_2S 1- Hour Exceedance

DATE	HOUR	READING (ppb)	AEP Ref #
June 3	22	10.6	312276
June 3	23	14.8	312276
June 4	0	10.8	312277
June 4	1	10.3	312277
June 4	2	18.5	312277
June 5	4	21.3	312299
June 6	3	14.7	312317
June 6	4	15.7	312317
June 7	0	12.9	312372
June 7	1	17.2	312372
June 7	2	11.5	312372
June 7	3	18.2	312372
June 7	4	17.3	312372
June 7	6	15.5	312372
June 7	21	12.7	312426
June 7	22	18.1	312426
June 7	23	23.0	312426
June 8	0	18.1	312427
June 20	3	24.0	312848
June 20	4	20.8	312848
June 20	5	15.8	312848
June 20	23	17.8	312899
June 21	0	21.6	312898
June 22	1	16.1	312944
June 22	2	19.8	312944
June 22	3	16.4	312944
June 22	4	15.5	312944
June 22	5	13.1	312944
June 23	1	13.3	312991
June 23	3	11.2	312991
June 23	4	10.8	312991
June 26	3	22.0	313093
June 26	4	11.8	313093
June 26	6	10.6	313107
June 27	0	17.1	313106
June 27	1	24.7	313106
June 27	2	25.9	313106
June 27	3	23.9	313106
June 27	5	28.2	313106
June 27	6	11.8	313156
June 27	21	11.5	313156
June 27	22	22.4	313156
June 27	23	40.8	313156
June 28	0	44.8	313157
June 28	1	54.6	313157
June 28	2	21.9	313157
June 28	4	58.1	313157
June 28	5	26.9	313157
June 28	6	12.6	313157
June 30	6	11.5	313293

H_2S 24- Hour Exceedance

DATE	READING (ppb)	AEP Ref #
June 5	7.1	312317
June 20	5.2	312957
June 22	4.6	312991
June 27	9.2	313156
June 28	10.4	313157

July 2016 H_2S Exceedance Summary Report

H_2S 1- Hour Exceedance

DATE	HOUR	READING (ppb)	AEP Ref #
June 3	22	10.6	312276
June 3	23	14.8	312276
June 4	0	10.8	312277
June 4	1	10.3	312277
June 4	2	18.5	312277
June 5	4	21.3	312299
June 6	3	14.7	312317
June 6	4	15.7	312317
June 7	0	12.9	312372
June 7	1	17.2	312372
June 7	2	11.5	312372
June 7	3	18.2	312372
June 7	4	17.3	312372
June 7	6	15.5	312372
June 7	21	12.7	312426
June 7	22	18.1	312426
June 7	23	23.0	312426
June 8	0	18.1	312427
June 20	3	24.0	312848
June 20	4	20.8	312848
June 20	5	15.8	312848
June 20	23	17.8	312899
June 21	0	21.6	312898
June 22	1	16.1	312944
June 22	2	19.8	312944
June 22	3	16.4	312944
June 22	4	15.5	312944
June 22	5	13.1	312944
June 23	1	13.3	312991
June 23	3	11.2	312991
June 23	4	10.8	312991
June 26	3	22.0	313093
June 26	4	11.8	313093
June 26	6	10.6	313107
June 27	0	17.1	313106
June 27	1	24.7	313106
June 27	2	25.9	313106
June 27	3	23.9	313106
June 27	5	28.2	313106
June 27	6	11.8	313156
June 27	21	11.5	313156
June 27	22	22.4	313156
June 27	23	40.8	313156
June 28	0	44.8	313157
June 28	1	54.6	313157
June 28	2	21.9	313157
June 28	4	58.1	313157
June 28	5	26.9	313157
June 28	6	12.6	313157
June 30	6	11.5	313293

H_2S 24- Hour Exceedance

DATE	READING (ppb)	AEP Ref #
June 5	7.1	312317
June 20	5.2	312957
June 22	4.6	312991
June 27	9.2	313156
June 28	10.4	313157

August 2016 H_2S Exceedance Summary Report

H_2S 1- Hour Exceedance

DATE	TIME (MST)	READING (ppb)	AEP REF #
August 5	3	13.4	314667
August 5	4	13.4	314667
August 5	5	10.9	314667
August 5	6	10.7	314667
August 7	1	11.9	314740
August 7	2	11.7	314740
August 7	4	15.1	314740
August 12	23	11.7	315002
August 13	0	15.6	315003
August 13	1	16.2	315003
August 13	2	17.0	315003
August 13	3	20.5	315003
August 13	4	21.3	315003
August 13	5	18.8	315003
August 13	6	14.6	315003
August 14	5	13.0	315031
August 14	6	11.8	315031
August 15	1	11.4	315043
August 15	2	24.5	315043
August 15	3	22.6	315043
August 15	4	13.6	315043
August 15	5	13.6	315043
August 15	6	12.2	315043
August 16	0	10.7	315097
August 16	2	15.8	315097
August 16	3	12.4	315097
August 16	4	19.8	315097
August 16	5	22.2	315097
August 16	6	10.9	315097
August 19	5	14.9	315241
August 19	6	12.2	315241

H_2S 24- Hour Exceedance

DATE	READING (ppb)	AEP REF #
August 5	3.3	314667
August 13	6.0	315003
August 15	5.6	315043
August 16	5.2	315097

TOTAL HYDROCARBONS (THC), METHANE (CH4), and NON-METHANE HYDROCARBONS (NMHC)

June	• Operational time was 95.0% equivalent to 36 hours of downtime. • The analyzer was installed on June 1 following the installation of the trailer on May 30, as per client's request. As valid data collection commenced on June 2, thirty-five hours of data were not collected and are therefore accounted for as downtime. • One hour of data collected on June 17 was invalidated due to a power failure.
July	• Operational time was 91.3% equivalent to 65 hours of downtime. • On July 10, the analyzer recorded low concentrations due to a malfunctioning valve actuator. The minute data was reviewed for the entire month of July and concentrations less than 1.86 ppm were invalidated. The set point of 1.86 ppm was determined by referencing data collected at neighbouring stations, within the LICA network, to yield a historical monthly average. Where more than 15 minutes of invalid data were encountered, that hourly average data was discarded. Sixty two hours of data were discarded due to this event. • Three hours of downtime were recorded between July 13 and July 15 due to two additional zero/span checks performed to address a drift in span response.
August	• Operational time was 95.3% equivalent to 35 hours of downtime. • Previously identified in July, the analyzer was recording intermittent low concentrations for CH_4 due to a malfunctioning valve actuator. Annual maintenance was performed on August 2 following a shut-down calibration. The valve actuator was replaced as part of the maintenance. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on August 3. Fifteen hours of downtime were recorded due to this maintenance event. • The minute data collected prior to the annual maintenance was reviewed. Concentrations less than 1.86 ppm were invalidated. The set point of 1.86 ppm was determined by referencing data collected at neighbouring stations, within the LICA network, to yield a historical monthly average. Where more than 15 minutes of invalid data were encountered, that hourly average data was discarded. Nineteen hours of data were discarded due to this event. • A zero/span check was triggered after the span gas cylinder was replaced on August 19, causing one hour of downtime.
September	• Operational time was 100%. No issues were identified.
October	• Operational time was 100%. No issues were identified.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 99.9% equivalent to 1 hour of downtime. • The span gas cylinder was replaced on December 27. A zero/span check was triggered afterwards, causing one hour of downtime.

OXIDES OF NITROGEN (NOx), NITRIC OXIDE (NO) and NITROGEN DIOXIDE (NO_2)

June	• Operational time was 94.2% equivalent to 42 hours of downtime. • The analyzer was installed on June 1 following the installation of the trailer on May 30 as per client's request. As valid data collection commenced on June 2, thirty-three hours of data were not collected and are therefore accounted for as downtime. • There were suspicions about the calibrator that was used for the June 2 calibration. For verification, the monthly calibration was repeated on June 27 using an alternate calibrator. The calibration met AMD requirements. Eight hours of downtime were recorded due to the additional calibration. • One hour of data collected on June 17 was invalidated due to a power failure.
July	• Operational time was 99.1% equivalent to 7 hours of downtime. • The routine monthly calibration was performed on July 12 during which the analyzer displayed unstable readings during the low gas phase titration sequence. A repeat calibration was completed on July 13 to verify analyzer performance and the calibration result met AMD requirements. Seven hours of downtime were recorded due to the additional quality check.
August	• Operational time was 95.7% equivalent to 32 hours of downtime. • Annual maintenance was performed on August 2 following a shut-down calibration. The sample pump was rebuilt. The analyzer was allowed time to stabilize overnight and a post-repair calibration was completed on August 3. Twenty-one hours of downtime were recorded due to this maintenance event. • The analyzer spanned towards the upper acceptance limit on August 5. The span check was repeated and a successful as-found response check was completed on August 6, confirming analyzer performance. The analyzer spanned high again on August 8 but still within acceptance limits. For diligence, a repeat calibration was performed on August 9. The results met AMD requirements. No data was discarded as these events impacted only the zero/span system and not analyzer performance. However, eleven hours of downtime were recorded due to the additional quality checks.
September	• Operational time was 100%. No issues were identified.
October	• Operational time was 100%. No issues were identified.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 99.2% equivalent to 6 hours of downtime. • The analyzer did not span correctly on December 23. A successful multipoint calibration was completed the same day. During the site visit, the oven temperature of the zero/span system was adjusted in order to meet the requirement for expected span values to fall within 40-80% of analyzer full scale. As the calibration results met the AMD, 2016 requirements, no data was discarded due to this event. However, six hours of downtime were recorded due to the additional calibration.

OZONE (O_3)

June	• Operational time was 94.3% equivalent to 41 hours of downtime. • The analyzer was installed on June 1 following the installation of the trailer on May 30, as per client's request. As valid data collection commenced on June 2, forty hours of data were not collected and are therefore accounted for as downtime. • One hour of data collected on June 17 was invalidated due to a power failure.
July	• Operational time was 100%. No issues were identified.
August	• Operational time was 100%. No issues were identified.
September	• Operational time was 100%. No issues were identified.
October	• Operational time was 100%. No issues were identified.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 100%. No issues were identified.

PARTICULATE MATTER $_{2.5}$ (LESS THAN 2.5 MICRONS) ($PM_{2.5}$)

June	• Operational time was 84.3% equivalent to 113 hours of downtime. This was reported to AEP under reference number 312799. • The Teom unit was installed following an installation audit on June 3. Fifty-six hours of data were not collected between June 1 and June 3 and are therefore accounted for as downtime. • The unit was not stable after installation, it was therefore placed in "maintenance" mode for monitoring purposes. The switch valve was rebuilt and the O-rings were reset on June 4. A successful repeat audit was performed on June 6 to confirm the Teom unit's performance. Twenty-five hours of downtime were incurred. • The second routine audit was performed on June 13, the unit generated unstable readings after the audit, possibly caused by a leak. The issue was fixed and the Teom was allowed time to stabilize. A post-repair audit was completed on June 14. Nineteen hours of data were invalidated due to this event. • One hour of data collected on June 17 was invalidated due to a power failure. • Twelve hours of data were invalidated as the data was below –3 µg/m^3.
July	• Operational time was 99.7% equivalent to 2 hours of downtime. • Two hours of data were invalidated as the data was below –3 µg/m^3.
August	• Operational time was 99.5% equivalent to 4 hours of downtime. • A 1-Hr exceedance event was recorded on August 19, at hour 07:00 at a concentration of 82.1 ppb. This was reported to AEP under reference number 315288. • Four hours of data were invalidated as the data was below –3 µg/m^3.
September	• Operational time was 93.5% equivalent to 47 hours of downtime. • The TEOM unit recorded intermittent negative readings in the days following the September 22 audit. As a corrective action, the filter was exchanged and reset on September 26 which resolved the issue. Data at hour 09:00 and 10:00 were invalidated due to the filter change and required time for equipment stabilization. Two hours of downtime were incurred. • The TEOM unit malfunctioned on September 30. It was restarted onsite on October 1. Twenty-four hours of downtime were recorded. • Twenty-one hours of data were invalidated as the data was below –3 µg/m^3.
October	• Operational time was 97.3% equivalent to 20 hours of downtime. • The TEOM unit malfunctioned on September 30. It was restarted onsite on October 1. Eleven hours of downtime were recorded. • Nine hours of data were invalidated as the data was below -3 µg/m^3.
November	• Operational time was 93.6% equivalent to 46 hours of downtime. • The TEOM software malfunctioned on November 21. The unit was restarted on November 23, and after stabilization, normal operations resumed. Thirty-six hours of data were discarded due to this event. • Ten hours of data were invalidated as the data was below -3 µg/m^3.
December	• Operational time was 98.1% equivalent to 14 hours of downtime. • Fourteen hours of data were invalidated as the data was below -3 µg/m^3.

WIND DATA

June	• Operational time was 94.9% equivalent to 37 hours of downtime. • The wind system was installed on June 2. Thirty-six hours of data were not collected between June 1 and June 2 and are therefore accounted for as downtime. • One hour of data collected on June 17 was invalidated due to a power failure.
July	• Operational time was 100%. No issues were identified.
August	• Operational time was 100%. No issues were identified.
September	• Operational time was 100%. No issues were identified.
October	• Operational time was 100%. No issues were identified.
November	• Operational time was 100%. No issues were identified.
December	• Operational time was 100%. No issues were identified.

2.0 Project Personnel

Mike Bisaga was the contact for Lakeland Industry & Community Association and the Maxxam field sampling team consisted of Alexander Yakupov, Limin Li and Raja Ashraf.

3.0 Plant Monthly Required AMD Summary

All monitoring analyzers and meteorological systems, with the exception of PM2.5 in June (84.3%), met the 90% operational uptime requirements during the monitoring period. This was reported to AEP under reference number 312799.

All data collected during the monitoring period, with the exception of H2S and PM2.5, were within the objectives outlined in the Alberta Ambient Air Quality Objectives and Guidelines Summary (AAAQOs).

4.0 Calculations and Results

All calculations and reporting of results follow the method described in the Air Monitoring Directive, 1989, 2006 Amendments to the Air Monitoring Directive, 1989 (AMD 2006) as well as AMD 2015 and 2016.

5.0 Methods and Procedures

The following methods and procedures were used to complete the test program:

Maxxam AIR SOP-00001 - Methane, Non-Methane Hydrocarbon Analyzer Monitoring
Maxxam AIR SOP-00208: RM Young Monitor Calibration
Maxxam AIR SOP-00209: Ambient H_2S Monitoring
Maxxam AIR SOP-00211: Ambient SO_2 Monitoring
Maxxam AIR SOP-00212: Ambient O_3 Monitoring
Maxxam AIR SOP-00213: Ambient $NO/NO_2/NOx$ Monitoring
Maxxam AIR SOP-00214: Ambient Hydrocarbon (THC) Monitoring
Maxxam AIR SOP-00215: Teom Operation

There were no deviations from the prescribed methods.

The following instruments were used to perform the test program:

Sulphur Dioxide - API 100E UV Fluorescent Analyzer
Hydrogen Sulphide - API 101E UV Fluorescent Analyzer
Total Hydrocarbons - Thermo 55i FID Analyzer
Methane, Non-Methane Hydrocarbon - Thermo 55i FID Analyzer
Oxides of Nitrogen - API 200E Chemiluminescent Analyzer
Ozone - Thermo 49i Photometric Analyzer
Particulate Matter ($PM_{2.5}$) - R&P 1405F Teom Unit
Wind System - RM Young Unit
Datalogger - ESC 8832

APPENDIX I
CONTINUOUS MONITORING DATA RESULTS

SULPHUR DIOXIDE

SULPHUR DIOXIDE (SO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB SO_2)						OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 20	20 < C ≤ 60	60 < C ≤ 110	110 < C ≤ 170	170 < C ≤ 340	> 340	1-HR	24-HR	1-HR	24-HR	
June	652	95.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
July	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
August	679	96.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
September	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
October	709	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
November	684	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.0
December	704	99.5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48	0	0	0.1
											ANNUAL AVERAGE		0.0

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

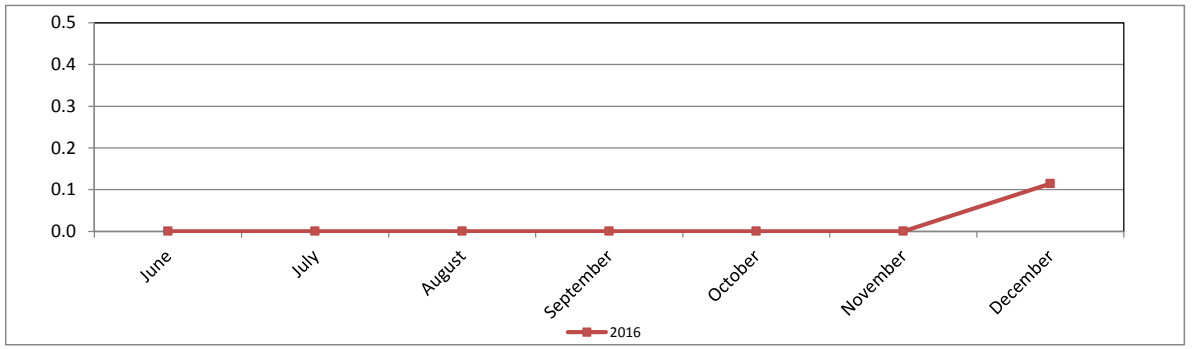
Alberta Ambient Air Quality Objectives Annual Average**	8.0	PPB
Annual Average for 2016	0.0	PPB

SULPHUR DIOXIDE (SO_2) 2016 One-Hour Readings in PPB

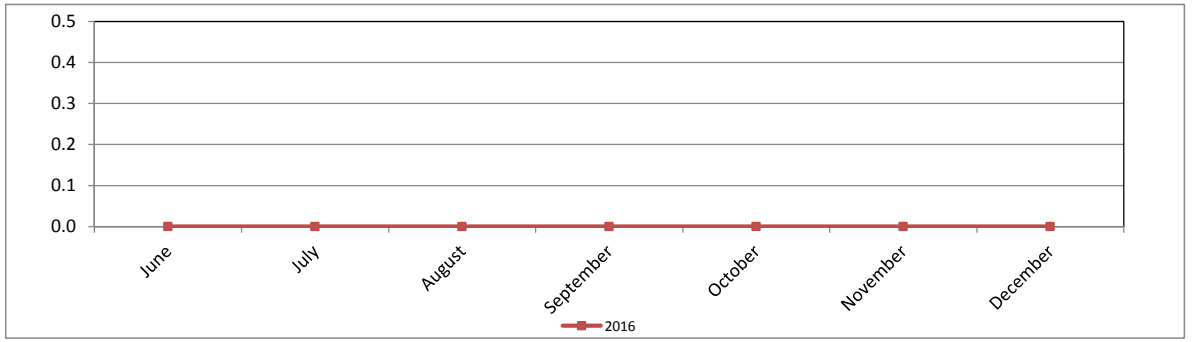
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	0.0	0.0	1.5
July	0.0	0.0	3.7
August	0.0	0.0	0.5
September	0.0	0.0	0.6
October	0.0	0.0	0.1
November	0.0	0.0	2.9
December	**0.1**	0.0	**4.8**

*Annual peak is bolded and highlighted.

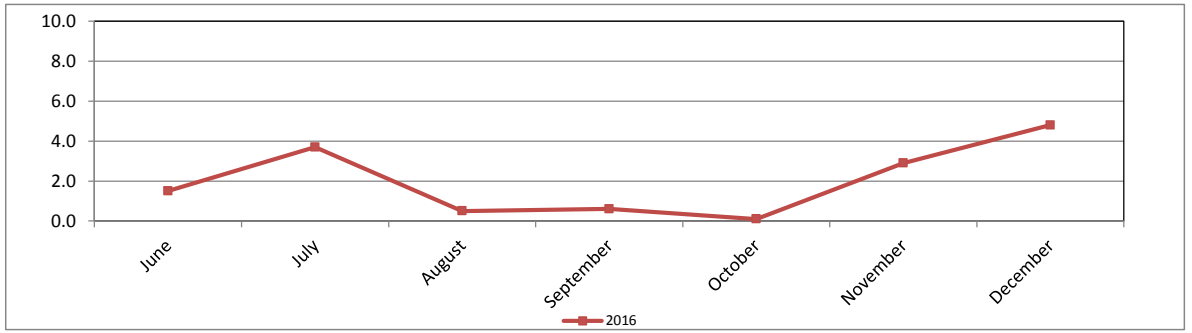
SULPHUR DIOXIDE (SO_2) 2016 Monthly Mean in PPB



SULPHUR DIOXIDE (SO_2) 2016 Monthly Minimum in PPB



SULPHUR DIOXIDE (SO_2) 2016 Monthly Maximum in PPB

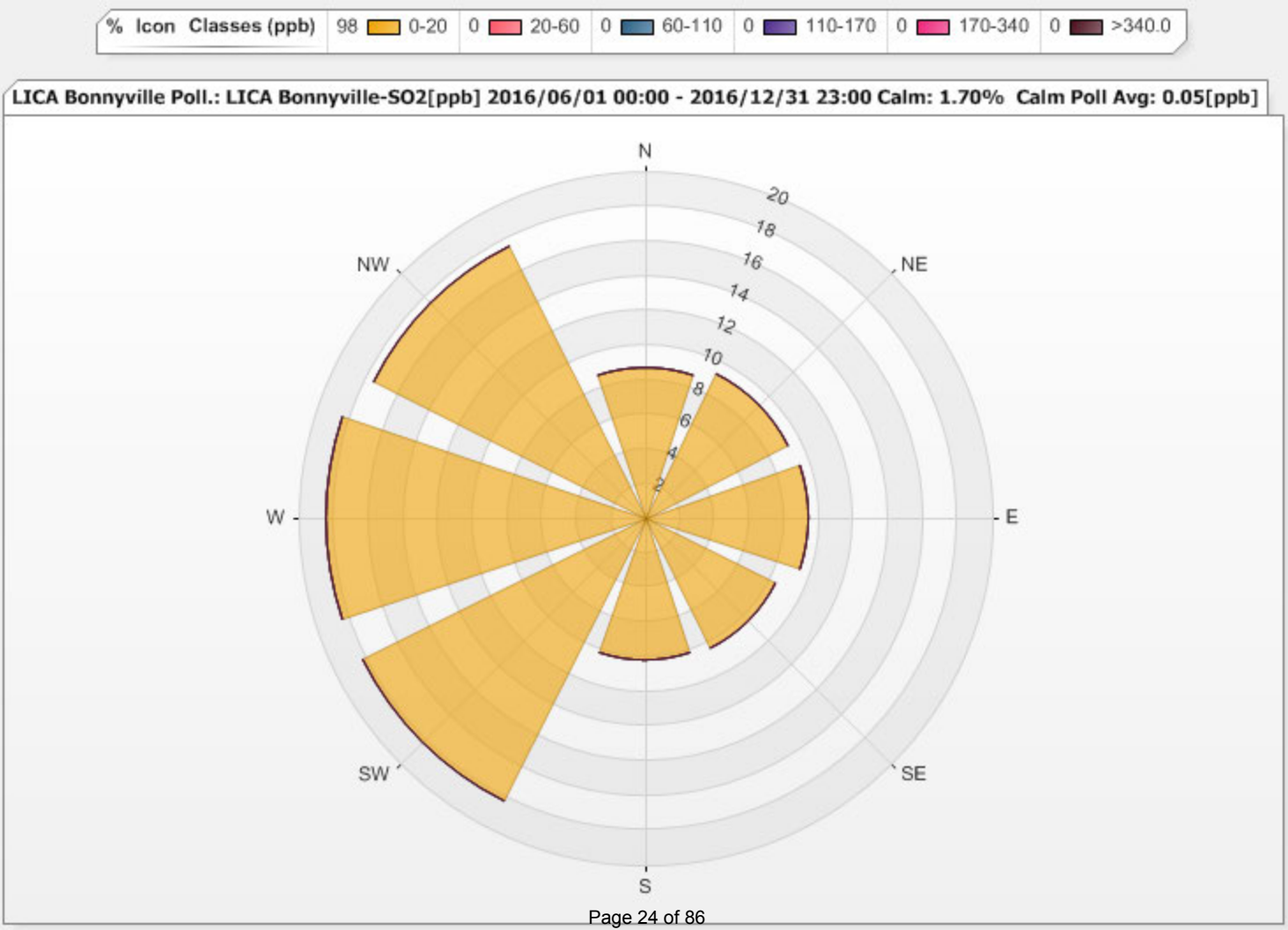


Wind: LICA Bonnyville
Poll.: LICA Bonnyville-SO2[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.70%

Calm Avg: 0.05 [ppb]

Direction	0-20	20-60	60-110	110-170	170-340	>340.0	Total
N	8.7	0.0	0.0	0.0	0.0	0.0	8.7
NE	9.3	0.0	0.0	0.0	0.0	0.0	9.3
E	9.5	0.0	0.0	0.0	0.0	0.0	9.5
SE	8.4	0.0	0.0	0.0	0.0	0.0	8.4
S	8.3	0.0	0.0	0.0	0.0	0.0	8.3
SW	18.3	0.0	0.0	0.0	0.0	0.0	18.3
W	18.5	0.0	0.0	0.0	0.0	0.0	18.5
NW	17.5	0.0	0.0	0.0	0.0	0.0	17.5
Summary	98.3	0.0	0.0	0.0	0.0	0.0	98.3


% Icon Classes (ppb)
98 0-20
0 20-60
0 60-110
0 110-170
0 170-340
0 >340.0
LICA Bonnyville Poll.: LICA Bonnyville-SO2[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.70% Calm Poll Avg: 0.05[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

HYDROGEN SULPHIDE

HYDROGEN SULPHIDE (H_2S) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB H_2S)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 3	4 < C ≤ 10	11 < C ≤ 50	> 50	1-HR	24-HR	1-HR	24-HR	
June	644	94.2	82.3%	9.6%	7.8%	0.3%	10	3	50	5	2.4
July	700	100.0	81.4%	12.0%	6.6%	0.0%	10	3	45	9	2.2
August	663	94.4	84.5%	10.7%	4.8%	0.0%	10	3	31	4	1.7
September	685	100.0	98.8%	1.2%	0.0%	0.0%	10	3	0	0	0.6
October	708	99.9	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
November	685	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.2
December	708	100.0	100.0%	0.0%	0.0%	0.0%	10	3	0	0	0.1
									ANNUAL AVERAGE		1.0

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

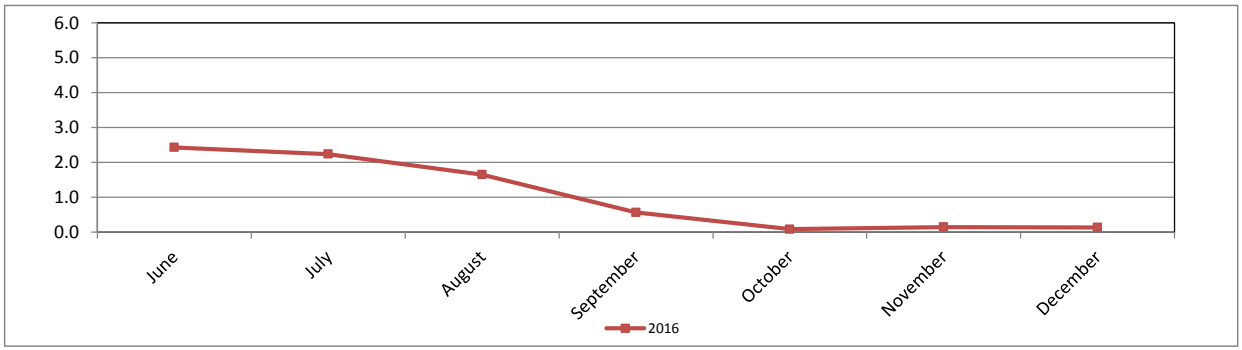
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	1.0	PPB

HYDROGEN SULPHIDE (H_2S) 2016 One-Hour Readings in PPB

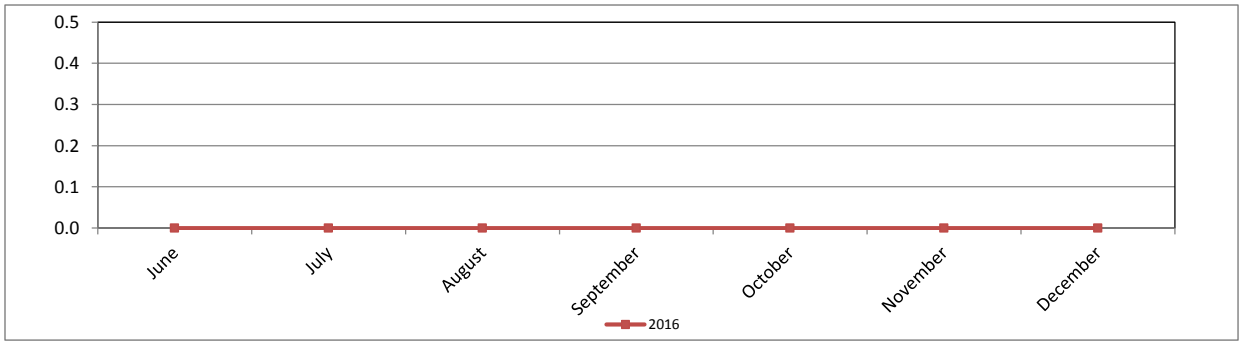
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	**2.4**	0.0	**58.1**
July	2.2	0.0	36.5
August	1.7	0.0	24.5
September	0.6	0.0	8.4
October	0.1	0.0	2.5
November	0.2	0.0	2.0
December	0.1	0.0	2.0

*Annual peak is bolded and highlighted.

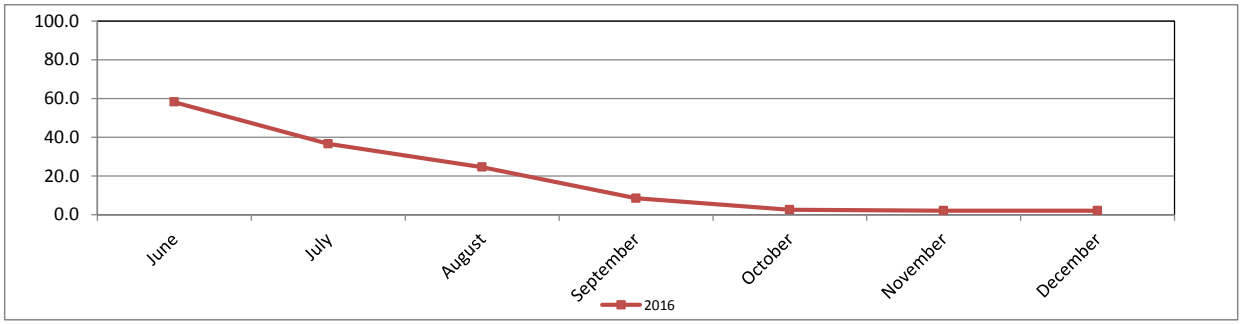
HYDROGEN SULPHIDE (H_2S) 2016 Monthly Mean in PPB



HYDROGEN SULPHIDE (H_2S) 2016 Monthly Minimum in PPB



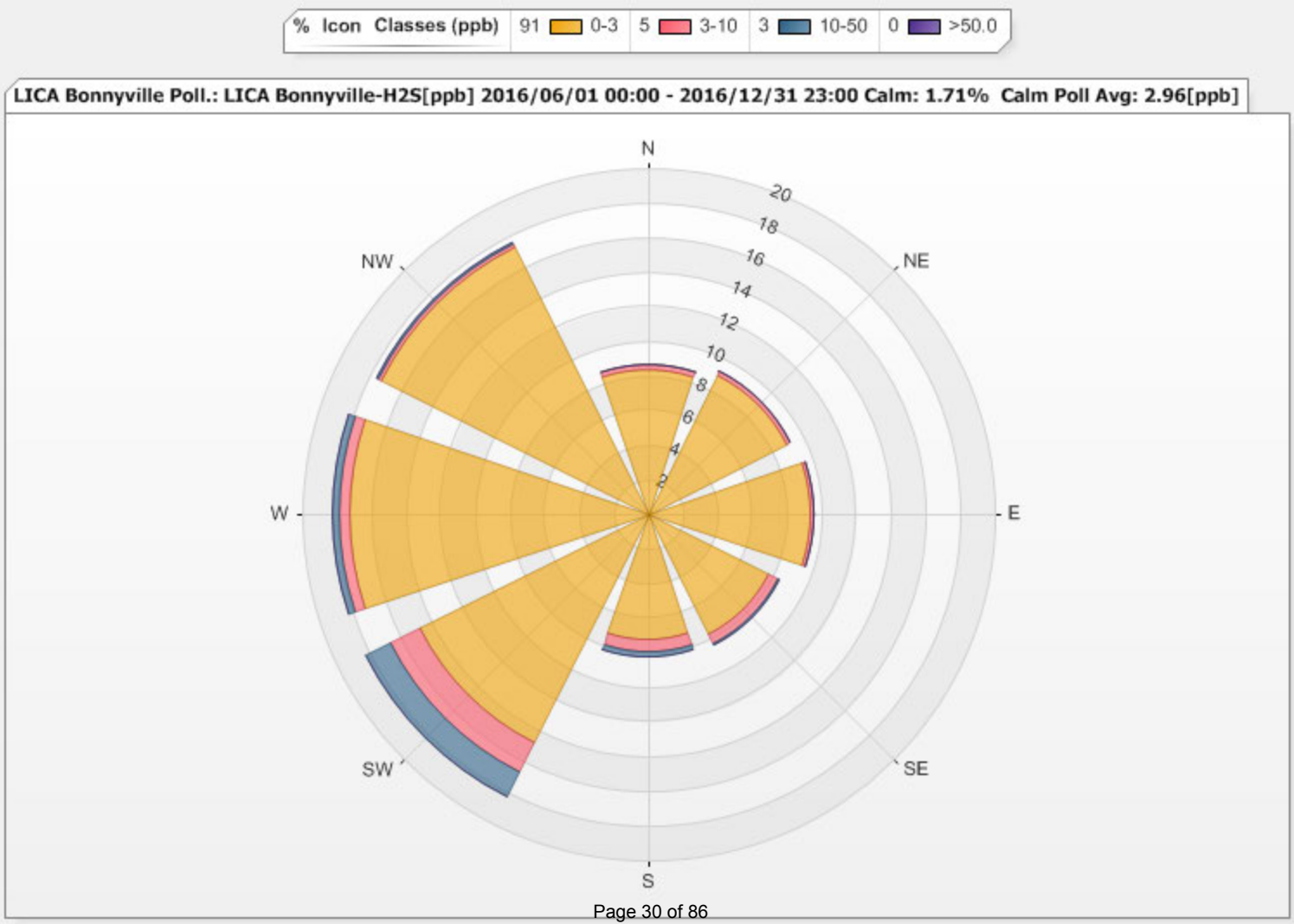
HYDROGEN SULPHIDE (H_2S) 2016 Monthly Maximum in PPB



Wind: LICA Bonnyville
Poll.: LICA Bonnyville-H2S[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.71% Calm Avg: 2.96 [ppb]

Direction	0-3	3-10	10-50	>50.0	Total
N	8.3	0.3	0.0	0.0	8.7
NE	9.0	0.2	0.0	0.0	9.2
E	9.4	0.2	0.0	0.0	9.6
SE	7.8	0.6	0.1	0.0	8.5
S	7.3	0.6	0.4	0.0	8.3
SW	14.8	1.9	1.6	0.0	18.3
W	17.3	0.6	0.4	0.0	18.3
NW	17.3	0.2	0.0	0.0	17.5
Summary	91.2	4.6	2.5	0.0	98.3


% Icon Classes (ppb)
91 0-3
5 3-10
3 10-50
0 >50.0
LICA Bonnyville Poll.: LICA Bonnyville-H2S[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.71% Calm Poll Avg: 2.96[ppb]
N
NE
E
SE
S
SW
W
NW
2
4
6
8
10
12
14
16
18
20

TOTAL HYDROCARBON

TOTAL HYDROCARBONS (THC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM THC)				OBJECTIVES** (PPM)		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
June	649	95.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	2.04
July	642	91.3	99.8%	0.2%	0.0%	0.0%	-	-	-	-	2.08
August	666	95.3	98.8%	1.2%	0.0%	0.0%	-	-	-	-	2.11
September	685	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	2.09
October	709	100.0	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.13
November	685	100.0	97.4%	2.6%	0.0%	0.0%	-	-	-	-	2.20
December	707	99.9	96.2%	3.8%	0.0%	0.0%	-	-	-	-	2.18
									ANNUAL AVERAGE		2.12

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

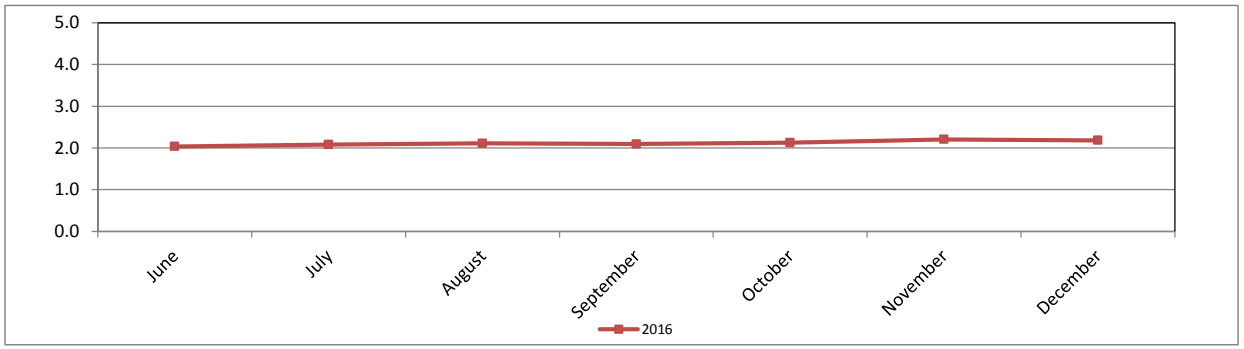
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.12	PPM

TOTAL HYDROCARBONS (THC) 2016 One-Hour Readings in PPM

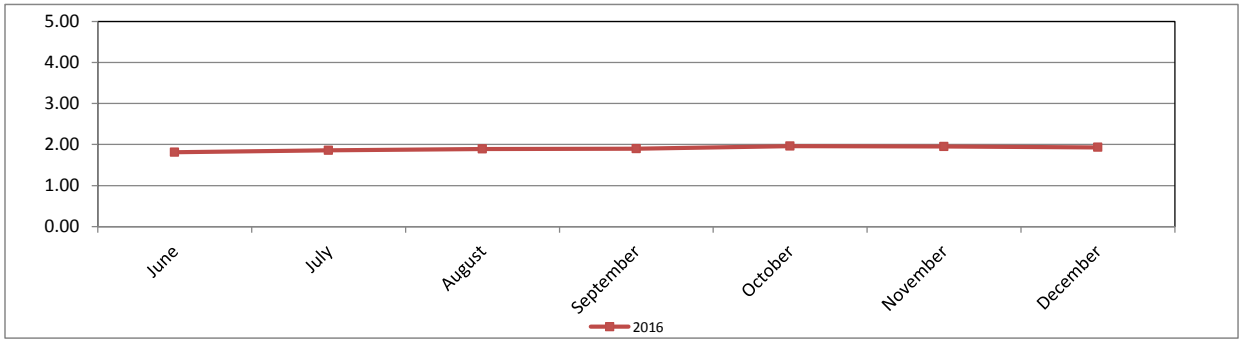
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	2.04	1.81	3.33
July	2.08	1.86	3.07
August	2.11	1.89	3.32
September	2.09	1.90	3.05
October	2.13	1.96	3.47
November	**2.20**	1.95	3.55
December	2.18	1.93	**3.86**

*Annual peak is bolded and highlighted.

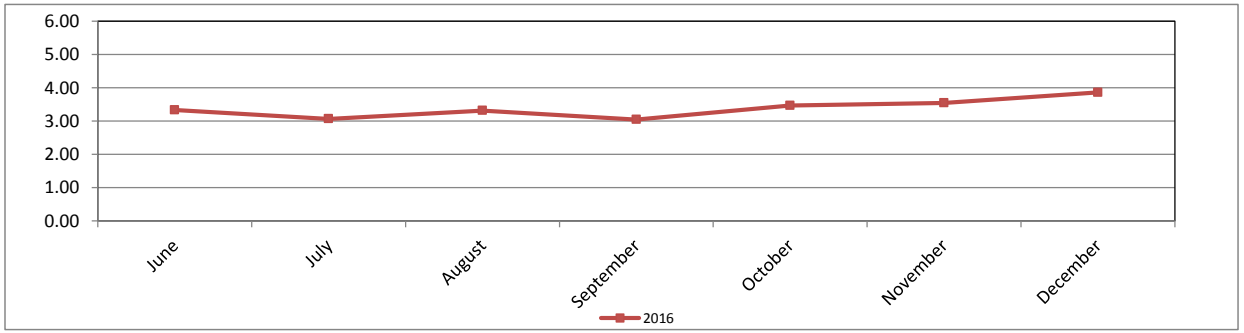
TOTAL HYDROCARBONS (THC) 2016 Monthly Mean in PPM



TOTAL HYDROCARBONS (THC) 2016 Monthly Minimum in PPM



TOTAL HYDROCARBONS (THC) 2016 Monthly Maximum in PPM



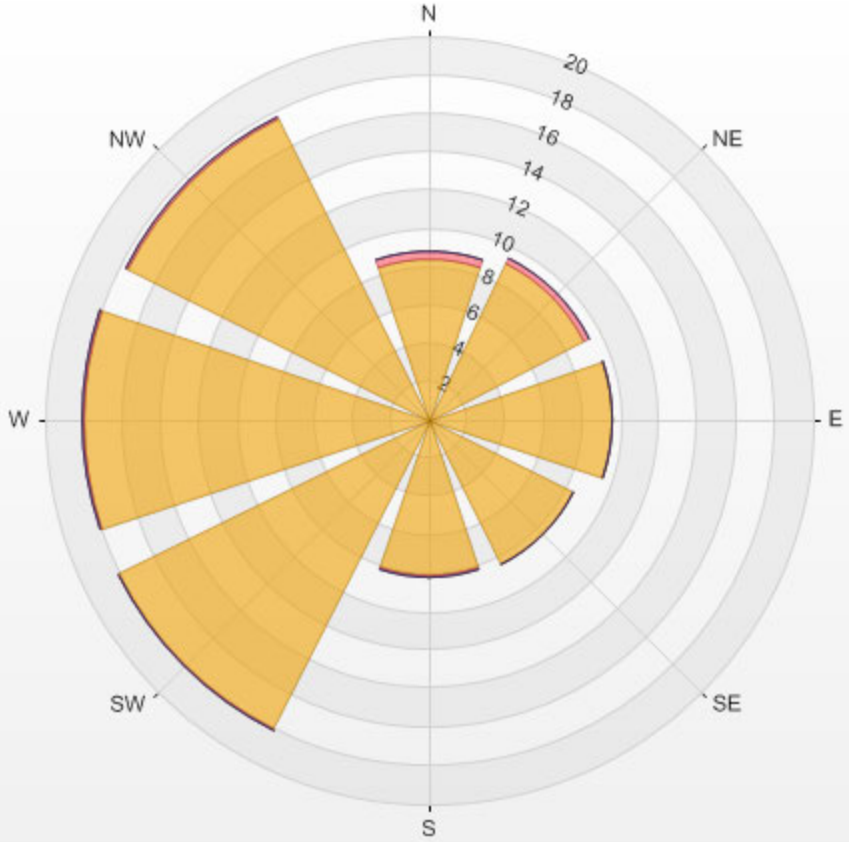
Wind: LICA Bonnyville
Poll.: LICA Bonnyville-THC55[ppm]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.71% Calm Avg: 2.55 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	8.4	0.4	0.0	0.0	8.9
NE	9.1	0.3	0.0	0.0	9.4
E	9.6	0.1	0.0	0.0	9.6
SE	8.4	0.0	0.0	0.0	8.4
S	8.1	0.1	0.0	0.0	8.2
SW	18.0	0.1	0.0	0.0	18.1
W	18.0	0.0	0.0	0.0	18.1
NW	17.6	0.1	0.0	0.0	17.7
Summary	97.2	1.1	0.0	0.0	98.3

%	Icon	Classes (ppm)							
97		0-3	1		3-10	0	10-50	0	>50.0

LICA Bonnyville Poll.: LICA Bonnyville-THC55[ppm] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.71% Calm Poll Avg: 2.55[ppm]



METHANE

METHANE (CH_4) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM CH_4)				OBJECTIVES** (PPM)		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 3.0	3.1 < C ≤ 10.0	10.1 < C ≤ 50.0	> 50.0	1-HR	24-HR	1-HR	24-HR	
June	649	95.0	99.8%	0.2%	0.0%	0.0%	-	-	-	-	2.03
July	642	91.3	99.8%	0.2%	0.0%	0.0%	-	-	-	-	2.08
August	666	95.3	99.1%	0.9%	0.0%	0.0%	-	-	-	-	2.11
September	685	100.0	99.9%	0.1%	0.0%	0.0%	-	-	-	-	2.09
October	709	100.0	99.6%	0.4%	0.0%	0.0%	-	-	-	-	2.13
November	685	100.0	98.4%	1.6%	0.0%	0.0%	-	-	-	-	2.19
December	707	99.9	96.2%	3.8%	0.0%	0.0%	-	-	-	-	2.18
									ANNUAL AVERAGE		2.12

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

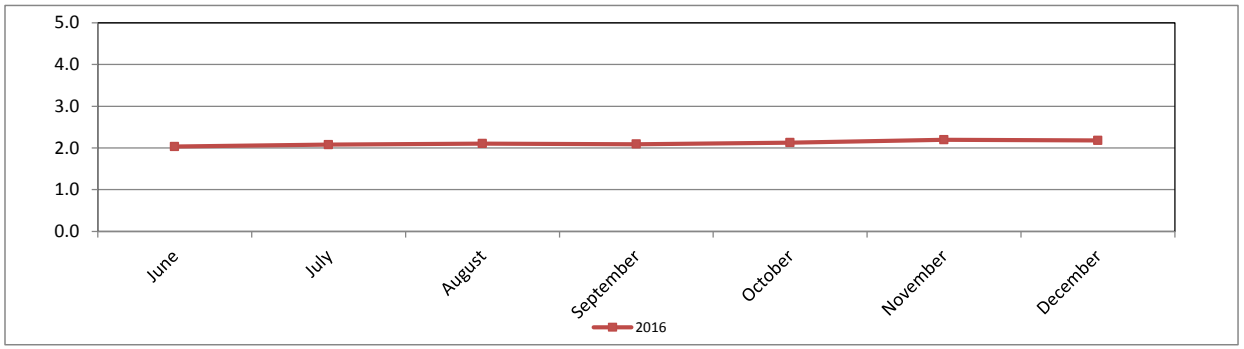
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	2.12	PPM

METHANE (CH_4) 2016 One-Hour Readings in PPM

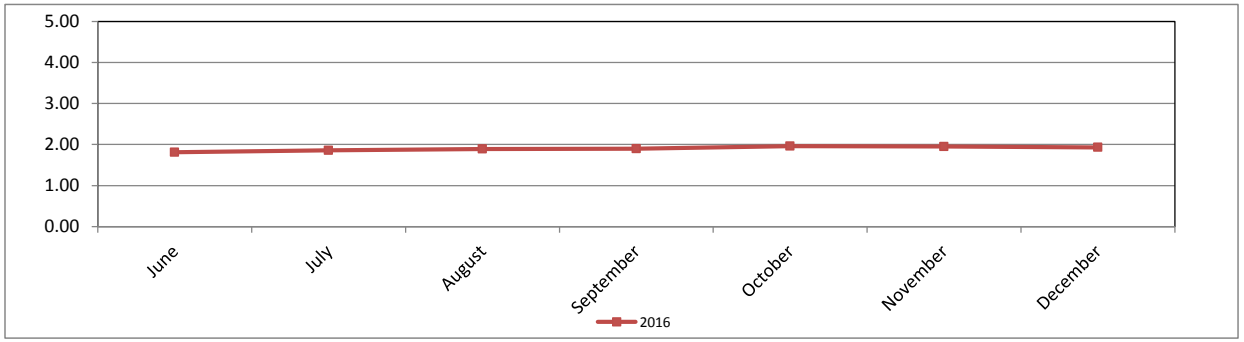
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	2.03	1.81	3.26
July	2.08	1.86	3.01
August	2.11	1.89	3.23
September	2.09	1.90	3.03
October	2.13	1.96	3.13
November	**2.19**	1.95	3.38
December	2.18	1.93	**3.69**

*Annual peak is bolded and highlighted.

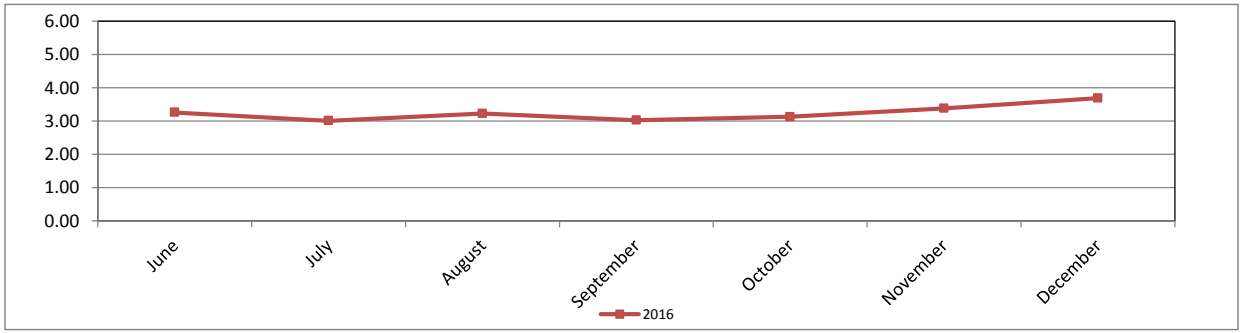
METHANE (CH_4) 2016 Monthly Mean in PPM



METHANE (CH_4) 2016 Monthly Minimum in PPM



METHANE (CH_4) 2016 Monthly Maximum in PPM



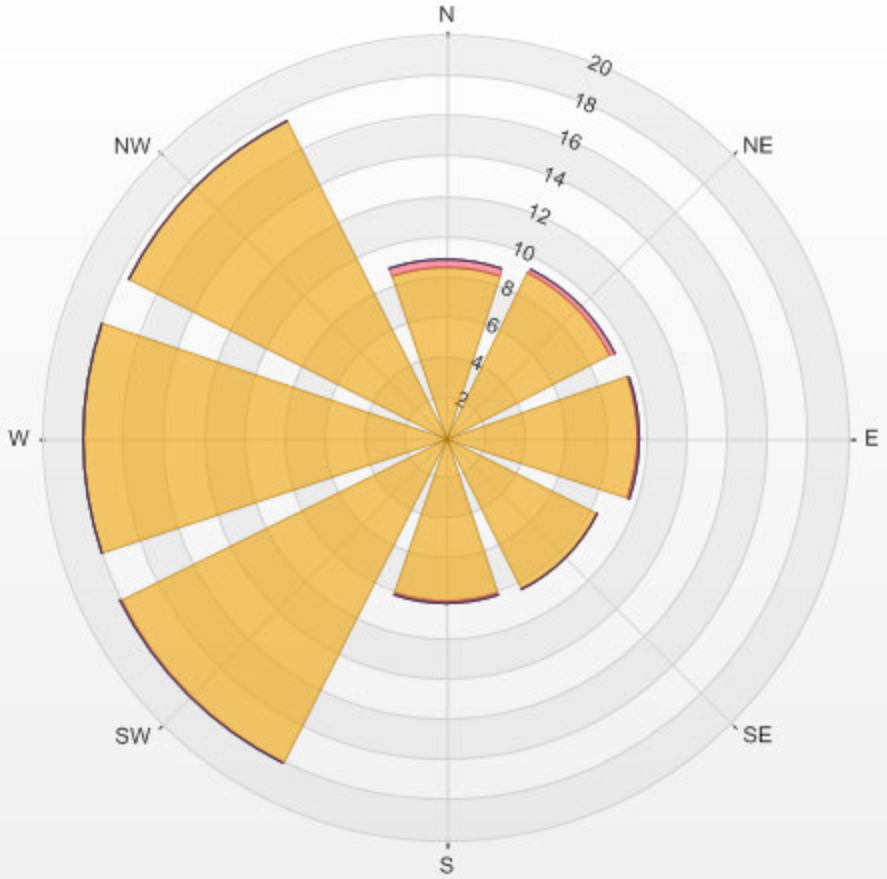
Wind: LICA Bonnyville
Poll.: LICA Bonnyville-CH4[ppm]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.71% Calm Avg: 2.51 [ppm]

Direction	0-3	3-10	10-50	>50.0	Total
N	8.5	0.4	0.0	0.0	8.9
NE	9.2	0.2	0.0	0.0	9.4
E	9.6	0.0	0.0	0.0	9.6
SE	8.4	0.0	0.0	0.0	8.4
S	8.1	0.1	0.0	0.0	8.2
SW	18.1	0.0	0.0	0.0	18.1
W	18.0	0.0	0.0	0.0	18.1
NW	17.6	0.1	0.0	0.0	17.7
Summary	97.4	0.8	0.0	0.0	98.3

%	Icon	Classes (ppm)							
			97	0-3	1	3-10	0	10-50	0 >50.0

LICA Bonnyville Poll.: LICA Bonnyville-CH4[ppm] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.71% Calm Poll Avg: 2.51[ppm]



NON-METHANE HYDROCARBON

NON-METHANE HYDROCARBONS (NMHC) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPM NMHC)						OBJECTIVES** (PPM)		EXCEEDANCES		MONTHLY AVERAGE (PPM)
			≤ 0.20	0.21 < C ≤ 0.50	0.51 < C ≤ 1.00	1.01 < C ≤ 2.00	2.01 < C ≤ 4.00	> 4.00	1-HR	24-HR	1-HR	24-HR	
June	649	95.0	99.7%	0.2%	0.0%	0.2%	0.0%	0.0%	-	-	-	-	0.01
July	642	91.3	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.01
August	666	95.3	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.01
September	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
October	709	100.0	99.7%	0.1%	0.1%	0.0%	0.0%	0.0%	-	-	-	-	0.00
November	685	100.0	99.6%	0.3%	0.1%	0.0%	0.0%	0.0%	-	-	-	-	0.01
December	707	99.9	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
											ANNUAL AVERAGE		0.01

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

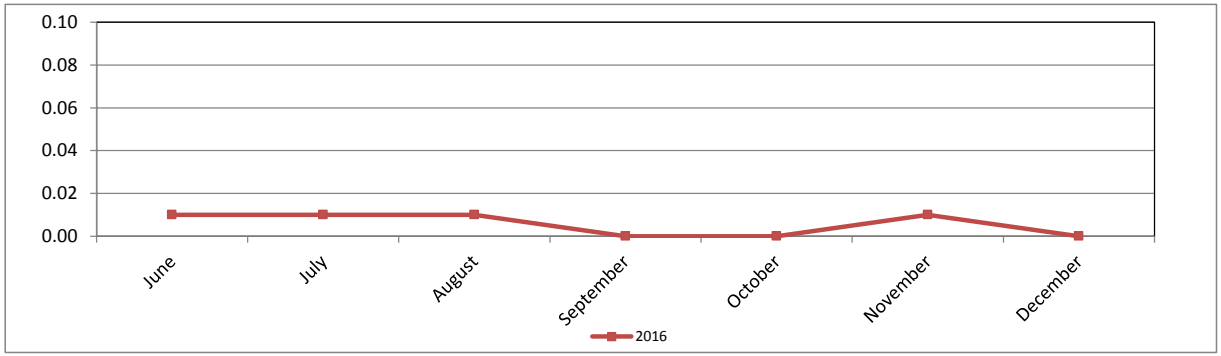
Alberta Ambient Air Quality Objectives Annual Average**	-	PPM
Annual Average for 2016	0.01	PPM

NON-METHANE HYDROCARBONS (NMHC) 2016 One-Hour Readings in PPM

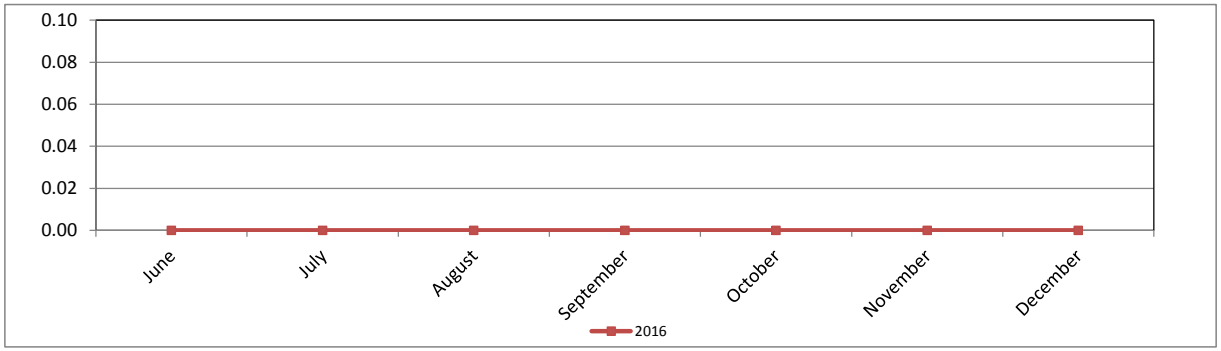
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	**0.01**	0.00	**1.30**
July	0.01	0.00	0.35
August	0.01	0.00	0.28
September	0.00	0.00	0.22
October	0.00	0.00	0.83
November	0.01	0.00	0.66
December	0.00	0.00	0.30

*Annual peak is bolded and highlighted.

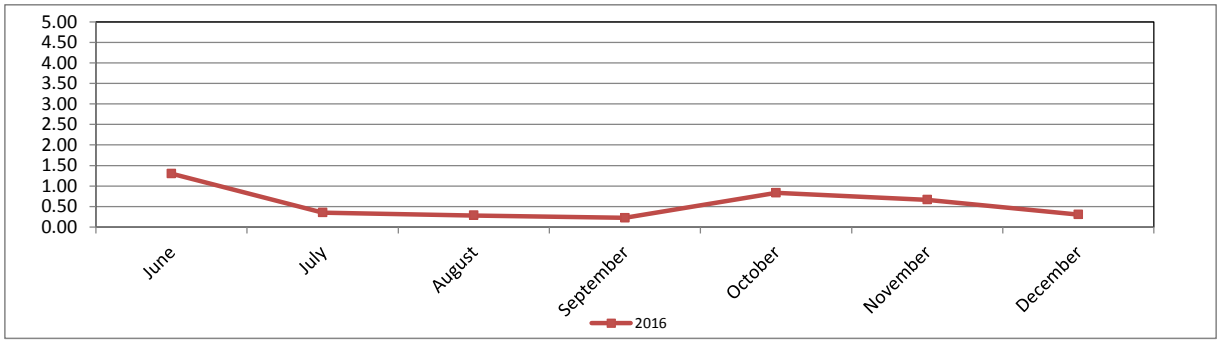
NON-METHANE HYDROCARBONS (NMHC) 2016 Monthly Mean in PPM



NON-METHANE HYDROCARBONS (NMHC) 2016 Monthly Minimum in PPM



NON-METHANE HYDROCARBONS (NMHC) 2016 Monthly Maximum in PPM



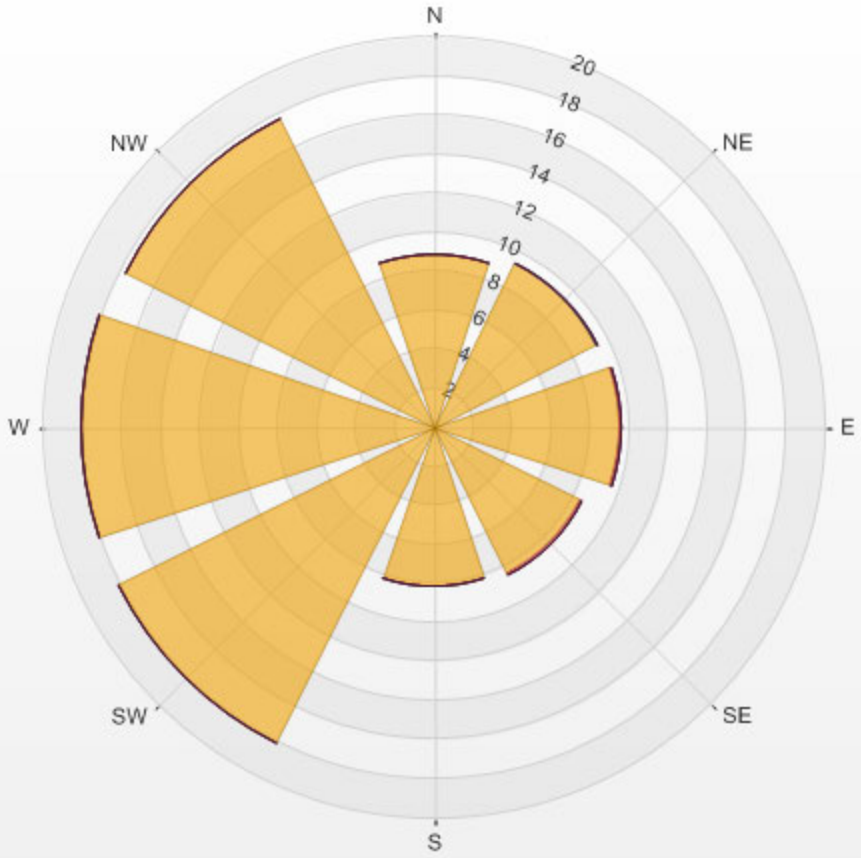
Wind: LICA Bonnyville
Poll.: LICA Bonnyville-NMHC[ppm]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.71% Calm Avg: 0.04 [ppm]

Direction	0-0.25	0.25-0.5	0.5-1	1-2	2-4	>4.0	Total
N	8.9	0.0	0.0	0.0	0.0	0.0	8.9
NE	9.3	0.0	0.0	0.0	0.0	0.0	9.4
E	9.5	0.1	0.0	0.0	0.0	0.0	9.6
SE	8.4	0.0	0.0	0.0	0.0	0.0	8.4
S	8.2	0.0	0.0	0.0	0.0	0.0	8.2
SW	18.1	0.0	0.0	0.0	0.0	0.0	18.1
W	18.1	0.0	0.0	0.0	0.0	0.0	18.1
NW	17.7	0.0	0.0	0.0	0.0	0.0	17.7
Summary	98.1	0.1	0.0	0.0	0.0	0.0	98.3

% Icon Classes (ppm)	98 0-0.25	0 0.25-0.5	0 0.5-1	0 1-2	0 2-4	0 >4.0

LICA Bonnyville Poll.: LICA Bonnyville-NMHC[ppm] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.71% Calm Poll Avg: 0.04[ppm]



OXIDES OF NITROGEN

OXIDES OF NITROGEN (NOx) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NOx)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
June	641	94.2	100.0%	0.0%	0.0%	0.0%	-	-	-	-	3.5
July	697	99.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.0
August	669	95.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	4.1
September	683	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	5.3
October	707	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	6.5
November	682	100.0	98.8%	1.2%	0.0%	0.0%	-	-	-	-	9.8
December	700	99.2	97.2%	2.7%	0.1%	0.0%	-	-	-	-	11.6
									ANNUAL AVERAGE		6.4

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

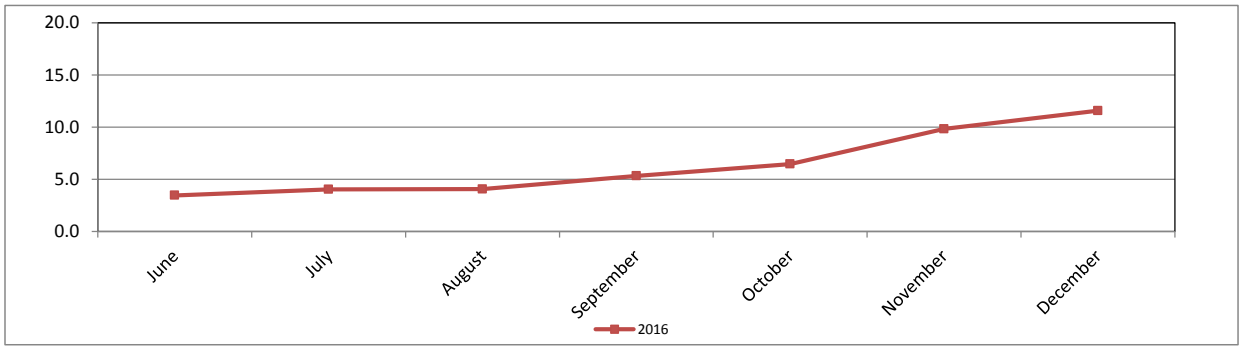
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	6.4	PPB

OXIDES OF NITROGEN (NOx) 2016 One-Hour Readings in PPB

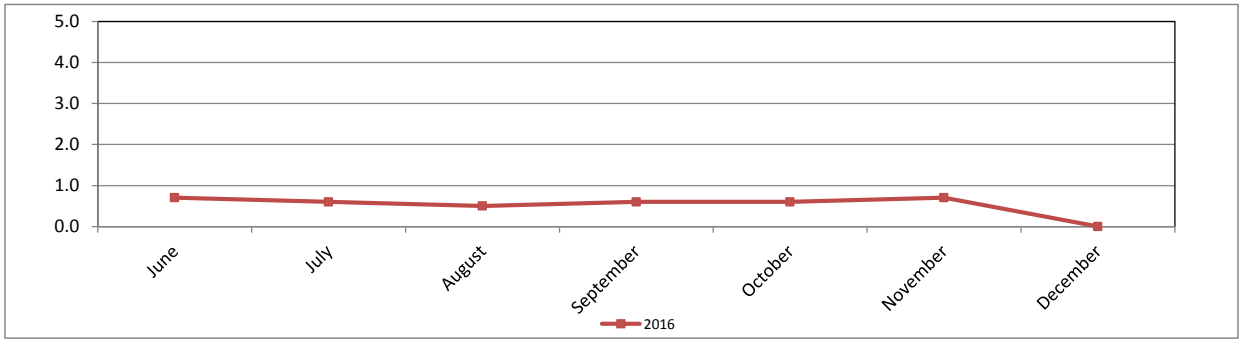
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	3.5	0.7	25.3
July	4.0	0.6	23.8
August	4.1	0.5	21.3
September	5.3	0.6	65.4
October	6.5	0.6	58.6
November	9.8	0.7	86.1
December	**11.6**	0.0	**122.1**

*Annual peak is bolded and highlighted.

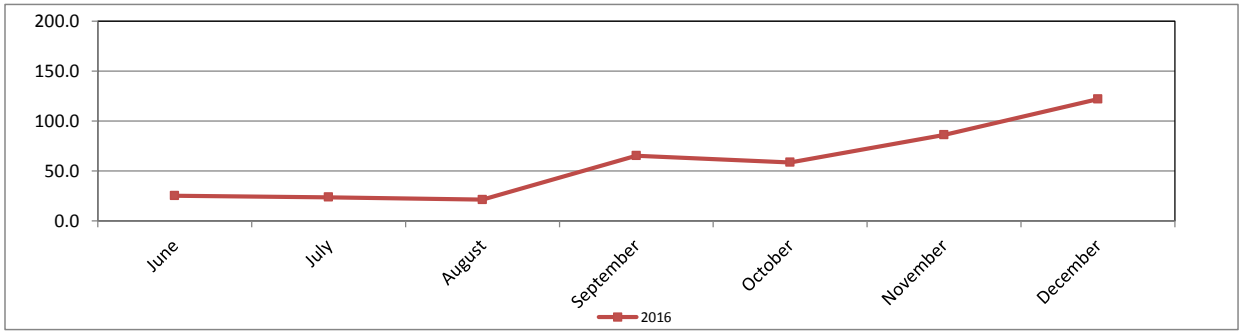
OXIDES OF NITROGEN (NOx) 2016 Monthly Mean in PPB



OXIDES OF NITROGEN (NOx) 2016 Monthly Minimum in PPB



OXIDES OF NITROGEN (NOx) 2016 Monthly Maximum in PPB



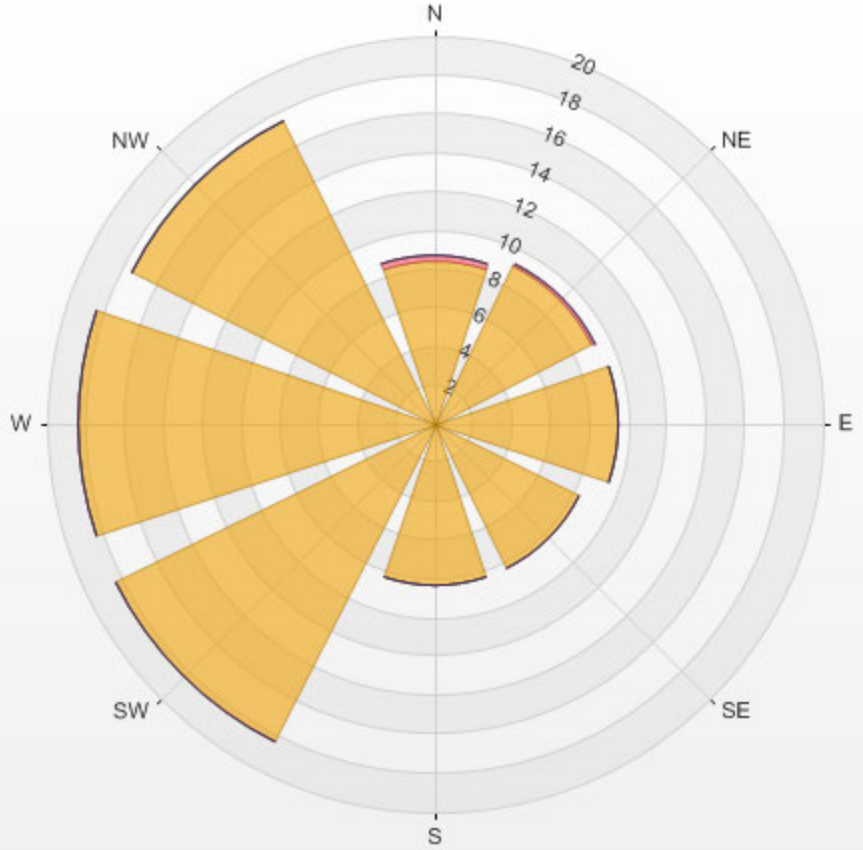
Wind: LICA Bonnyville
Poll.: LICA Bonnyville-NOX[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.72% Calm Avg: 19.90 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	8.5	0.2	0.0	0.0	8.7
NE	9.1	0.2	0.0	0.0	9.3
E	9.5	0.0	0.0	0.0	9.5
SE	8.4	0.0	0.0	0.0	8.4
S	8.3	0.0	0.0	0.0	8.3
SW	18.4	0.0	0.0	0.0	18.4
W	18.4	0.0	0.0	0.0	18.4
NW	17.5	0.0	0.0	0.0	17.5
Summary	97.9	0.4	0.0	0.0	98.3

% Icon Classes (ppb)	98 0-50	0 50-110	0 110-210	0 >210.0

LICA Bonnyville Poll.: LICA Bonnyville-NOX[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.72% Calm Poll Avg: 19.90[ppb]



NITRIC OXIDES

NITRIC OXIDE (NO) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
June	641	94.2	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.6
July	697	99.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.7
August	669	95.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.0
September	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.4
October	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.1
November	682	100.0	99.6%	0.4%	0.0%	0.0%	-	-	-	-	3.2
December	700	99.2	99.6%	0.4%	0.0%	0.0%	-	-	-	-	3.6
									ANNUAL AVERAGE		1.8

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

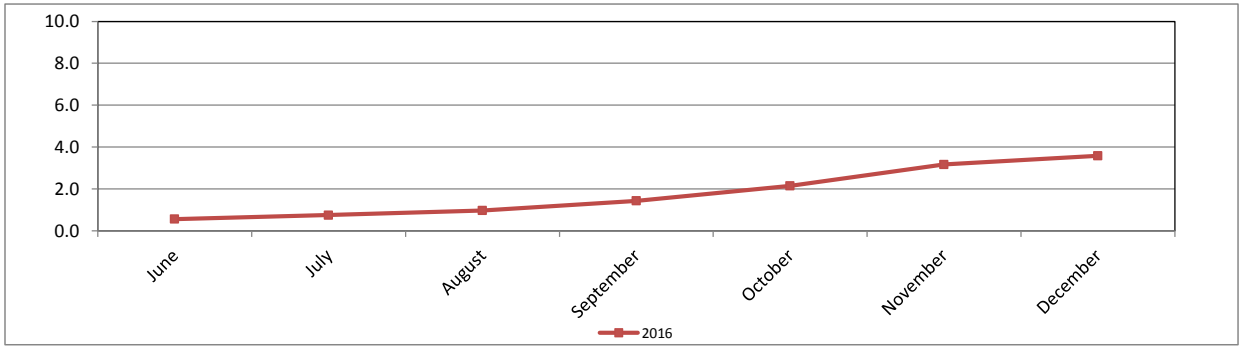
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	1.8	PPB

NITRIC OXIDE (NO) 2016 One-Hour Readings in PPB

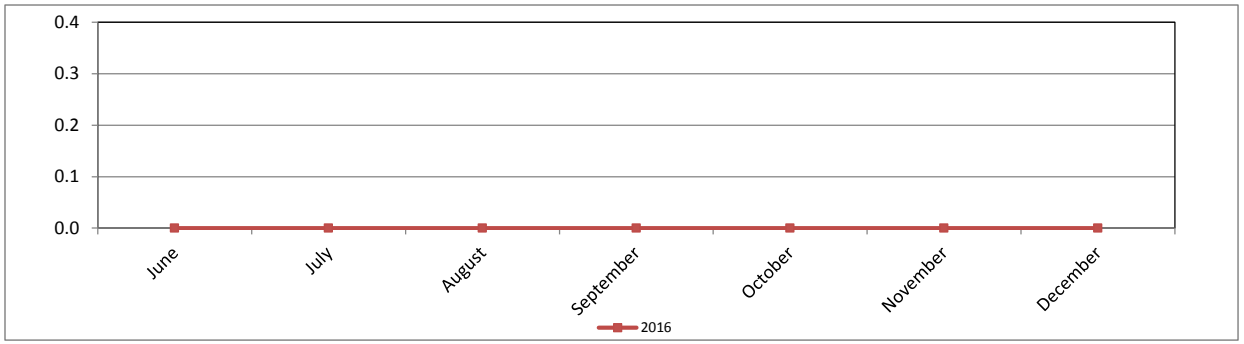
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	0.6	0.0	7.7
July	0.7	0.0	13.8
August	1.0	0.0	13
September	1.4	0.0	46.5
October	2.1	0.0	36.7
November	3.2	0.0	65.5
December	**3.6**	0.0	**88.8**

*Annual peak is bolded and highlighted.

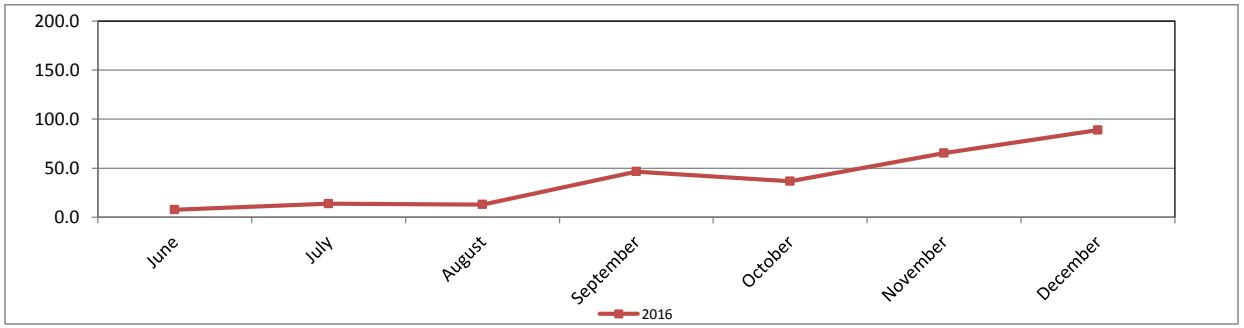
NITRIC OXIDE (NO) 2016 Monthly Mean in PPB



NITRIC OXIDE (NO) 2016 Monthly Minimum in PPB



NITRIC OXIDE (NO) 2016 Monthly Maximum in PPB



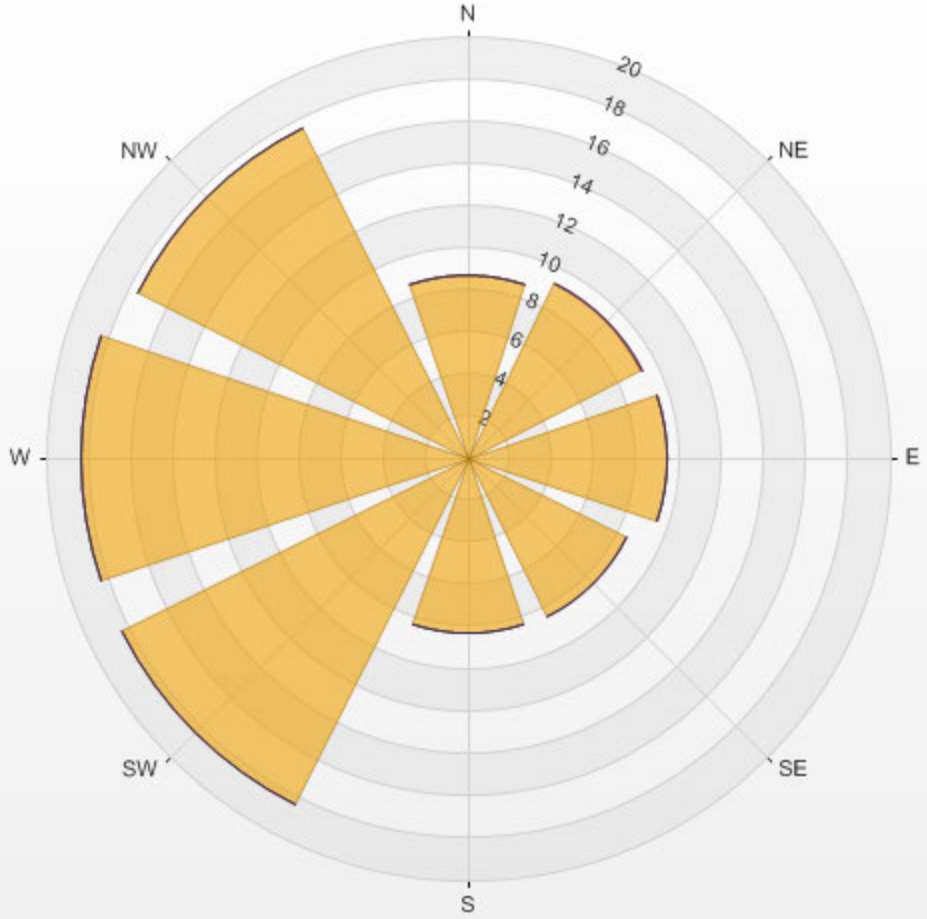
Wind: LICA Bonnyville
Poll.: LICA Bonnyville-NO[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.72% Calm Avg: 8.51 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	8.6	0.0	0.0	0.0	8.7
NE	9.2	0.0	0.0	0.0	9.3
E	9.5	0.0	0.0	0.0	9.5
SE	8.4	0.0	0.0	0.0	8.4
S	8.3	0.0	0.0	0.0	8.3
SW	18.4	0.0	0.0	0.0	18.4
W	18.4	0.0	0.0	0.0	18.4
NW	17.5	0.0	0.0	0.0	17.5
Summary	98.2	0.1	0.0	0.0	98.3

% Icon Classes (ppb)	98 0-50	0 50-110	0 110-210	0 >210.0

LICA Bonnyville Poll.: LICA Bonnyville-NO[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.72% Calm Poll Avg: 8.51[ppb]



NITROGEN DIOXIDE

NITROGEN DIOXIDE (NO_2) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB NO_2)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
June	641	94.2	100.0%	0.0%	0.0%	0.0%	159	-	0	-	2.9
July	697	99.1	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.3
August	669	95.7	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.1
September	683	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	3.9
October	707	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	4.3
November	682	100.0	100.0%	0.0%	0.0%	0.0%	159	-	0	-	6.7
December	700	99.2	100.0%	0.0%	0.0%	0.0%	159	-	0	-	8.0
									ANNUAL AVERAGE		4.6

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

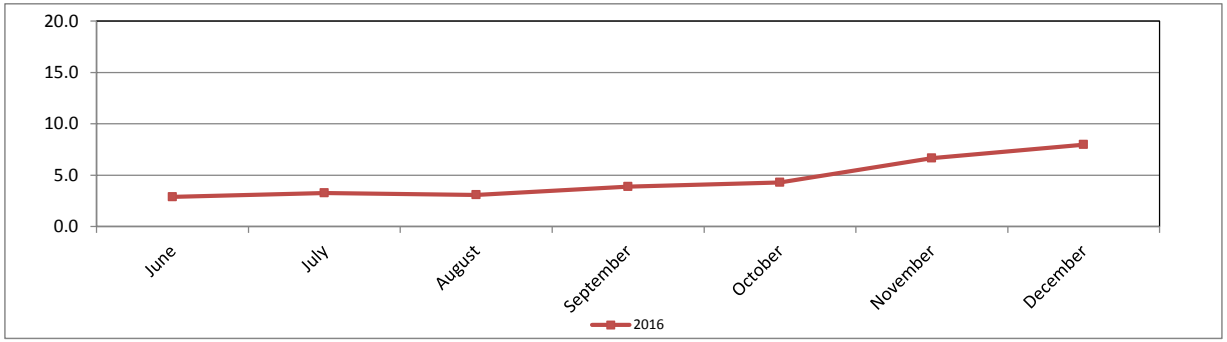
Alberta Ambient Air Quality Objectives Annual Average**	24	PPB
Annual Average for 2016	4.6	PPB

NITROGEN DIOXIDE (NO_2) 2016 One-Hour Readings in PPB

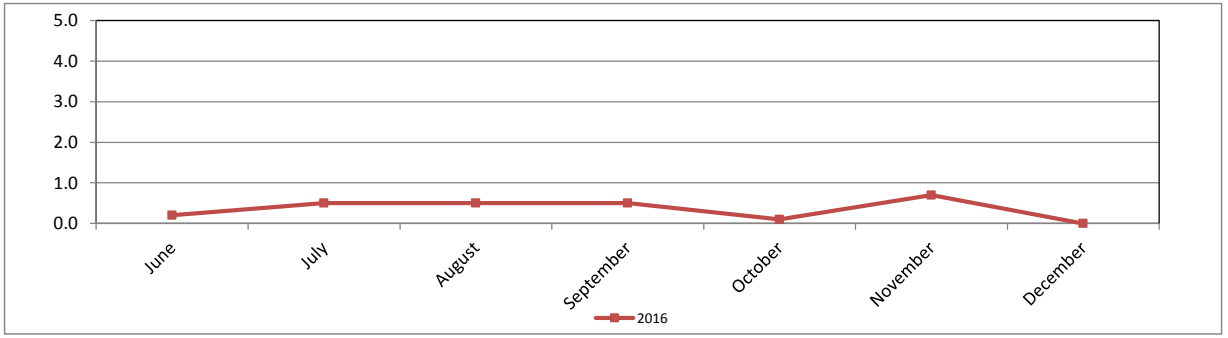
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	2.9	0.2	20.2
July	3.3	0.5	11.9
August	3.1	0.5	10.8
September	3.9	0.5	21.2
October	4.3	0.1	23.1
November	6.7	0.7	27.7
December	**8.0**	0.0	**35.0**

*Annual peak is bolded and highlighted.

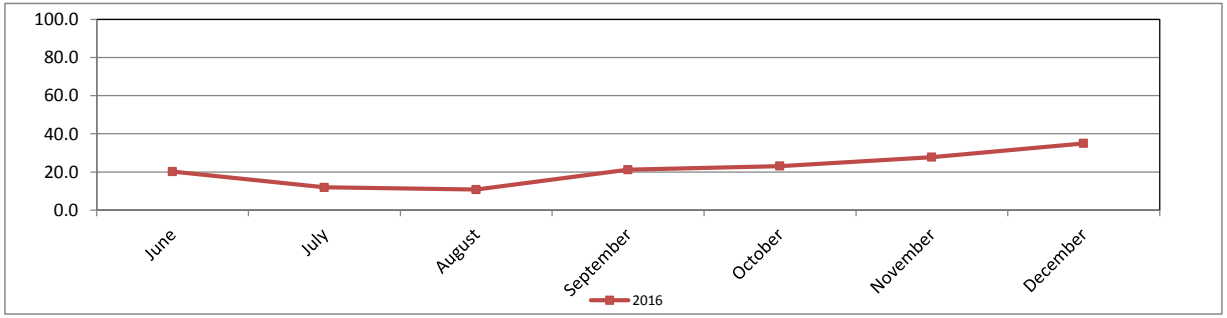
NITROGEN DIOXIDE (NO_2) 2016 Monthly Mean in PPB



NITROGEN DIOXIDE (NO_2) 2016 Monthly Minimum in PPB



NITROGEN DIOXIDE (NO_2) 2016 Monthly Maximum in PPB

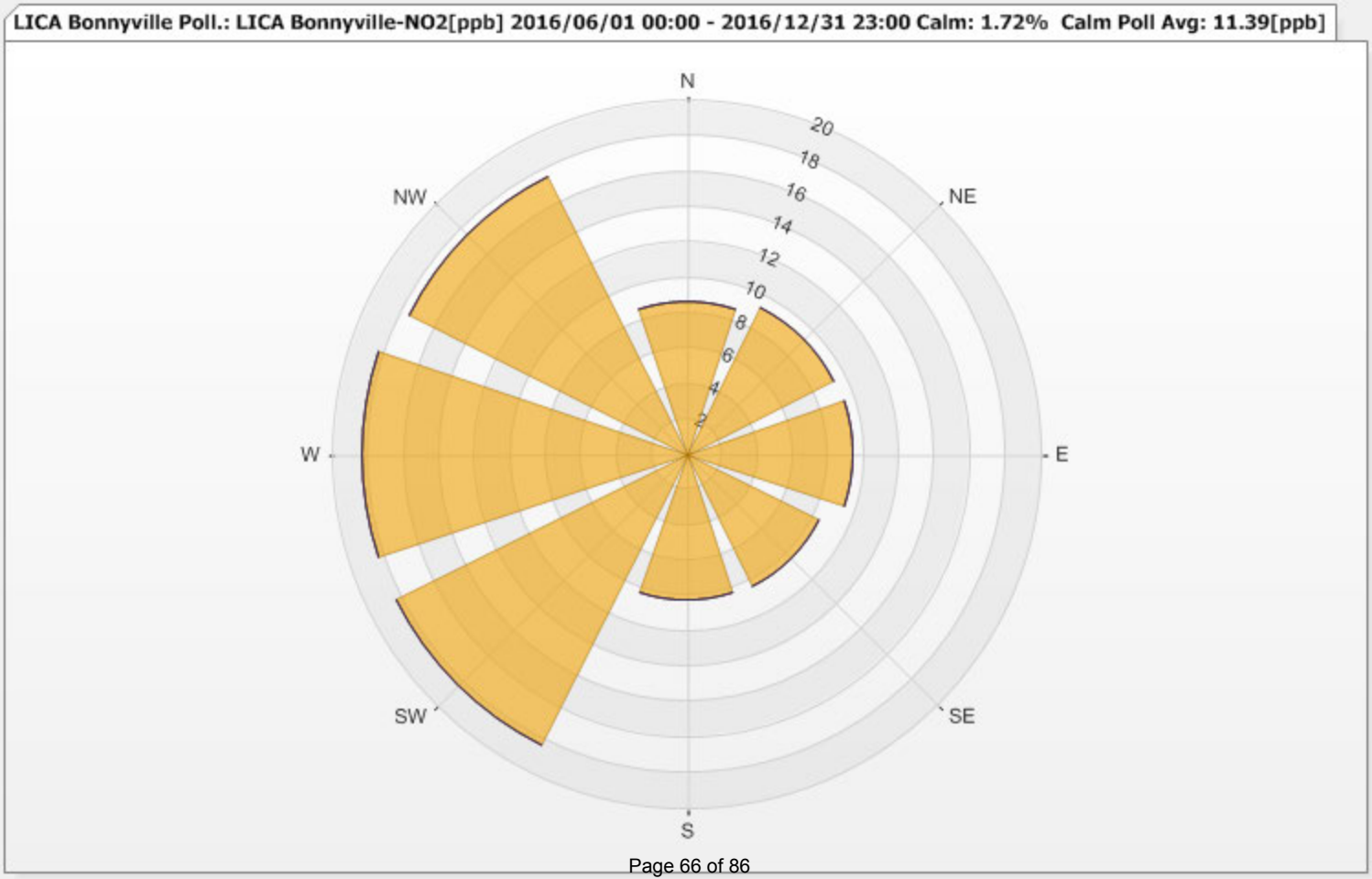


Wind: LICA Bonnyville
Poll.: LICA Bonnyville-NO2[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.72% Calm Avg: 11.39 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	8.7	0.0	0.0	0.0	8.7
NE	9.3	0.0	0.0	0.0	9.3
E	9.4	0.0	0.0	0.0	9.4
SE	8.4	0.0	0.0	0.0	8.4
S	8.3	0.0	0.0	0.0	8.3
SW	18.4	0.0	0.0	0.0	18.4
W	18.4	0.0	0.0	0.0	18.4
NW	17.5	0.0	0.0	0.0	17.5
Summary	98.3	0.0	0.0	0.0	98.3


% Icon Classes (ppb)
98 0-50
0 50-110
0 110-210
0 >210.0


LICA Bonnyville Poll.: LICA Bonnyville-NO2[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.72% Calm Poll Avg: 11.39[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

OZONE

OZONE (O_3) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (PPB O_3)				OBJECTIVES** (PPB)		EXCEEDANCES		MONTHLY AVERAGE (PPB)
			≤ 50	51 < C ≤ 110	111 < C ≤ 210	> 210	1-HR	24-HR	1-HR	24-HR	
June	646	94.3	92.9%	7.1%	0.0%	0.0%	82	-	0	-	33.6
July	707	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	23.7
August	707	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	19.7
September	686	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	19.2
October	709	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	16.4
November	685	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	16.7
December	708	100.0	100.0%	0.0%	0.0%	0.0%	82	-	0	-	23.6
									ANNUAL AVERAGE		21.8

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available "-" is used.

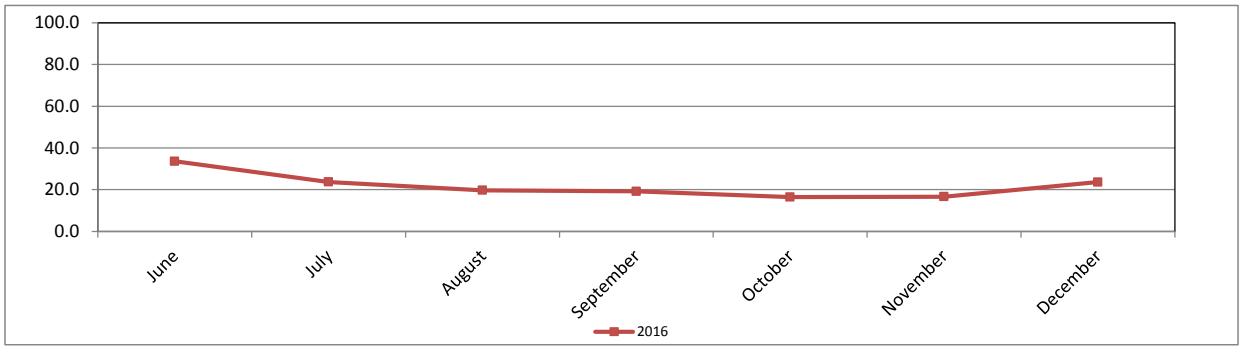
Alberta Ambient Air Quality Objectives Annual Average**	-	PPB
Annual Average for 2016	21.8	PPB

OZONE (O_3) 2016 One-Hour Readings in PPB

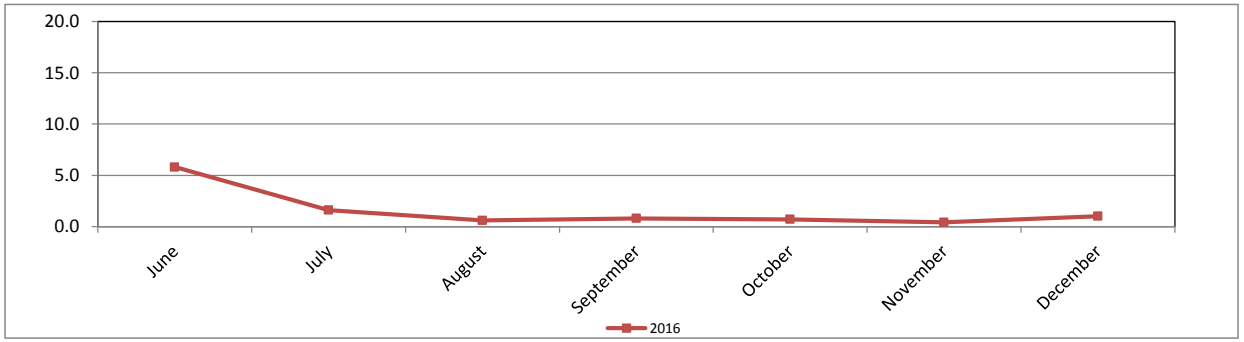
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	**33.6**	5.8	**67.7**
July	23.7	1.6	45.3
August	19.7	0.6	42.7
September	19.2	0.8	45.4
October	16.4	0.7	33.6
November	16.7	0.4	40.1
December	23.6	1.0	38.6

*Annual peak is bolded and highlighted.

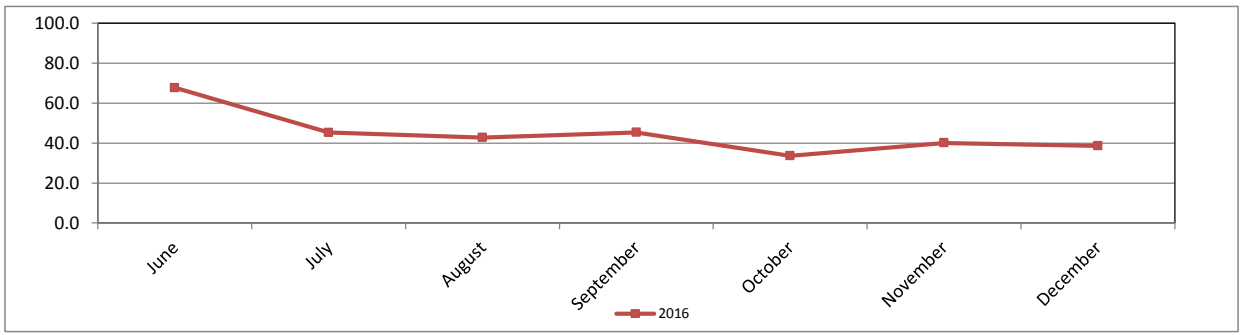
OZONE (O_3) 2016 Monthly Mean in PPB



OZONE (O_3) 2016 Monthly Minimum in PPB



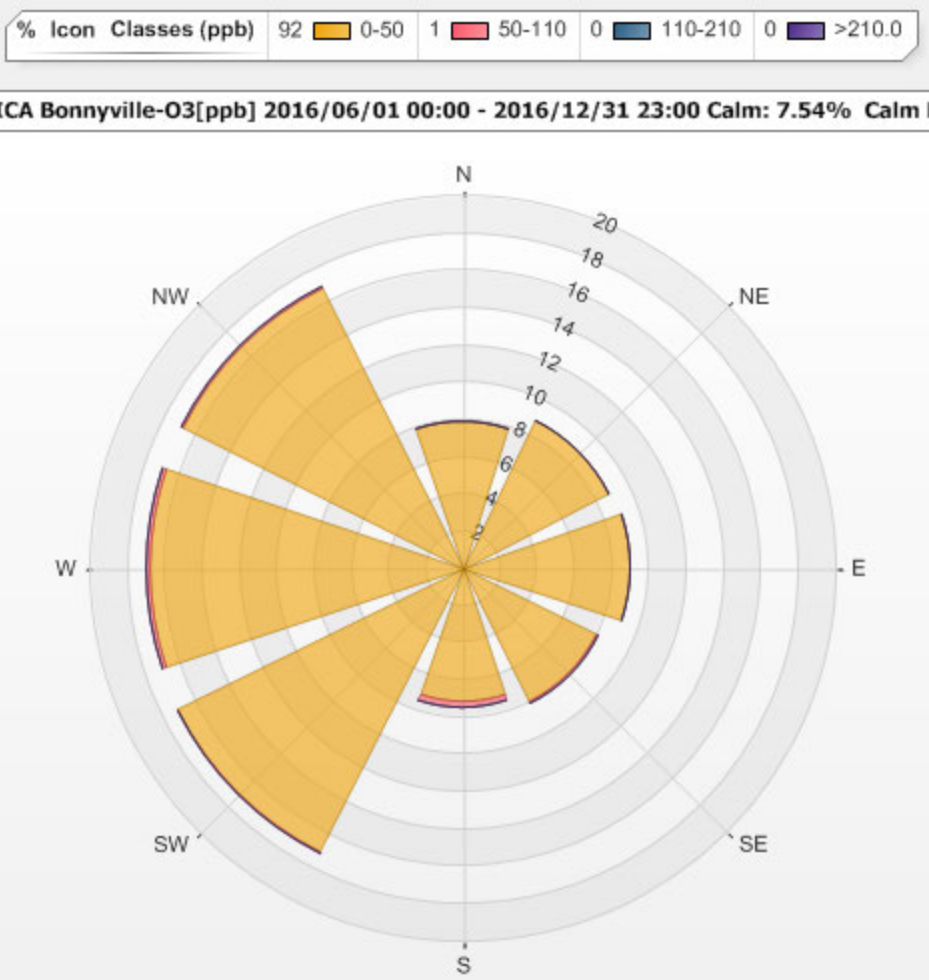
OZONE (O_3) 2016 Monthly Maximum in PPB



Wind: LICA Bonnyville
Poll.: LICA Bonnyville-O3[ppb]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 7.54% Calm Avg: 12.34 [ppb]

Direction	0-50	50-110	110-210	>210.0	Total
N	7.8	0.0	0.0	0.0	7.8
NE	8.8	0.0	0.0	0.0	8.8
E	9.0	0.0	0.0	0.0	9.0
SE	8.1	0.1	0.0	0.0	8.2
S	7.2	0.4	0.0	0.0	7.6
SW	17.1	0.1	0.0	0.0	17.2
W	16.8	0.2	0.0	0.0	17.0
NW	16.8	0.1	0.0	0.0	16.9
Summary	91.5	0.9	0.0	0.0	92.5


% Icon Classes (ppb)
92 0-50
1 50-110
0 110-210
0 >210.0
LICA Bonnyville Poll.: LICA Bonnyville-O3[ppb] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 7.54% Calm Poll Avg: 12.34[ppb]
N
NE
E
SE
S
SW
W
NW
20
18
16
14
12
10
8
6
4
2

PARTICULATE MATTER 2.5

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Averages and Frequency Distributions of One Hour Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (µg/m³ $PM_{2.5}$)						OBJECTIVES** (µg/m³)		EXCEEDANCES		MONTHLY AVERAGE (µg/m³)
			≤ 30	31 < C ≤ 60	61 < C ≤ 80	81 < C ≤ 120	121 < C ≤ 240	> 240	1-HR	24-HR	1-HR	24-HR	
June	597	84.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	5.0
July	737	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	6.4
August	732	99.5	99.2%	0.5%	0.1%	0.1%	0.0%	0.0%	82	30	1	0	5.0
September	669	93.5	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	4.3
October	718	97.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	3.9
November	670	93.6	99.1%	0.9%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	6.1
December	727	98.1	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	82	30	0	0	5.7
											ANNUAL AVERAGE		5.2

*Number of Readings - excluding calibration hours
**If Alberta Ambient Air Quality Objectives are not available, "-" is used.

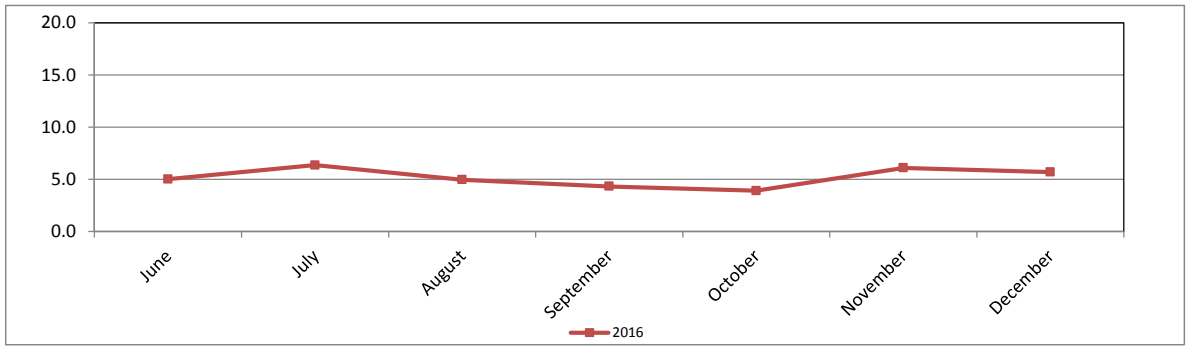
Alberta Ambient Air Quality Objectives Annual Average**	-	µg/m³
Annual Average for 2016	5.2	µg/m³

PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 One-Hour Readings in ug/m^3

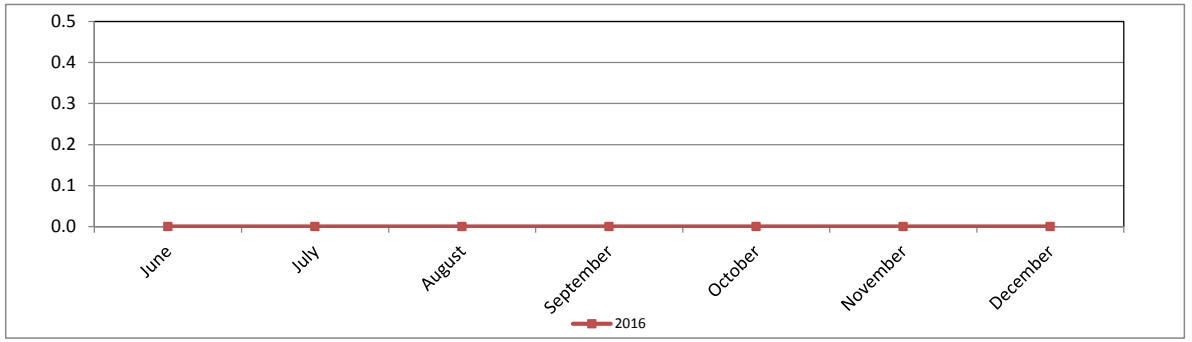
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	5.0	0.0	22.6
July	**6.4**	0.0	28.6
August	5.0	0.0	**82.1**
September	4.3	0.0	30.1
October	3.9	0.0	28.2
November	6.1	0.0	56.1
December	5.7	0.0	31.1

*Annual peak is bolded and highlighted.

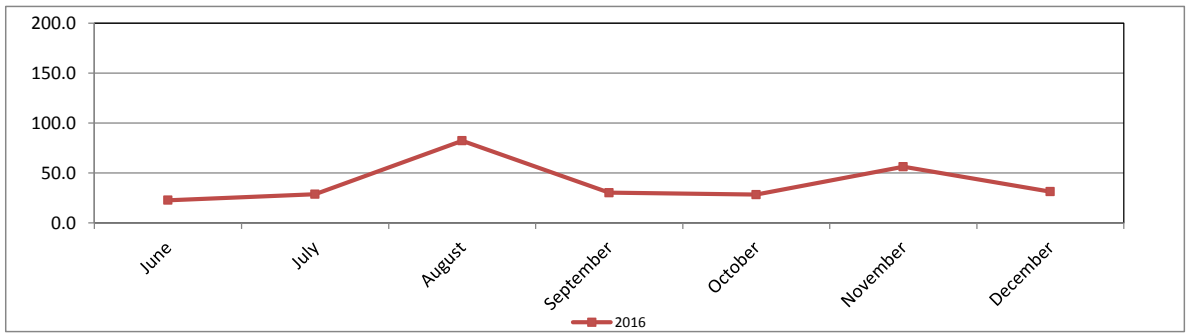
PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Mean in ug/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Minimum in ug/m^3



PARTICULATE MATTER 2.5 (LESS THAN 2.5 MICRONS) ($PM_{2.5}$) 2016 Monthly Maximum in ug/m^3



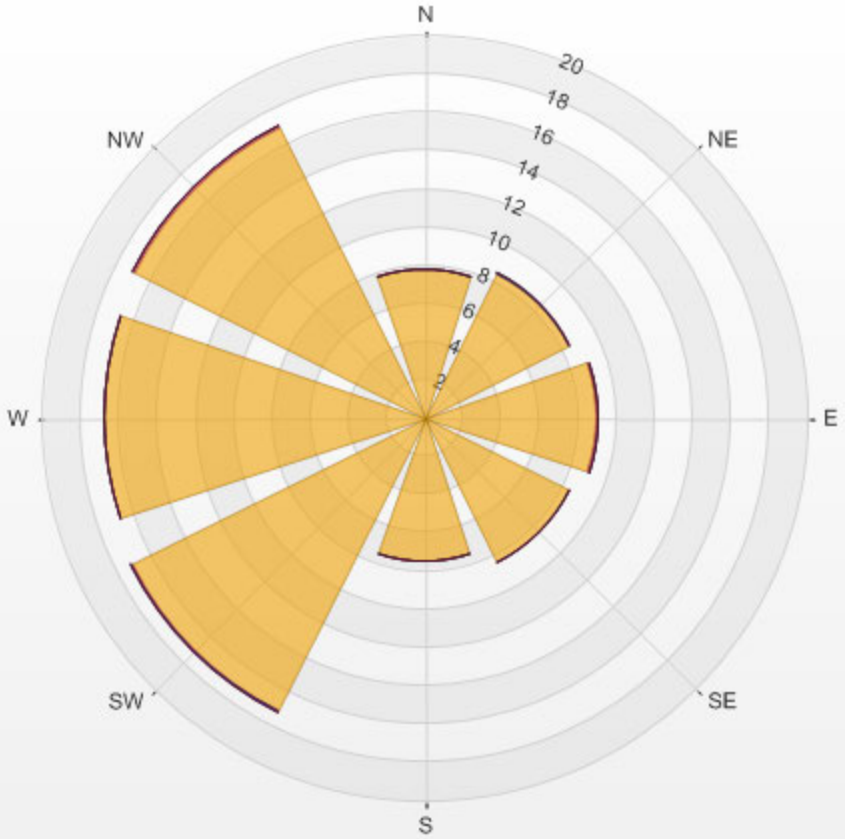
Wind: LICA Bonnyville Poll.: LICA Bonnyville-PM25[ug/m^3(L)]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: PollutionRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 7.74% Calm Avg: 7.19 [ug/m^3]

Direction	0-30	30-60	60-80	80-120	120-240	>240.0	Total
N	7.8	0.0	0.0	0.0	0.0	0.0	7.8
NE	8.4	0.0	0.0	0.0	0.0	0.0	8.5
E	9.0	0.0	0.0	0.0	0.0	0.0	9.0
SE	8.4	0.0	0.0	0.0	0.0	0.0	8.4
S	7.5	0.0	0.0	0.0	0.0	0.0	7.5
SW	17.1	0.1	0.0	0.0	0.0	0.0	17.2
W	16.7	0.0	0.0	0.0	0.0	0.0	16.8
NW	17.0	0.1	0.0	0.0	0.0	0.0	17.1
Summary	92.0	0.2	0.0	0.0	0.0	0.0	92.3

% Icon Classes (ug/m3(L))	92 0-30	0 30-60	0 60-80	0 80-120	0 120-240	0 >240.0

LICA Bonnyville Poll.: LICA Bonnyville-PM25[ug/m3(L)] 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 7.74% Calm Poll Avg: 7.19[ug/m3(L)]



WIND SPEED

WIND SPEED (WS) 2016 Monthly Data Summary of One Hour Readings

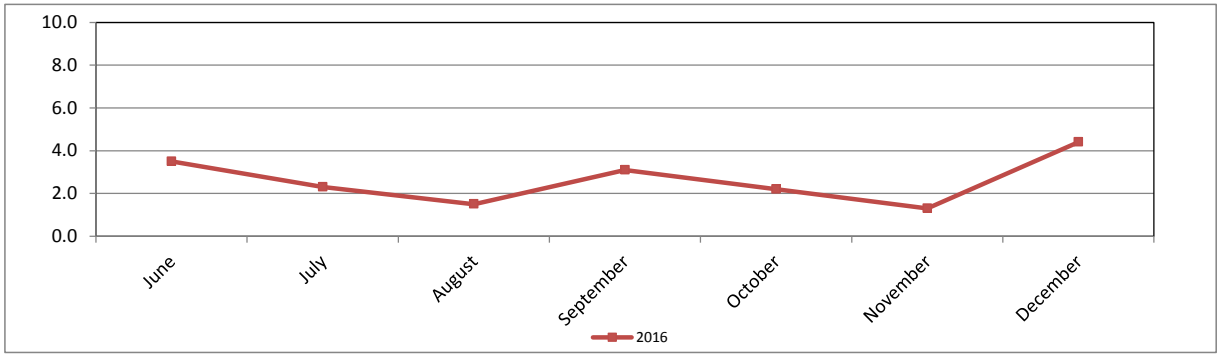
Month	Number of Readings*	Operational Time (%)	Monthly Average (KPH)	Minimum Hourly Average (KPH)	Maximum Hourly Average (KPH)	Maximum Daily Average (KPH)
June	683	94.9	3.5	0.1	31.8	22.8
July	744	100.0	2.2	0.2	20.4	9.6
August	744	100.0	1.5	0.0	22.7	11.4
September	720	100.0	3.1	0.0	24.2	14.1
October	744	100.0	2.2	0.0	19.1	14.3
November	720	100.0	1.3	0.1	26.8	12.9
December	744	100.0	4.4	0.0	21.2	15.2

WIND SPEED (WS) 2016 One-Hour Readings in km/hr

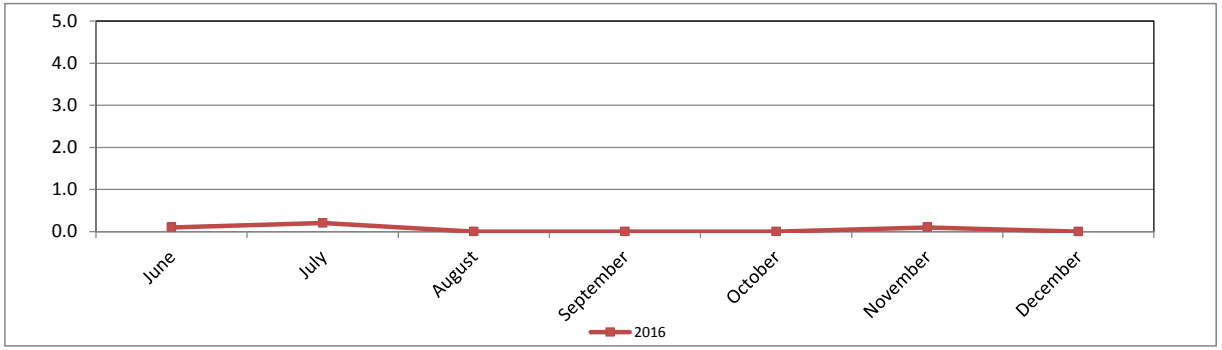
	2016		
Month	**MEAN**	**MINIMUM**	**MAXIMUM**
June	3.5	0.1	**31.8**
July	2.2	0.2	20.4
August	1.5	0.0	22.7
September	3.1	0.0	24.2
October	2.2	0.0	19.1
November	1.3	0.1	26.8
December	**4.4**	0.0	21.2

*Annual peak is bolded and highlighted.

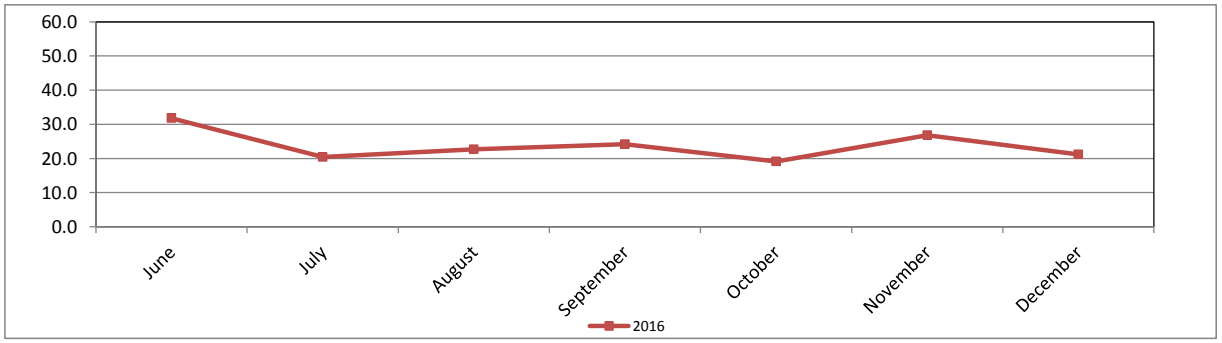
WIND SPEED (WS) 2016 Monthly Mean in km/hr



WIND SPEED (WS) 2016 Monthly Minimum in km/hr



WIND SPEED (WS) 2016 Monthly Maximum in km/hr



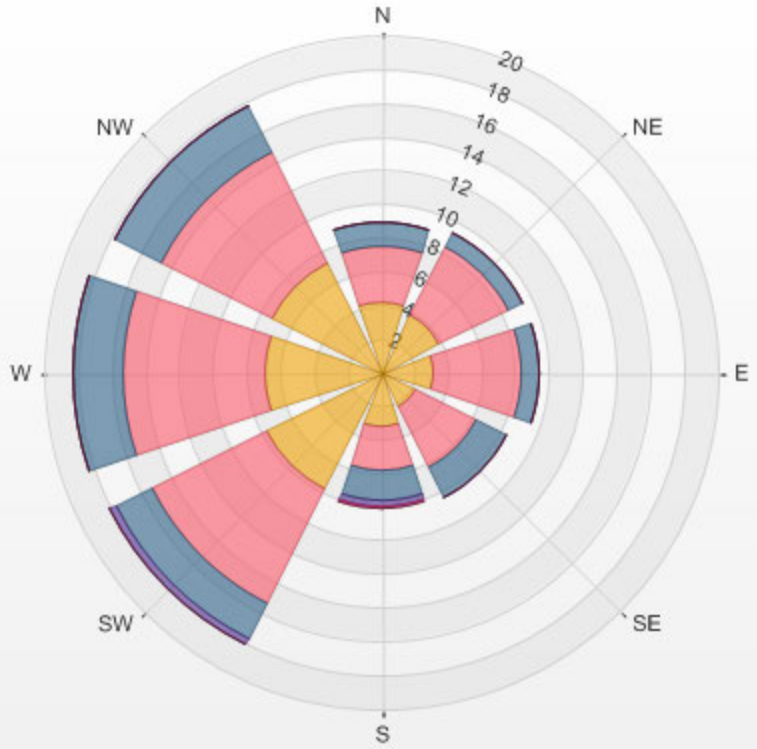
Wind: LICA Bonnyville
Monitor: WSP [kph]
Periodically: 2016/06/01 00:00-2016/12/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

Calm: 1.71%

Direction	0.5-6.0	6.0-12.0	12.0-20.0	20.0-29.0	29.0-39.0	>39.0	Total
N	4.2	3.4	1.4	0.0	0.0	0.0	9.0
NE	3.8	4.6	0.9	0.0	0.0	0.0	9.3
E	3.1	5.1	1.1	0.0	0.0	0.0	9.4
SE	2.3	4.0	2.0	0.0	0.0	0.0	8.4
S	3.2	2.5	1.8	0.5	0.1	0.0	8.1
SW	7.7	7.6	2.4	0.4	0.0	0.0	18.1
W	7.0	8.4	3.0	0.0	0.0	0.0	18.4
NW	7.3	7.4	3.0	0.0	0.0	0.0	17.8
Summary	38.7	43.0	15.6	1.0	0.1	0.0	98.3

% Icon Classes (kph)	39	0.5-6.0	43	6.0-12.0	16	12.0-20.0	1	20.0-29.0	0	29.0-39.0	0	>39.0

LICA Bonnyville 2016/06/01 00:00 - 2016/12/31 23:00 Calm: 1.71% Calm Wind Avg Speed: 0.26(kph)



APPENDIX II
REPORT CERTIFICATION FORM

Report Certification Form

Alberta Airshed (if applicable)	**EPA Approval or Code of Practice Registration #** (if applicable)
YES	**NA**
Company Name (if applicable)	**Industrial Operation Name** (if applicable)
Lakeland Industry & Community Association	**Bonnyville**
Name of the Representative of the Person Responsible (Last, First, Middle)	**Position / Title of the Representative of the Person Responsible**
Adekanmbi, Wunmi	**Project Manager, Customer Service, Air Services**
Is an External Party Certifying the Report? (If 'Yes', fill in the fields below for the external person.	
☐ **Yes** ■ **No**	
Name of External Person Certifying the Report (Last, First, Middle)	**Position / Title of External Person Certifying the Report**
NA	**NA**
Company Name for the External Person Certifying the Report	**Identification of Qualifications / Professional Designations of the External Person Certifying the Report**
NA	**NA**

I certify that I have reviewed and verified the submitted report. I also certify that the report presented with this certification form is complete, accurate and representative of the monitoring results and timeframe.

Signature of the Representative of the Person Responsible / External Person Certifying the Report

October 25, 2017

Report Issued Date (dd-mm-yyyy)