

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

April 2, 2019

Subject: Annual Report Submission for the PRAMP Reno AQM station

Peace River Area Monitoring Program Committee (PRAMP) is pleased to submit the ambient air monitoring annual report conducted at the PRAMP Reno AQM Station in the year of 2018.

The air monitoring program consists of continuous air monitoring 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
VOC Canister	Maxxam Analytics	InnoTech Alberta Inc	InnoTech Alberta Inc	Not Applicable

In 2018, one contravention was reported to AEP in 2018: AEP reference # 343123 for the August 2018 event, and it was because the operational uptime for the hydrocarbon analyzer did not meet the 90% uptime requirement. A detailed summary of this incident is included in the summary of monthly report discussions of the report.

In 2018, four NMHC canisters were collected. A detailed summary of these events is included in the summary of monthly report discussions of the report.

The data acquisition system was upgraded on September 18 and September 19. The Envidas Ultimate datalogger was installed to replace the ESC 8832 datalogger.

As the PRAMP Technical Program Managers, 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 verify 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.

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

Respectfully,



Peace River Area Monitoring Program Committee
Suite 91, 305-4625 Varsity Dr NW
Calgary, AB, T3A 0Z9

Two handwritten signatures in blue ink are shown side-by-side, separated by a forward slash. The first signature is "Michael Bisaga" and the second is "Lily Lin".

Michael Bisaga / Lily Lin
Technical Program Managers
Peace River Area Monitoring Program
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JANUARY - DECEMBER 2018
ANNUAL AMBIENT AIR QUALITY MONITORING REPORT
Project #: 196-2018-21-A
PRAMP-2018

Prepared for:

Peace River Area Monitoring Program Committee

Lily Lin

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Monitoring Station

Reno Station

Date of Report Issuance: March 28, 2019

Report Preparation By:

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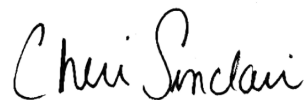
Project Team Lead, Customer Service, Air Services

Reviewed By:

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Supervisor, Customer Service, Air Services



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Peace River Area Monitoring Program Committee

Peace River

Alberta

Attention: Lily Lin

Date: March 28, 2019

Subject: ANNUAL AMBIENT AIR QUALITY MONITORING REPORT for JANUARY - DECEMBER 2018

Between the months of January - December 2018, Maxxam Analytics was contracted to manage the ambient air quality monitoring and maintenance activities at the Reno Station near Peace River Oil Sands Area 1, Alberta., Alberta. The monitoring program provides measurements of ambient air pollutants and meteorological data to satisfy the reporting requirements of the Alberta airshed.

The annual report provides a summary of air monitoring activities and performance measures that were detailed in the monthly reports. The results of continuous monitoring are summarized and represented through annual statistics, plots and rose charts.

Annual Validation Synopsis

The station is equipped with analyzers to measure SO₂, TRS, THC, CH₄ and NMHC. The meteorological sensors and equipment capture data for WS, WD, RH, BP, AT and STNTPX. Data presented in this report has undergone the post-final validation procedures, as outlined in Chapter 6, 4.6, DQ 4-Q (AMD, 2016). 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 evaluation of data collected in 2018 did not reveal any errors or omissions that would require resubmission of air data to Alberta Environment and Parks (AEP) airdata warehouse.

A summary of the annual statistics for the continuous monitoring program are presented below:

Annual Summary	SO ₂ ppb	TRS ppb	THC ppm	CH ₄ ppm	NMHC ppm	WS kph	RH %	BP millibars	AT °C	STNTPX °C
Minimum	0	0.14	1.86	1.86	0	0.0	9	911	-36.5	18.1
MinDate	2018/01/01 00:00	2018/05/03 07:00	2018/07/06 21:00	2018/07/06 21:00	2018/01/01 00:00	2018/02/07 21:00	2018/05/15 17:00	2018/12/14 21:00	2018/01/11 05:00	2018/01/09 09:00
Maximum	3	4.06	6.76	6.75	0.11	26.4	95	959	31.6	32.7
MaxDate	2018/03/10 01:00	2018/07/15 05:00	2018/04/01 06:00	2018/04/01 06:00	2018/03/07 21:00	2018/03/01 11:00	2018/09/11 08:00	2018/01/28 02:00	2018/06/20 16:00	2018/07/16 19:00
Avg	0	0.42	2.03	2.03	0	1.4	65	938	1.7	22.1
Num	8307	8289	8072	8072	8072	8743	8746	8746	8746	8746
Data[%]	99.7	99.6	97.0	97.0	97.0	99.8	99.8	99.8	99.8	99.8

A summary of NMHC canister events for 2018 is presented below:

Summary of NMHC Canister events for 2018				
Station	Date	Time	NMHC Conc. (ppm)	Notes
PRAMP Reno	February 25, 2018	23:50	0.40	Sample not analyzed due to a collection error.
PRAMP Reno	March 7, 2018	21:45	0.42	Sample processed as per PRAMP Chain of Custody.
PRAMP Reno	July 2, 2018	08:10	2.10	Not a valid event. Sample however analyzed for background study.
PRAMP Reno	August 6, 2018	17:55	0.32	Not a valid event. Sample however analyzed for background study.

Exceedance & Performance Reporting:

All measured ambient air concentrations were below the Alberta Ambient Air Quality Objectives and Guidelines (AAAQO, 2018, as amended). Comparisons of these concentrations to the corresponding AAAQOs were done in accordance with Chapter 9, 16.3.2, RC 16-R (AMD, 2016). Accordingly, the averaging specifications and data completeness criteria, as defined in Appendix A, were applied. (Chapter 9, Appendix A, AMD 2016).

The operational time of 79.7% for the THC/CH₄/NMHC analyzer did not meet the equipment uptime specifications as per Chapter 6, DQ 4-C (AMD, 2016) in August. This contravention was reported to AEP under reference number 343123. Three events contributed to the downtime:

- Due to the depletion of the carrier gas (N₂) and the corrective actions performed to address it, thirty-seven hours of downtime were recorded between August 5 and August 7.
- Due to the depletion of the fuel gas (H₂) and the corrective actions performed to address it, twenty-three hours of downtime were recorded between August 8 and August 9.
- A calibration attempt on August 21 did not meet Maxxam's internal stability requirement due to poor sample injections. The rotor and actuator were replaced and a successful post-repair calibration was subsequently completed. Data was invalidated back to the point of failed performance, determined as August 18 at 00:00. Ninety-one hours of downtime were incurred due to this event.

Summary of AMD Contraventions for 2018		
AMD Contravention	Month Reported	AEP Reference #
Equipment uptime for THC/CH ₄ /NMHC < 90%	August	343123

For all the remaining parameters, the data capture rates for all continuous ambient air analyzers, meteorological systems and data acquisition systems were above the 90% requirement.

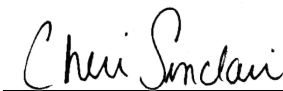
Monitoring Overview:

Data-logger Upgrade: A data-logger upgrade was implemented between September 18 and September 19. The Ultimate data-logger was installed to replace the resident ESC 8832.

During this monitoring period, there were no scheduled audits that Maxxam Analytics was privy to.

Should you have any questions concerning the results or if we can be of further assistance, please contact your Maxxam representative indicated below.

Reviewed by:



Cheri Sinclair, B.Sc.
Supervisor, Customer Service, Air Services
403-819-9139

I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe and the specified analysis, summarization and reporting requirements. Certification of submitted information is specific to the contents of this report and is not intended to represent the onus of the Person Responsible, as outlined in Chapter 9, RC 2-E.

Equipment and Procedures				
Parameter	Units	Instrument	Method	Serial #
SULPHUR DIOXIDE (SO ₂)	ppb	API 100A UV Fluorescent Analyzer	Maxxam AIR SOP-00209: Ambient Sulphur Monitoring	841
TOTAL REDUCED SULPHUR (TRS)	ppb	Thermo 43i - TLE UV Fluorescent Analyzer		1162460022
TOTAL HYDROCARBONS (THC)	ppm	Thermo 55i FID Analyzer	Maxxam AIR SOP-00001 - Methane, Non-Methane Hydrocarbon Analyzer Monitoring	1314057759
METHANE (CH ₄)	ppm			
NON-METHANE HYDROCARBONS (NMHC)	ppm			
WIND SPEED (WS)	kph	RM Young 05305-VK Unit	Maxxam AIR SOP-00208: RM Young Wind Monitor Calibration	149769
WIND DIRECTION (WD)	degree			
RELATIVE HUMIDITY (RH)	%	RM Young Unit	Operation Manual	60837897
BAROMETRIC PRESSURE (BP)	mbar	Met One Unit	Operation Manual	R12877
AMBIENT TEMPERATURE (AT)	°C	RM Young Unit	Operation Manual	60837897
DATALOGGER	-	ESC 8832 and Envidas Ultimate	-	-
NMHC CANISTER SAMPLES	-	Canister Sampler	Maxxam AIR SOP-00225: The Collection of VOCs in Ambient Air Using Canisters and Xontech	-

Continuous Monitoring Annual Results Summary

2018 SULPHUR DIOXIDE (SO₂) Monthly Averages & Frequency Distributions of 1-Hr Readings

Month	Number of Readings*	Operational Time (%)	% Readings in Concentration Range (ppb SO ₂)						AAAQO** (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	0
February	639	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
March	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
April	684	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
May	703	99.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
June	678	99.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
July	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
August	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
September	676	99.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
October	707	99.9	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	0
December	705	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
Annual	8307	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0	0	0

N/D - Valid Data Not Available

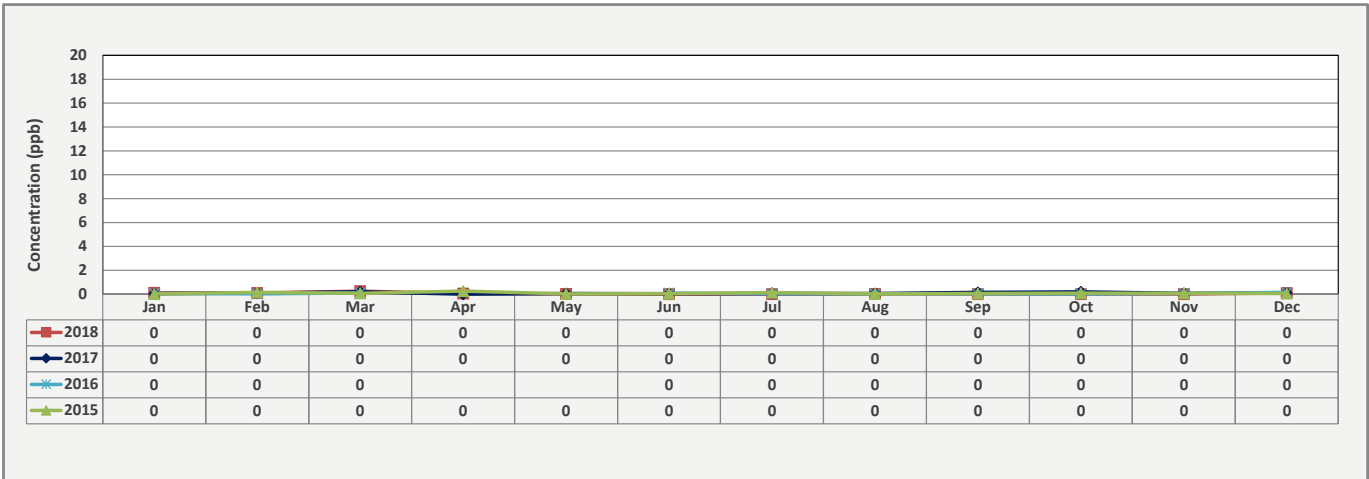
*# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

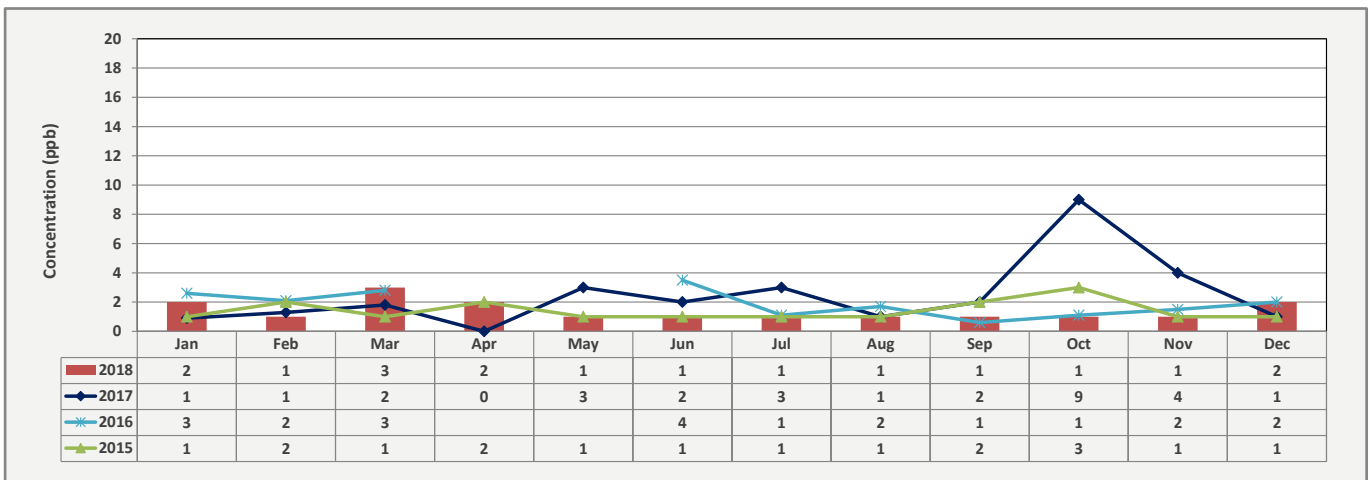
Alberta Ambient Air Quality Objectives Annual Average**	8.0	ppb
Annual Average for 2018	0	ppb

SO ₂ Data Identifiers _ Total Hours Flagged = 453										
Continuous Flag	C	C1	G	P	Q	R	S	S1	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Daily Zero/Span	Additional Zero/Span	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Annual Total	53	5	0	7	0	0	377	4	0	7

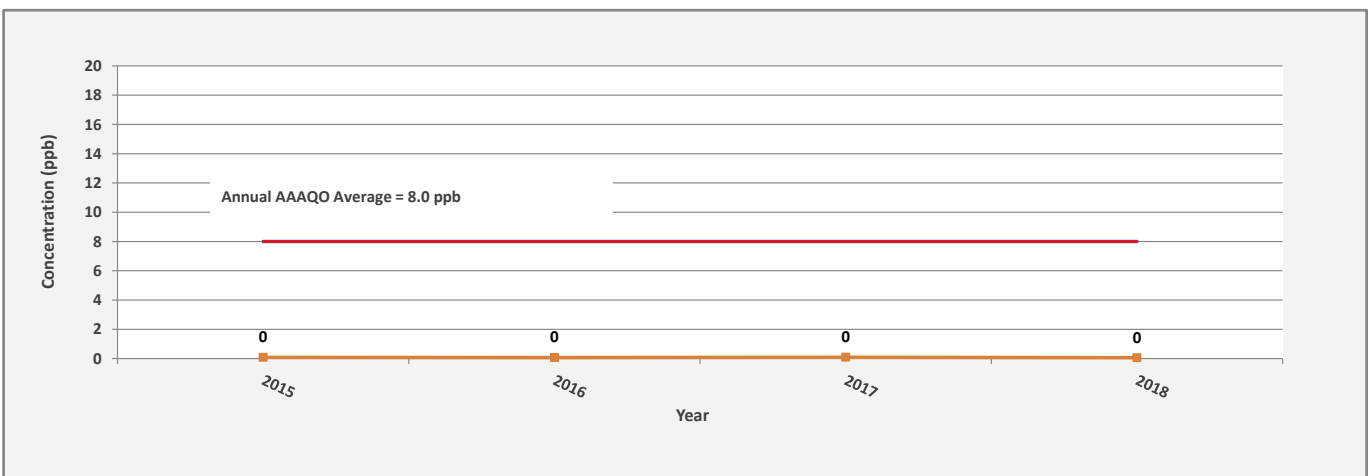
2015 to 2018 SO₂ Monthly Averages



2015 to 2018 SO₂ Monthly Maximum Averages

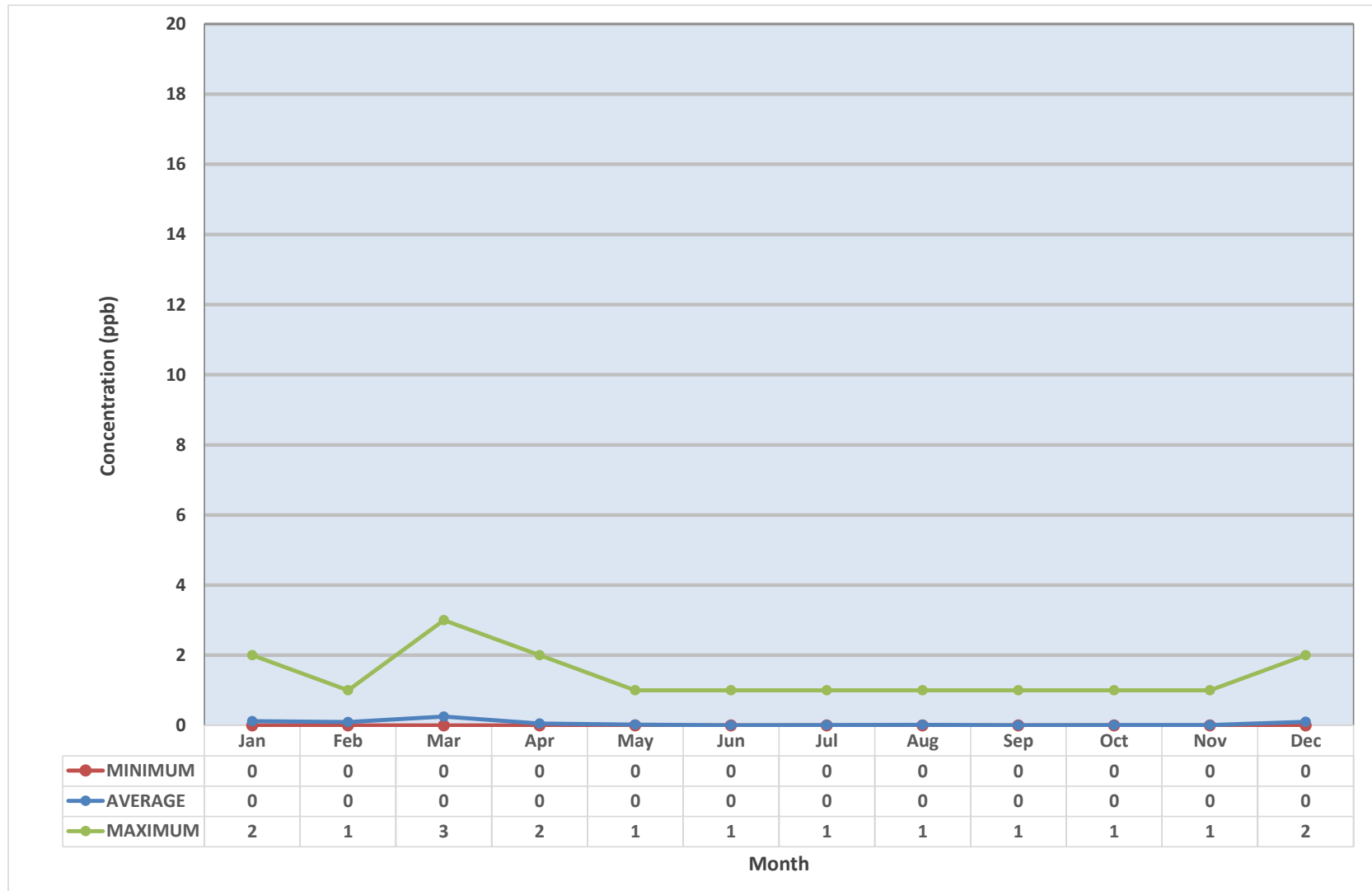


2015 to 2018 SO₂ Annual Averages

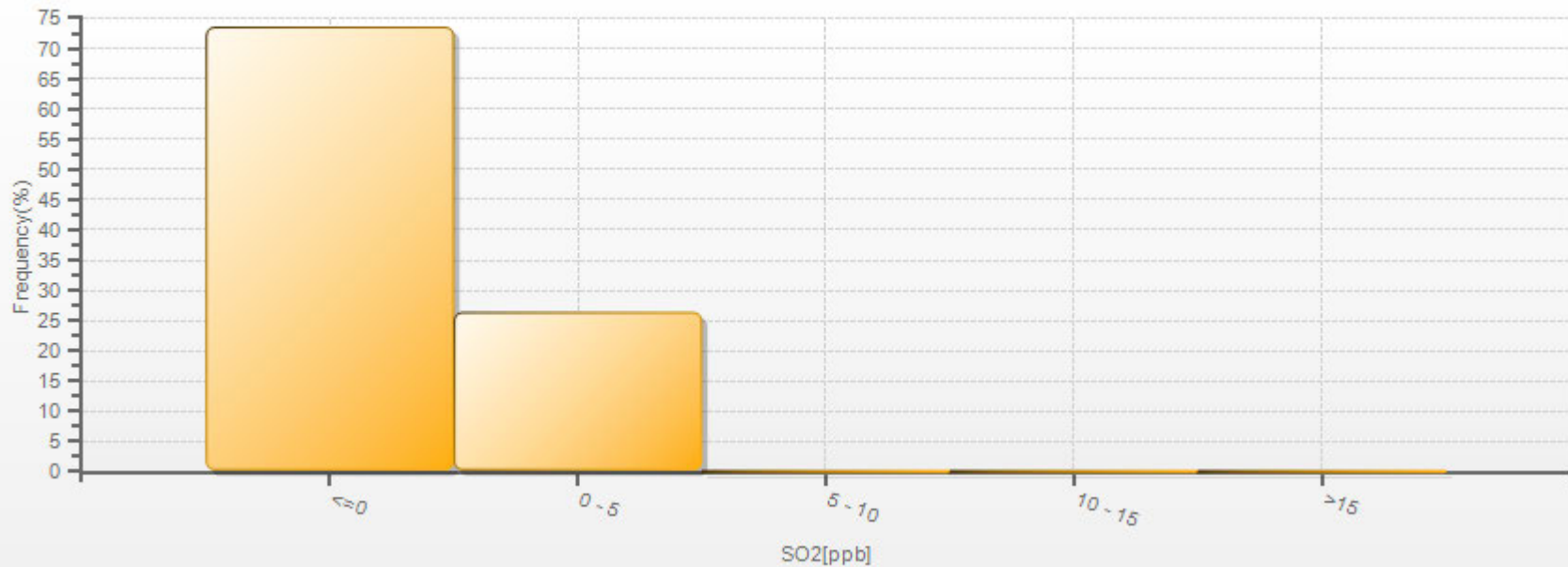


Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 SO₂ Monthly Statistics



SO2[ppb] Histogram: PRAMP_RENO Periodically: 2018/01/01 00:00-2018/12/31 23:00 1 Hr.



2018 TOTAL REDUCED SULPHUR (TRS) Monthly Averages & Frequency Distributions of 1-Hr 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	703	99.5	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
February	638	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
March	703	99.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
April	684	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
May	707	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
June	676	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
July	706	99.7	99.7%	0.3%	0.0%	0.0%	-	-	-	-	1
August	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1
September	674	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
October	701	99.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
November	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
December	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0
Annual	8289	99.6	100.0%	0.0%	0.0%	0.0%			0	0	0

N/D - Valid Data Not Available

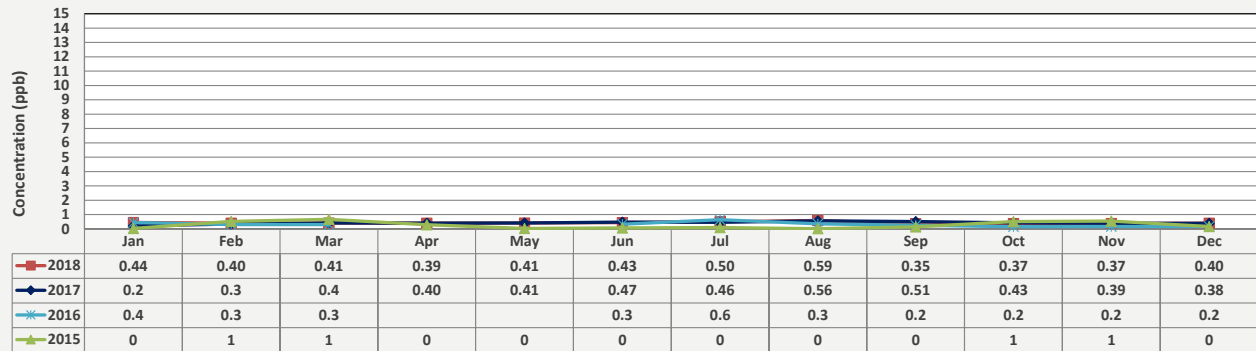
*# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

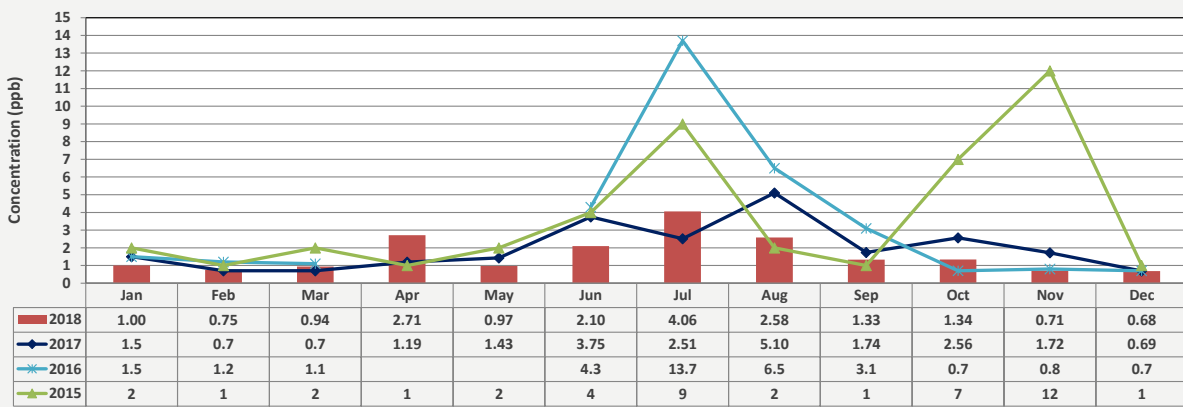
Alberta Ambient Air Quality Objectives Annual Average**	-	ppb
Annual Average for 2018	0	ppb

TRS Data Identifiers _ Total Hours Flagged = 471										
Continuous Flag	C	C1	G	P	Q	R	S	S1	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Daily Zero/Span	Additional Zero/Span	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Annual Total	60	0	0	7	0	1	378	12	0	13

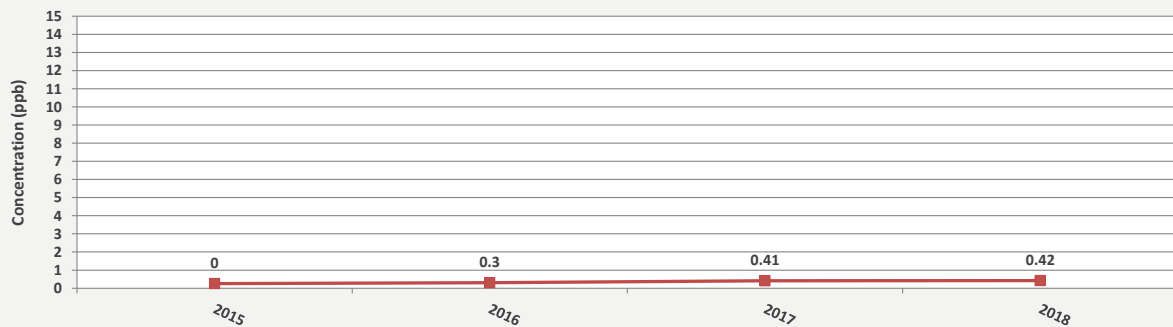
2015 to 2018 TRS Monthly Averages



2015 to 2018 TRS Monthly Maximum Averages

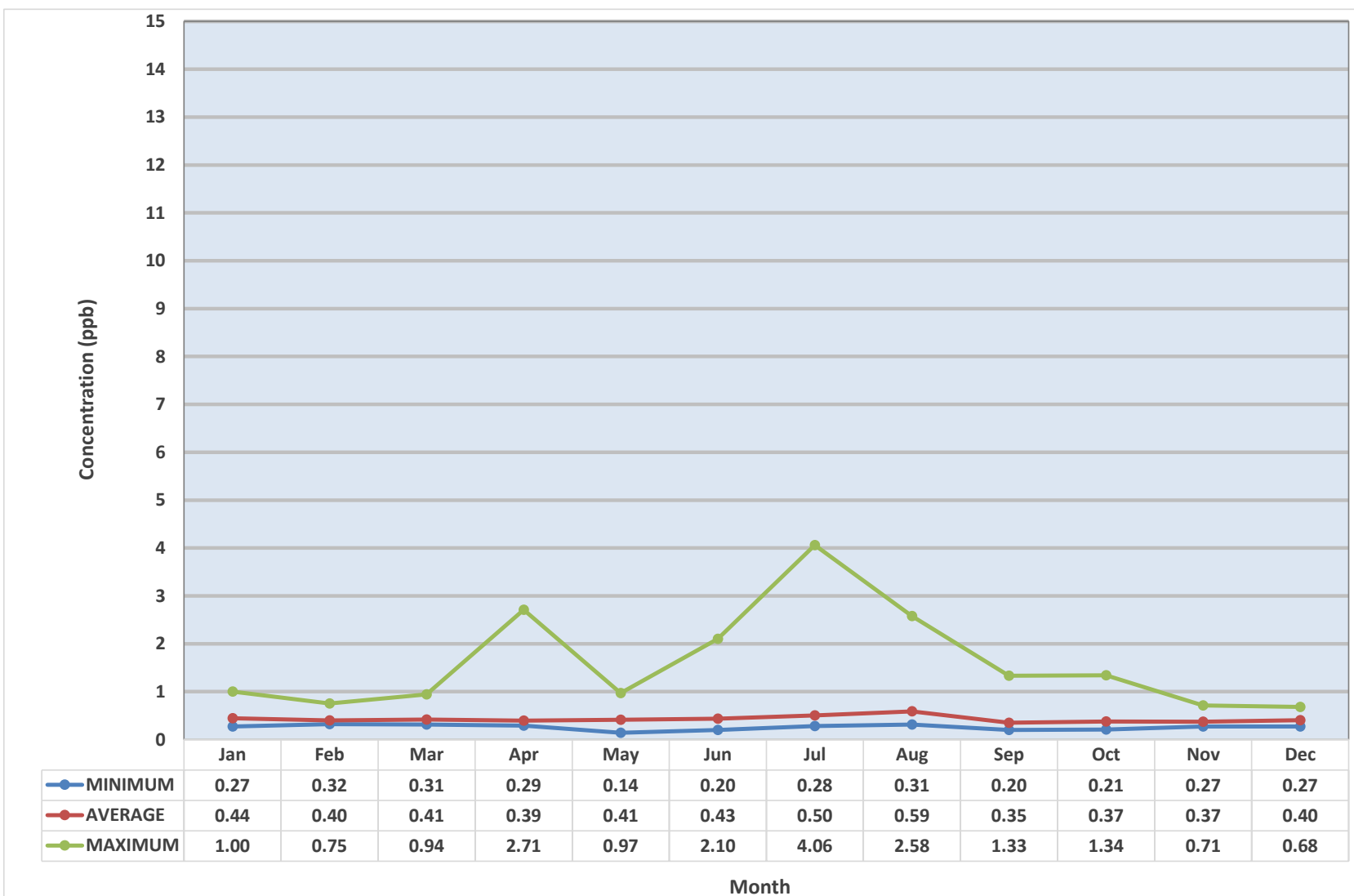


2015 to 2018 TRS Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 TRS Monthly Statistics



2018 TOTAL HYDROCARBONS (THC) Monthly Averages & Frequency Distributions of 1-Hr 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	689	97.3	98.4%	1.6%	0.0%	0.0%	-	-	-	-	2.13
February	638	99.7	99.4%	0.6%	0.0%	0.0%	-	-	-	-	2.02
March	708	100.0	95.9%	4.1%	0.0%	0.0%	-	-	-	-	2.11
April	685	100.0	98.2%	1.8%	0.0%	0.0%	-	-	-	-	2.05
May	708	99.9	99.6%	0.4%	0.0%	0.0%	-	-	-	-	1.95
June	638	93.3	99.5%	0.5%	0.0%	0.0%	-	-	-	-	1.98
July	699	98.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.97
August	562	79.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.96
September	677	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.00
October	675	95.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.03
November	686	100.0	99.1%	0.9%	0.0%	0.0%	-	-	-	-	2.08
December	707	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	2.09
Annual	8072	97.0	99.2%	0.8%	0.0%	0.0%			0	0	2.03

N/D - Valid Data Not Available

*# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

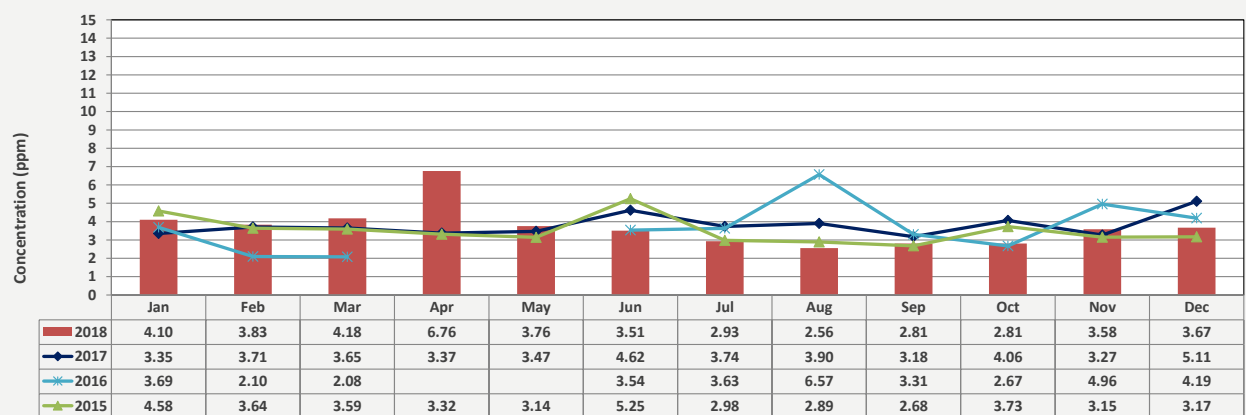
Alberta Ambient Air Quality Objectives Annual Average**	-	ppm
Annual Average for 2018	2.03	ppm

THC Data Identifiers _ Total Hours Flagged = 688										
Continuous Flag	C	C1	G	P	Q	R	S	S1	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Daily Zero/Span	Additional Zero/Span	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Annual Total	51	3	0	7	0	0	367	6	218	36

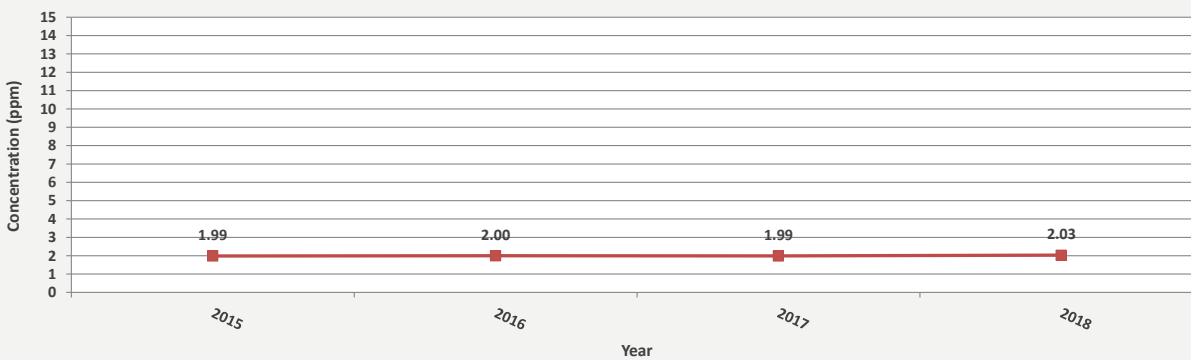
2015 to 2018 THC Monthly Averages



2015 to 2018 THC Monthly Maximum Averages

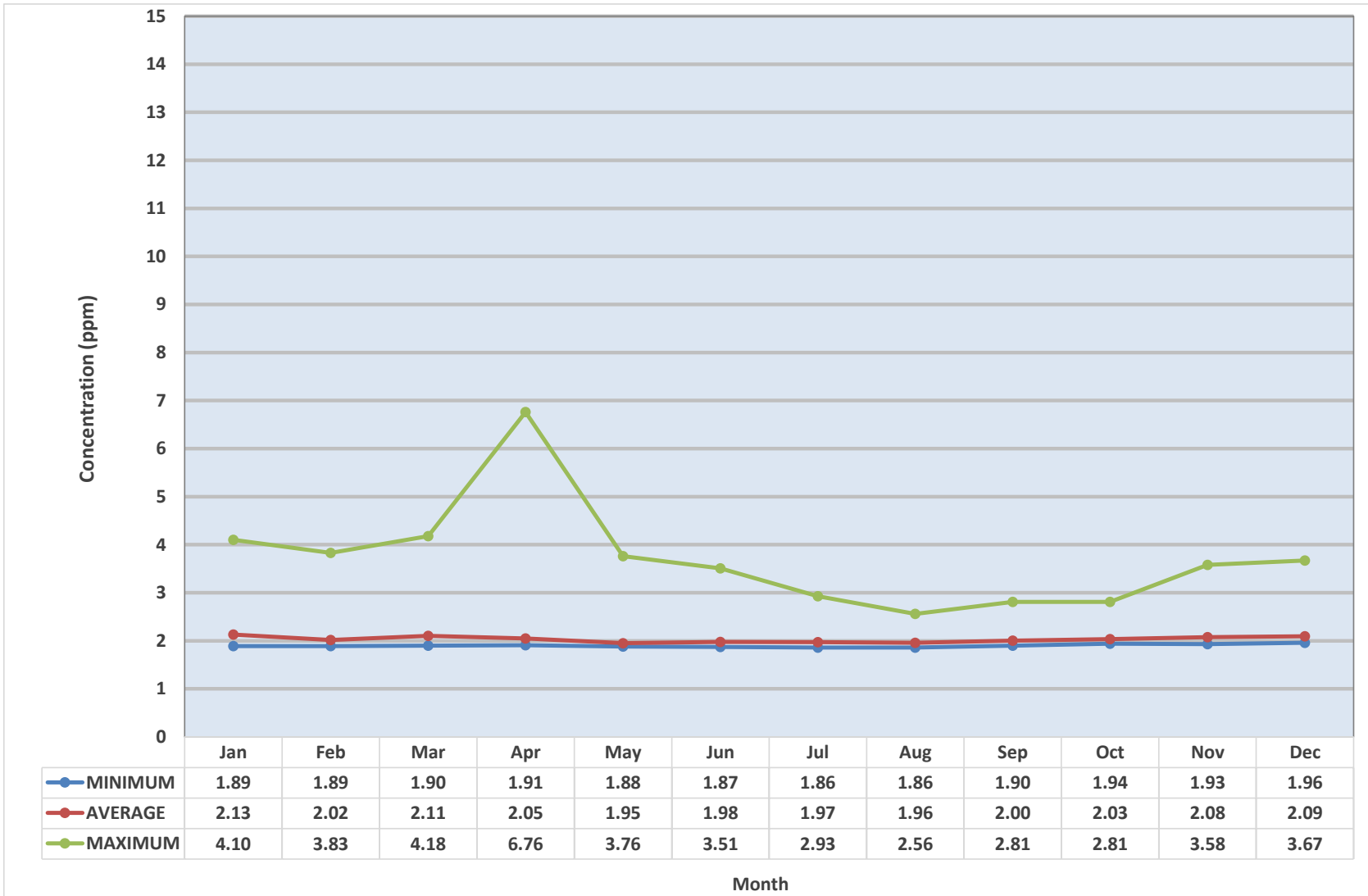


2015 to 2018 THC Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 THC Monthly Statistics



2018 METHANE (CH ₄) Monthly Averages & Frequency Distributions of 1-Hr 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	
January	689	97.3	98.4%	1.6%	0.0%	0.0%	-	-	-	-	2.13
February	638	99.7	99.4%	0.6%	0.0%	0.0%	-	-	-	-	2.02
March	708	100.0	95.9%	4.1%	0.0%	0.0%	-	-	-	-	2.11
April	685	100.0	98.2%	1.8%	0.0%	0.0%	-	-	-	-	2.05
May	708	99.9	99.6%	0.4%	0.0%	0.0%	-	-	-	-	1.95
June	638	93.3	99.5%	0.5%	0.0%	0.0%	-	-	-	-	1.98
July	699	98.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.97
August	562	79.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.96
September	677	99.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.00
October	675	95.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.03
November	686	100.0	99.1%	0.9%	0.0%	0.0%	-	-	-	-	2.08
December	707	100.0	99.7%	0.3%	0.0%	0.0%	-	-	-	-	2.09
Annual	8072	97.0	99.2%	0.8%	0.0%	0.0%			0	0	2.03

N/D - Valid Data Not Available

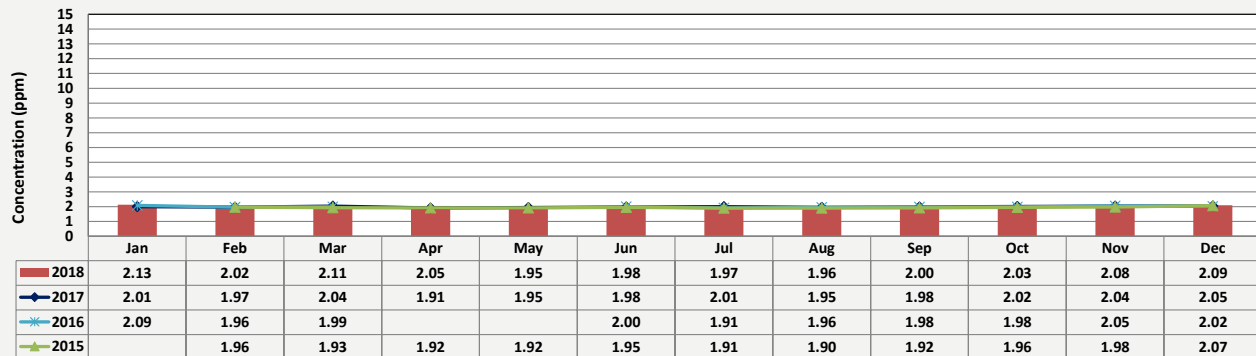
*# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

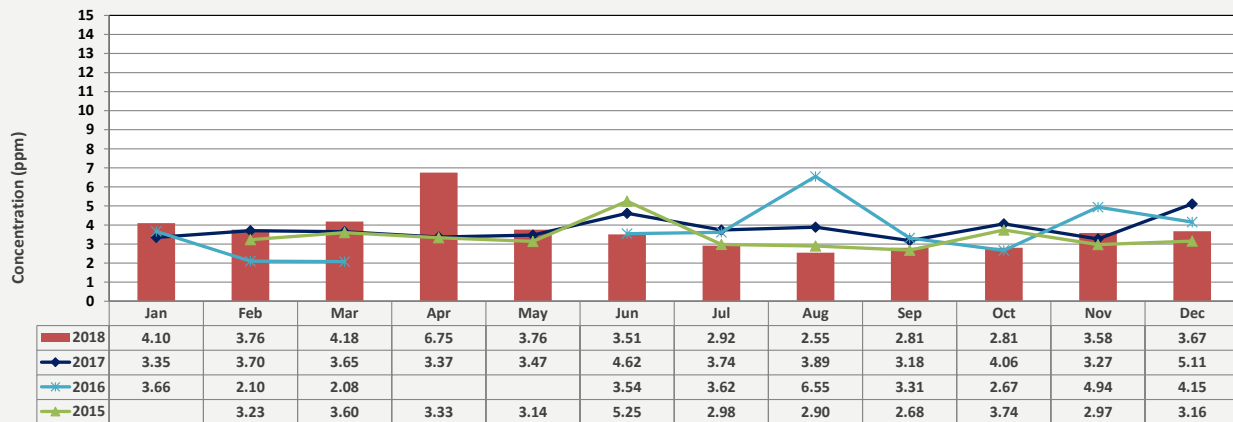
Alberta Ambient Air Quality Objectives Annual Average**	- ppm
Annual Average for 2018	2.03 ppm

CH ₄ Data Identifiers _ Total Hours Flagged = 688										
Continuous Flag	C	C1	G	P	Q	R	S	S1	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Daily Zero/Span	Additional Zero/Span	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Annual Total	51	3	0	7	0	0	367	6	218	36

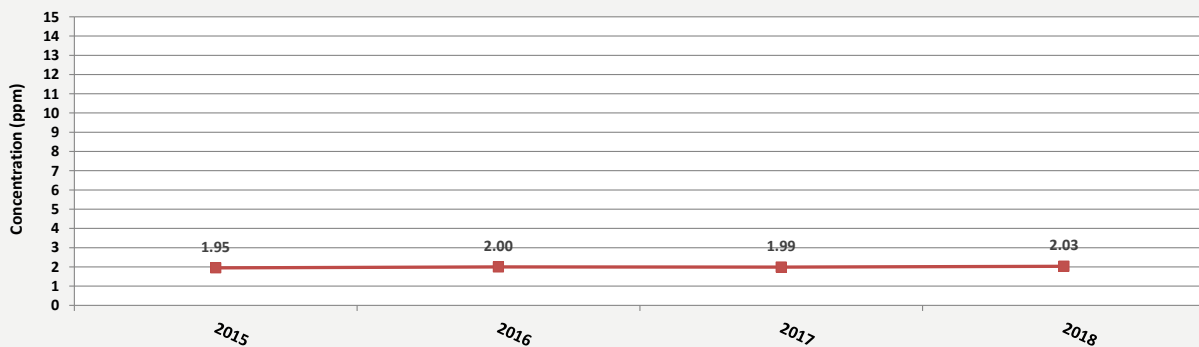
2015 to 2018 CH₄ Monthly Averages



2015 to 2018 CH₄ Monthly Maximum Averages

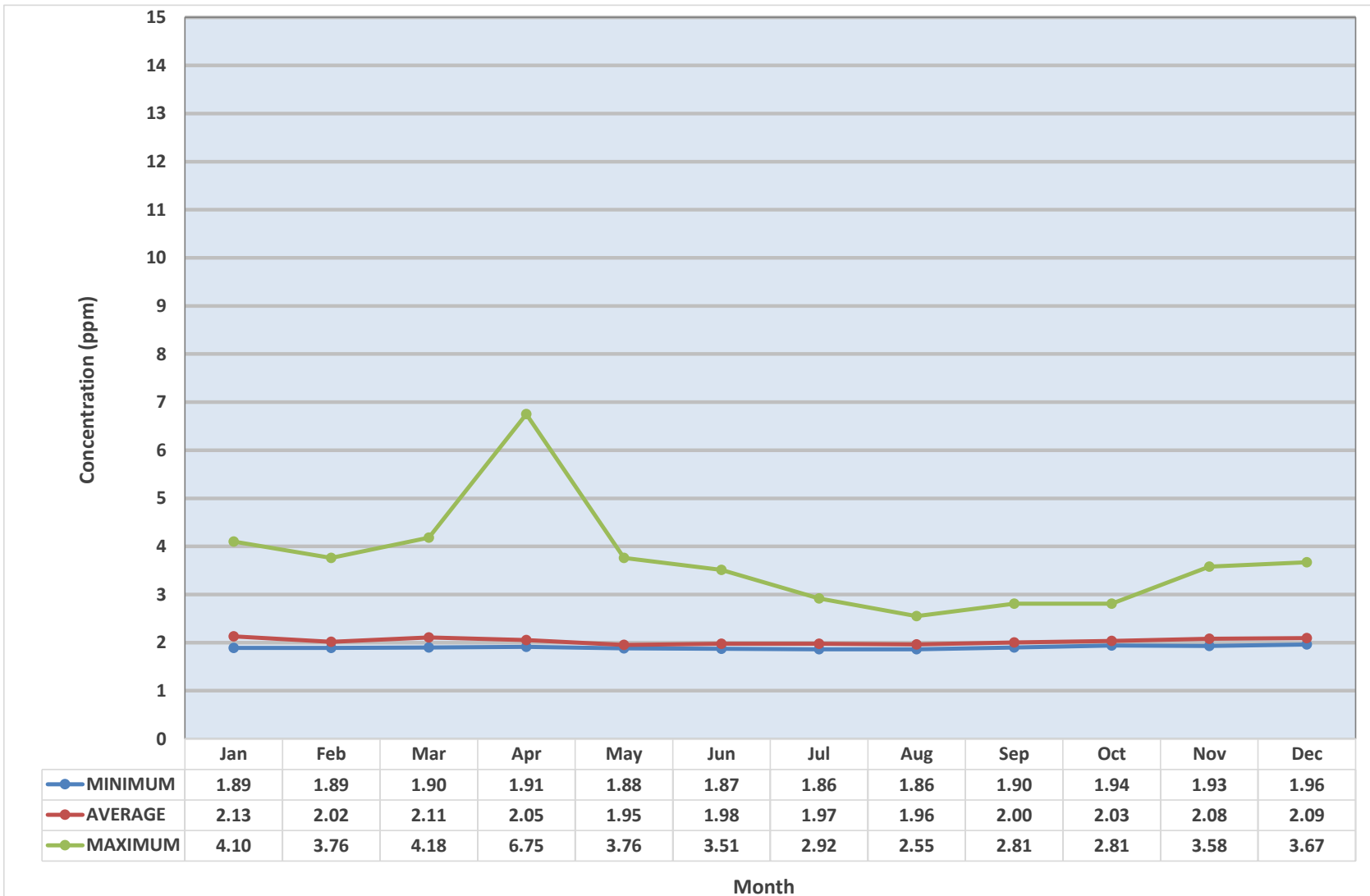


2015 to 2018 CH₄ Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016. CH₄ was not monitored in January 2015.

2018 CH₄ Monthly Statistics



2018 NON-METHANE HYDROCARBONS (NMHC) Monthly Averages & Frequency Distributions of 1-Hr 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	
January	689	97.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
February	638	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
March	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
April	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
May	708	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
June	638	93.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
July	699	98.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
August	562	79.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
September	677	99.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
October	675	95.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
November	686	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
December	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
Annual	8072	97.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0	0	0.00

N/D - Valid Data Not Available

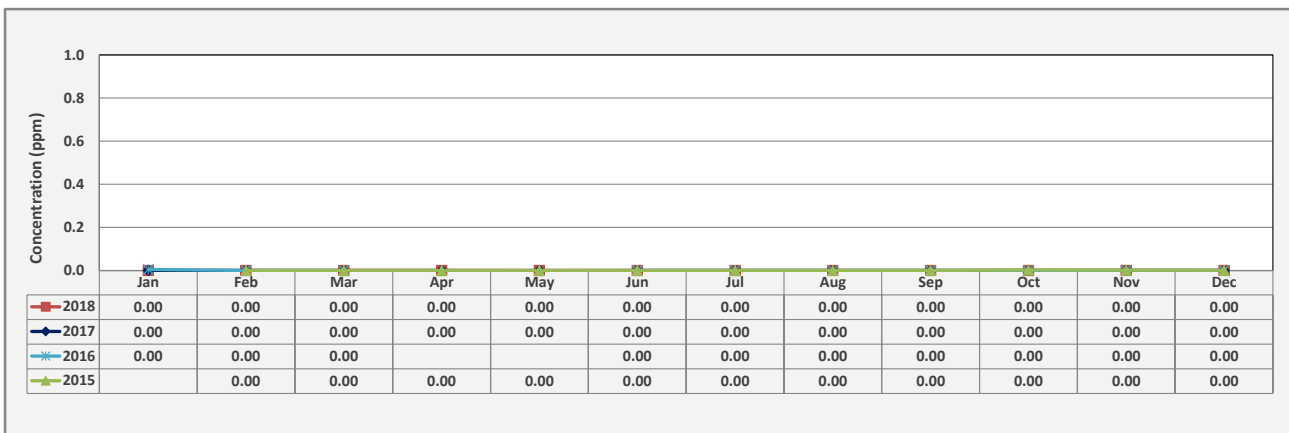
*# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

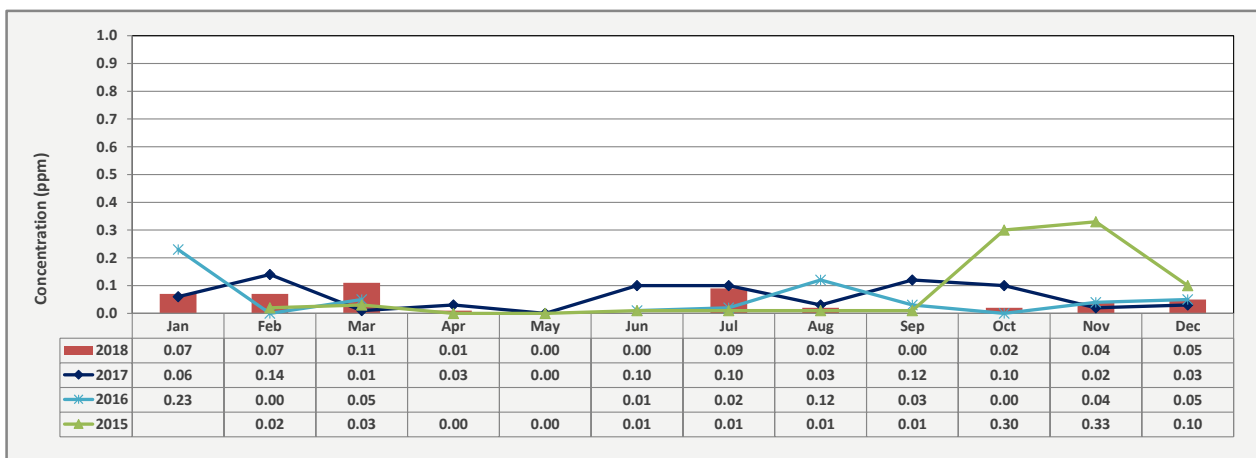
Alberta Ambient Air Quality Objectives Annual Average**	-	ppm
Annual Average for 2018	0.00	ppm

NMHC Data Identifiers _ Total Hours Flagged = 688										
Continuous Flag	C	C1	G	P	Q	R	S	S1	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Daily Zero/Span	Additional Zero/Span	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y	Y	Y
Annual Total	51	3	0	7	0	0	367	6	218	36

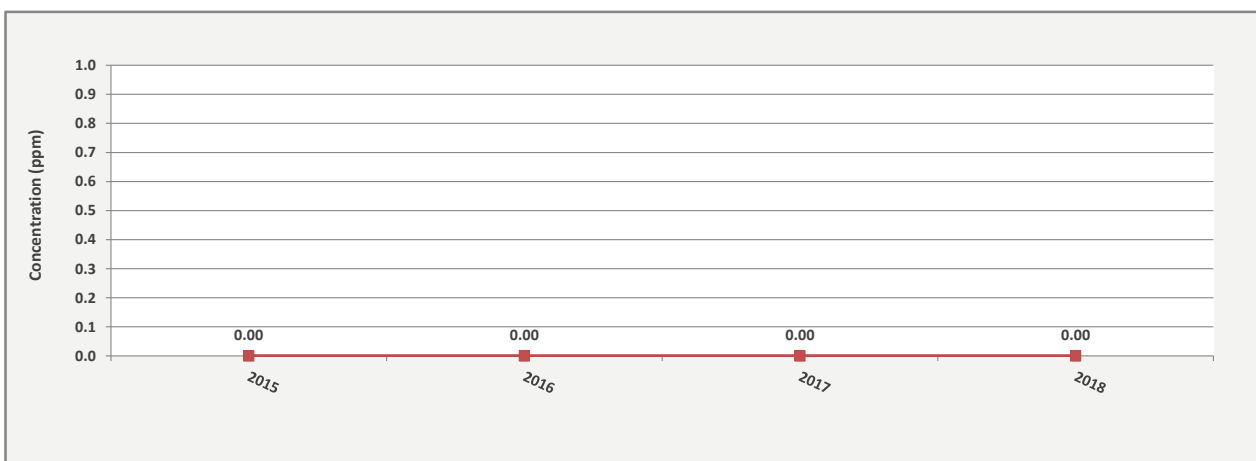
2015 to 2018 NMHC Monthly Averages



2015 to 2018 NMHC Monthly Maximum Averages

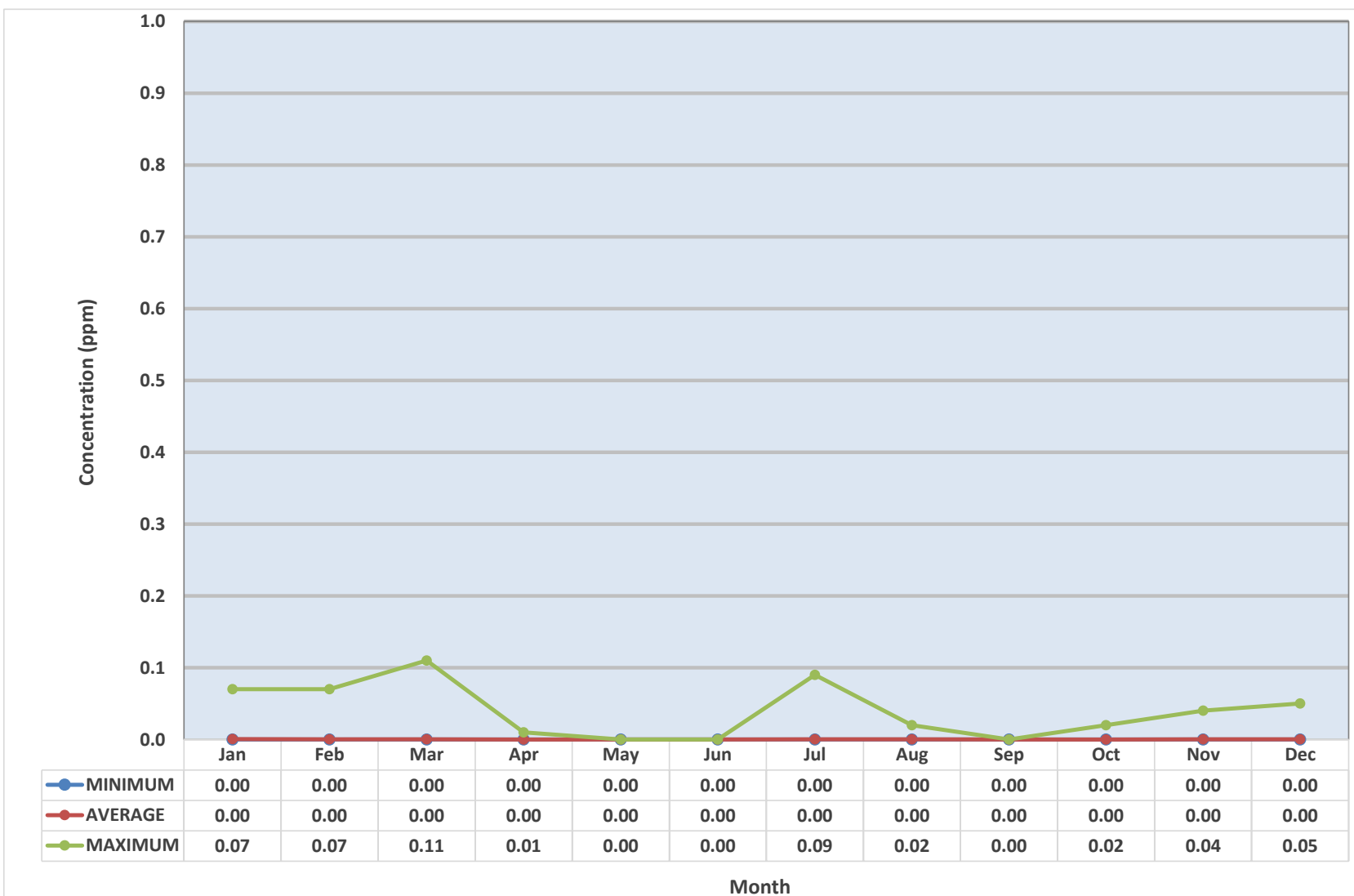


2015 to 2018 NMHC Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016. NMHC was not monitored in January 2015.

2018 NMHC Monthly Statistics



2018 AMBIENT TEMPERATURE (AT) Monthly Data Summary of 1-Hr & 24-Hr Readings					
Month	Number of Readings*	Operational Time (%)	Monthly Average (°C)	Maximum 1-Hr Average (°C)	Maximum 24-Hr Average (°C)
January	744	100.0	-12.7	3.4	0.4
February	672	100.0	-14.7	2.2	-0.4
March	744	100.0	-7.0	8.0	1.6
April	720	100.0	-0.2	21.4	12.1
May	744	100.0	14.5	30.7	23.7
June	713	99.0	14.9	31.6	24.8
July	744	100.0	16.5	28.3	21.1
August	744	100.0	15.2	28.5	20.9
September	713	99.0	4.7	19.5	13.7
October	744	100.0	2.7	19.8	12.9
November	720	100.0	-5.2	5.7	1.0
December	744	100.0	-9.1	2.4	0.3
Annual	8746	99.8	1.6	16.8	11.0

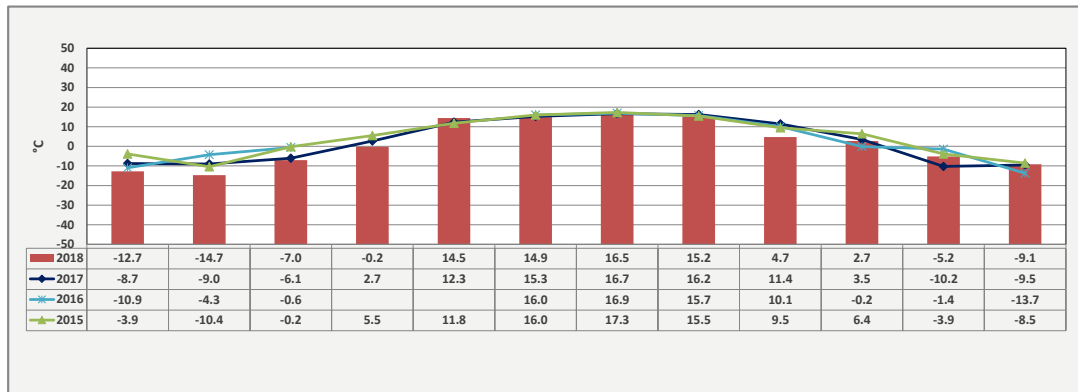
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

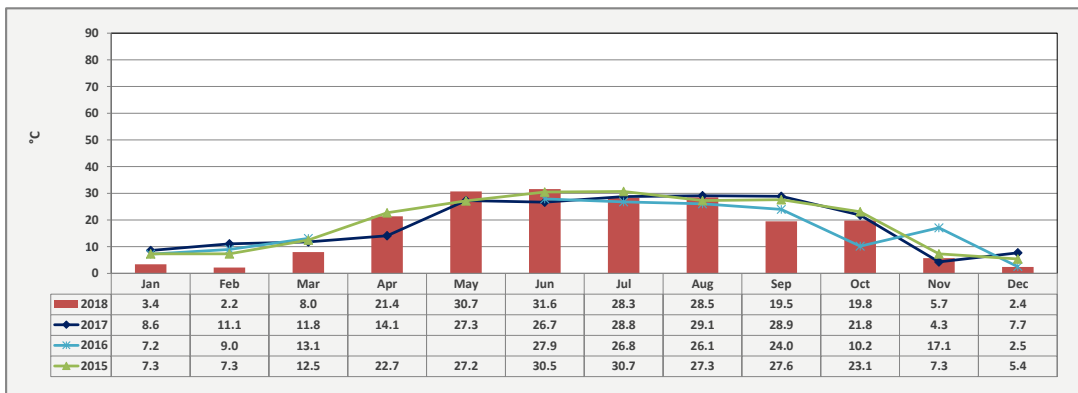
Annual Average for 2018	1.6 °C
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AT Data Identifiers _ Total Hours Flagged = 14								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	0	0	0	7	0	0	0	7

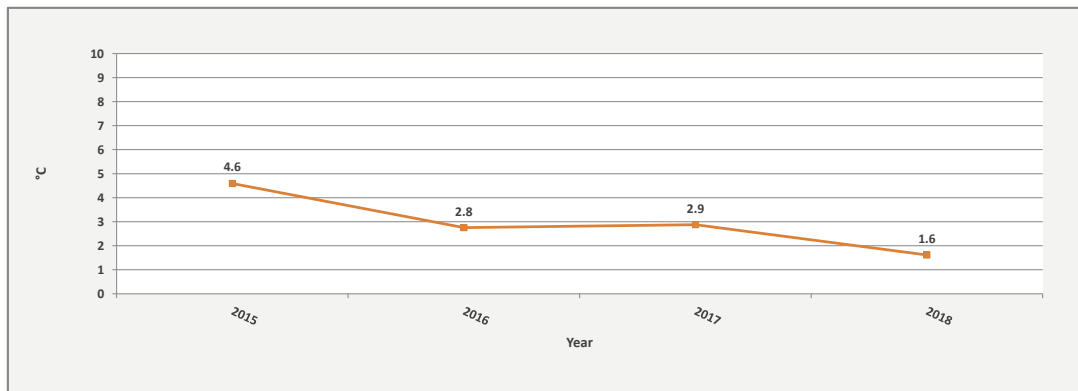
2015 to 2018 TPX Monthly Averages



2015 to 2018 TPX Monthly Maximum Averages

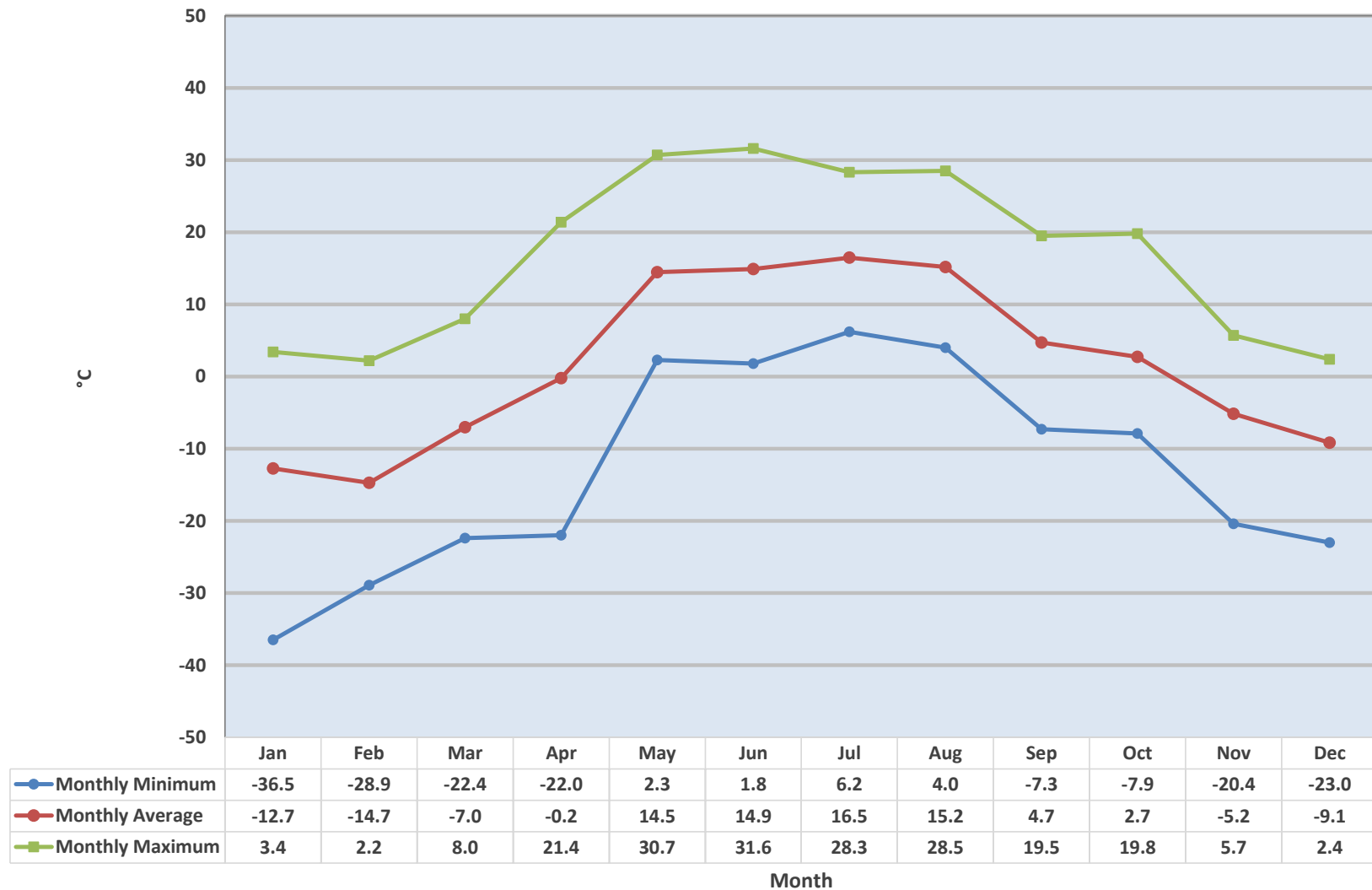


2015 to 2018 TPX Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 AT Monthly Statistics



2018 RELATIVE HUMIDITY (RH) Monthly Data Summary of 1-Hr & 24-Hr Readings					
Month	Number of Readings*	Operational Time (%)	Monthly Average (%)	Maximum 1-Hr Average (%)	Maximum 24-Hr Average (%)
January	744	100.0	73	88	86
February	672	100.0	65	91	81
March	744	100.0	64	93	79
April	720	100.0	55	92	85
May	744	100.0	42	90	64
June	713	99.0	61	94	87
July	744	100.0	68	94	91
August	744	100.0	69	94	89
September	713	99.0	71	95	91
October	744	100.0	63	94	87
November	720	100.0	79	94	91
December	744	100.0	73	90	86
Annual	8746	99.8	65	92	85

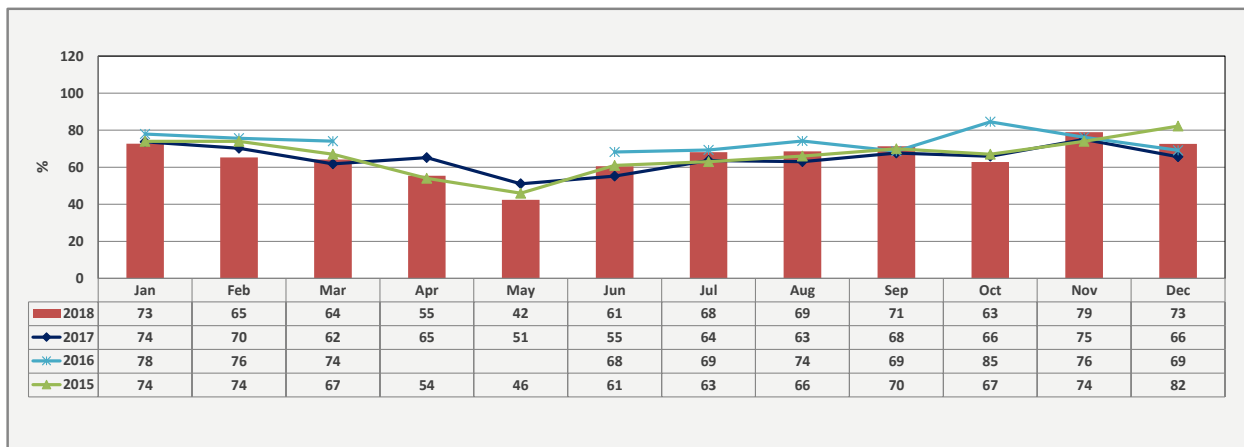
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

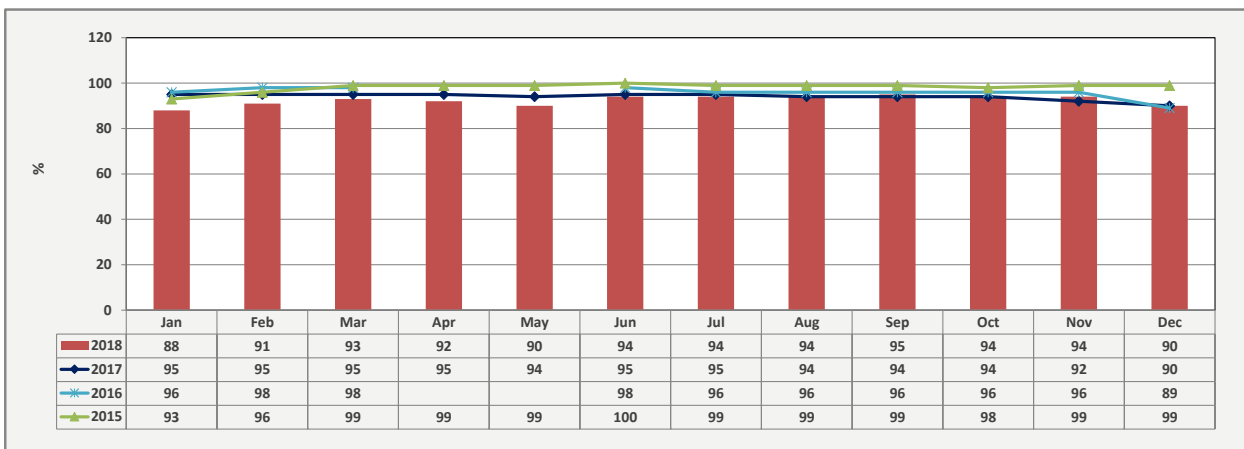
Annual Average for 2018	65	%
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RH Data Identifiers _ Total Hours Flagged = 14								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	0	0	0	7	0	0	0	7

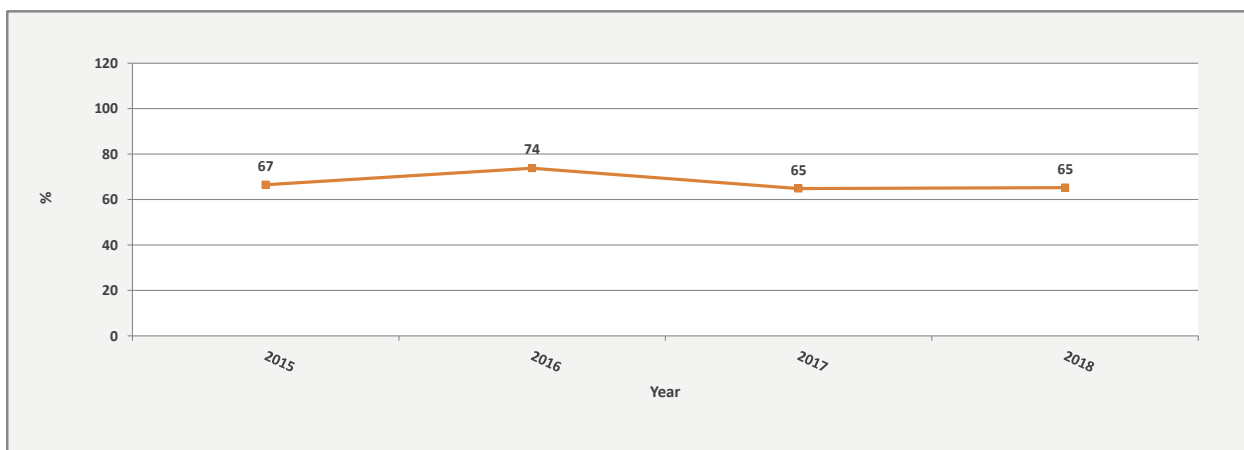
2015 to 2018 RH Monthly Averages



2015 to 2018 RH Monthly Maximum Averages

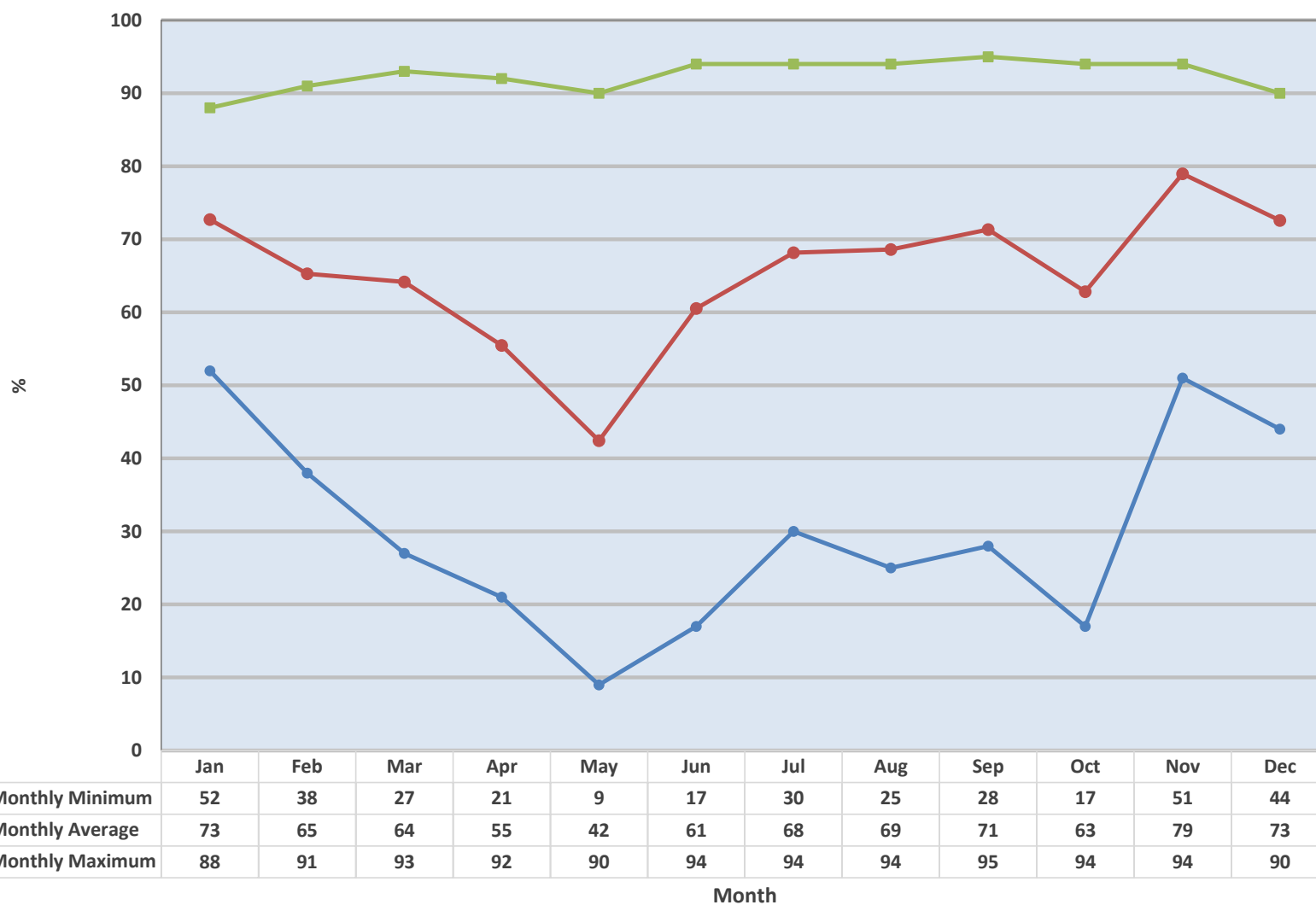


2015 to 2018 RH Annual Averages



Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 RH Monthly Statistics



2018 BAROMETRIC PRESSURE (BP) Monthly Data Summary of 1-Hr & 24-Hr Readings					
Month	Number of Readings*	Operational Time (%)	Monthly Average (millibar)	Maximum 1-Hr Average (millibar)	Maximum 24-Hr Average (millibar)
January	744	100.0	938	959	955
February	672	100.0	939	958	956
March	744	100.0	939	958	953
April	720	100.0	939	955	954
May	744	100.0	938	949	948
June	713	99.0	934	944	943
July	744	100.0	942	952	951
August	744	100.0	937	951	949
September	713	99.0	943	953	952
October	744	100.0	939	953	951
November	720	100.0	937	958	956
December	744	100.0	934	951	947
Annual	8746	99.8	938	953	951

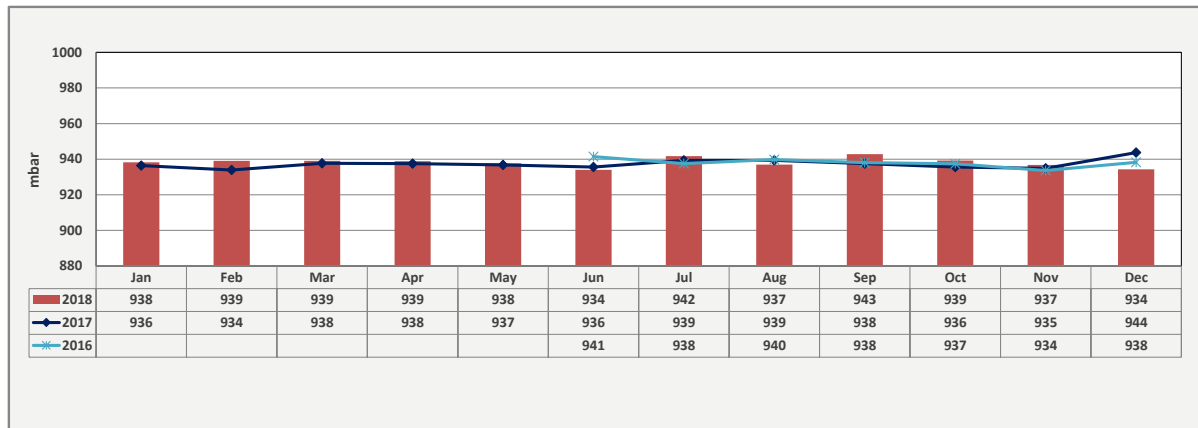
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

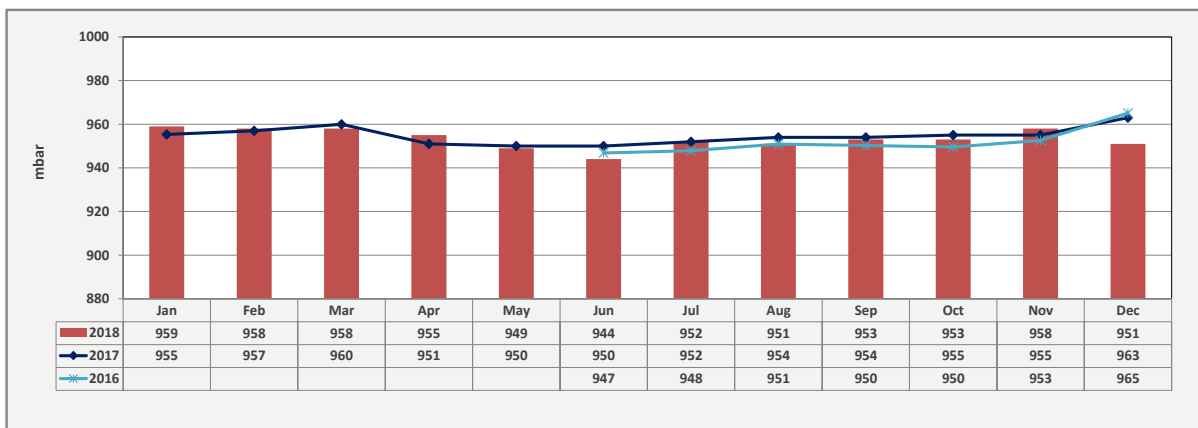
Annual Average for 2018	938	mbar
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BP Data Identifiers _ Total Hours Flagged = 14								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	0	0	0	7	0	0	0	7

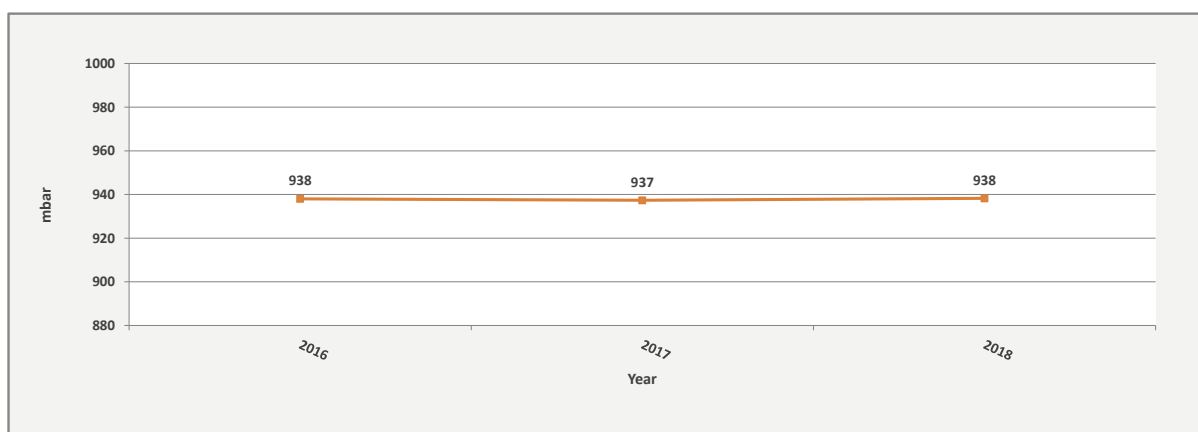
2016 to 2018 BP Monthly Averages



2016 to 2018 BP Monthly Maximum Averages

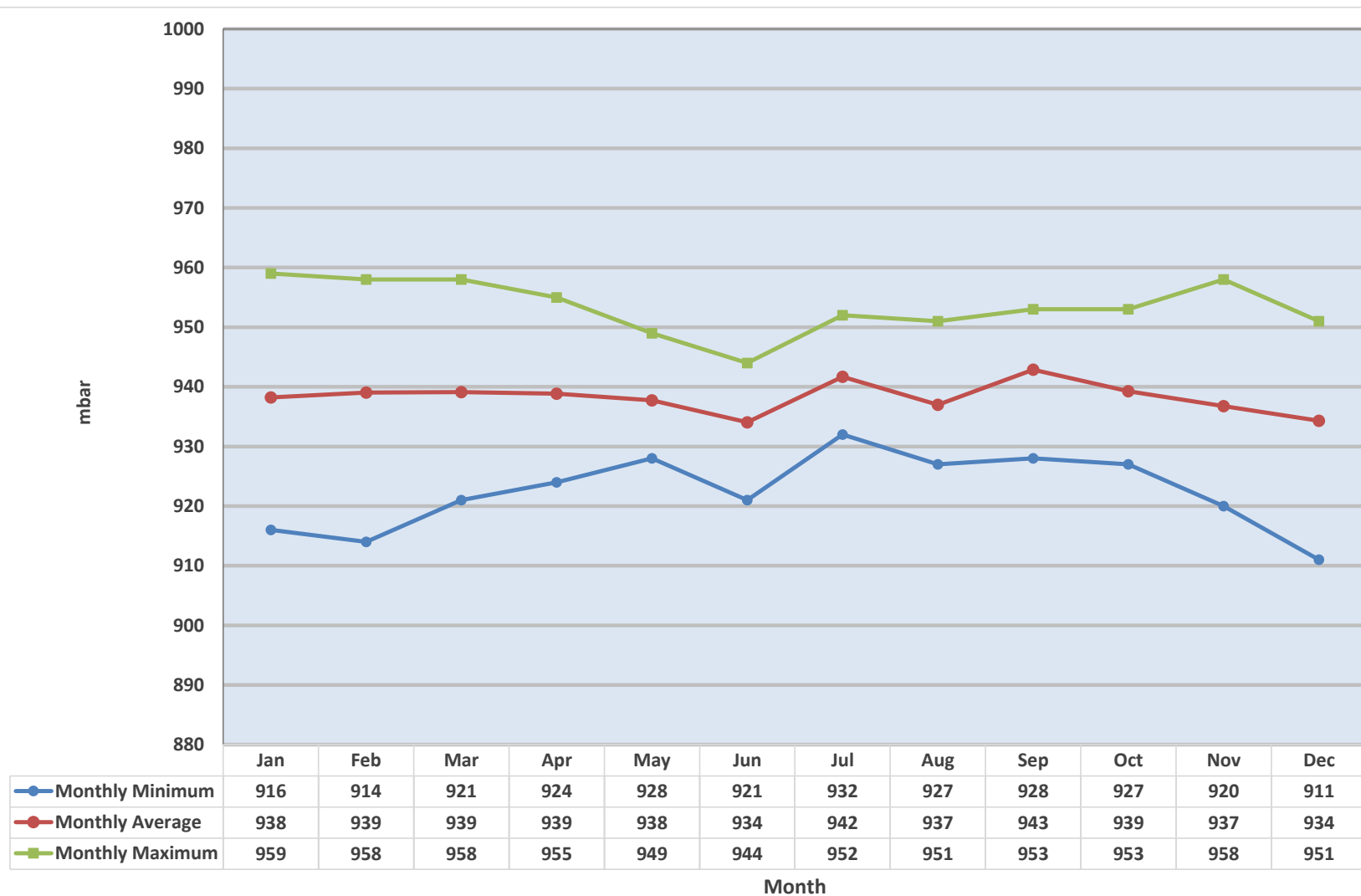


2016 to 2018 BP Annual Averages



Note: Barometric Pressure was not monitored between January and May 2016.

2018 BP Monthly Statistics



2018 STATION TEMPERATURE (STNTPX) Monthly Data Summary of 1-Hr & 24-Hr Readings					
Month	Number of Readings*	Operational Time (%)	Monthly Average (°C)	Maximum 1-Hr Average (°C)	Maximum 24-Hr Average (°C)
January	744	100.0	22.2	23.0	22.7
February	672	100.0	22.3	24.0	22.6
March	744	100.0	20.9	28.2	23.5
April	720	100.0	21.9	25.9	23.2
May	744	100.0	21.5	25.2	23.8
June	713	99.0	21.8	25.0	23.3
July	744	100.0	22.3	32.7	25.0
August	744	100.0	23.1	27.9	24.0
September	713	99.0	22.5	25.4	23.4
October	744	100.0	22.1	23.7	23.2
November	720	100.0	22.6	20.2	24.7
December	744	100.0	22.1	23.8	23.3
Annual	8746	99.8	22.1	25.4	23.6

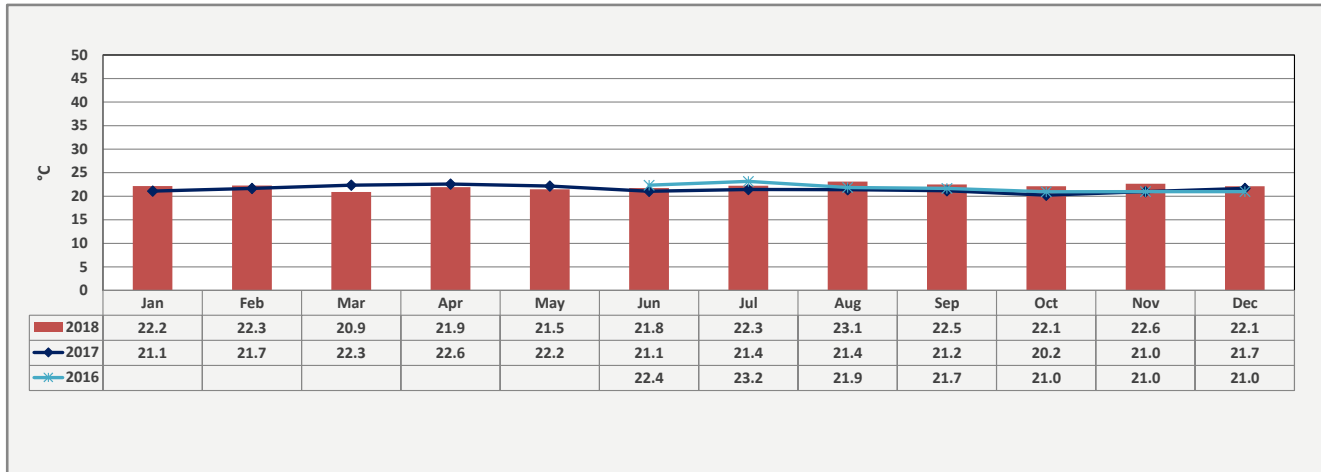
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

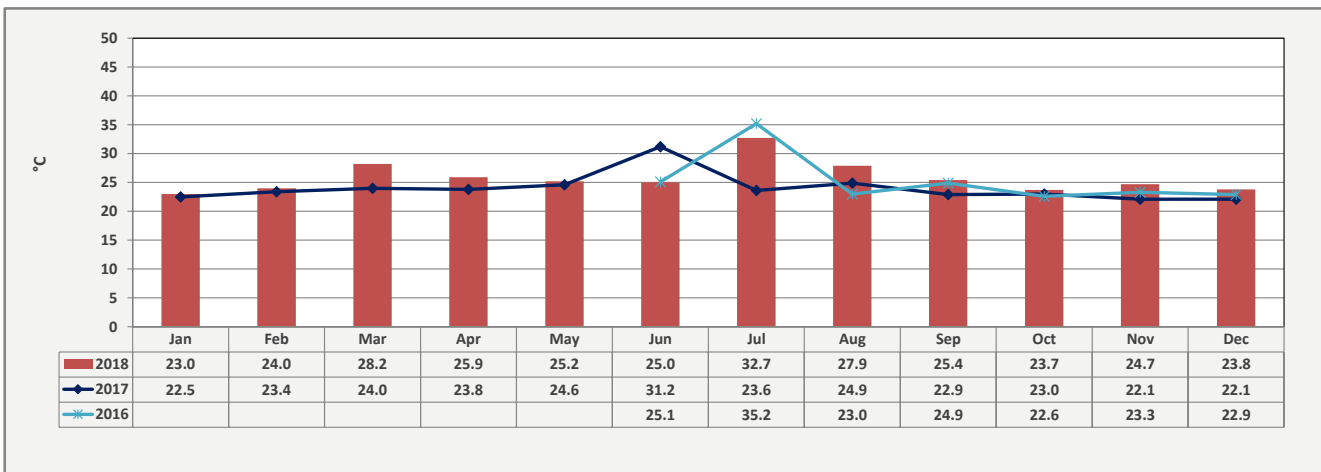
Annual Average for 2018	22.1 °C
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STX Data Identifiers _ Total Hours Flagged = 14								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	0	0	0	7	0	0	0	7

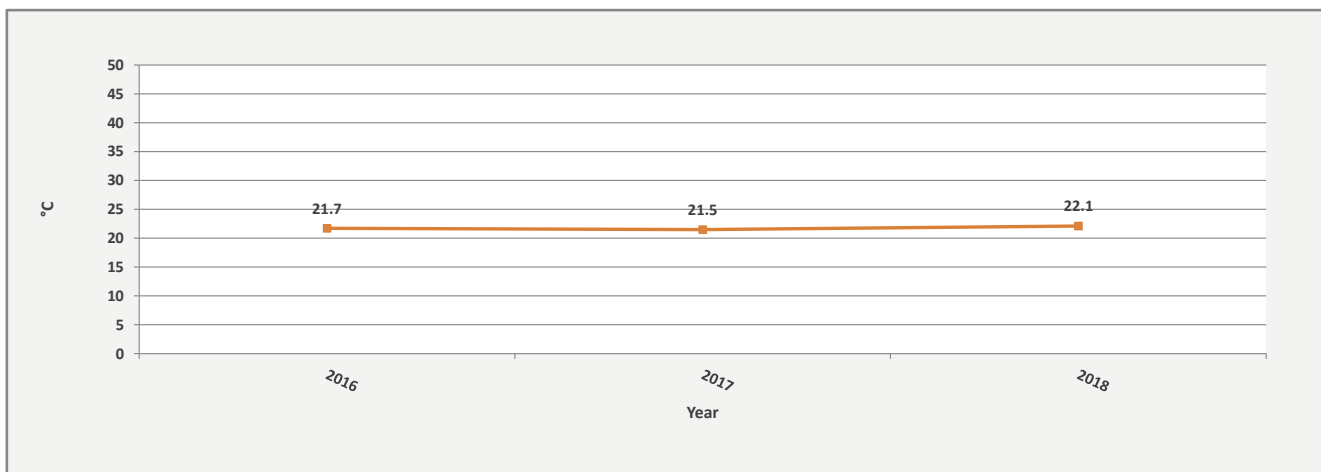
2016 to 2018 STNTPX Monthly Averages



2016 to 2018 STNTPX Monthly Maximum Averages

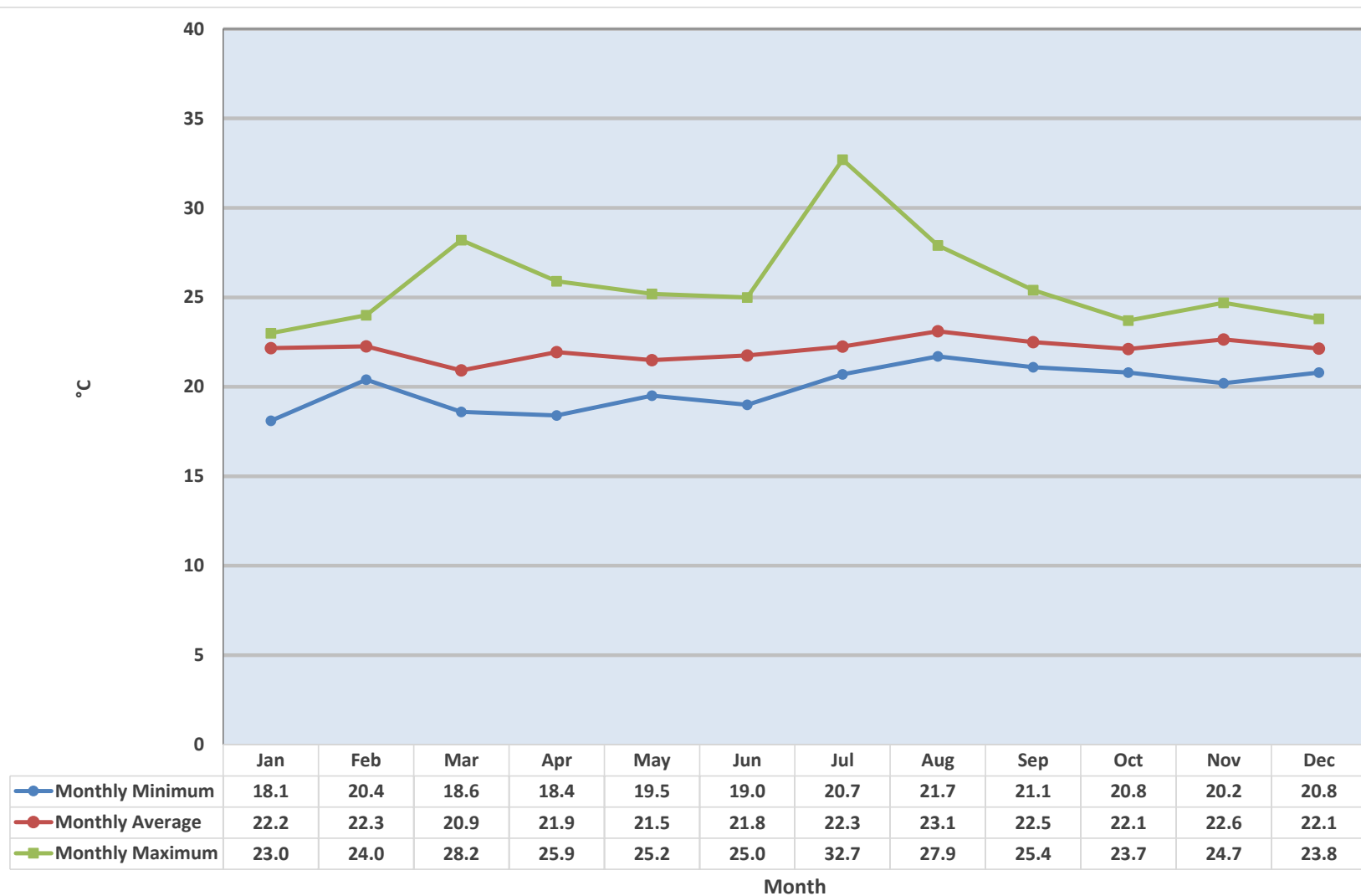


2016 to 2018 STNTPX Annual Averages



Note: Station Temperature was not monitored between January and May 2016..

2018 STNTPX Monthly Statistics



2018 WIND SPEED (WS) Monthly Data Summary of 1-Hr & 24-Hr Readings					
Month	Number of Readings*	Operational Time (%)	Monthly Average (kph)	Maximum 1-Hr Average (kph)	Maximum 24-Hr Average (kph)
January	744	100.0	0.7	17.7	10.7
February	672	100.0	3.2	20.2	10.0
March	744	100.0	1.7	26.4	21.0
April	717	100.0	0.8	19.2	13.0
May	744	100.0	2.5	19.6	11.2
June	713	99.0	3.0	19.4	10.9
July	744	100.0	2.2	14.0	9.3
August	744	100.0	2.9	13.9	7.8
September	713	99.0	0.7	14.2	7.5
October	744	100.0	2.2	19.9	11.7
November	720	100.0	1.0	14.9	10.1
December	744	100.0	2.4	18.2	11.7
Annual	8743	99.8	1.4	18.1	11.2

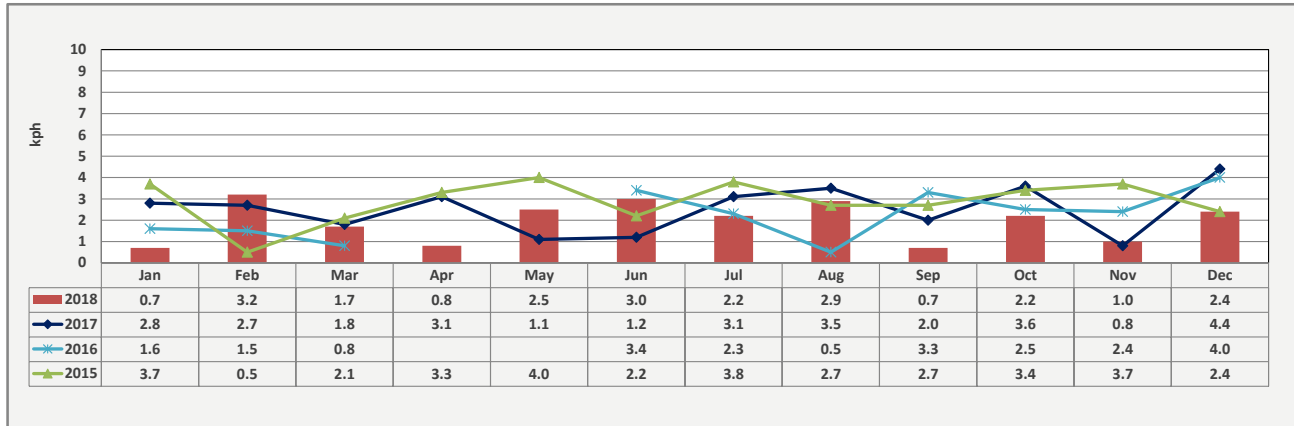
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

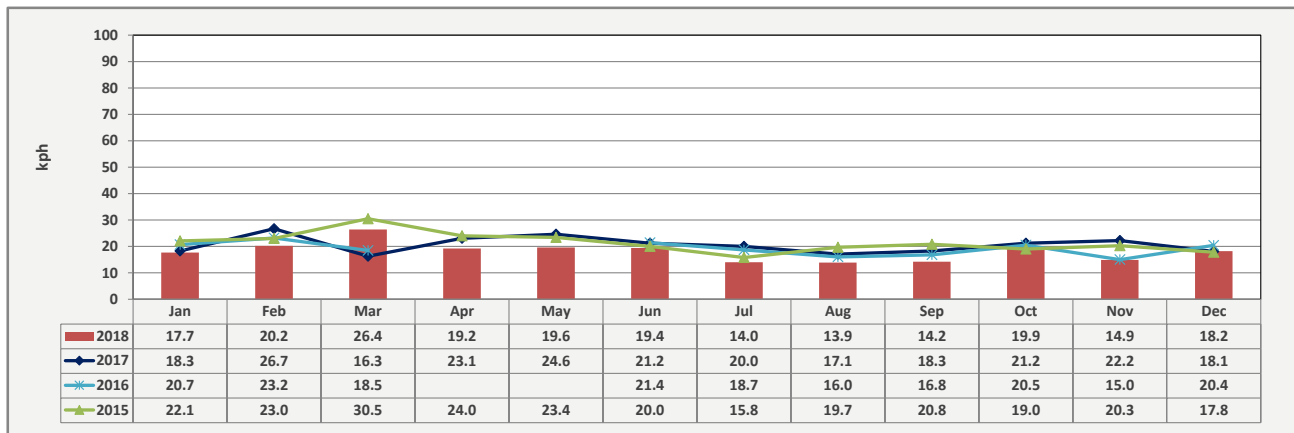
Annual Average for 2018	1.4 kph
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WS Data Identifiers _ Total Hours Flagged = 17								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	3	0	0	7	0	0	0	7

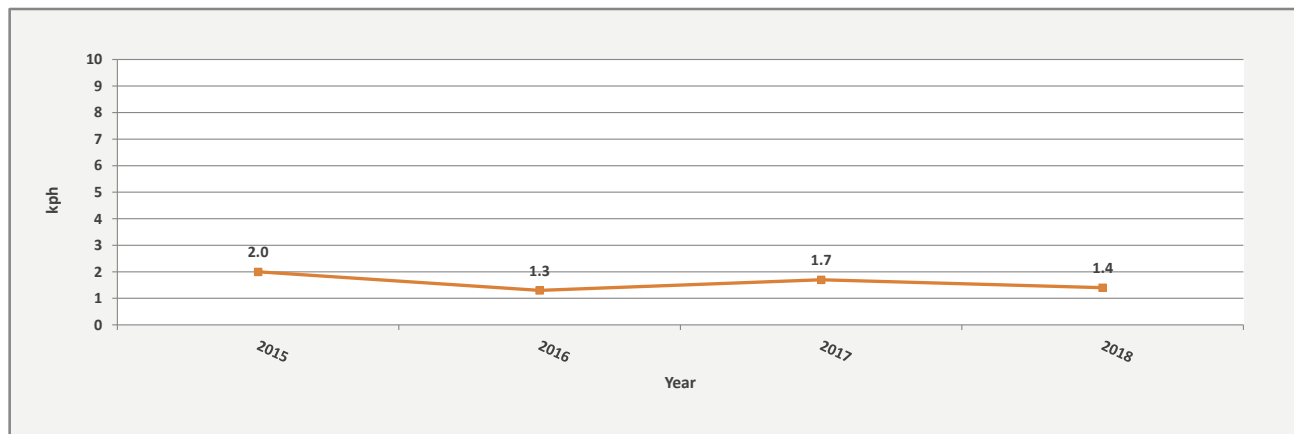
2015 to 2018 WS Monthly Averages



2015 to 2018 WS Monthly Maximum Averages

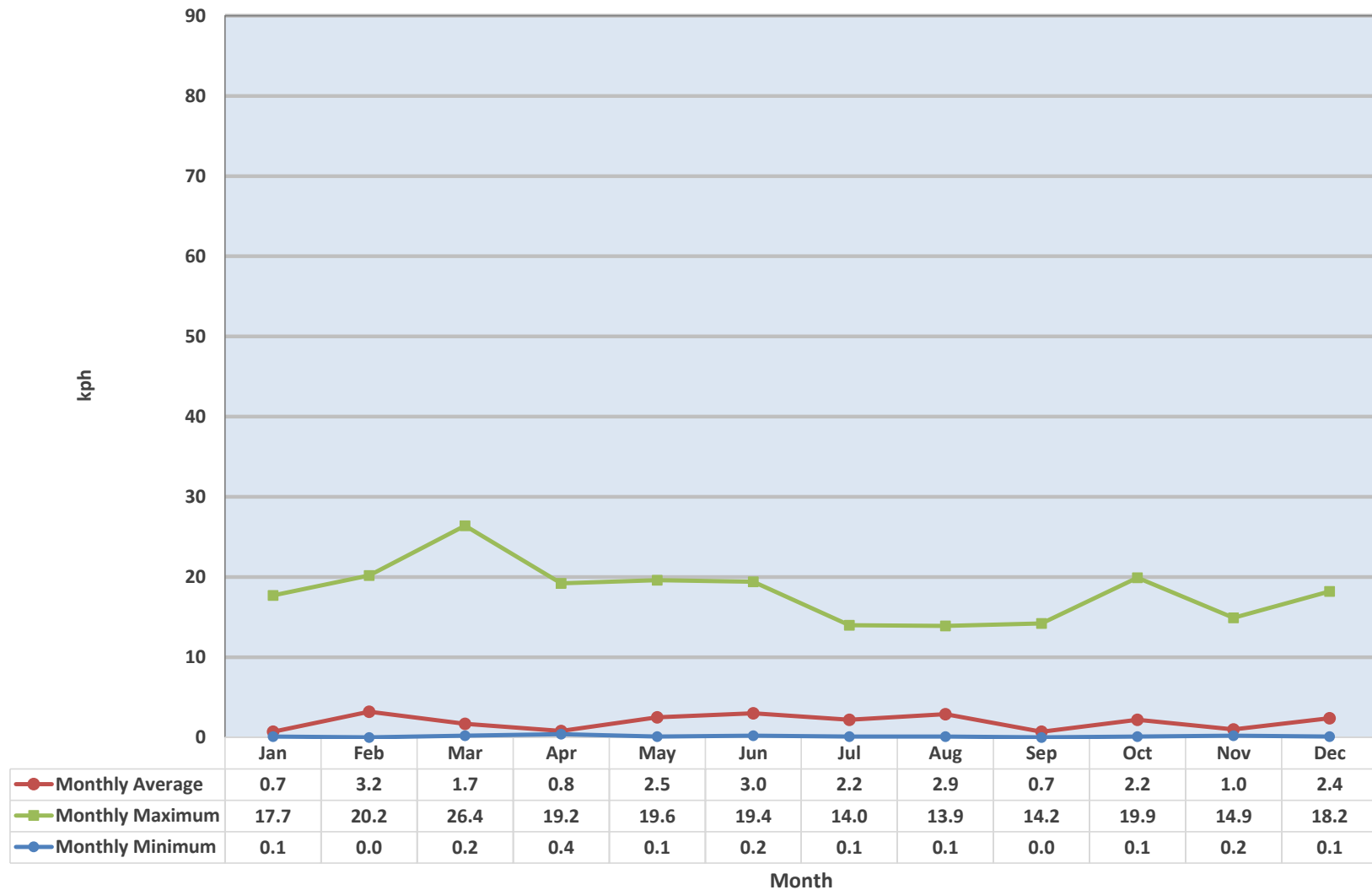


2015 to 2018 WS Annual Averages

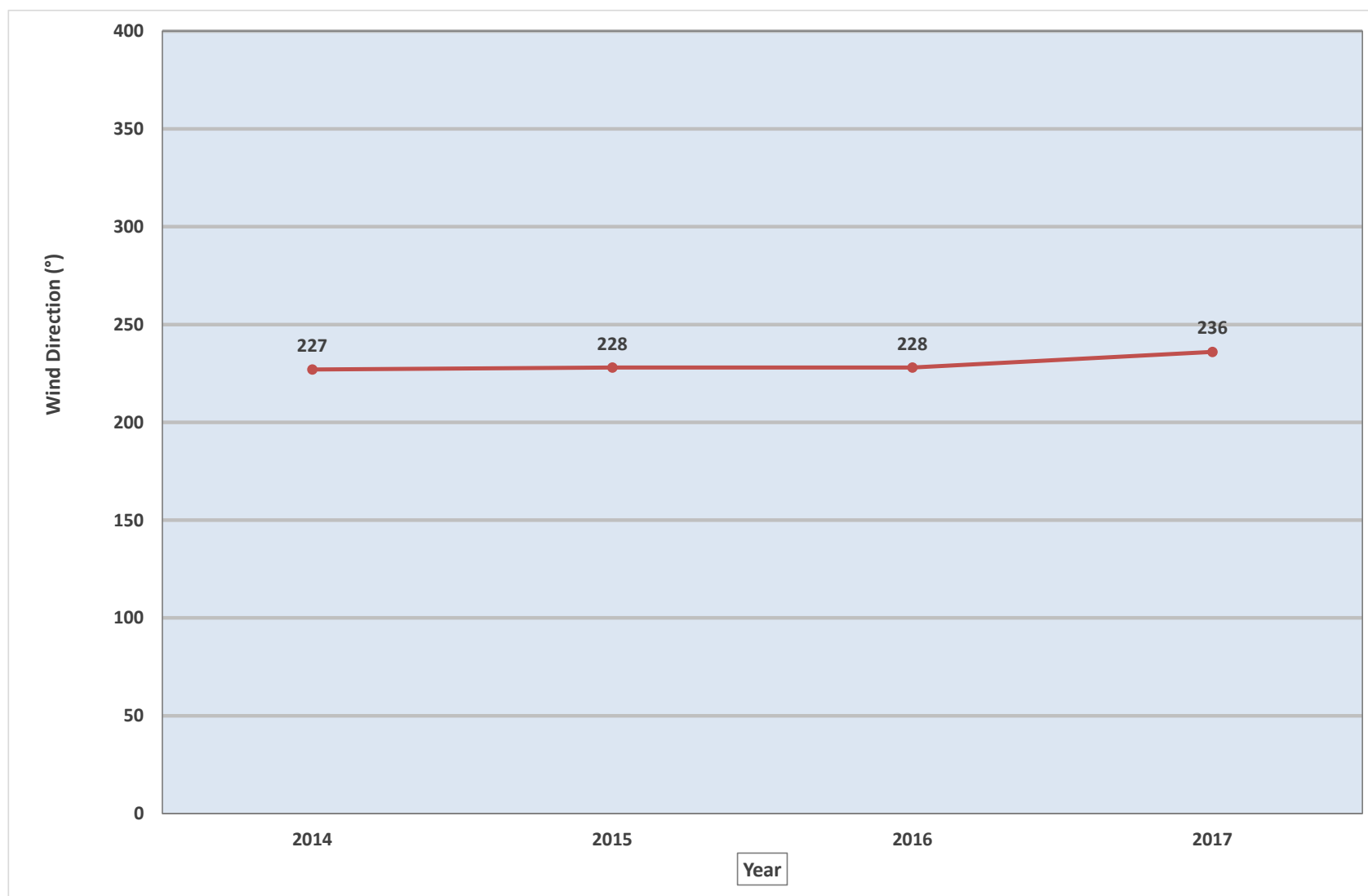


Note: Ambient air quality monitoring was not carried out in April and May 2016.

2018 WS Monthly Statistics



2015 to 2018 WD Annual Averages



Wind: PRAMP_RENO
Monitor: WSP [kph]
Periodically: 2018/01/01 00:00-2018/12/31 23:00
Type: WindRose
Direction: Blowing From (Wind Frequency)
Based On 1 Hr.

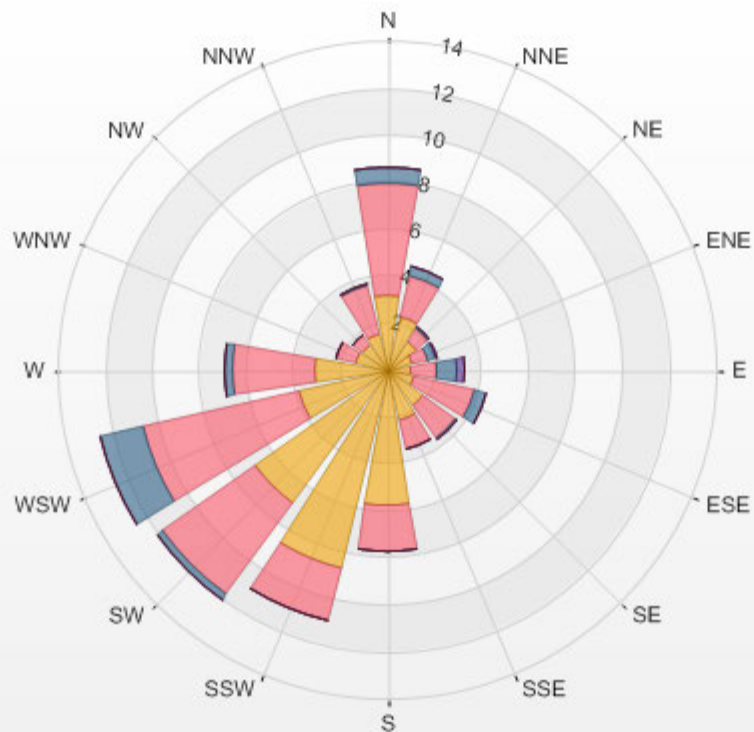
Calm: 9.38%

Calm Avg: 1.11 (kph)

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	3.2	4.8	0.7	0.0	0.0	0.0	8.7
NNE	2.4	1.8	0.4	0.0	0.0	0.0	4.5
NE	1.5	0.6	0.1	0.0	0.0	0.0	2.2
ENE	1.1	0.6	0.4	0.1	0.0	0.0	2.2
E	1.0	1.1	0.9	0.4	0.0	0.0	3.4
ESE	1.2	2.6	0.5	0.0	0.0	0.0	4.3
SE	1.9	1.7	0.1	0.0	0.0	0.0	3.6
SSE	2.2	1.3	0.0	0.0	0.0	0.0	3.5
S	5.8	1.9	0.0	0.0	0.0	0.0	7.7
SSW	8.7	2.3	0.0	0.0	0.0	0.0	11.0
SW	7.0	4.8	0.3	0.0	0.0	0.0	12.1
WSW	3.9	6.8	1.9	0.0	0.0	0.0	12.5
W	3.1	3.4	0.4	0.0	0.0	0.0	7.0
WNW	1.4	0.8	0.0	0.0	0.0	0.0	2.3
NW	1.3	0.5	0.0	0.0	0.0	0.0	1.8
NNW	1.6	2.1	0.1	0.0	0.0	0.0	3.8
Summary	47.3	37.2	5.7	0.5	0.0	0.0	90.6

PRAMP_RENO 2018/01/01 00:00 - 2018/12/31 23:00

Calm: 9.38% Calm Avg: 1.11 (kph)



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

SULPHUR DIOXIDE (SO ₂)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 99.2%, equivalent to six hours of downtime. • The analyzer spanned close to the lower acceptance limit on May 17. A repeat zero-span check conducted on May 18 drifted further outside the limit. This demonstrated that the permeation tube was depleted, prompting a site visit on May 19. Following a successful as-found response check, the permeation tube was replaced and the oven temperature was adjusted. A successful repeat calibration was subsequently completed. Six hours of downtime were recorded due to the additional quality checks.
June	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. • The routine monthly calibration was performed on October 18. The expected span value that was set following the daily zero-span check on October 19 was inaccurate, as the analyzer required a longer stabilization period. An additional zero-span check was later triggered at hour 08:00 to assess span response, incurring one hour of downtime on October 19.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 99.7%, equivalent to two hours of downtime. These were incurred due to an additional zero-span check performed on December 12 to assess a biased high drift in span response.

TOTAL REDUCED SULPHUR (TRS)	
January	- Operational time, for the monitoring period was 99.5%, equivalent to four hours of downtime. - The analyzer spanned towards the upper acceptance limit on January 5. Scheduled and additional span checks performed afterwards were within acceptance limits but suggested a need for corrective action. The issue was addressed during the routine monthly calibration performed on January 9. The calibration met AMD requirements and the expected span value was subsequently updated. The hour following the calibration was discarded due to the analyzer's slow recovery from the post-calibration internal zero-span check. Four hours of downtime were recorded due to this event.
February	Operational time for the monitoring period was 100%. No operational issues were identified.
March	- Operational time for the monitoring period was 99.6%, equivalent to three hours of downtime. - Due to unstable station temperature, analyzer span response fluctuated between March 10 and March 12, with two instances where the analyzer spanned outside the upper acceptance limit. In both cases, the repeat zero-span checks conducted in the earlier hours of the following day were very close to the mean and did not show a drift. This prompted a site visit on March 13 where the routine monthly calibration was successfully completed. The air conditioning system was adjusted during this visit and no further issues were identified. As the monthly calibration met AMD requirements, no data was discarded due to this event. However, three hours of downtime were recorded due to the additional zero-span checks.
April	Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. This was incurred due to an additional zero-span check performed on April 29 to assess a biased high drift in span response.
May	Operational time for the monitoring period was 99.7%, equivalent to two hours of downtime. These were incurred due to an additional zero-span check performed on May 1 to assess a biased high drift in span response.
June	- Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23. - The zero-span system oven temperature was adjusted on June 14, causing the analyzer to span outside the lower acceptance limit on June 15. The expected span value was updated later on June 15 after the oven temperature had stabilized. This event did not impact data quality.
July	Operational time for the monitoring period was 99.7%, equivalent to two hours of downtime. These were incurred due to an additional zero-span check performed between July 3 and July 4 to assess a biased low drift in span response.
August	Operational time for the monitoring period was 100%. No operational issues were identified.
September	Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.

TOTAL REDUCED SULPHUR (TRS) contd.

October	- Operational time for the monitoring period was 99.1%, equivalent to seven hours of downtime. - The routine monthly calibration was attempted on October 18 but was aborted as AMD requirements were not met when the analyzer was tested at Mid point. Troubleshooting traced the problem to the calibration gas. The analyzer was restored to the as-found background settings, an additional zero-span check was successfully completed and the analyzer was returned to sampling mode. A successful monthly calibration was subsequently completed on October 19, using an alternate calibration gas. Seven hours of downtime were attributed to the unsuccessful calibration attempt and the troubleshooting/corrective actions performed around it.
November	Operational time for the monitoring period was 100%. No operational issues were identified.
December	Operational time for the monitoring period was 100%. No operational issues were identified.

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

January	- Operational time, for the monitoring period was 97.3%, equivalent to twenty hours of downtime. - Upon arrival at the station on January 9 for the routine monthly calibration, the carrier (Nitrogen) gas was found running low even though it had only been replaced on December 30. Further investigation revealed a leak in the regulator. The regulator was swapped with a THC regulator and calibration was commenced. However, the low point did not meet AMD requirements. It was suspected that the alternate regulator might have been a source of contamination, compromising the calibration. Column conditioning was, therefore, run overnight to remove any possible contamination. A successful post-repair calibration was completed on January 10. Twenty hours of downtime were recorded due to this event. - As the carrier gas leakage did not impact analyzer performance, as demonstrated by the daily QC and analyzer diagnostics which met AMD requirements, showing no drifts or anomaly, and the as-found portion of the calibration was successful, data collected between the last multi-point calibration on December 30 and the calibration attempt on January 9 are deemed valid.
February	- Operational time for the monitoring period was 99.7%, equivalent to two hours of downtime. - The fuel gas (H₂) cylinder was replaced on February 9. An additional zero-span check was completed afterwards as a quality check, incurring one hour of downtime. - The routine monthly calibration was performed on February 22. The fuel gas (H₂) cylinder was replaced before the calibration. One hour of downtime was incurred at hour 12:00 due to sample manifold cleaning. - A canister event was recorded on February 25 at 23:50, at an initial concentration of 0.40 ppm. However, the sample was not analyzable due to a collection error. This might have resulted from loose electrical connections, causing the sample valve not to open for the duration of sample collection.

TOTAL HYDROCARBONS (THC), METHANE (CH ₄) & NON-METHANE HYDROCARBONS (NMHC) contd.	
March	- Operational time for the monitoring period was 100%. No operational issues were identified. - A canister event was recorded on March 7 at 21:45, at an initial concentration of 0.42 ppm. A pressure sensor for the canister system was installed on March 13.
April	Operational time for the monitoring period was 100%. No operational issues were identified.
May	- Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. - The span gas cylinder was replaced on May 19. An additional zero-span check was conducted afterwards to provide a reference for the expected span value that would reflect the concentration of the new gas. One hour of downtime was recorded due to the additional quality check.
June	- Operational time for the monitoring period was 93.3%, equivalent to forty-eight hours of downtime. - The fuel gas (H₂) pressure ran low on June 8, prompting a site visit on June 9 where the gas cylinder was replaced by a Reno site contact. An additional zero-span response check was completed afterwards as a quality check. Twenty- two hours of downtime were recorded due to this event. - The analyzer started recording unusually low concentrations on June 12, prompting a site visit on June 13. Upon arrival, the analyzer was found to have flamed out due to a leak in the tubing connected to the fuel gas regulator. The leak was repaired, the fuel gas cylinder was replaced and the analyzer was relit. A successful routine monthly calibration was subsequently completed. Nineteen hours of downtime were recorded due to this event. - A power failure occurred from hour 18:00 on June 22 to hour 00:00 on June 23, incurring seven hours of downtime.
July	- Operational time for the monitoring period was 98.9%, equivalent to eight hours of downtime. - The carrier gas (N₂) pressure ran low on July 2, prompting an immediate site visit where the gas cylinder was replaced. An additional zero-span response check was completed afterwards as a quality check. Seven hours of downtime were recorded due to this event. - The routine monthly calibration was performed on July 4. One hour of downtime as incurred at hour 09:00 due to sample manifold cleaning. - On July 18, the channels were placed briefly in "maintenance" mode to prevent sample contamination while a wasp nest was being exterminated with a volatile aerosol insecticide. This did not impact the hourly average data completeness criteria. - During minute data review, CH₄ minute concentrations recorded lower than 1.80 ppm, along with the corresponding THC and NMHC values, were excluded and the corresponding hourly average recalculated, due to suspected poor injections. - One 5-minute concentration of 2.10 ppm was recorded on July 2 at 08:10. This is not considered a valid canister event as the carrier gas was being replaced at the time.

TOTAL HYDROCARBONS (THC), METHANE (CH₄) & NON-METHANE HYDROCARBONS (NMHC) contd.

August	- Operational time for the monitoring period was 79.7%, equivalent to 151 hours of downtime. The AMD's 90% operational time requirement was not met this month. This contravention was reported to AEP under reference number: 343123. - The carrier gas (N₂) pressure ran low on August 5, prompting a site visit on August 7 where the gas cylinder was replaced. A zero-span response check was completed afterwards as a quality check. Thirty-seven hours of downtime were recorded due to this event. - The fuel gas (H₂) pressure ran low on August 8, prompting a site visit on August 9 where both the fuel and span gas cylinders were replaced and the routine monthly calibration was successfully completed. Twenty-three hours of downtime were recorded due to this event. - Beginning on August 18, frequent poor sample injections were observed. This prompted a site visit on August 21 where a shut-down calibration was attempted prior to maintenance. However, the As-Found High point did not meet requirements as there were poor sample injections that impacted the stability criteria. The rotor and actuator were replaced and a successful post-repair calibration was subsequently completed. Data was invalidated back to the point of failed performance, determined as August 18 at 00:00. Ninety-one hours of downtime were incurred due to this event. - Minute data for the month was reviewed. CH₄ minute concentrations recorded lower than 1.80 ppm, along with the corresponding THC and NMHC values, were excluded and the corresponding hourly average recalculated, due to poor injections. - A canister sample was collected on August 6 at 17:55 at an initial concentration of 0.32 ppm. This is not a valid event as the analyzer was offline at the time. The sample was however processed for background VOC analysis.
September	Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	- Operational time for the monitoring period was 95.6%, equivalent to thirty-three hours of downtime. - The fuel (H₂) and carrier (N₂) gas cylinders were replaced on October 1. The analyzer, however, failed to relight after the gas exchange, despite several attempts by Reno site contacts, due to a configuration error. This problem was corrected via remote connection where a programming conflict was resolved. The analyzer resumed normal operations on October 2, following a successful zero-span check. Thirty-three hours of downtime were incurred due to this event.
November	Operational time for the monitoring period was 100%. No operational issues were identified.
December	- Operational time for the monitoring period was 100%. - Anomalous data outputs were recorded for THC on December 1 at 10:31, and for CH₄ on December 23 at 08:59. These data, along with the respective corresponding Hydrocarbon minute data, were discarded and the hourly averages were re-calculated.

WIND SPEED (WS) & WIND DIRECTION (WD)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 100%. No operational issues were identified.
June	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 100%. No operational issues were identified.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 100%. No operational issues were identified.

RELATIVE HUMIDITY (RH)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 100%. No operational issues were identified.
June	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 100%. No operational issues were identified.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 100%. No operational issues were identified.

BAROMETRIC PRESSURE (BP)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 100%. No operational issues were identified.
June	Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 100%. No operational issues were identified.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 100%. No operational issues were identified.

AMBIENT TEMPERATURE (AT)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 100%. No operational issues were identified.
June	Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 100%. No operational issues were identified.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 100%. No operational issues were identified.

STATION TEMPERATURE (STNTPX)	
January	• Operational time for the monitoring period was 100%. No operational issues were identified.
February	• Operational time for the monitoring period was 100%. No operational issues were identified.
March	• Operational time for the monitoring period was 100%. No operational issues were identified.
April	• Operational time for the monitoring period was 100%. No operational issues were identified.
May	• Operational time for the monitoring period was 100%. No operational issues were identified.
June	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a power failure that occurred from hour 18:00 on June 22 to hour 00:00 on June 23.
July	• Operational time for the monitoring period was 100%. No operational issues were identified.
August	• Operational time for the monitoring period was 100%. No operational issues were identified.
September	• Operational time for the monitoring period was 99.0%, equivalent to seven hours of downtime. These were incurred due to a data-logger upgrade. The Ultimate data-logger was installed to replace the resident ESC 8832.
October	• Operational time for the monitoring period was 100%. No operational issues were identified.
November	• Operational time for the monitoring period was 100%. No operational issues were identified.
December	• Operational time for the monitoring period was 100%. No operational issues were identified.

List of Acronyms

AAAQO	Alberta Ambient Air Quality Objectives and Guidelines Summary
A/C	Air Conditioning
AEP	Alberta Environment and Parks
AMD	Air Monitoring Directive
AT	Ambient Temperature
BP	Barometric Pressure
CH₄	Methane
hr	Hour
hrs	Hours
HVAC	Heating, Ventilation, and Air Conditioning
kph	Kilometers per hour
MaxDate	Date and time maximum value was recorded
mbar	Millibar
MinDate	Date and time minimum value was recorded
NMHC	Non-methane Hydrocarbon
Num	Number
ppb	Parts per billion
ppm	Parts per million
QA	Quality assurance
QC	Quality control
RH	Relative Humidity
s/n	Serial Number
SOP	Standard Operating Procedure
SO₂	Sulphur Dioxide
STNTPX	Station Temperature
THC	Total Hydrocarbons
TRS	Total Reduced Sulphur
UV	Ultraviolet
vs.	versus
WS	Wind Speed
WD	Wind Direction
°C	Degrees Celsius

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of this report