

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

April 2, 2019

Subject: Annual Report Submission for the PRAMP 842 AQM station

Peace River Area Monitoring Program Committee (PRAMP) is pleased to submit the ambient air monitoring annual report conducted at the PRAMP 842 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, two contraventions were reported to AEP in 2018: AEP reference # 339130 for the June 2018 event, and AEP reference # 346425 for the October event. Both events were because the operational uptime for the hydrocarbon analyzer did not meet the 90% uptime requirement. A detailed summary of these incidents is included in the summary of monthly report discussions of the report.

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

The air monitoring station was replaced, and the data acquisition system was upgraded between July 31 and August 3. The Envirologics 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
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Peace River Area Monitoring Program
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JANUARY - DECEMBER 2018
ANNUAL AMBIENT AIR QUALITY MONITORING REPORT
Project #: 8449-2018-03-A
PRAMP-2018

Prepared for:

Peace River Area Monitoring Program Committee

Lily Lin

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Monitoring Station

Three Creeks 842b Station

Date of Report Issuance: March 31, 2019

Report Preparation By:

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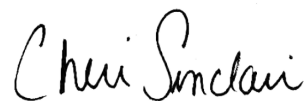
Project Team Lead, Customer Service, Air Services

Reviewed By:

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Supervisor, Customer Service, Air Services



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TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
Cover Letter	3
Annual Validation Synopsis	3
Summary of NMHC Canister Events	3
Exceedance & Performance Reporting	3
Monitoring Overview	4
Equipment and Procedure	5
Continuous Monitoring Annual Results Summary	6
Sulphur Dioxide	7
Total Reduced Sulphur	11
Total Hydrocarbon	14
Methane	17
Non-Methane Hydrocarbon	20
Ambient Temperature	23
Relative Humidity	26
Barometric Pressure	29
Station Temperature	32
Wind Speed & Wind Direction	35
Summary of Monthly Report Discussions	41
List of Acronyms	54
End of Report	55

Peace River Area Monitoring Program Committee

Peace River

Alberta T9N 2J7

Attention: Lily Lin

Date: March 31, 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 Three Creeks 842b Station near Peace River Oil Sands Area 2, 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	TRS	THC	CH ₄	NMHC	WS	RH	BP	AT	StnTPX
	ppb	ppb	ppm	ppm	ppm	kph	%RH	millibars	OC	OC
Minimum	0.0	0.00	1.86	1.86	0.00	0.1	14.0	915	-39.3	18.9
MinDate	2018/01/01 06:00	2018/07/03 02:00	2018/08/14 16:00	2018/08/14 16:00	2018/01/01 00:00	2018/01/15 18:00	2018/05/15 16:00	2018/12/11 17:00	2018/01/12 05:00	2018/03/30 10:00
Maximum	3	2.05	2.63	2.63	0.16	33.3	97	965	31.6	30.3
MaxDate	2018/02/05 13:00	2018/08/11 06:00	2018/03/13 04:00	2018/03/13 04:00	2018/11/28 08:00	2018/10/20 11:00	2018/11/28 06:00	2018/01/28 05:00	2018/06/20 16:00	2018/08/07 03:00
Avg	0	0.22	2.01	2.00	0.00	2.7	70	943	1.3	22.1
Num	8249	8172	7251	7251	7251	8689	8713	8713	8713	8713
Data[%]	99.0	98.3	87.1	87.1	87.1	99.2	99.5	99.5	99.5	99.5

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 842b	March 1, 2018	01:25	0.33	Not a valid event. Sample however analyzed for background study.
PRAMP 842b	July 26, 2018	07:30	0.31	Sample processed as per PRAMP Chain of Custody.

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 9.2% (in June) and 66.3% (in October) for the THC/CH₄/NMHC analyzer did not meet the equipment uptime specifications as per Chapter 6, DQ 4-C (AMD, 2016). These contraventions were reported to AEP under reference numbers 339130 and 346425, respectively.

Two major events contributed to the downtime in June.

- The analyzer failed to properly recover after replacing the fuel gas cylinder on June 2, due to a hardware failure. The analyzer (Thermo 55i, s/n:1505664392) was removed and a replacement analyzer (Thermo 55i, s/n:1433563261) was installed on June 3. A successful installation calibration was performed on June 4. Seventy-six hours of downtime were incurred due to this event.
- A calibration attempt on June 27 did not meet Maxxam's internal stability requirement. Column conditioning was run overnight and a successful post-repair calibration was completed on June 28. Data was discarded back to the last valid multi-point calibration, which was on June 4. 578 hours of downtime were recorded due to this event.

One major event was responsible for the downtime in October.

- A calibration attempt on October 31 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 October 21 at hour 06:00. Two hundred and fifty 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%	June	339130
Equipment uptime for THC/CH ₄ /NMHC < 90%	October	346425

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.

Monthly Monitoring Overview:

Station Upgrade: A station upgrade was implemented between July 31 and August 3. The trailer was replaced and the Envidas 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	Thermo 43i UV Fluorescent Analyzer	Maxxam AIR SOP-00209: Ambient Sulphur Monitoring	835033373
TOTAL REDUCED SULPHUR (TRS)	ppb	Thermo 43i - TLE UV Fluorescent Analyzer		1164600023
TOTAL HYDROCARBONS (THC)	ppm	Thermo 55i FID Analyzer	Maxxam AIR SOP-00001 - Methane, Non-Methane Hydrocarbon Analyzer Monitoring	1505664392, 1433563261
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	124638
WIND DIRECTION (WD)	degree			
RELATIVE HUMIDITY (RH)	%	Campbell Scientific Unit	Operation Manual	C2608
BAROMETRIC PRESSURE (BP)	mbar	Met One Unit	Operation Manual	K12864
AMBIENT TEMPERATURE (AT)	°C	Campbell Scientific Unit	Operation Manual	C2608
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	685	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
May	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
June	675	98.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
July	674	95.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
August	670	94.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
September	684	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	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
December	707	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	172	48.0	0	0	0
Annual	8249	99.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			0	0	0

N/D - Valid Data Not Available

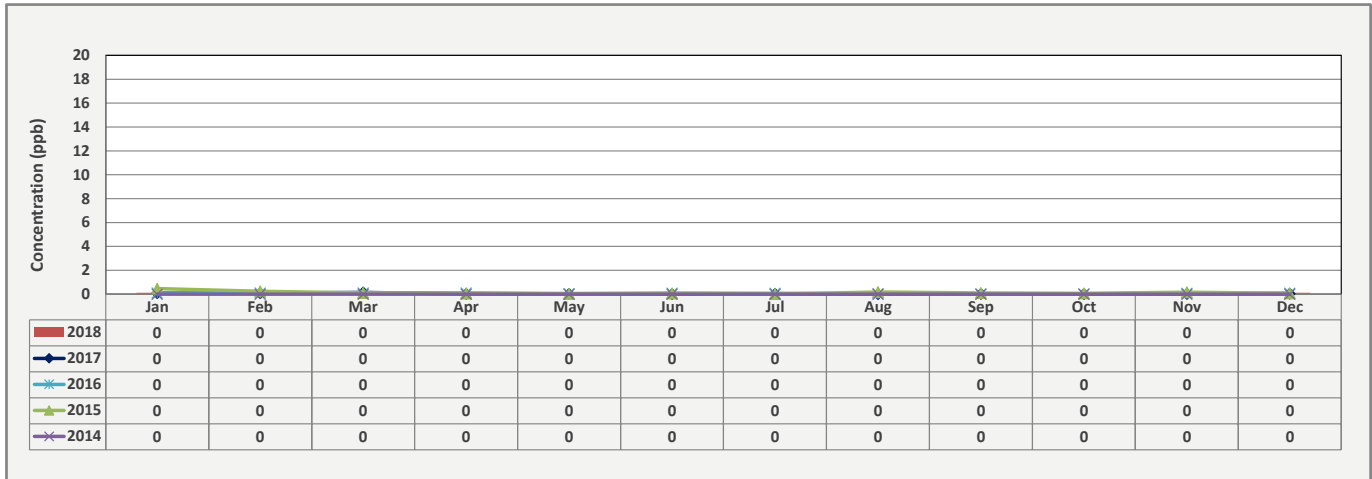
*# of valid readings excluding calibration hours

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

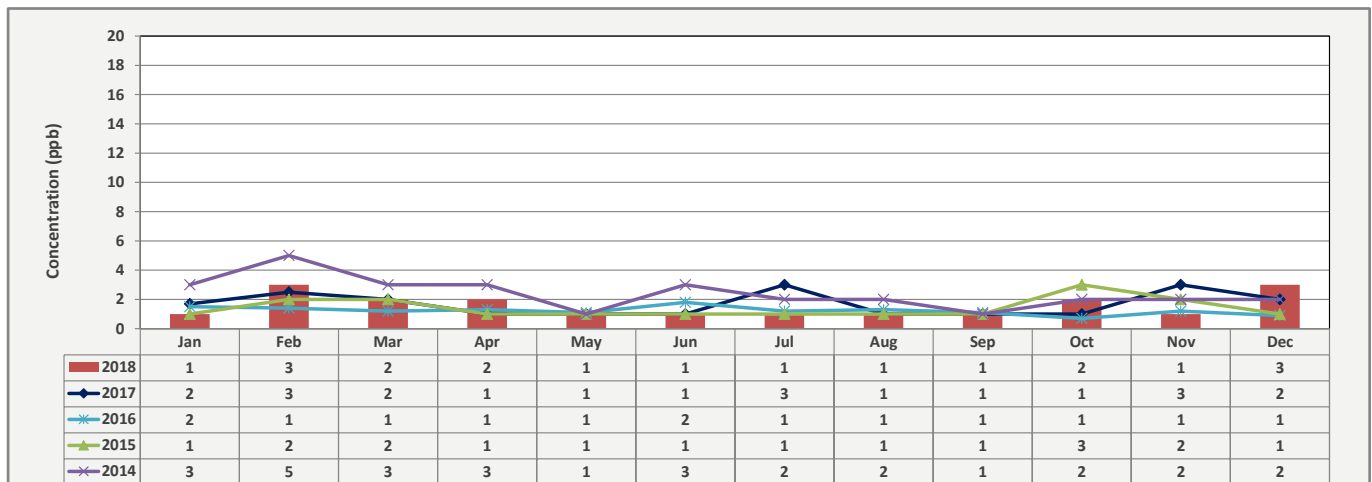
Alberta Ambient Air Quality Objectives Annual Average**	8.0	ppb
Annual Average for 2018	0	ppb

SO ₂ Data Identifiers _ Total Hours Flagged = 511										
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	52	4	0	9	0	0	374	0	1	71

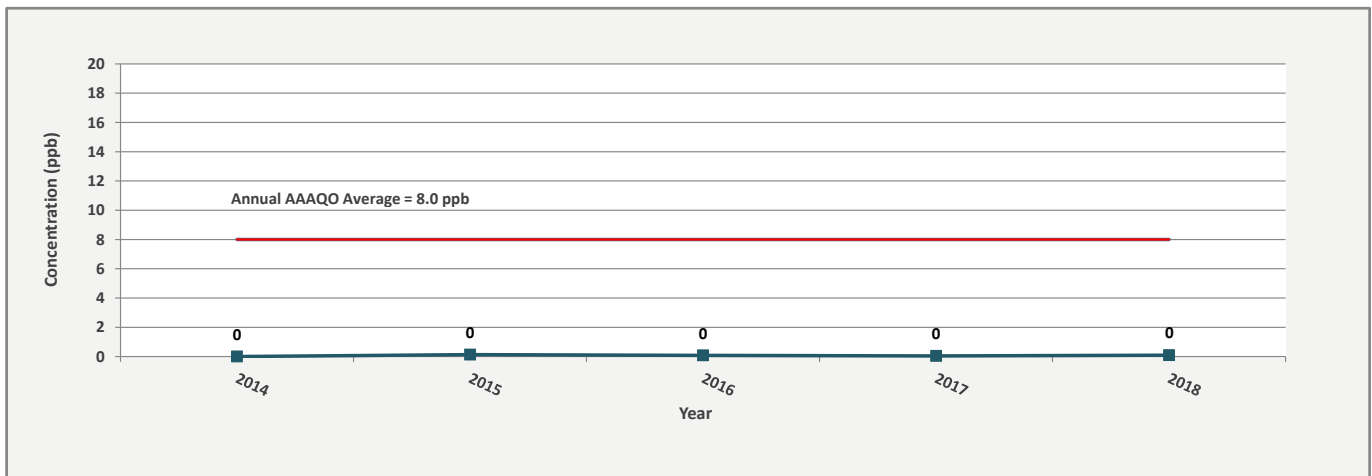
2014 to 2018 SO₂ Monthly Averages



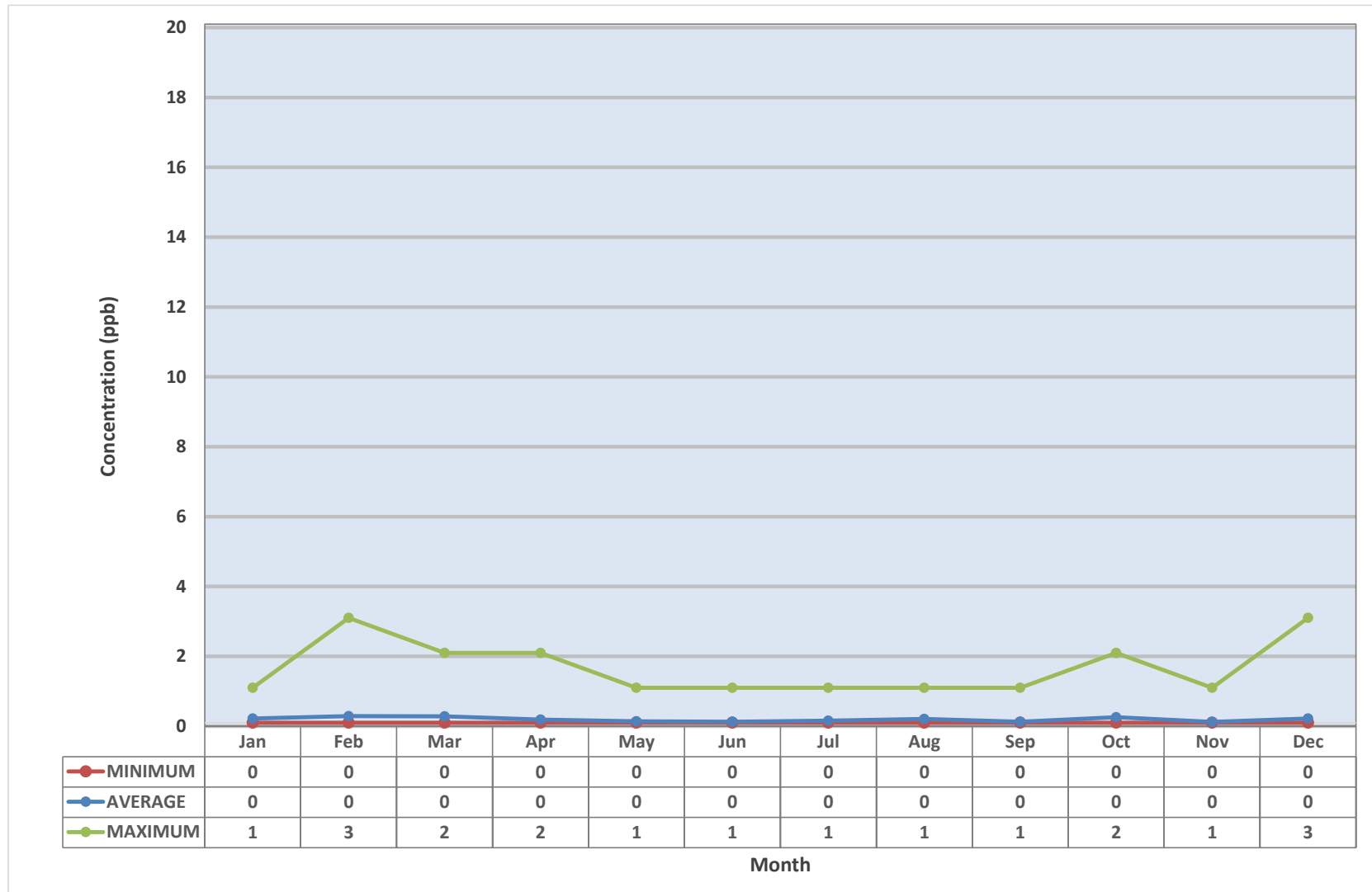
2014 to 2018 SO₂ Monthly Maximum Averages



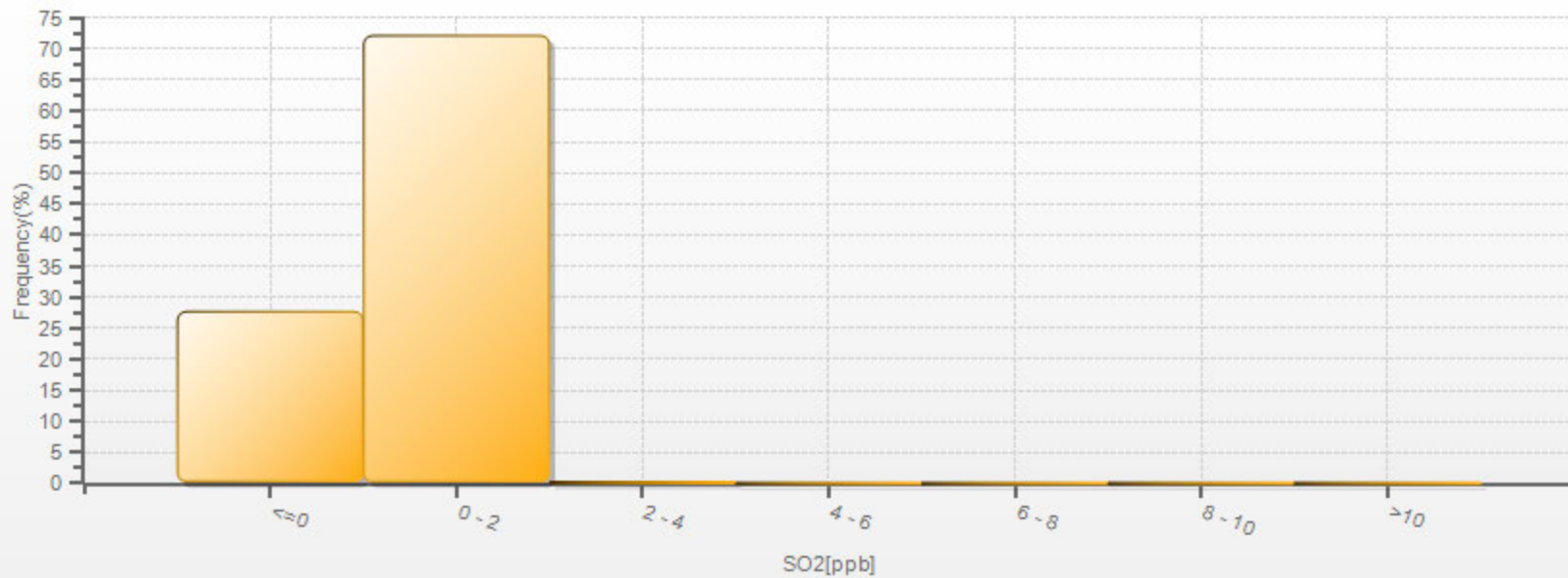
2014 to 2018 SO₂ Annual Averages



2018 SO₂ Monthly Statistics



SO2[ppb] Histogram: PRAMP_842 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	667	94.4	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.19
February	637	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.20
March	701	99.5	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.18
April	685	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.16
May	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.17
June	674	98.8	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.22
July	674	95.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.27
August	648	91.5	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.38
September	683	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.17
October	707	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.20
November	683	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.22
December	706	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	0.26
Annual	8172	98.3	100.0%	0.0%	0.0%	0.0%			0	0	0.22

N/D - Valid Data Not Available

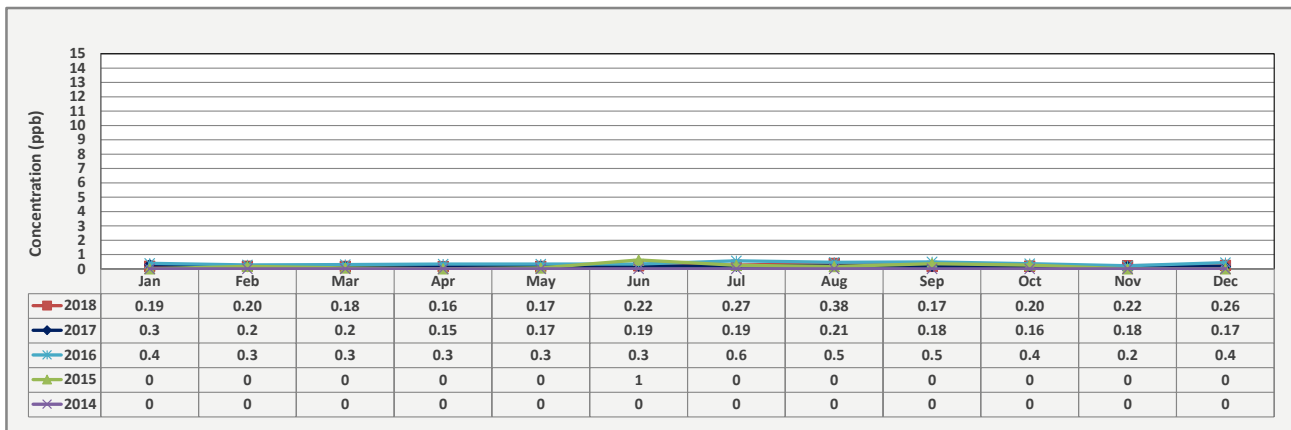
*# of valid readings excluding calibration hours

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

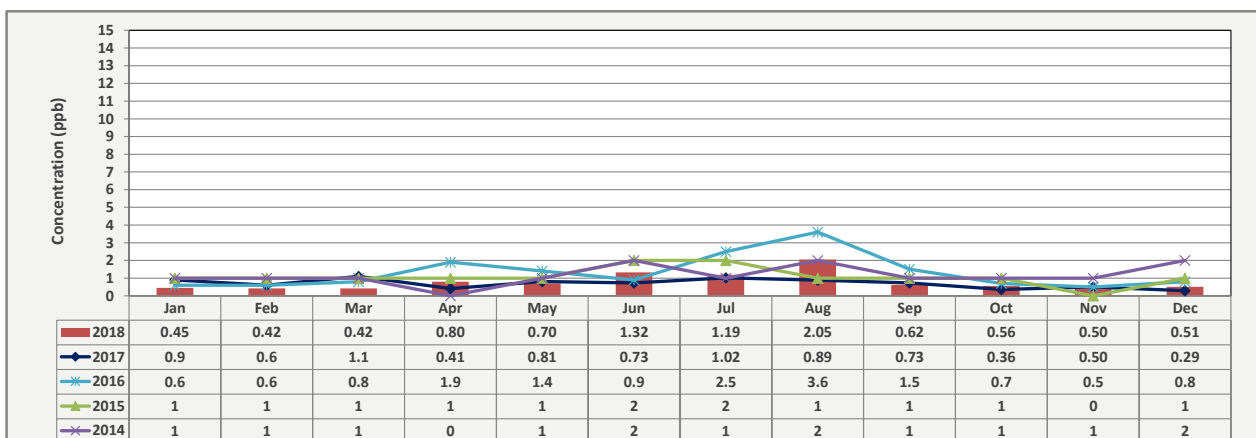
Alberta Ambient Air Quality Objectives Annual Average**	-	ppb
Annual Average for 2018	0.22	ppb

TRS Data Identifiers _ Total Hours Flagged = 588										
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	61	19	0	9	0	0	372	3	1	123

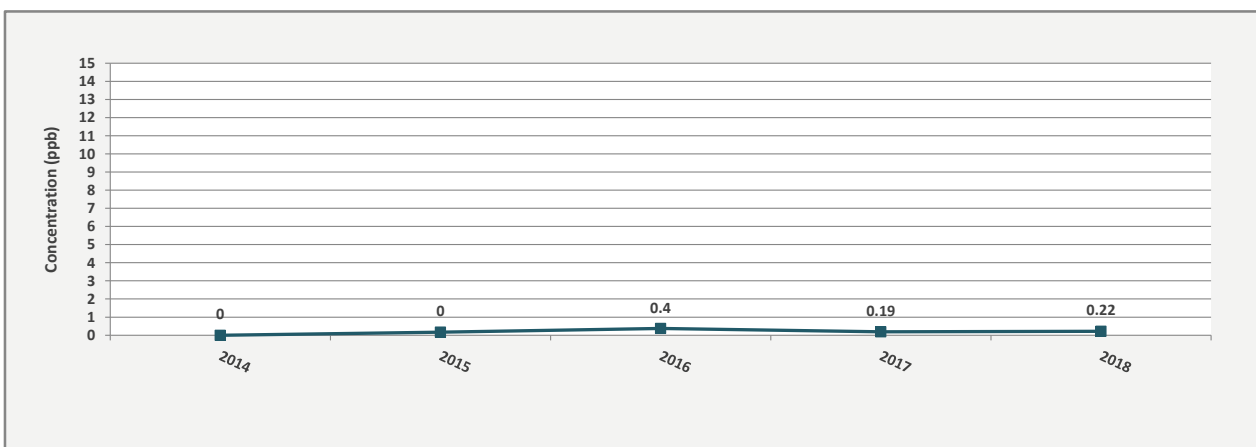
2014 to 2018 TRS Monthly Averages



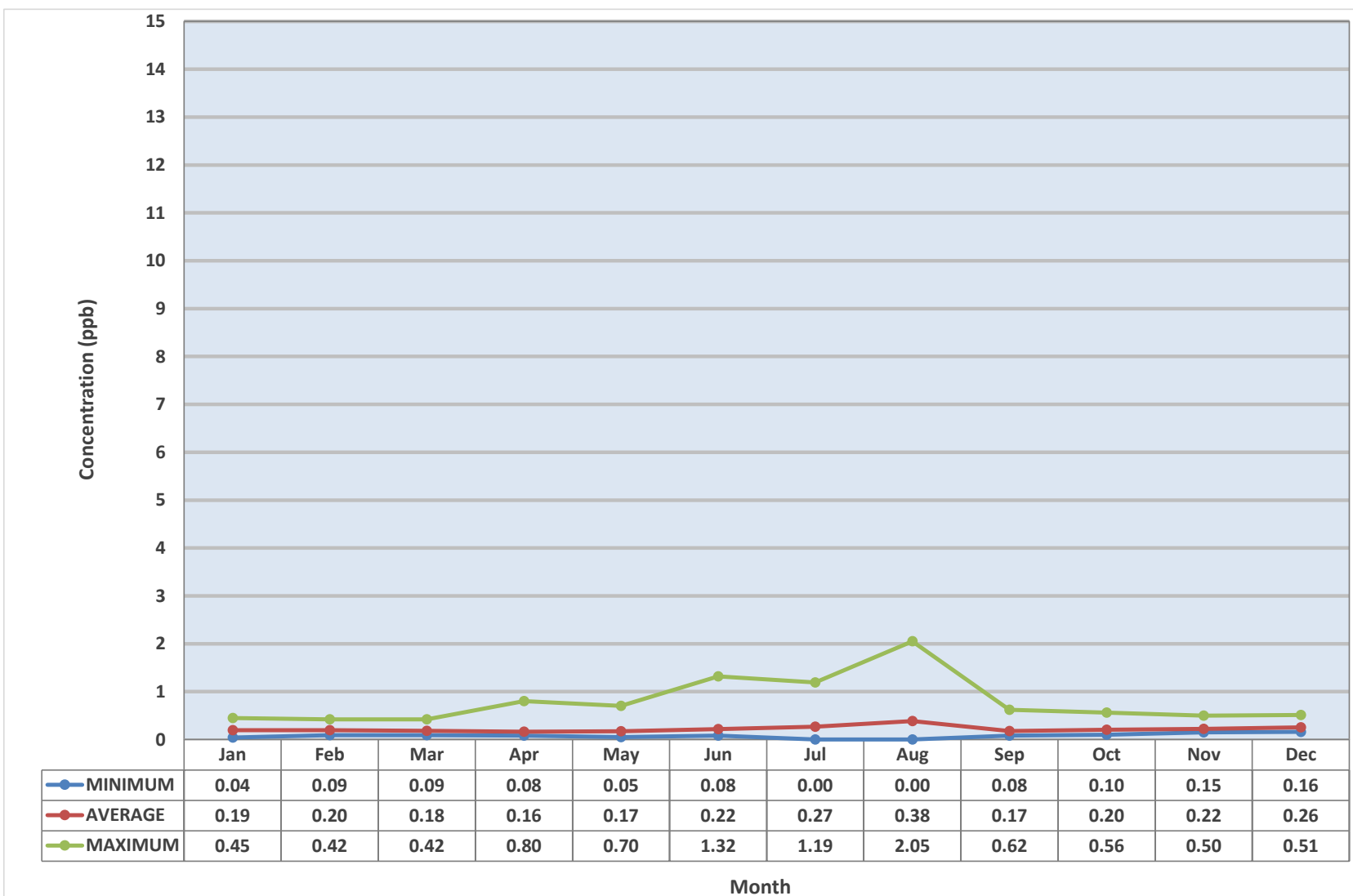
2014 to 2018 TRS Monthly Maximum Averages



2014 to 2018 TRS Annual Averages



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	706	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.05
February	631	98.8	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.99
March	689	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.02
April	682	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.98
May	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.96
June	57	9.2	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.93***
July	651	92.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.95
August	647	91.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.99
September	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.01
October	468	66.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.00***
November	622	91.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.03
December	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.06
Annual	7251	87.1	100.0%	0.0%	0.0%	0.0%			0	0	2.01

N/D - Valid Data Not Available

*# of valid readings excluding calibration hours

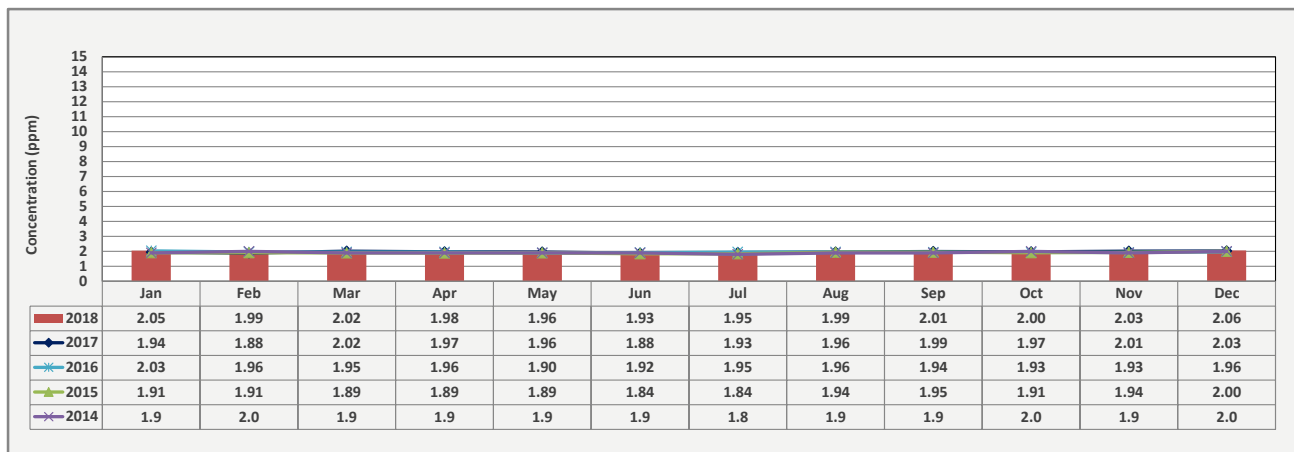
**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

***The monthly average is displayed for reference only and was not included in the annual average. The data completeness criteria for a monthly average was not met, as per Appendix A.

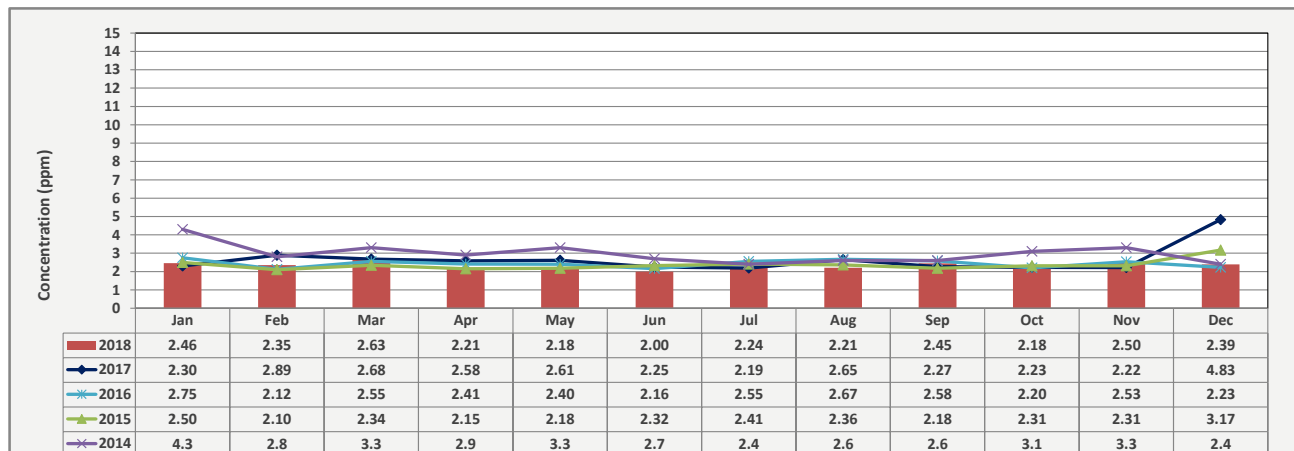
Alberta Ambient Air Quality Objectives Annual Average**	-	ppm
Annual Average for 2018	2.01	ppm

THC Data Identifiers _ Total Hours Flagged = 1509										
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	52	19	0	4	0	0	332	13	954	135

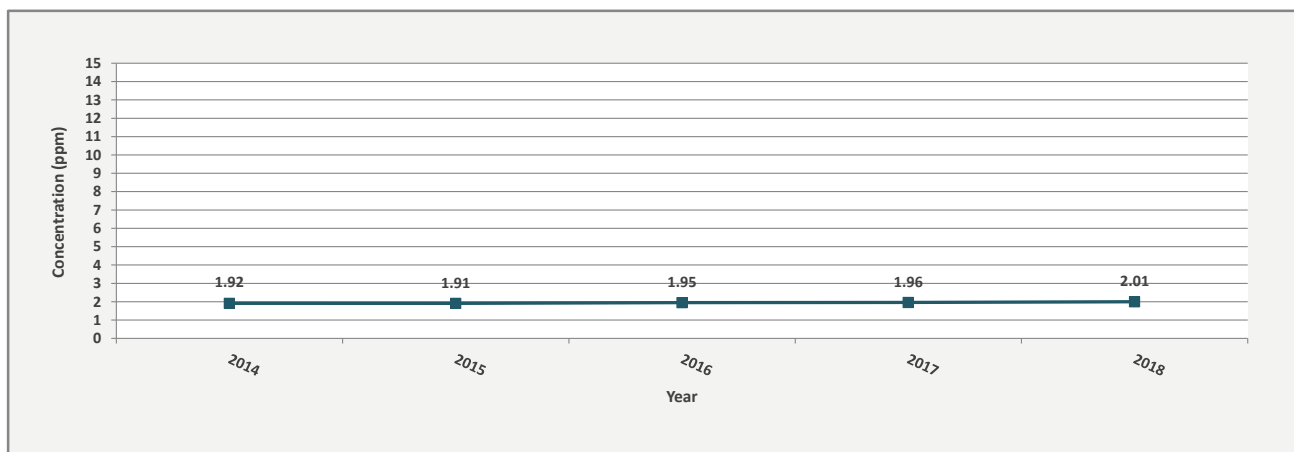
2014 to 2018 THC Monthly Averages



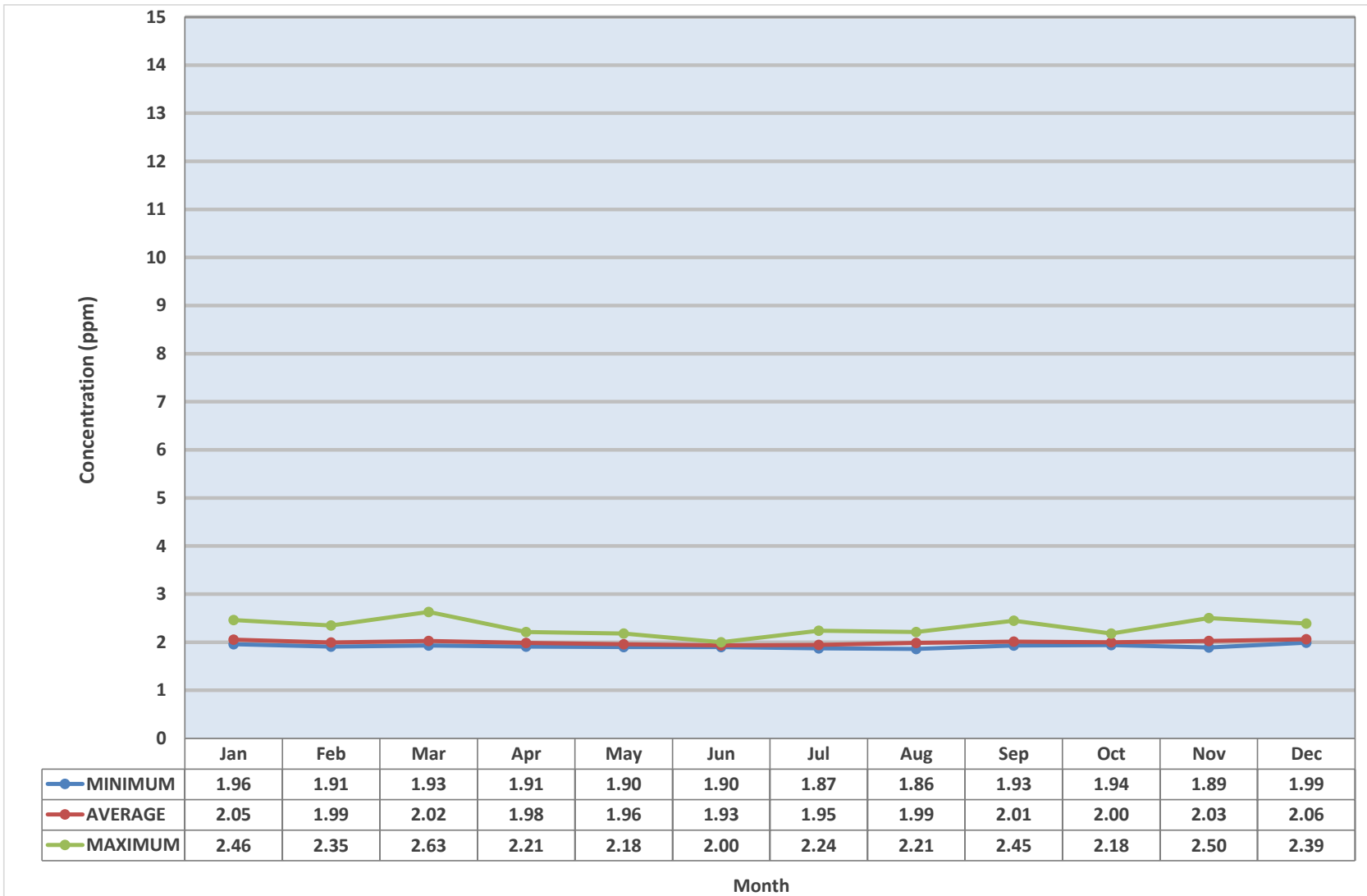
2014 to 2018 THC Monthly Maximum Averages



2014 to 2018 THC Annual Averages



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	706	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.05
February	631	98.8	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.99
March	689	97.6	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.02
April	682	99.7	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.98
May	708	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.96
June	57	9.2	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.93***
July	651	92.1	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.95
August	647	91.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	1.99
September	684	100.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.01
October	468	66.3	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.00***
November	622	91.0	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.03
December	706	99.9	100.0%	0.0%	0.0%	0.0%	-	-	-	-	2.06
Annual	7251	87.1	100.0%	0.0%	0.0%	0.0%			0	0	2.00

N/D - Valid Data Not Available

*# of valid readings excluding calibration hours

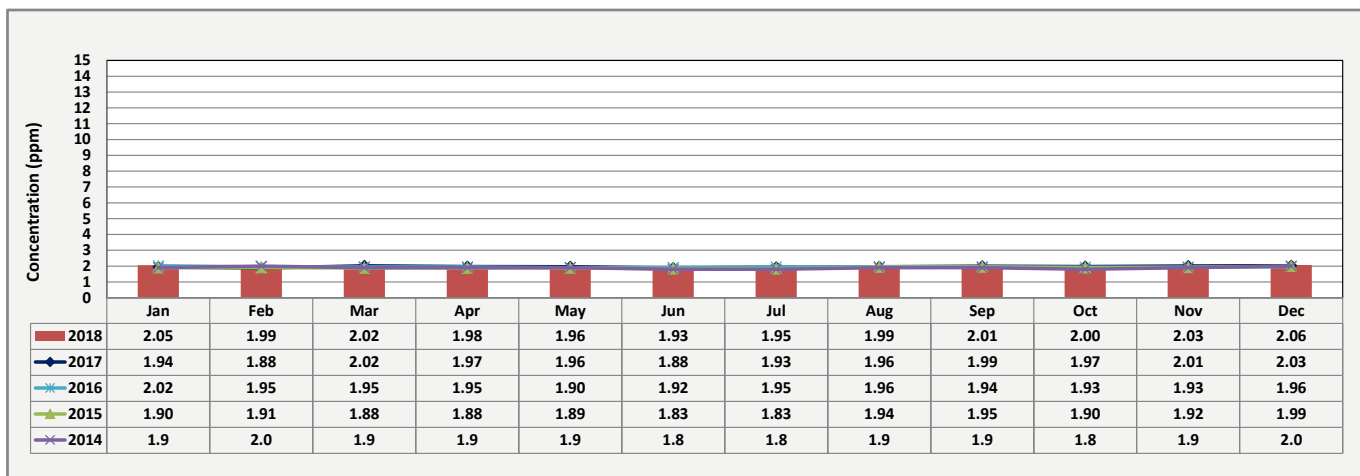
**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

***The monthly average is displayed for reference only and was not included in the annual average. The data completeness criteria for a monthly average was not met, as per Appendix A.

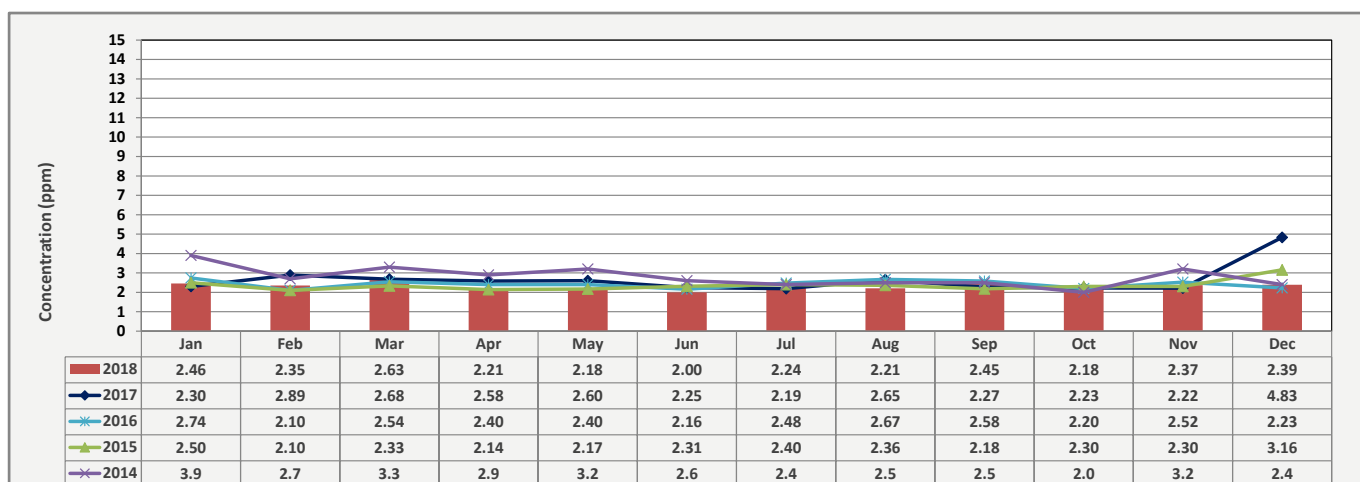
Alberta Ambient Air Quality Objectives Annual Average**	- ppm
Annual Average for 2018	2.00 ppm

CH ₄ Data Identifiers _ Total Hours Flagged = 1509										
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	52	19	0	4	0	0	332	13	954	135

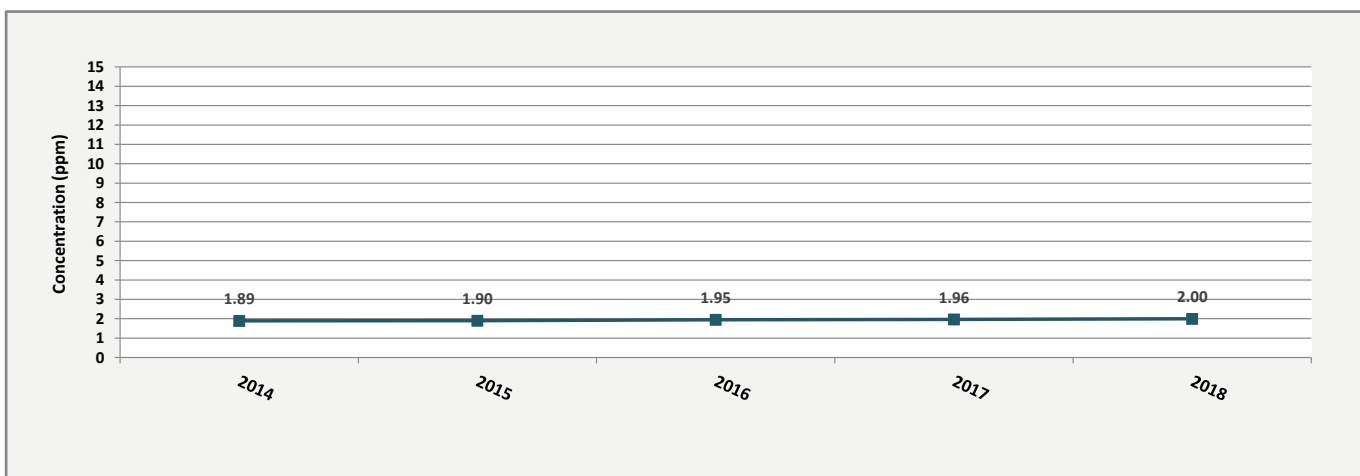
2014 to 2018 CH₄ Monthly Averages



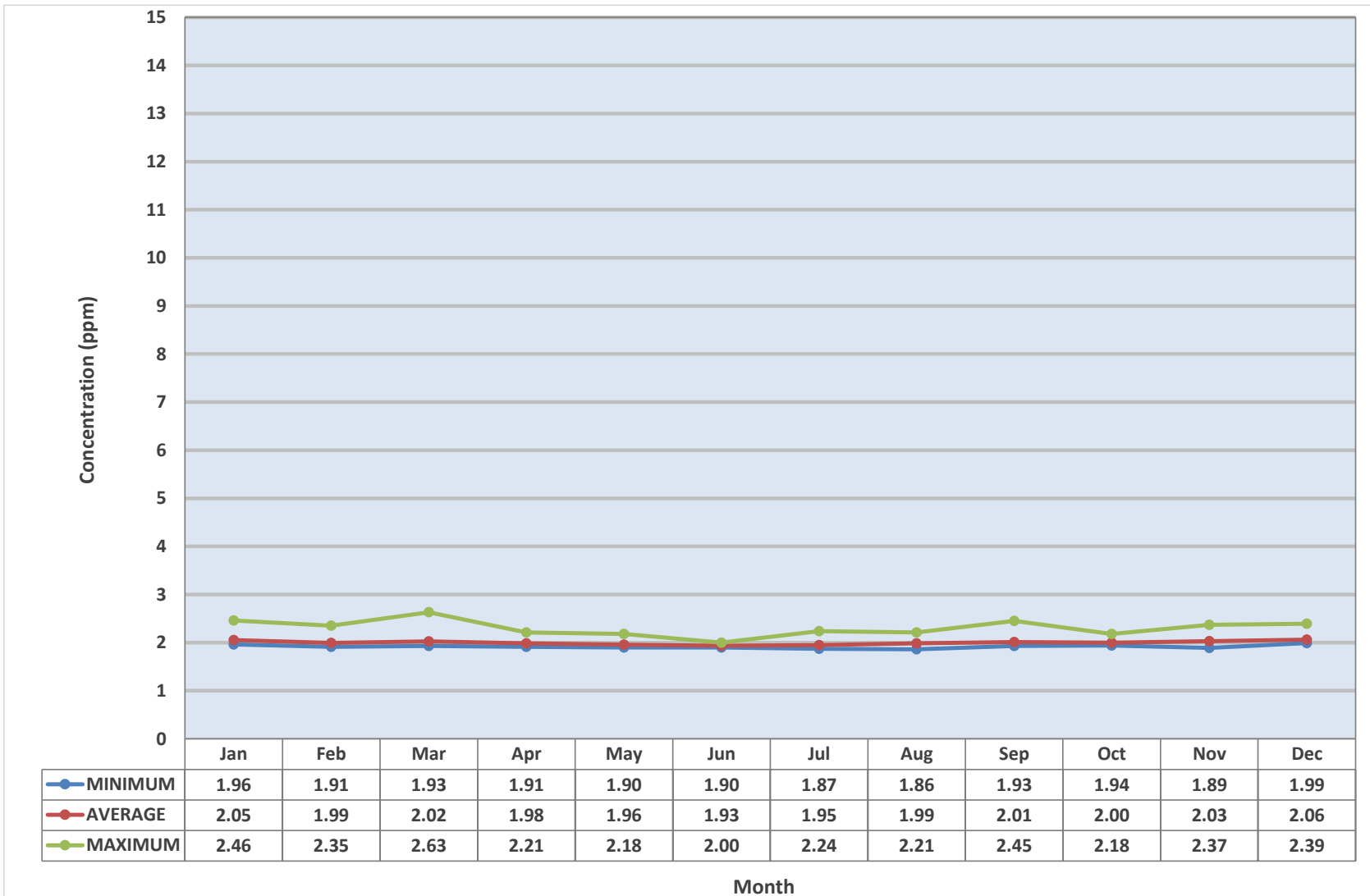
2014 to 2018 CH₄ Monthly Maximum Averages



2014 to 2018 CH₄ Annual Averages



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	706	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
February	631	98.8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
March	689	97.6	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
April	682	99.7	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
May	708	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
June	57	9.2	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00***
July	651	92.1	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
August	647	91.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
September	684	100.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
October	468	66.3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00***
November	622	91.0	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
December	706	99.9	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	0.00
Annual	7251	87.1	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

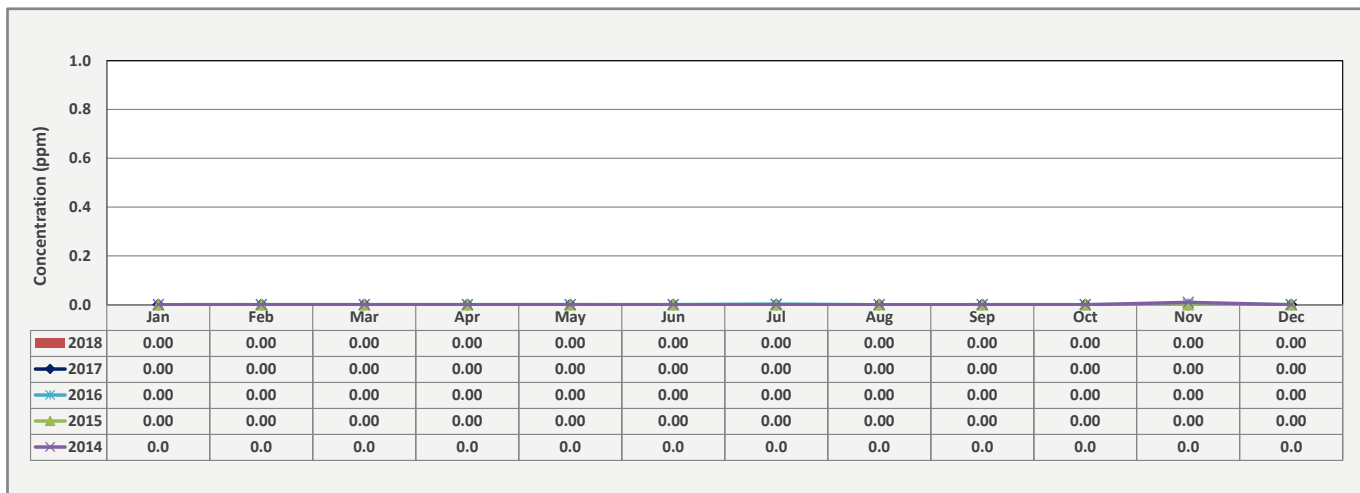
**If Alberta Ambient Air Quality Objectives and Guidelines are not available '-' is used

***The monthly average is displayed for reference only and was not included in the annual average. The data completeness criteria for a monthly average was not met, as per Appendix A.

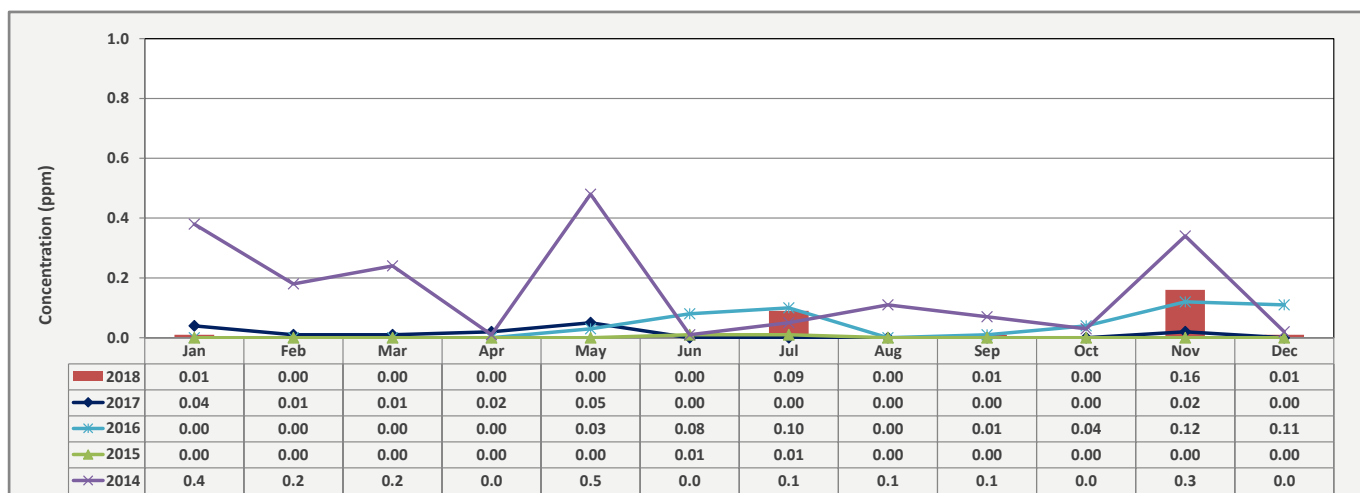
Alberta Ambient Air Quality Objectives Annual Average**	-	ppm
Annual Average for 2018	0.00	ppm

NMHC Data Identifiers _ Total Hours Flagged = 1509										
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	52	19	0	4	0	0	332	13	954	135

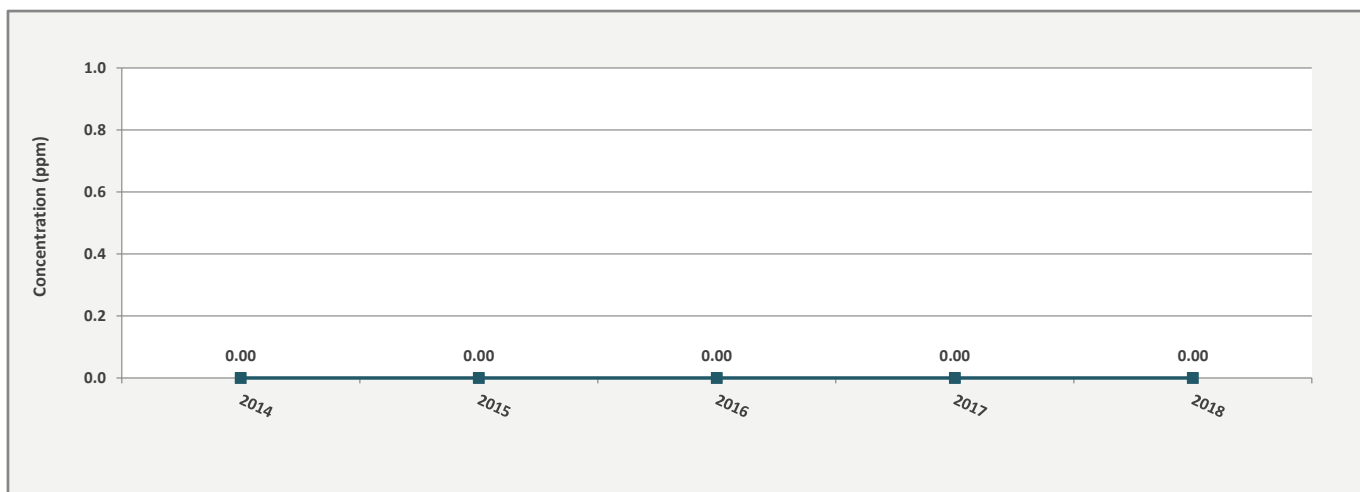
2014 to 2018 NMHC Monthly Averages



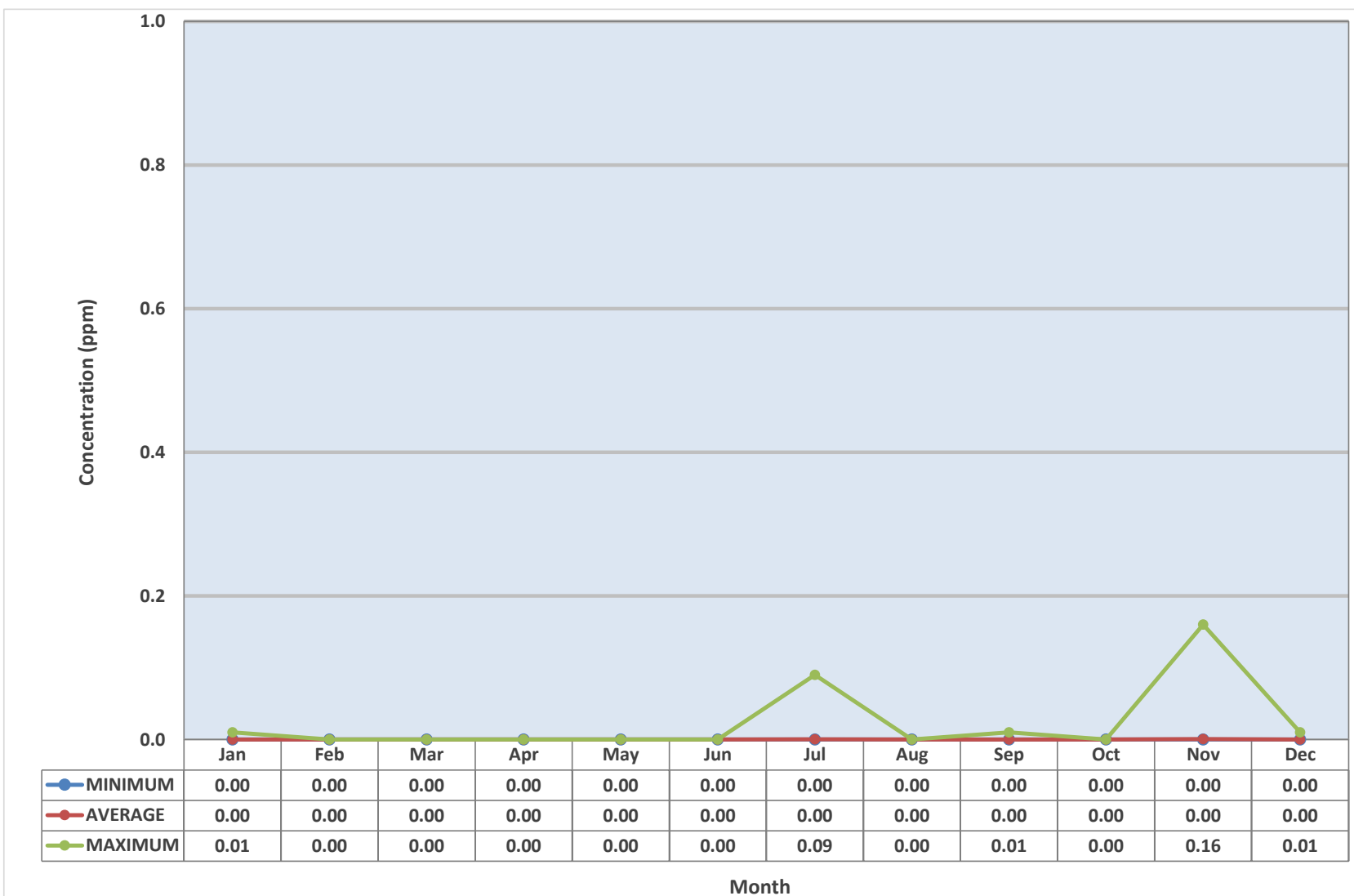
2014 to 2018 NMHC Monthly Maximum Averages



2014 to 2018 NMHC Annual Averages



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	-12.9	2.7	-0.1
February	672	100.0	-15.2	1.6	-1.0
March	744	100.0	-7.1	12.5	3.4
April	720	100.0	-0.1	21.4	11.9
May	744	100.0	14.0	30.2	22.5
June	711	98.8	14.4	31.6	24.9
July	728	97.8	15.9	26.6	20.9
August	722	97.0	14.7	27.7	20.0
September	720	100.0	4.0	18.6	12.6
October	744	100.0	2.4	18.4	13.0
November	720	100.0	-5.4	5.6	2.7
December	744	100.0	-9.2	3.0	0.3
Annual	8713	99.5	1.3	16.7	10.9

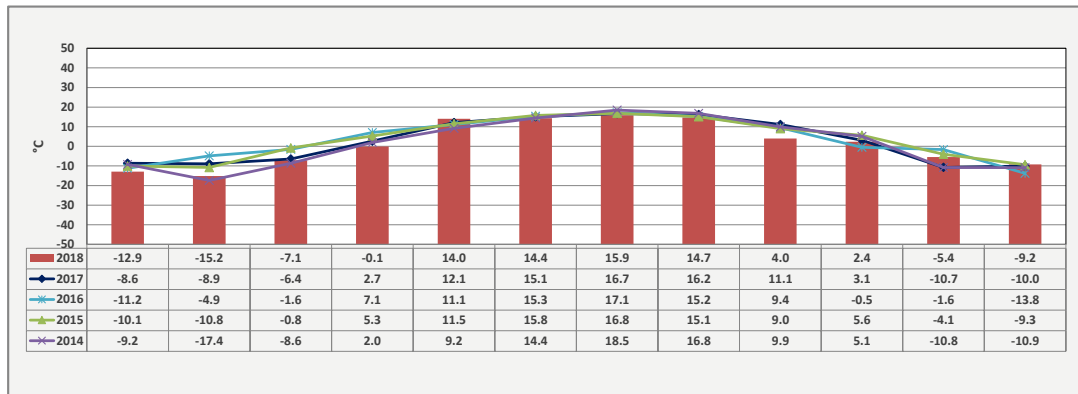
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

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

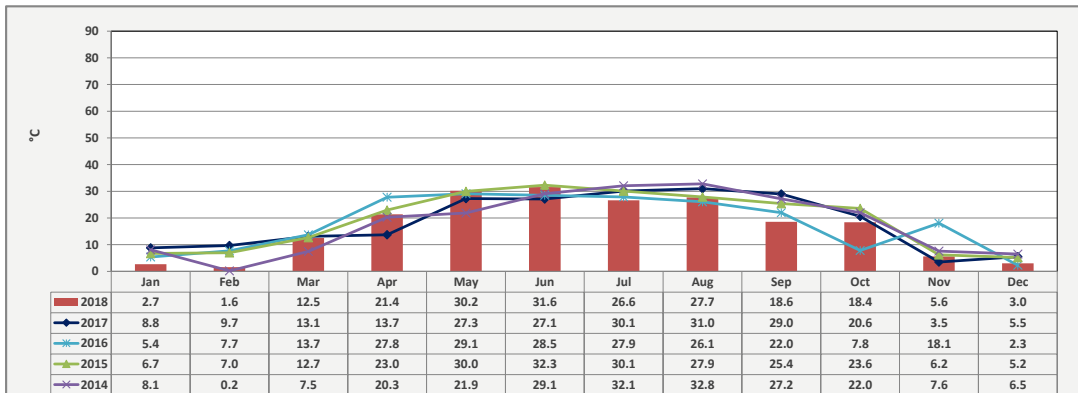
Annual Average for 2018	1.3 °C
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AT Data Identifiers _ Total Hours Flagged = 47								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment 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	9	0	0	0	38

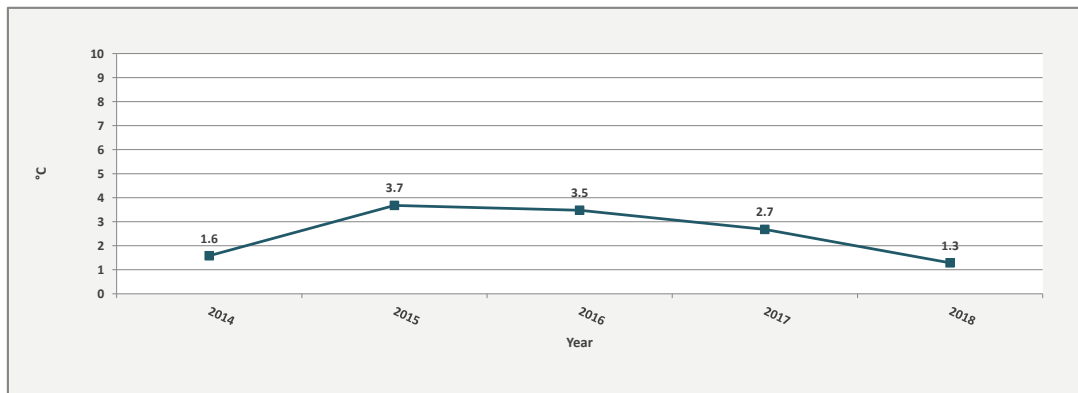
2014 to 2018 AT Monthly Averages



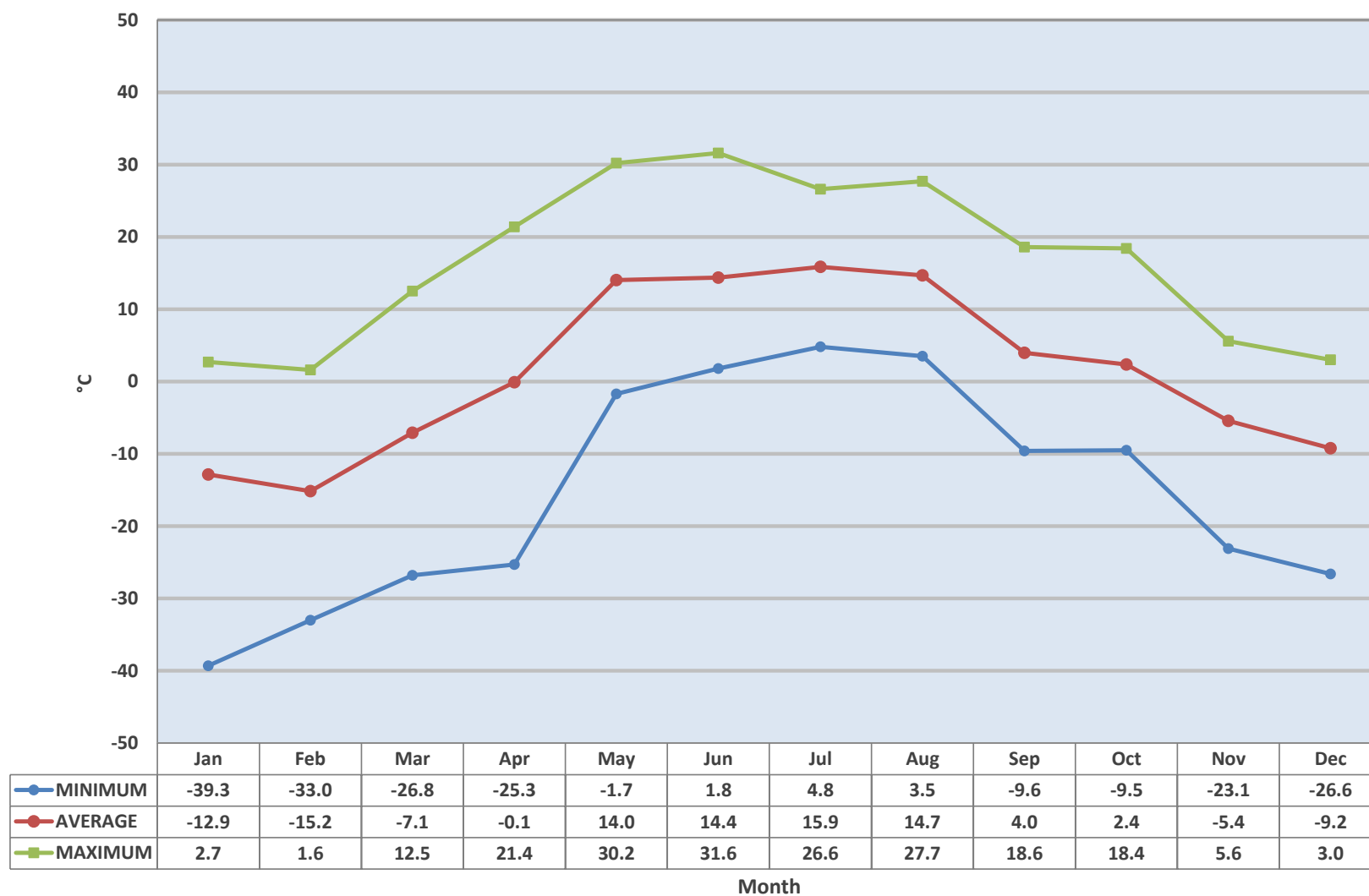
2014 to 2018 AT Monthly Maximum Averages



2014 to 2018 AT Annual Averages



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	81	95	93
February	672	100.0	75	96	85
March	744	100.0	68	93	84
April	720	100.0	58	95	92
May	744	100.0	45	95	61
June	711	98.8	65	96	90
July	728	97.8	72	95	90
August	722	97.0	70	96	93
September	720	100.0	75	96	93
October	744	100.0	66	96	91
November	720	100.0	83	97	93
December	744	100.0	79	95	92
Annual	8713	99.5	70	95	88

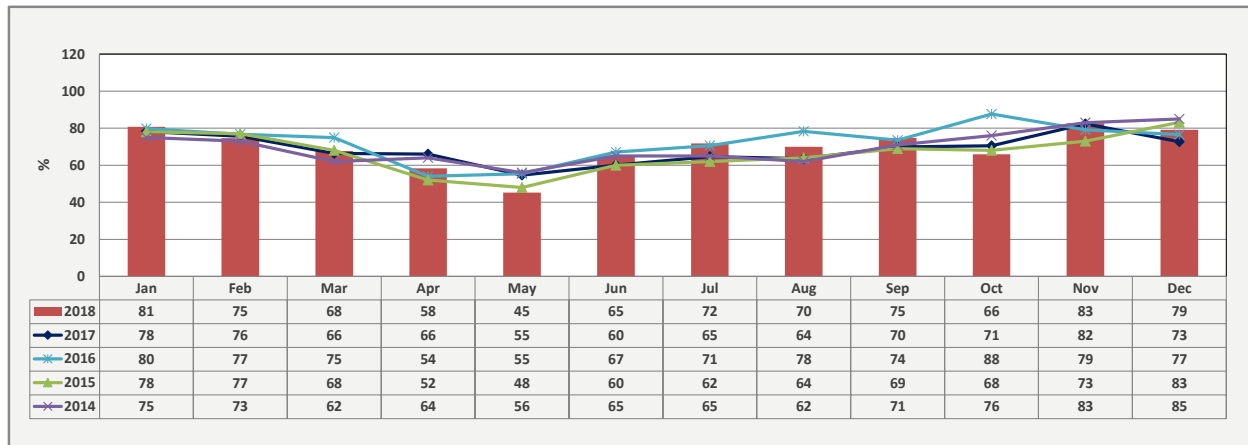
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

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

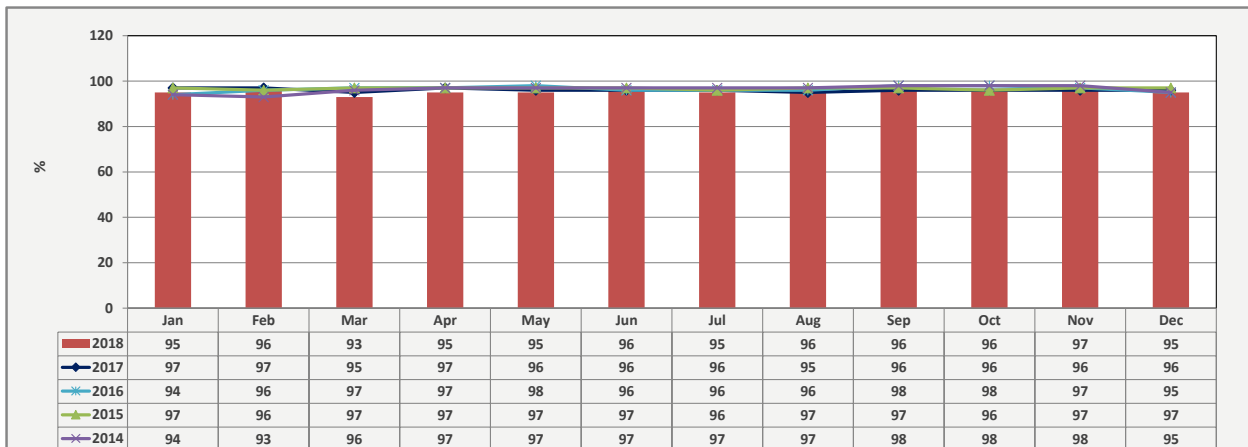
Annual Average for 2018	70	%
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RH Data Identifiers _ Total Hours Flagged = 47								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment 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	9	0	0	0	38

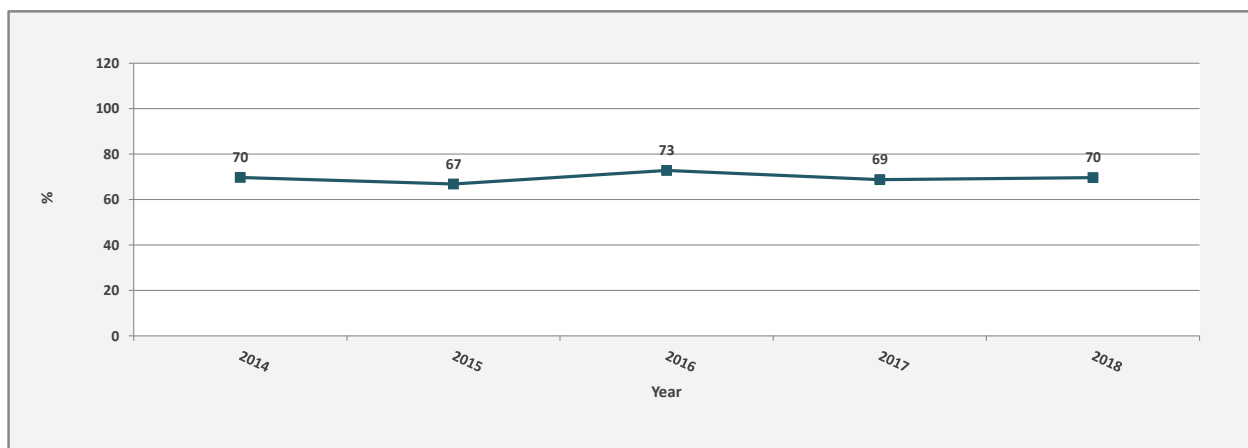
2014 to 2018 RH Monthly Averages



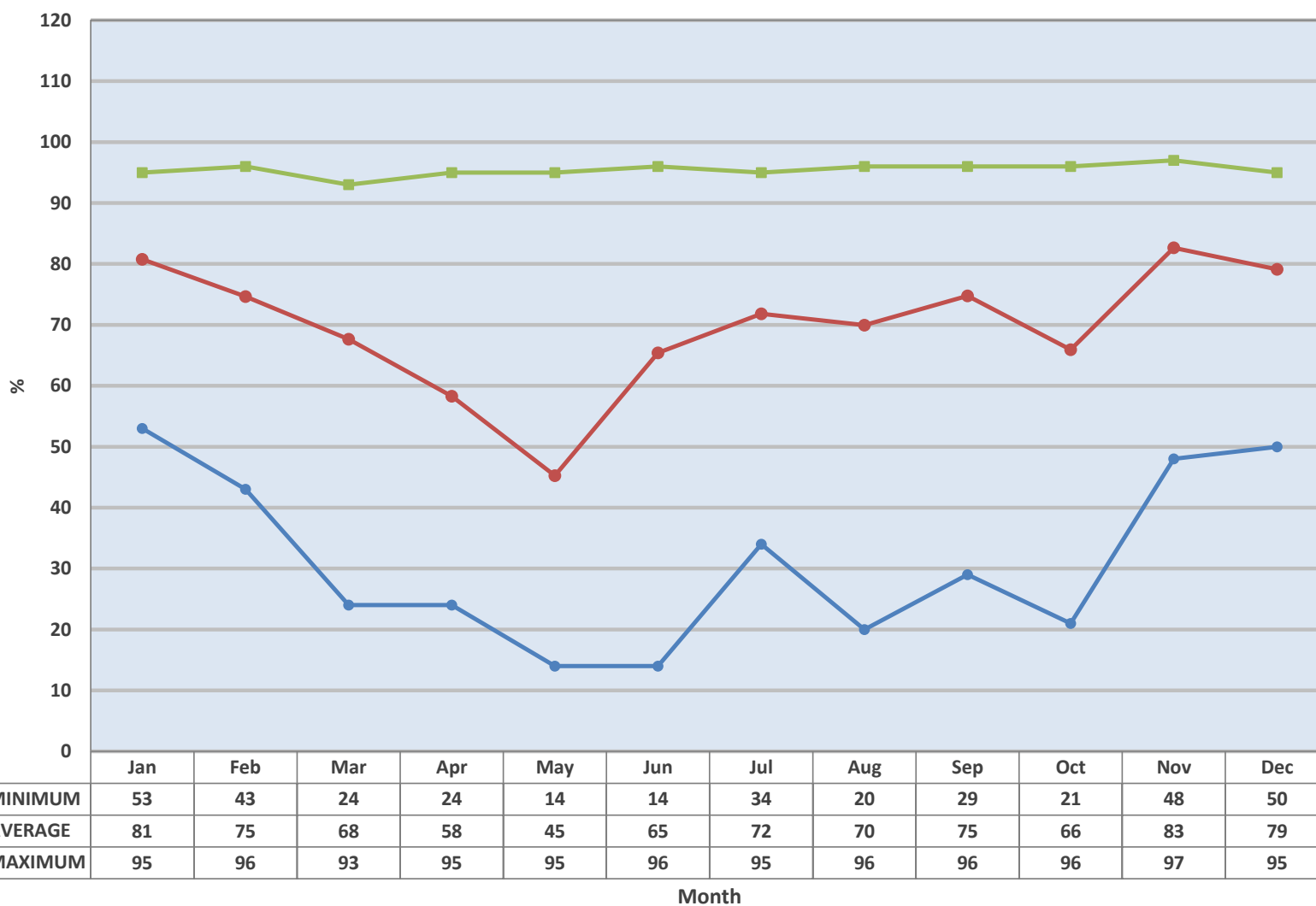
2014 to 2018 RH Monthly Maximum Averages



2014 to 2018 RH Annual Averages



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	943	965	961
February	672	100.0	944	963	961
March	744	100.0	944	963	959
April	720	100.0	943	961	959
May	744	100.0	942	953	952
June	711	98.8	938	948	946
July	728	97.8	946	957	956
August	722	97.0	941	955	953
September	720	100.0	947	958	957
October	744	100.0	944	957	956
November	720	100.0	941	963	961
December	744	100.0	939	956	952
Annual	8713	99.5	943	958	956

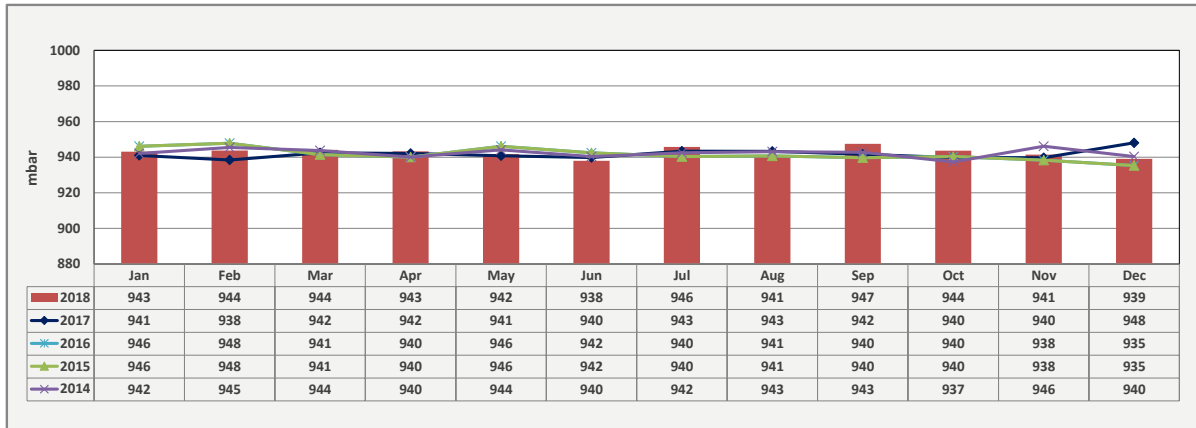
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

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

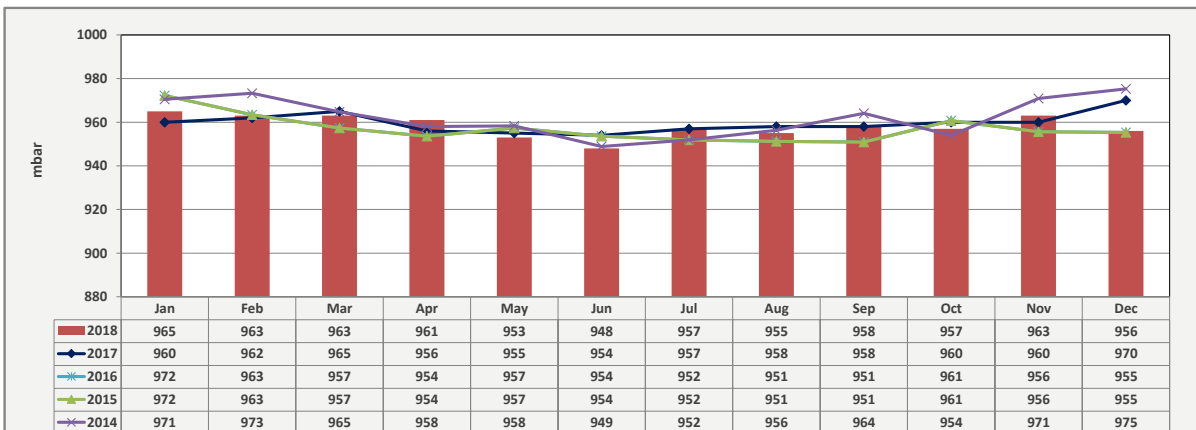
Annual Average for 2018	943 mbar
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BP Data Identifiers _ Total Hours Flagged = 47								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
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	9	0	0	0	38

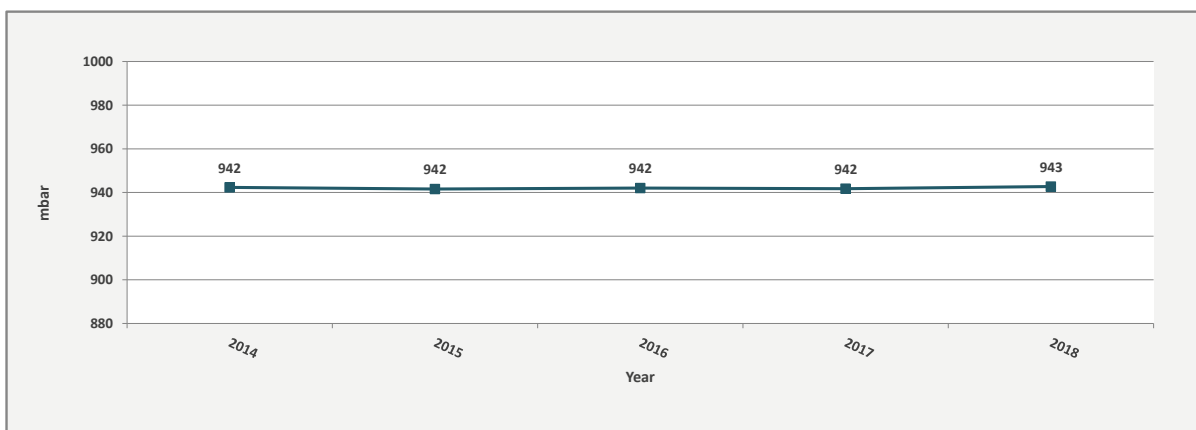
2014 to 2018 BP Monthly Averages



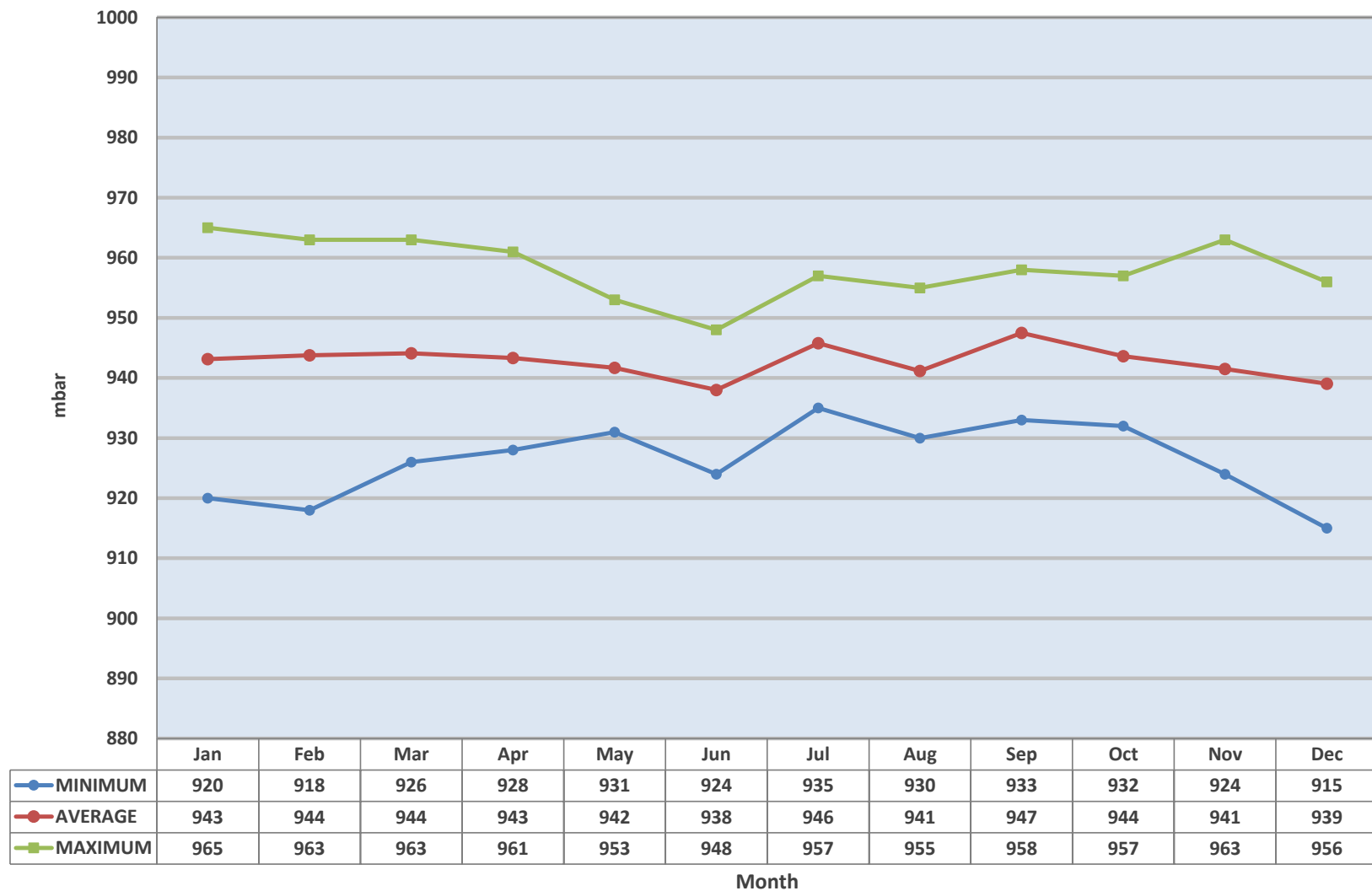
2014 to 2018 BP Monthly Maximum Averages



2014 to 2018 BP Annual Averages



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	21.0	22.7	21.6
February	672	100.0	20.9	22.2	21.4
March	744	100.0	21.5	24.5	22.9
April	720	100.0	21.8	26.6	24.1
May	744	100.0	21.6	24.4	22.8
June	711	98.8	23.6	25.4	24.5
July	728	97.8	21.6	24.1	22.1
August	722	97.0	23.4	30.3	25.7
September	720	100.0	22.5	23.9	22.9
October	744	100.0	22.5	23.3	22.7
November	720	100.0	22.5	21.3	23.7
December	744	100.0	21.8	23.4	23.0
Annual	8713	99.5	22.1	24.3	23.1

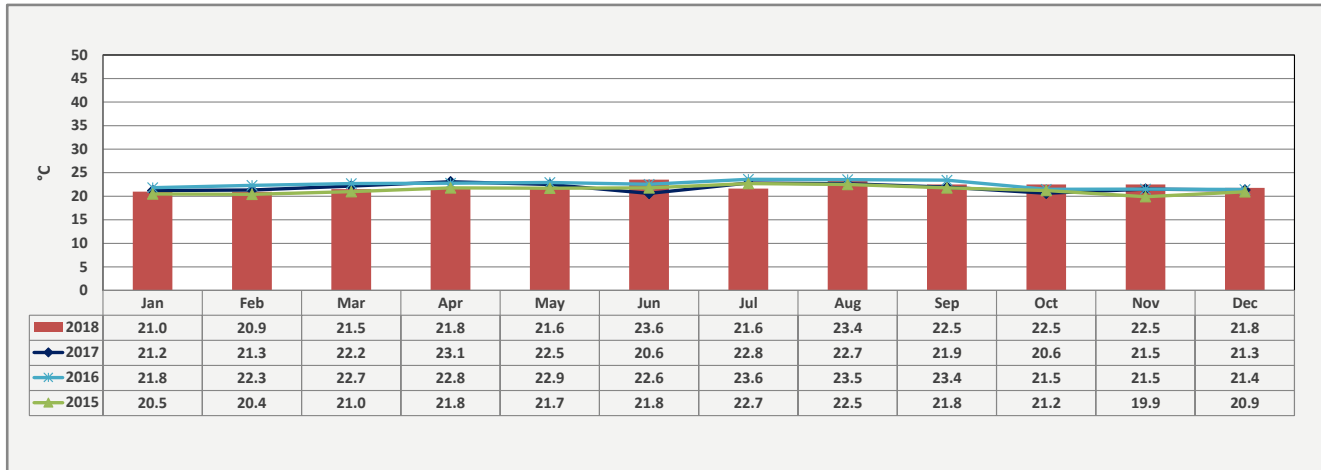
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

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

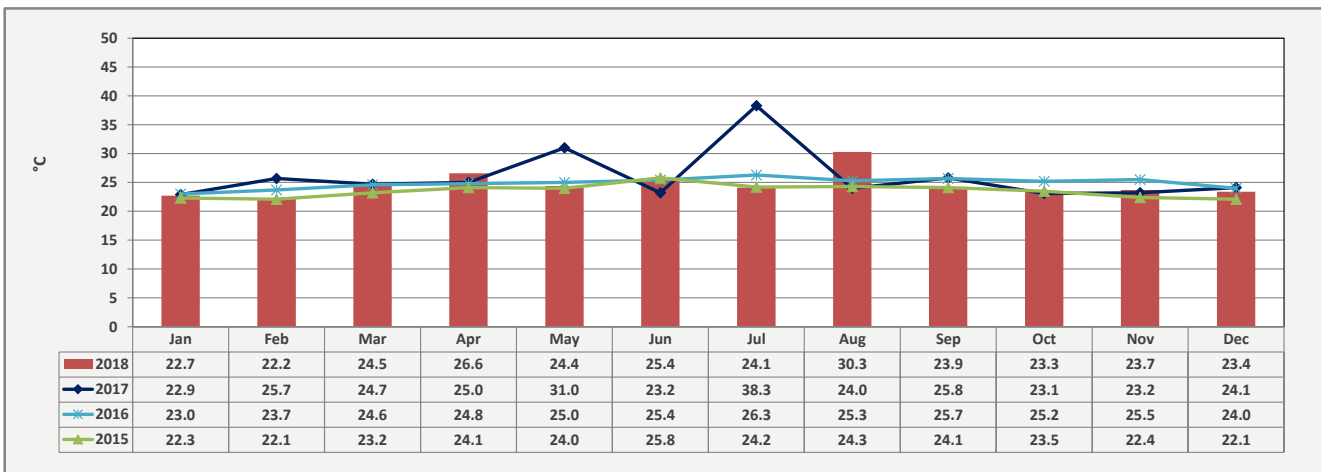
Annual Average for 2018	22.1 °C
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STX Data Identifiers _ Total Hours Flagged = 47								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
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	9	0	0	0	38

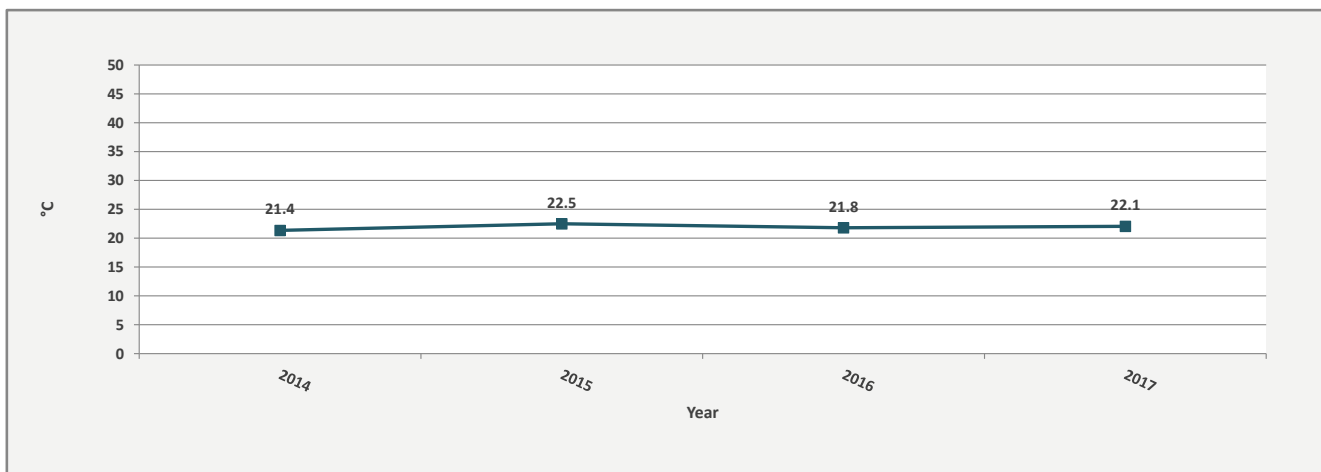
2014 to 2018 STNTPX Monthly Averages



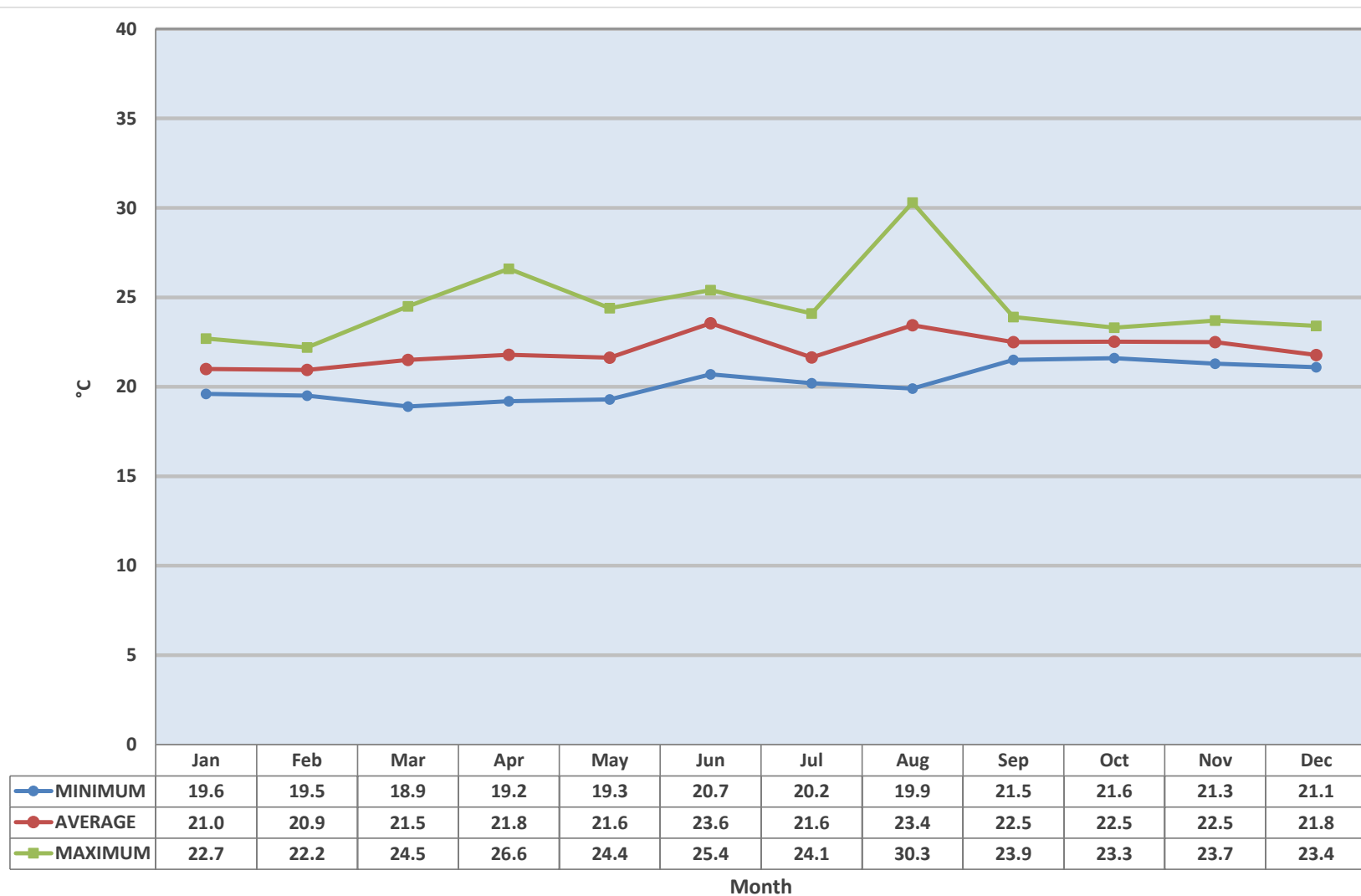
2014 to 2018 STNTPX Monthly Maximum Averages



2014 to 2018 STNTPX Annual Averages



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	1.1	23.7	15.2
February	672	100.0	4.3	27.1	16.5
March	744	100.0	1.0	23.8	14.7
April	720	100.0	2.7	23.9	15.7
May	744	100.0	4.4	30.2	17.1
June	711	98.8	4.6	30.5	19.5
July	728	97.8	3.2	22.0	13.7
August	698	94.1	4.8	23.6	14.5
September	720	100.0	0.5	22.0	8.7
October	744	100.0	3.8	33.3	18.6
November	720	100.0	2.4	20.3	12.3
December	744	100.0	4.0	28.4	19.0
Annual	8689	99.2	2.7		

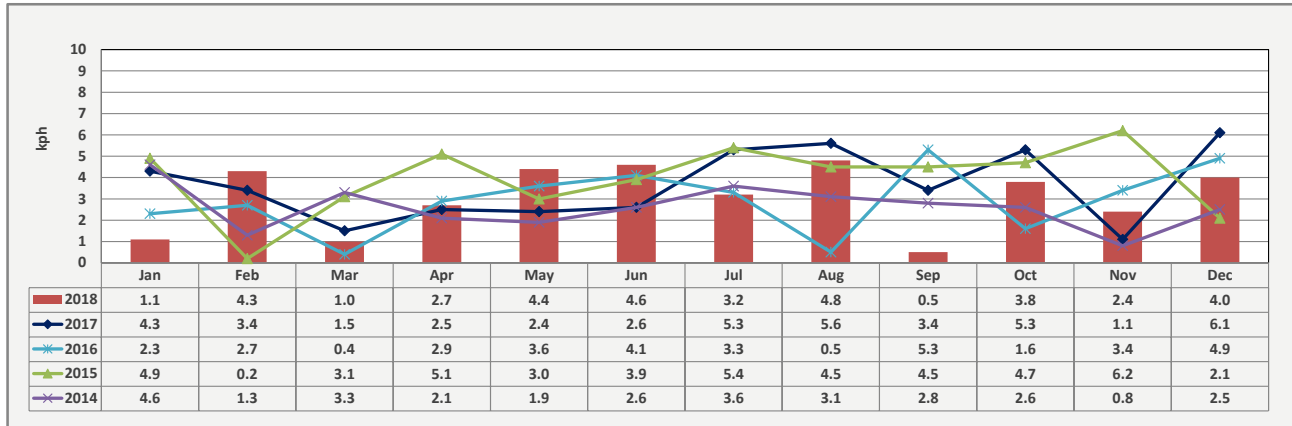
N/D - Valid Data Not Available *# of valid readings excluding calibration hours

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

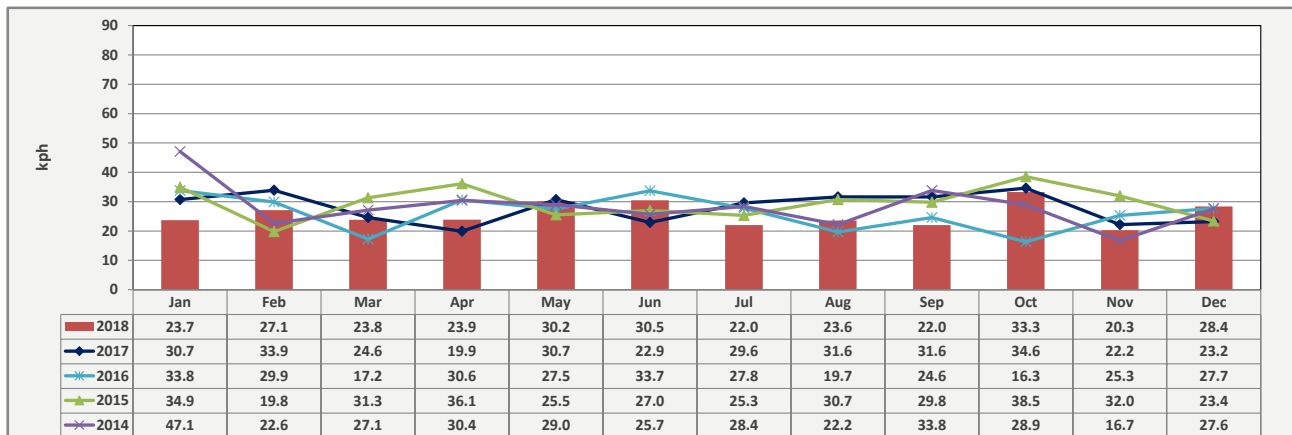
Annual Average for 2018	2.7 kph
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WS Data Identifiers _ Total Hours Flagged = 71								
Continuous Flag	C	C1	G	P	Q	R	X	Y
Name	Calibration	Additional Calibration	Out for Repair	Power Failure	Quality Assurance	Recovery	Machine Malfunction	Maintenance
Equipment in Operation	Y	Y	N	N	Y	Y	N	N
Downtime Accrued	N	Y	Y	Y	N	Y	Y	Y
Annual Total	2	0	0	9	0	0	0	60

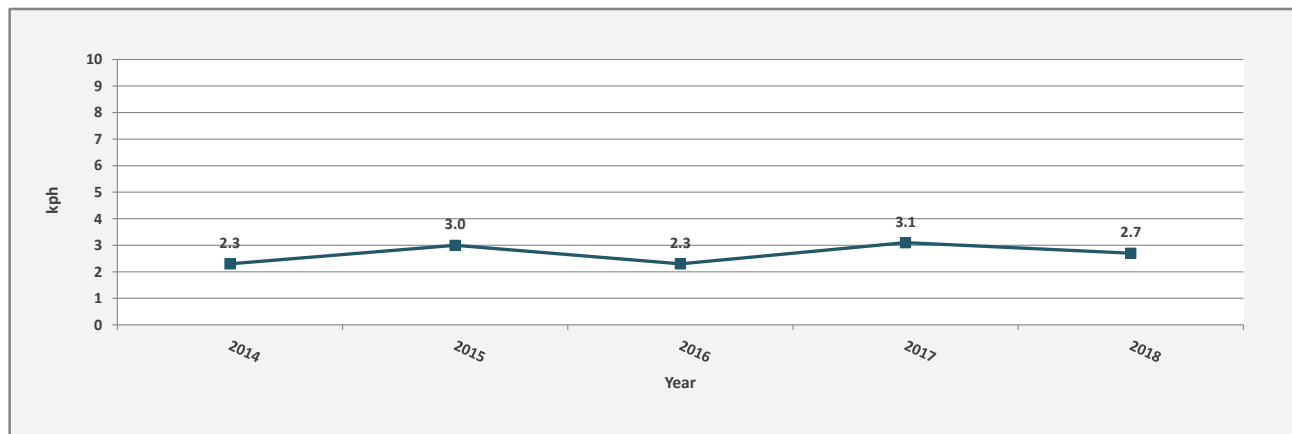
2014 to 2018 WS Monthly Averages



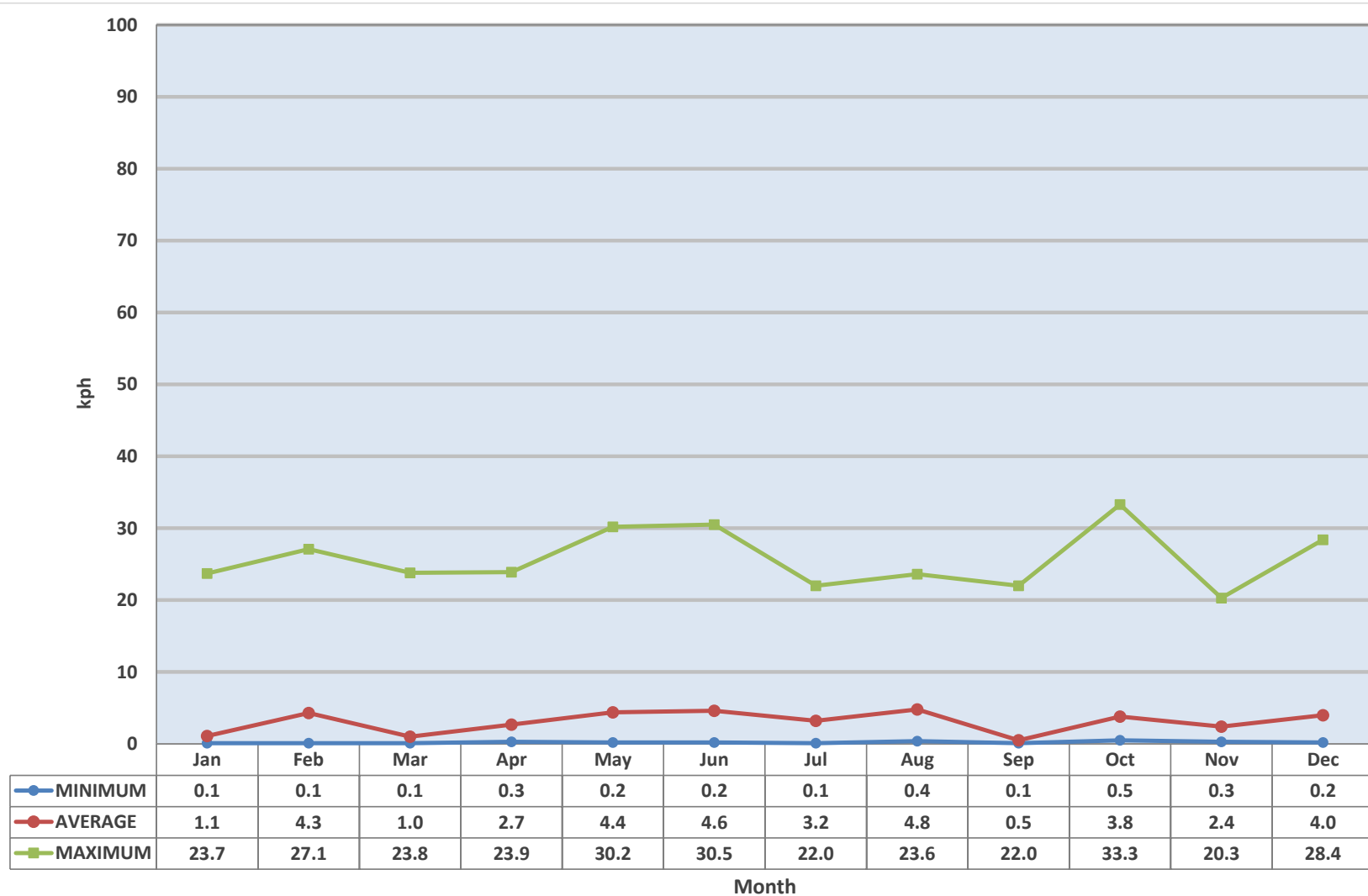
2014 to 2018 WS Monthly Maximum Averages



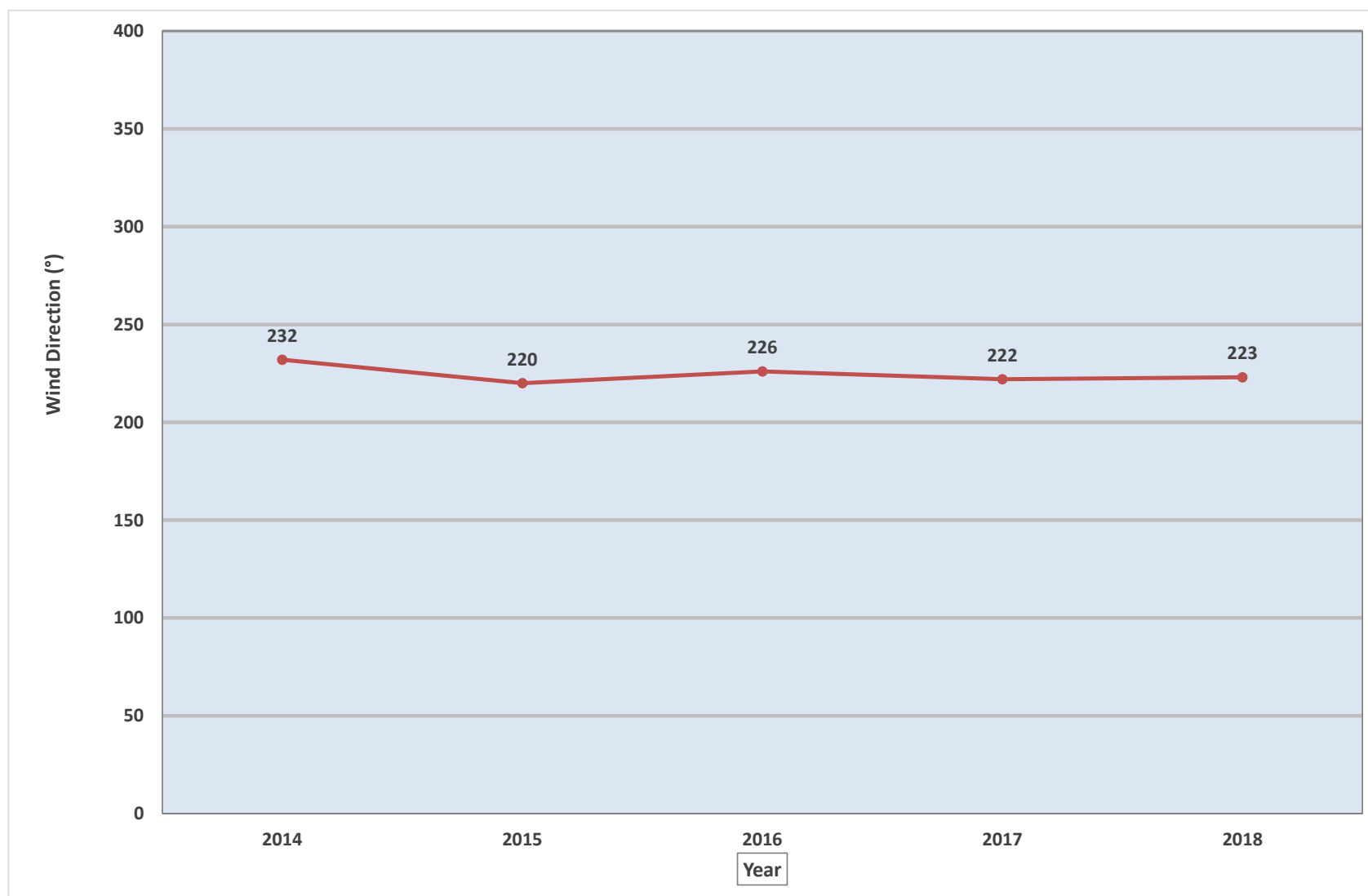
2014 to 2018 WS Annual Averages



2018 WS Monthly Statistics



2014 to 2018 WD Annual Averages



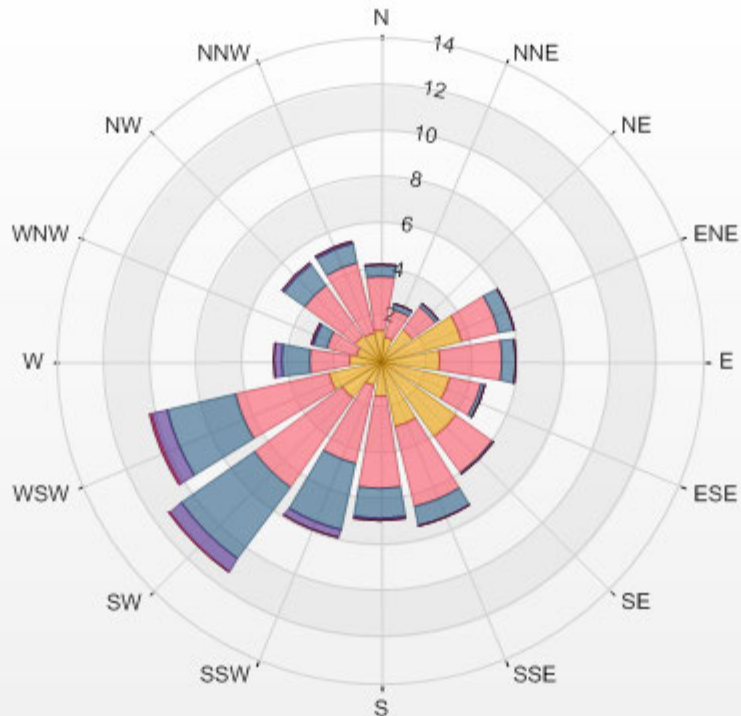
Wind: PRAMP_842
 Monitor: WSP [kph]
 Periodically: 2018/01/01 00:00-2019/01/01 23:00
 Type: WindRose
 Direction: Blowing From (Wind Frequency)
 Based On 1 Hr.

Calm: 5.50%

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	1.3	2.4	0.5	0.0	0.0	0.0	4.2
NNE	1.1	1.2	0.3	0.0	0.0	0.0	2.6
NE	1.7	1.2	0.2	0.0	0.0	0.0	3.1
ENE	3.7	1.6	0.7	0.0	0.0	0.0	6.0
E	2.6	2.7	0.6	0.0	0.0	0.0	5.9
ESE	3.1	1.5	0.1	0.0	0.0	0.0	4.7
SE	4.1	1.8	0.1	0.0	0.0	0.0	6.1
SSE	3.0	3.5	0.9	0.0	0.0	0.0	7.4
S	1.5	4.0	1.3	0.1	0.0	0.0	6.9
SSW	1.2	3.5	2.9	0.4	0.0	0.0	7.9
SW	2.0	4.7	3.9	0.7	0.0	0.0	11.3
WSW	2.3	4.1	3.0	0.7	0.1	0.0	10.2
W	1.3	1.8	1.2	0.3	0.0	0.0	4.6
WNW	1.1	1.3	0.6	0.1	0.0	0.0	3.1
NW	1.4	2.7	1.2	0.0	0.0	0.0	5.2
NNW	1.3	3.1	0.9	0.1	0.0	0.0	5.3
Summary	32.7	41.0	18.4	2.3	0.1	0.0	94.5

PRAMP_842 2018/01/01 00:00 - 2019/01/01 23:00

Calm: 5.50% Calm Avg: 1.15 (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 100%. No operational issues were identified.
June	- Operational time for the monitoring period was 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00. - During minute data review, data that was considered an anomalous spike, was discarded and the corresponding hourly average (June 26 at 00:00) was re-calculated.
July	- Operational time for the monitoring period was 95.3%, equivalent to thirty-five hours of downtime. - Following a successful shut-down calibration on July 30, a station upgrade was implemented. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Thirty-five hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	- Operational time for the monitoring period was 94.6%, equivalent to forty hours of downtime. - Following the installation of the Ultimate data logger and an analyzer installation calibration, monitoring activity resumed on August 2. Forty hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade. - Due to programming complications arising from the data logger upgrade, the automated daily zero-span check, scheduled for hour 10:00 on August 4, was not executed. The issue was resolved later that day and a successful zero-span check was completed on August 5.
September	Operational time for the monitoring period was 100%. No operational issues were identified.
October	Operational time for the monitoring period was 100%. No operational issues were identified.
November	- Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. - The automated daily zero-span check, scheduled for hour 13:00 on November 24, failed to execute. A valid zero-span check was manually completed at hour 14:00 of the same day. One hour of downtime was incurred due to the failed execution.
December	- Operational time for the monitoring period was 100%. - On December 14, the analyzer screen was found blank while valid data was being recorded on the datalogger. The analyzer was reset and the issue was resolved. Four minutes of data were lost and the hourly average at 09:00 was re-calculated.

TOTAL REDUCED SULPHUR (TRS)	
January	- Operational time, for the monitoring period was 94.4%, equivalent to forty-two hours of downtime. - The analyzer spanned below the lower acceptance limit on January 2. Two successive span results confirmed the drift. An as-found response check was therefore scheduled for January 3. After an initial attempt that demonstrated a slow response, the regulator was repurged, calibration equipment were checked and the as-found response check was successfully completed afterwards. The span result continued to drift outside the lower acceptance limit following the as-found response check. A shut-down calibration was therefore performed on January 4 in order to renew the scrubber material. The calibration was however deemed unreliable as the analyzer was slow to stabilize. The analyzer was allowed to run overnight to condition the new scrubber material and a successful post-repair calibration was completed on January 5. Data was invalidated back to the successful as-found response check on January 3. Thirty-nine hours of downtime were recorded due to this event. - The span response on January 11 was close to the lower acceptance limit, and the span check completed on January 12 was outside limits, prompting an immediate site visit where an as-found response check was completed. The results met AMD requirements. It is suspected that the span drift resulted from extreme cold weather conditions as improvements were recorded with increasing ambient temperatures. Three hours of downtime were incurred due to this additional quality check.
February	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 conducted on February 28, to assess a biased high drift in span response.
March	- Operational time for the monitoring period was 99.5%, equivalent to four hours of downtime. - The routine monthly calibration was performed on March 1. On the initial attempt, the As-Found High point was slow to respond, and the AMD's 20-minute response time requirement was not met. A second As-Found High point response check was performed after re-purging the regulator, and the 20-minute response time requirement was met. However, the second As-Found High point marginally satisfies Maxxam's internal stability requirement. As a precaution, the calibration was repeated on March 2, using an alternate calibration equipment set-up. The results were satisfactory for both Maxxam and AMD requirements. Four hours of downtime were recorded due to the additional quality check.
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.

TOTAL REDUCED SULPHUR (TRS) contd.	
June	- Operational time for the monitoring period was 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00. - The analyzer failed the daily span check on June 27 as the zero-span system required more time to recover from the power failure. The daily span result on June 28 was within acceptance limits. This event did not impact data quality. - During minute data review, data that was considered an anomalous spike was discarded and the corresponding hourly average (June 26 at 00:00) was re-calculated.
July	- Operational time for the monitoring period was 95.3%, equivalent to thirty-five hours of downtime. - Following a successful shut-down calibration on July 30, a station upgrade was implemented. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Thirty-five hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	- Operational time for the monitoring period was 91.5%, equivalent to sixty-three hours of downtime. - Following the installation of the Ultimate data logger and a successful analyzer installation calibration, monitoring activity resumed on August 3. Fifty-seven hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade. - Due to programming complications arising from the data logger upgrade, the automated daily zero-span check, scheduled for hour 10:00 on August 4, was not executed. The issue was resolved later that day and a successful zero-span check was completed on August 5. - The analyzer started drifting towards the lower acceptance limit on August 11. Subsequent scheduled and additional span response checks conducted between August 12 and August 14 yielded similar results. This prompted a site visit on August 14 where a repeat calibration was successfully completed. The expected span value was updated on August 15. Six hours of downtime were incurred due to the additional quality checks.
September	Operational time for the monitoring period was 100%. No operational issues were identified.
October	Operational time for the monitoring period was 100%. No operational issues were identified.
November	- Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. - The automated daily zero-span check, scheduled for hour 13:00 on November 24, failed to execute. A valid zero-span check was manually completed at hour 14:00 of the same day. One hour of downtime was incurred due to the failed execution.
December	Operational time for the monitoring period was 100%. No operational issues were identified.

TOTAL HYDROCARBONS (THC), METHANE (CH ₄) & NON-METHANE HYDROCARBONS (NMHC)	
January	- Operational time, for the monitoring period was 99.7%, equivalent to two hours of downtime. - Due to a drop in station temperature while the technician moved equipment in/out during a station visit on January 12, the analyzer had a firmware crash. Resetting the analyzer once station temperatures were back in the normal range corrected the problem. One hour of downtime was recorded at hour 11:00 as a result. - The pressure sensor configuration for the VOC canister sampler, as requested by PRAMP, was implemented on January 16. - The span and fuel (H₂) gas cylinders were replaced on January 16 and a successful zero-span verification was completed as a quality check. Expected span value was subsequently updated. One hour of downtime was recorded at hour 11:00 due to this event. - During minute data review, data that were deemed anomalous, due to suspected poor injections, were discarded and the corresponding hourly average was re-calculated.
February	- Operational time for the monitoring period was 98.8%, equivalent to eight hours of downtime. - Towards the end of the month, the analyzer started exhibiting poor sample injections, as demonstrated by sporadic minute data recorded at concentrations lower than 1.80 ppm. The actuator failed on February 28, causing the analyzer to span outside the lower acceptance limit. The actuator was replaced on March 1, following a successful shut-down calibration. THC minute concentrations < 1.80 ppm, along with the corresponding CH₄ and NMHC values, were excluded and the corresponding hourly averages were re-calculated. Hourly averages with less than 45 minutes of valid data were discarded, incurring eight hours of downtime.
March	- Operational time for the monitoring period was 97.6%, equivalent to eighteen hours of downtime. - The actuator failed on February 28 and was replaced on March 1, following a successful shut-down calibration. A successful post-repair calibration was subsequently completed. Eight hours of downtime were recorded due to this malfunction and the maintenance event performed to address it. - On March 2, at hour 12:00, the analyzer recorded erroneous static values over a twenty-minute period. This was investigate by the technician on site and the analyzer was restarted. An additional zero-span check was successfully completed afterwards as a quality check. No further issues were identified. Two hours of downtime were accrued due to this event.

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

March	• The zero phase of the daily zero-span check did not properly execute on March 3 and March 10, causing erroneous zero records. Additional repeat zero-span checks were triggered as corrective actions following these events. Investigations were carried out onsite on March 15 and no problems were identified. Three hours of downtime were recorded due to the additional quality checks. • An additional zero-span check was conducted on March 15 to assess span drift over time. The results of the additional and subsequent scheduled zero-span checks showed slight drifts towards the lower acceptance limit. As a preventing measure, a repeat calibration was conducted on March 22 and the expected span value was subsequently updated. Five hours of downtime were recorded due to the additional quality checks. • During minute data review, data that were deemed anomalous, due to suspected poor injections, were discarded and the corresponding hourly average was re-calculated. • One 5-minute concentration of 0.33 ppm was recorded on March 1 at 01:25. This is not a valid canister event as the analyzer was not producing valid data at the time, due to a malfunction. The sample was however processed for analysis, at PRAMP's request, for a baseline VOC study.
April	• Operational time for the monitoring period was 99.7%, equivalent to two hours of downtime. • On April 11, following a successful shut-down calibration, the sample pump was replaced as a routine maintenance measure. A post-repair calibration was successfully completed afterwards. Two hours of downtime were recorded due to this event. • During minute data review, data that were deemed anomalous, due to suspected poor injections, were discarded and the corresponding hourly average was re-calculated.
May	• Operational time for the monitoring period was 100%. • During minute data review, data that were deemed anomalous, due to suspected poor injections, were discarded and the corresponding hourly average was re-calculated.
June	• Operational time for the monitoring period was 9.2%, equivalent to 654 hours of downtime. The 90% operational time requirement was not met this month. This contravention was reported to AEP under reference number: 339130. • The fuel gas (H₂) was depleted on June 1. The gas cylinder was replaced and the analyzer was restarted by client site contacts on June 2. However, the analyzer failed to properly recover due to a hardware failure. The analyzer (Thermo 55i, s/n:1505664392) was removed and a replacement analyzer (Thermo 55i, s/n:1433563261) was mobilized and installed onsite on June 3 by a Maxxam technician. The analyzer was left offline to stabilize overnight and an installation calibration was completed on June 4. Seventy-six hours of downtime were incurred due to this event.

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

June	On June 26, a low trending drift in recorded concentrations was observed, prompting a site visit on June 27, where a shut-down calibration was attempted. The calibration was, however, unsuccessful as Maxxam's internal stability requirement was not met for the Methane component at high-point. The Nitrogen purifier and the actuator were replaced. Column conditioning was run overnight and a successful post-repair calibration was completed on June 28. Data was discarded back to the last valid multi-point calibration, which was on June 4. 578 hours of downtime were recorded due to this event.
July	- Operational time for the monitoring period was 92.1%, equivalent to fifty-nine hours of downtime. - The fuel gas (H₂) was depleted on July 1, causing the analyzer to flame out. This prompted a site visit on July 2 where the gas was replaced and the analyzer was relit. Two consecutive repeat zero-span checks were run afterwards to enhance the stability of the zero-span system. Forty hours of downtime were recorded due to this event. - Following a successful shut-down calibration on July 31, a station upgrade was implemented. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Eighteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade. - A canister event was recorded on July 26 at 07:30, at an initial concentration of 0.31 ppm. The sample was processed for analysis as outlined in the PRAMP Chain of Custody. As a quality check, an additional zero-span check was triggered after the canister was replaced, incurring one hour of downtime.
August	- Operational time for the monitoring period was 91.3%, equivalent to sixty-five hours of downtime. - Following the installation of the Ultimate data logger and a successful analyzer installation calibration, monitoring activity resumed on August 3. Fifty-seven hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade. - Due to programming complications arising from the data logger upgrade, the automated daily zero-span check, scheduled for hour 10:00 on August 4, was not executed. The issue was resolved later that day and a successful zero-span check was completed on August 5.

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

August	• The channels were placed offline on August 10, during an HVAC maintenance event, incurring three hours of downtime. • The fuel (H₂) and span gas cylinders were replaced on August 23. An additional zero-span check was performed afterwards as a quality check, incurring one hour of downtime. • The automated daily zero check, scheduled for hour 07:00 on August 30, did not properly execute. A successful zero check was performed manually at hour 08:00. A site visit was immediately scheduled to investigate the zero-span system. Troubleshooting revealed a loose orifice. The orifice was tightened and secured, and gas pressures were verified to optimize flow. As the issue was isolated to the zero-span system, data quality was not impacted. However, four hours of downtime were incurred due to the corrective actions performed.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
October	• Operational time for the monitoring period was 66.3%, equivalent to 251 hours of downtime. The AMD's 90% operational time requirement was not met this month. This contravention was reported to AEP under reference number: 346425. • Towards the end of the month, frequent poor sample injections were observed. This prompted a site visit on October 31 where a shut-down calibration was attempted prior to maintenance. However, the Low point did not meet requirements as there were poor sample injections that impacted the stability criteria. The injection components (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 October 21 at hour 06:00. Two hundred and fifty one hours of downtime were incurred due to this event.
November	• Operational time for the monitoring period was 91.0%, equivalent to sixty-five hours of downtime. • Beginning on November 18, frequent poor sample injections were recorded. This prompted a site visit on November 20 where a shut-down calibration was attempted prior to analyzer replacement. However, AMD requirements were not met when the analyzer was tested at As-Found High point. The analyzer (Thermo 55i, s/n: 1433563261) was removed for maintenance and a replacement (Thermo 55i, s/n: 1505664392) was installed. Column conditioning was run overnight and a successful installation calibration was completed on November 21. Data was invalidated back to the point of failed performance, determined as November 18 at hour 20:00. Sixty-four one hours of downtime were incurred due to this event. • CH₄ minute concentrations recorded lower than 1.80 ppm due to poor sample injections that occurred before the determined point of failed performance, along with the corresponding THC and NMHC values, were excluded and the corresponding hourly average recalculated. • The automated daily zero-span check, scheduled for hour 13:00 on November 24, failed to execute. A valid zero-span check was manually completed at hour 14:00 of the same day. One hour of downtime was incurred due to the failed execution.

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

December	• Operational time for the monitoring period was 99.9%, equivalent to one hour of downtime. • The span gas cylinder was replaced on December 13. A repeat zero-span check was subsequently completed as a quality check. The expected span value was not updated as the span gas concentration did not change significantly. One hour of downtime was recorded due to the additional quality check. • During minute data review, data that were deemed anomalous, due to suspected poor injections or anomalous spike in concentration, were discarded and the corresponding hourly average was re-calculated.
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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 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00.
July	• Operational time for the monitoring period was 97.8%, equivalent to sixteen hours of downtime. • A station upgrade was implemented this month. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Sixteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	• Operational time for the monitoring period was 94.1%, equivalent to forty-four hours of downtime. • Following the installation of the Ultimate data logger, monitoring activity resumed on August 2. Forty-four hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade. • The routine annual wind system audit was conducted on August 22. The as-found audit met the AMD's audit requirements. However, the wind system was not operating within performance specifications. Adjustments were therefore made on the wind direction and the audit was repeated. The as-left state of the wind system met the performance specifications.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
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 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00.
July	• Operational time for the monitoring period was 97.8%, equivalent to sixteen hours of downtime. • A station upgrade was implemented this month. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Sixteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	• Operational time for the monitoring period was 97.0%, equivalent to twenty-two hours of downtime. • Following the installation of the Ultimate data logger, monitoring activity resumed on August 1. Twenty-two hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
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 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00.
July	• Operational time for the monitoring period was 97.8%, equivalent to sixteen hours of downtime. • A station upgrade was implemented this month. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Sixteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	• Operational time for the monitoring period was 97.0%, equivalent to twenty-two hours of downtime. • Following the installation of the Ultimate data logger, monitoring activity resumed on August 1. Twenty-two hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
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 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00.
July	• Operational time for the monitoring period was 97.8%, equivalent to sixteen hours of downtime. • A station upgrade was implemented this month. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Sixteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	• Operational time for the monitoring period was 97.0%, equivalent to twenty-two hours of downtime. • Following the installation of the Ultimate data logger, monitoring activity resumed on August 1. Twenty-two hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
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 98.8%, equivalent to nine hours of downtime. These were incurred due to two power events that occurred on June 4, at hours 04:00-07:00, and June 27, at hours 02:00-06:00.
July	• Operational time for the monitoring period was 97.8%, equivalent to sixteen hours of downtime. • A station upgrade was implemented this month. The trailer was replaced and the Ultimate data logger was installed to replace the resident ESC 8832. Sixteen hours of data were lost in the July monitoring period as a result of activities surrounding this upgrade.
August	• Operational time for the monitoring period was 97.0%, equivalent to twenty-two hours of downtime. • Following the installation of the Ultimate data logger, monitoring activity resumed on August 1. Twenty-two hours of data were lost in the August monitoring period as a result of activities surrounding this data logger upgrade. • On August 10, maintenance was conducted on the HVAC system, to address an instability in station temperature.
September	• Operational time for the monitoring period was 100%. No operational issues were identified.
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