



# **Peace Airshed Zone Association**

## **Ambient Air Monitoring Network Summary**

**Ambient Air Quality Monitoring Program**

**2020 Annual Data Summary Report**

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March 31, 2021

**Alberta Environment and Parks**

11th Floor, Oxbridge Place  
9820-106 Street  
Edmonton Alberta T5K 2J6

Subject: **Peace Airshed Zone Association (PAZA)  
Annual 2020 Ambient Air Quality Monitoring Report**

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Please find enclosed the 2020 PAZA Annual Ambient Air Quality Monitoring Network Summary.

The representative of the Person Responsible for this monitoring program is:

Mandeep Dhaliwal, B.Sc., P.Chem.  
Program Manager  
Box 21135  
Grande Prairie, Alberta T8V 6W7  
Email: [Mandeep@paza.ca](mailto:Mandeep@paza.ca)  
Phone: 403-608-9697

This report was prepared by Matrix Solutions Inc. and reviewed by Mandeep Dhaliwal.

PAZA has retained the services of WSP Canada Inc. to conduct continuous ambient monitoring and Matrix Solutions Inc. to provide data validation and reporting.

This report is submitted by PAZA on behalf of the industrial member companies to satisfy the requirements of the facility Operating Approvals listed in Table A.

The annual summary report includes the operational summaries and hourly continuous monitoring results.

**Continuous Monitoring:**

Detailed Annual Summaries are included in the report for the seven stations:

Henry Pirker (Grande Prairie),  
Evergreen Park,  
Smoky Heights,  
Beaverlodge,  
Valleyview,  
Donnelly, and  
Wembley-Portable.

**Table A. PAZA members with Facility Operating Approvals**

<b>Company</b>	<b>Facility</b>	<b>LSD</b>	<b>EPEA Approval No.</b>
Advantage Oil & Gas Ltd.	Glacier	05-02-076-13-W6	262479-00-00
Alberta Power (2000) Ltd. (an ATCO company)	Sturgeon	SW-06-069-21-W5	10283-02-02
ATCO Power Canada	Poplar Hill	11-19-073-08-W6	67774-01-01
ATCO Power Canada	Valleyview	SW-06-069-21-W5	147709-01-01
AltaGas Ltd.	Pouce Coupe	03-03-081-13-W6	247673-00-00
	Ante Creek	02-26-068-25-W5	266694-00-00
	Gordondale	02-26-068-25-W5	287474-00-00
Apache Canada Ltd.	House Mountain	01-08-070-10-W5	10137-02-02
Birchcliff Energy Ltd.	Pouce Coupe	03-22-078-12-W6	252529-00-00
Canadian Natural Resources Limited	Bonanza	11-25-081-11-W6	00000029-01-00
	Progress/Gordondale	01-01-077-10-W6	00010036-02-00
	Gold Creek	13-26-067-05-W6	00010446-02-00
	Teepee Creek	SE-2-074-04-W6	00001635-02-00
	Sturgeon/Valleyview	02-02-069-22-W5	1633-02-00
Canfor Forest Products	Grande Prairie	SW-23-071-06-W6	152645-01-00
Conocophillips Canada Energy Partnership	Wembley	06-19-073-08-W6	00000212-01-00
Devon Canada	NW Belloy (Dunvegan)	16-36-079-03-W6	00009810-02-00
	Eaglesham (South)	02-14-077-25-W5	00047669-01-00
	North Normanville	03-36-079-23-W5	00047455-01-00
	West Culp	05-34-078-25-W6	00136284-00-00
	Cecil	08-15-084-08-W6	00010032-02-00
Encana Corporation	Sexsmith	04-08-075-07-W6	00010002-01-00
Enerplus Resources	Pouce Coupe	SW-06-069-21-W5	1464-02-03
Exshaw Oil Corporation	Spirit River	03-10-077-07-W6	344521-00-00
Grande Prairie Generation Inc.	Northern Prairie Power Project	04-19-073-08-W6	00238762-00-00
Inception Exploration Ltd.	Gold Creek	03-26-069-05-W6	00335317-00-02
Long Run Exploration	Eaglesham	01-25-076-01-W6	00241532-00-00
	Kakut	14-12-075-03-W6	00248469-00-00
	Donnelly	06-01-077-21-W5	00000087-02-00
	Puskwaskau	03-26-074-01-W6	00017524-01-00
	Longview Oil Corp.	Sunset House	06-22-070-20-W5
Penn West Petroleum Ltd.	Tangent	13-29-080-23-W5	00001746-02-00
	Pouce Coupe	16-07-078-11-W6	00000614-01-00
Petrus Resources	Rycroft	08-25-077-06-W6	11351-02-00
	Spirit River	08-34-077-06-W6	11096-02-00
NorthRiver Midstream Inc.	Fourth Creek	16-11-082-09-W6	00000263-01-00
	Gordondale	11-26-079-09-W6	00011495-01-01
	Pouce Coupe/Bonanza	3-23-080-13-W6	00070203-01-01
Suncor Energy Inc.	Progress	07-22-078-09-W6	00011428-02-00
TAQA North Ltd.	Valhalla	13-21-076-09-W6	00017620-01-00
Veresen Energy	Hythe Brainard	11-18-074-12-W6	00010910-02-00
Weyerhaeuser Canada	Grande Prairie Pulp and Wood Plant	01-14-070-05-W6	00000113-02-00

**Concentrations in excess of the Clean Air Regulations (Alberta Ambient Air Quality Objectives) in 2020 occurred:**

- February 2020 – Smoky Heights for PM<sub>2.5</sub>
- May 2020 – Henry Pirker for PM<sub>2.5</sub>; Smoky Heights for PM<sub>2.5</sub>
- August 2020 – Donnelly for H<sub>2</sub>S
- September 2020 – Henry Pirker for PM<sub>2.5</sub>
- November 2020 – Henry Pirker for PM<sub>2.5</sub>

Detailed information at each station is summarized in the following tables:

**The following is the summary of the Smoky Heights PM<sub>2.5</sub> hourly events (>80 µg/m<sup>3</sup>):**

Reference Number	Pollutant	Date	From MST	To MST	Average µg/m <sup>3</sup>	WS km/hr	WD degrees
363464	PM <sub>2.5</sub>	Feb 02, 2020	18:00	19:00	127.1	9.8	6.8
366501	PM <sub>2.5</sub>	May 14, 2020	21:00	22:00	142.5	1.7	22.2

**The following is the summary of the Henry Pirker PM<sub>2.5</sub> hourly events (>80 µg/m<sup>3</sup>):**

Reference Number	Pollutant	Date	From MST	To MST	Average µg/m <sup>3</sup>	WS km/hr	WD degrees
376736	PM <sub>2.5</sub>	May 30, 2020	19:00	20:00	158.4	0.6	109.1
376736	PM <sub>2.5</sub>	May 30, 2020	20:00	21:00	152.2	4.3	333.0

**The following is the summary of the Henry Pirker PM<sub>2.5</sub> 24-hr events (>29 µg/m<sup>3</sup>):**

Reference Number	Pollutant	Date	Average (µg/m <sup>3</sup> )	WS (km/hr)	WD (degrees)
371836	PM <sub>2.5</sub>	Sept 19, 2020	30.7	3.6	264
373871	PM <sub>2.5</sub>	Nov 20, 2020	30.0	1.7	280.4

**The following is the summary of the Donnelly H<sub>2</sub>S hourly events (>10 ppb):**

Reference Number	Pollutant	Date	From MST	To MST	Average ppb	WS km/hr	WD degrees
370114	H <sub>2</sub> S	Aug 06, 2020	10:00	11:00	10.1	8.8	133.0

**Operational times less than 90 percent:**

- February 2020 - Power issues at Valleyview resulting in operational times less than 90%; valid data was >75% (AEP#373638).
- July 2020 - THC analyzer at Henry Pirker station had operational issues that resulted in THC, CH<sub>4</sub> and NMHC analyzer <90% (AEP#370894), valid data was >75%.
- August 2020 - TRS analyzer at Wembley station had operational issues that resulted in <90% and valid data <75% (AEP #370391).
- August 2020 - TRS analyzer at Smoky Heights station had operational issues that resulted in <90% (AEP#372260), valid data was >75%.
- November 2020 – THC analyzer at Wembley station had operational issues that resulted in THC, CH<sub>4</sub> and NMHC analyzer <90% (AEP#373577), valid data was >75%.

**Air Incidents**

None were reported to PAZA.

### **Deviations from Authorized Monitoring Methods**

Trees nearby to Valleyview air monitoring station exceed the height allowed under section 2.3 of the siting criteria in Chapter 3 of the AMD. This variance was authorized in writing by the director on February 4, 2019. Trees were cut in August 2020.

### **Missed calibrations.**

None to report.

### **AEP Audits in 2020.**

There was no audit performed in 2020 by AEP.

### **Passive Monitoring**

- Passive samples were analyzed by Bureau Veritas Laboratories
- 371 passive sulphur dioxide samples collected over 12 months at 31 sites in PAZA
  - Minimum monthly value was 0.1ppb collected at East Prairie
  - Maximum monthly value was 0.6ppb collected at Poplar
  - Maximum monthly average was 0.4ppb in January
- 36 passive ozone samples collected over 12 months at 3 sites in PAZA
  - Minimum monthly value was 31.4ppb collected at Bay Tree
  - Maximum monthly value was 34.4ppb collected at Crooked Creek
  - Maximum monthly average was 49.8ppb in March
- 371 passive nitrogen dioxide samples collected over 12 months at 31 sites in PAZA
  - Minimum monthly value was 0.2ppb collected at Peavine
  - Maximum monthly value was 6.3ppb collected at Grande Prairie
  - Maximum monthly average was 2.6ppb in January
- 32 passive hydrogen sulphide samples collected over 12 months at 3 sites in PAZA
  - Minimum monthly value was 0.2ppb collected at Guy
  - Maximum monthly value was 0.4ppb collected at Girouxville 3
  - Maximum monthly average was 0.6ppb in June
- There were no exceedances of the AAAQOs for all monitored parameters at any of the passive monitoring stations during 2020.

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.

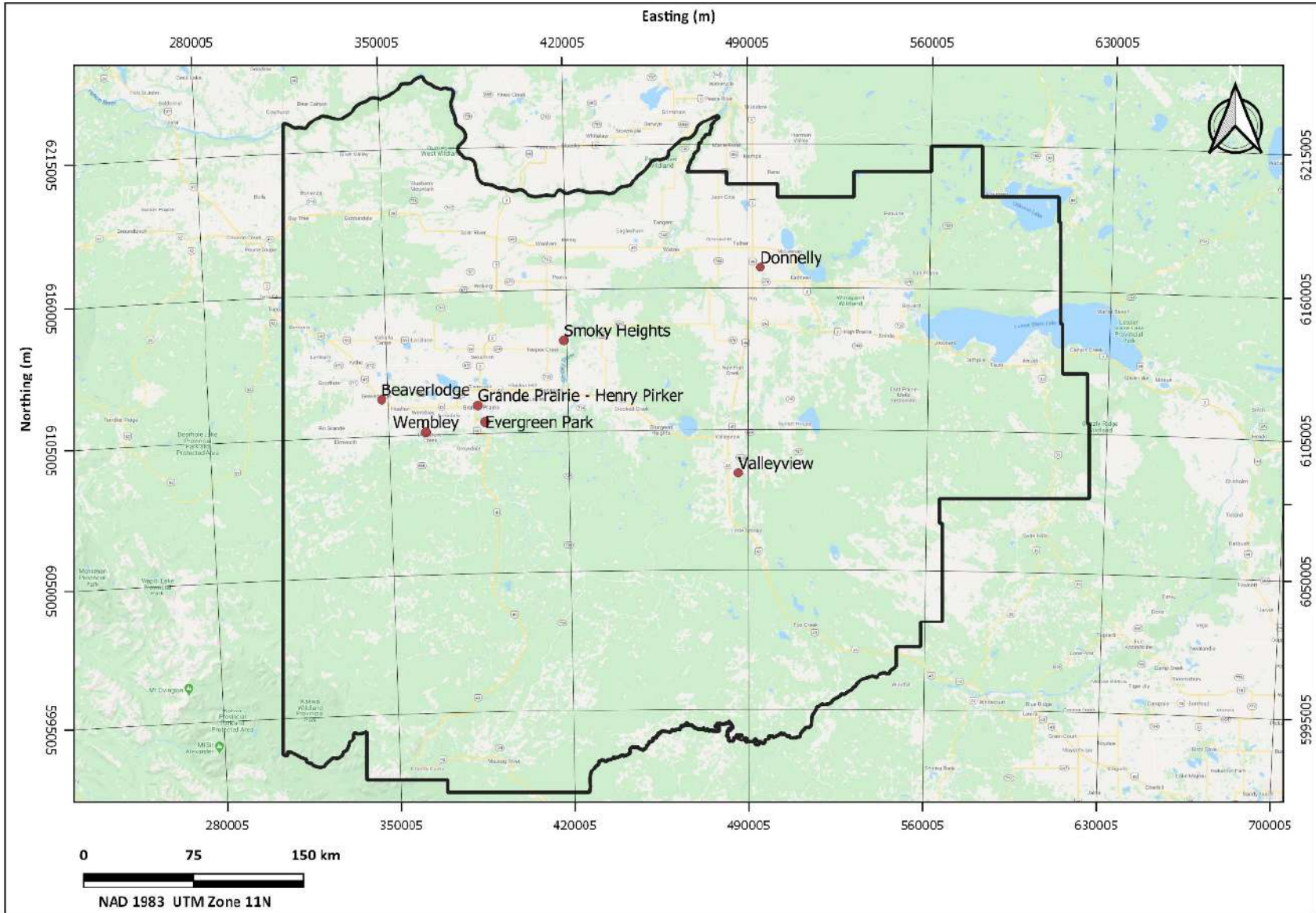


Mandeep Dhaliwal, B.Sc., P.Chem.

Program Manager



### PAZA Continuous Monitoring Station Locations



### PAZA Passive Monitoring Station Locations

## 1 Beaverlodge Key Parameters - Continuous Monitoring Data - 2020 Summary

### Beaverlodge Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
<b>Sulphur Dioxide</b> SO <sub>2</sub> measured in ppb	0.4	4.5	Feb 18	20.7	Feb 12 02:00	100.0%	0	0	0	0
<b>Nitrogen Dioxide</b> NO <sub>2</sub> measured in ppb	3.8	24.2	Jan 20	36.0	Jan 20 02:00	99.8%	0	-	-	0
<b>Oxides of Nitrogen</b> NO <sub>x</sub> measured in ppb	4.6	44.4	Jan 20	92.1	Jan 07 12:00	99.8%	-	-	-	-
<b>Nitric Oxide</b> NO measured in ppb	0.8	20.0	Jan 20	62.6	Jan 07 12:00	99.8%	-	-	-	-
<b>Ozone</b> O <sub>3</sub> measured in ppb	28.0	50.4	Apr 29	58.5	Apr 29 19:00	99.4%	0	-	-	-
<b>Particulate Matter</b> PM <sub>2.5</sub> measured in µg/m <sup>3</sup>	3.9	23.5	Sep 19	59.1	Dec 17 02:00	98.8%	0	0	-	-

## 1.1 Sulphur Dioxide (SO<sub>2</sub>) - Beaverlodge 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	710	61.3%	34.9%	3.2%	0.6%	0.0%	0.0%	1.3	4.1	Jan 19	17.2	Jan 04 15:00	100.0%	0	0	0
February 2020	649	81.0%	17.1%	1.5%	0.3%	0.0%	0.0%	0.7	4.5	Feb 18	20.7	Feb 12 02:00	100.0%	0	0	0
March 2020	709	82.8%	16.6%	0.4%	0.1%	0.0%	0.0%	0.6	1.4	Mar 30	13.8	Mar 16 17:00	100.0%	0	0	0
April 2020	685	90.9%	9.1%	0.0%	0.0%	0.0%	0.0%	0.3	1.3	Apr 05	4.2	Apr 05 07:00	100.0%	0	0	0
May 2020	708	95.2%	4.8%	0.0%	0.0%	0.0%	0.0%	0.2	0.8	May 17	3.4	May 08 22:00	100.0%	0	0	0
June 2020	685	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Jun 05	3.7	Jun 05 10:00	99.9%	0	0	0
July 2020	709	98.7%	1.1%	0.1%	0.0%	0.0%	0.0%	0.1	0.7	Jul 11	5.7	Jul 11 08:00	100.0%	0	0	0
August 2020	708	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.6	Aug 20	4.4	Aug 05 11:00	100.0%	0	0	0
September 2020	687	94.0%	5.4%	0.4%	0.1%	0.0%	0.0%	0.3	1.9	Sep 23	14.5	Sep 23 19:00	100.0%	0	0	0
October 2020	706	95.3%	4.0%	0.4%	0.3%	0.0%	0.0%	0.3	2.1	Oct 16	13.8	Oct 02 11:00	100.0%	0	0	0
November 2020	686	83.8%	15.7%	0.4%	0.0%	0.0%	0.0%	0.6	2.1	Nov 17	9.2	Nov 07 02:00	100.0%	0	0	0
December 2020	709	90.7%	9.2%	0.1%	0.0%	0.0%	0.0%	0.4	1.4	Dec 14	5.3	Dec 14 20:00	100.0%	0	0	0
<b>Annual</b>	<b>8351</b>	<b>89.3%</b>	<b>10.0%</b>	<b>0.6%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.4</b>	<b>4.5</b>	<b>Feb 18</b>	<b>20.7</b>	<b>Feb 12 02:00</b>	<b>100.0%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

## 1.2 Nitrogen Dioxide (NO<sub>2</sub>) - Beaverlodge 2020 Summary and Frequency Distribution

Nitrogen Dioxide (NO<sub>2</sub>) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents 1-hr 172ppb
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	707	28.0%	46.0%	20.9%	5.1%	0.0%	0.0%	11.1	24.2	Jan 20	36.0	Jan 20 02:00	100.0%	0
February 2020	662	61.3%	30.7%	7.6%	0.5%	0.0%	0.0%	5.6	15.0	Feb 18	34.4	Feb 18 20:00	100.0%	0
March 2020	707	72.4%	24.2%	3.4%	0.0%	0.0%	0.0%	4.0	11.4	Mar 14	27.6	Mar 14 09:00	100.0%	0
April 2020	678	87.8%	11.8%	0.4%	0.0%	0.0%	0.0%	2.3	9.0	Apr 02	27.2	Apr 02 09:00	99.0%	0
May 2020	703	97.0%	3.0%	0.0%	0.0%	0.0%	0.0%	1.6	2.8	May 05	12.9	May 06 08:00	99.3%	0
June 2020	683	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	1.4	2.2	Jun 05	7.7	Jun 12 06:00	99.9%	0
July 2020	707	97.7%	2.3%	0.0%	0.0%	0.0%	0.0%	1.4	2.8	Jul 30	8.6	Jul 30 06:00	100.0%	0
August 2020	707	94.5%	5.5%	0.0%	0.0%	0.0%	0.0%	1.8	3.6	Aug 17	10.3	Aug 27 07:00	100.0%	0
September 2020	685	90.5%	9.3%	0.1%	0.0%	0.0%	0.0%	2.3	4.9	Sep 30	15.4	Sep 30 08:00	100.0%	0
October 2020	707	85.9%	14.0%	0.1%	0.0%	0.0%	0.0%	2.7	5.1	Oct 09	15.6	Oct 07 10:00	100.0%	0
November 2020	685	66.1%	26.0%	7.9%	0.0%	0.0%	0.0%	5.4	14.1	Nov 23	25.6	Nov 23 18:00	100.0%	0
December 2020	706	56.8%	37.4%	5.8%	0.0%	0.0%	0.0%	5.7	12.3	Dec 15	28.0	Dec 30 22:00	99.9%	0
<b>Annual</b>	<b>8337</b>	<b>78.1%</b>	<b>17.6%</b>	<b>3.9%</b>	<b>0.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>3.8</b>	<b>24.2</b>	<b>Jan 20</b>	<b>36.0</b>	<b>Jan 20 02:00</b>	<b>99.8%</b>	<b>0</b>

AAAQO Objectives: Annual: 24ppb, 1-Hr: 159ppb

### 1.3 Nitric Oxide (NO) - Beaverlodge 2020 Summary and Frequency Distribution

Nitric Oxide (NO) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	707	82.6%	10.3%	5.1%	2.0%	0.0%	0.0%	3.4	20.0	Jan 20	62.6	Jan 07 12:00	100.0%
February 2020	662	91.2%	8.2%	0.6%	0.0%	0.0%	0.0%	1.2	4.8	Feb 18	24.4	Feb 03 12:00	100.0%
March 2020	707	94.5%	4.0%	1.4%	0.1%	0.0%	0.0%	1.1	5.8	Mar 14	33.1	Mar 14 10:00	100.0%
April 2020	678	98.1%	1.3%	0.3%	0.3%	0.0%	0.0%	0.5	5.7	Apr 02	38.7	Apr 02 09:00	99.0%
May 2020	703	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.7	May 05	7.2	May 06 08:00	99.3%
June 2020	683	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.5	Jun 18	2.9	Jun 18 08:00	99.9%
July 2020	707	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3	0.7	Jul 23	5.0	Jul 29 06:00	100.0%
August 2020	707	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.3	1.1	Aug 17	9.7	Aug 17 08:00	100.0%
September 2020	685	98.0%	1.8%	0.3%	0.0%	0.0%	0.0%	0.5	2.2	Sep 16	16.8	Sep 30 10:00	100.0%
October 2020	707	99.2%	0.7%	0.1%	0.0%	0.0%	0.0%	0.4	1.4	Oct 02	23.0	Oct 07 10:00	100.0%
November 2020	685	94.5%	4.8%	0.7%	0.0%	0.0%	0.0%	1.0	5.9	Nov 23	23.1	Nov 23 13:00	100.0%
December 2020	706	95.6%	4.1%	0.3%	0.0%	0.0%	0.0%	0.7	2.5	Dec 22	17.1	Dec 22 13:00	99.9%
<b>Annual</b>	<b>8337</b>	<b>96.1%</b>	<b>3.0%</b>	<b>0.7%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.8</b>	<b>20.0</b>	<b>MAXIMUM VALUES</b>			<b>99.8%</b>

AAAQO Objectives: none

### 1.4 Oxides of Nitrogen (NO<sub>x</sub>) - Beaverlodge 2020 Summary and Frequency Distribution

Oxides of Nitrogen (NO<sub>x</sub>) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	707	24.9%	43.8%	18.1%	13.2%	0.0%	0.0%	14.6	44.4	Jan 20	92.1	Jan 07 12:00	100.0%
February 2020	662	58.2%	29.3%	10.1%	2.4%	0.0%	0.0%	6.9	20.0	Feb 18	43.5	Feb 24 09:00	100.0%
March 2020	707	68.9%	24.9%	4.7%	1.6%	0.0%	0.0%	5.1	17.3	Mar 14	56.5	Mar 14 09:00	100.0%
April 2020	678	84.1%	14.7%	0.6%	0.6%	0.0%	0.0%	2.8	14.7	Apr 02	66.2	Apr 02 09:00	99.0%
May 2020	703	94.6%	5.3%	0.1%	0.0%	0.0%	0.0%	1.8	3.6	May 05	20.3	May 06 08:00	99.3%
June 2020	683	97.1%	2.9%	0.0%	0.0%	0.0%	0.0%	1.6	2.7	Jun 05	9.0	Jun 12 07:00	99.9%
July 2020	707	95.0%	5.0%	0.0%	0.0%	0.0%	0.0%	1.7	3.4	Jul 29	13.2	Jul 29 06:00	100.0%
August 2020	707	91.4%	8.3%	0.3%	0.0%	0.0%	0.0%	2.1	4.6	Aug 17	17.1	Aug 18 08:00	100.0%
September 2020	685	86.3%	12.4%	1.3%	0.0%	0.0%	0.0%	2.8	6.8	Sep 30	29.2	Sep 30 10:00	100.0%
October 2020	707	82.3%	17.0%	0.6%	0.1%	0.0%	0.0%	3.2	6.4	Oct 09	38.8	Oct 07 10:00	100.0%
November 2020	685	62.6%	25.8%	10.4%	1.2%	0.0%	0.0%	6.4	20.1	Nov 23	38.7	Nov 20 09:00	100.0%
December 2020	706	55.7%	33.6%	10.3%	0.4%	0.0%	0.0%	6.4	14.9	Dec 15	33.6	Dec 22 13:00	99.9%
<b>Annual</b>	<b>8337</b>	<b>75.1%</b>	<b>18.6%</b>	<b>4.7%</b>	<b>1.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.6</b>	<b>44.4</b>	<b>MAXIMUM VALUES</b>			<b>99.8%</b>

AAAQO Objectives: none

## 1.5 Ozone (O<sub>3</sub>) - Beaverlodge 2020 Summary and Frequency Distribution

Ozone (O<sub>3</sub>) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 10 (ppb)	10 to 20 (ppb)	20 to 40 (ppb)	40 to 60 (ppb)	60 to 76 (ppb)	> 76 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		24-hr 76ppb	1-hr 76ppb
January 2020	709	13.3%	23.6%	56.8%	6.3%	0.0%	0.0%	23.3	39.3	Jan 30	43.4	Jan 30 20:00	100.0%	0	0
February 2020	663	2.3%	4.4%	68.0%	25.3%	0.0%	0.0%	33.8	45.8	Feb 21	48.3	Feb 21 07:00	100.0%	0	0
March 2020	709	0.0%	1.8%	60.1%	38.1%	0.0%	0.0%	37.0	49.4	Mar 26	52.6	Mar 26 04:00	100.0%	0	0
April 2020	668	0.0%	0.1%	30.1%	69.8%	0.0%	0.0%	42.4	50.4	Apr 29	58.5	Apr 29 19:00	98.1%	0	0
May 2020	682	0.6%	10.3%	62.6%	26.5%	0.0%	0.0%	33.6	42.9	May 12	54.7	May 13 14:00	96.2%	0	0
June 2020	685	1.6%	20.3%	73.7%	4.4%	0.0%	0.0%	26.5	37.0	Jun 11	44.2	Jun 12 18:00	99.9%	0	0
July 2020	710	9.4%	46.6%	43.7%	0.3%	0.0%	0.0%	19.3	29.5	Jul 31	42.4	Jul 27 17:00	100.0%	0	0
August 2020	698	5.2%	29.8%	63.3%	1.7%	0.0%	0.0%	22.9	30.8	Aug 05	48.0	Aug 05 14:00	98.3%	0	0
September 2020	686	8.0%	33.5%	57.6%	0.9%	0.0%	0.0%	22.0	32.9	Sep 28	42.9	Sep 28 14:00	100.0%	0	0
October 2020	709	3.9%	20.5%	74.2%	1.4%	0.0%	0.0%	25.1	36.9	Oct 06	43.5	Oct 04 15:00	100.0%	0	0
November 2020	686	5.8%	23.8%	70.4%	0.0%	0.0%	0.0%	24.1	35.0	Nov 09	38.9	Nov 09 15:00	100.0%	0	0
December 2020	709	8.3%	18.1%	68.5%	5.1%	0.0%	0.0%	26.5	40.4	Dec 24	44.0	Dec 23 22:00	99.9%	0	0
<b>Annual</b>	<b>8314</b>	<b>4.9%</b>	<b>19.4%</b>	<b>60.8%</b>	<b>15.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>28.0</b>	<b>50.4</b>	<b>MAXIMUM VALUES</b>		<b>99.4%</b>	<b>0</b>	<b>0</b>	

AAAQO Objectives: 1-Hr: 76ppb

## 1.6 Particulate Matter (PM<sub>2.5</sub>) - Beaverlodge 2020 Summary and Frequency Distribution

Particulate Matter (PM<sub>2.5</sub>) Frequency Distribution at Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (µg/m <sup>3</sup> )	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 2 (µg/m <sup>3</sup> )	2 to 4 (µg/m <sup>3</sup> )	4 to 10 (µg/m <sup>3</sup> )	10 to 20 (µg/m <sup>3</sup> )	20 to 29 (µg/m <sup>3</sup> )	> 29 (µg/m <sup>3</sup> )		24-hr (µg/m <sup>3</sup> )	Date	1-hr (µg/m <sup>3</sup> )	Date		24-hr 29 µg/m <sup>3</sup>	1-hr 80 µg/m <sup>3</sup>
January 2020	730	36.0%	19.3%	27.0%	13.7%	2.3%	1.6%	5.6	23.5	Jan 20	41.6	Jan 20 05:00	98.7%	0	0
February 2020	690	59.7%	16.7%	19.4%	4.1%	0.1%	0.0%	2.8	9.1	Feb 15	22.0	Feb 15 18:00	99.4%	0	0
March 2020	740	34.6%	31.5%	29.7%	4.2%	0.0%	0.0%	3.6	10.2	Mar 19	18.2	Mar 20 05:00	100.0%	0	0
April 2020	718	63.2%	21.6%	12.5%	2.1%	0.4%	0.1%	2.5	6.4	Apr 05	30.4	Apr 06 03:00	100.0%	0	0
May 2020	742	31.4%	35.0%	31.0%	1.6%	0.5%	0.4%	3.8	10.3	May 31	43.6	May 31 06:00	100.0%	0	0
June 2020	701	40.4%	30.4%	24.8%	4.4%	0.0%	0.0%	3.5	8.7	Jun 06	16.6	Jun 20 04:00	97.8%	0	0
July 2020	742	34.6%	34.6%	27.6%	3.1%	0.0%	0.0%	3.6	9.3	Jul 31	15.9	Jul 31 22:00	100.0%	0	0
August 2020	684	49.0%	18.9%	23.5%	6.4%	1.3%	0.9%	4.1	23.3	Aug 01	32.7	Aug 01 15:00	92.3%	0	0
September 2020	714	48.6%	24.9%	12.3%	11.1%	1.5%	1.5%	4.5	23.5	Sep 19	53.7	Sep 19 11:00	99.6%	0	0
October 2020	741	46.3%	32.8%	19.3%	1.6%	0.0%	0.0%	2.8	8.2	Oct 03	14.6	Oct 24 00:00	100.0%	0	0
November 2020	717	46.7%	11.6%	22.0%	15.8%	2.8%	1.1%	5.2	17.1	Nov 20	36.0	Nov 20 07:00	100.0%	0	0
December 2020	726	53.3%	12.9%	20.4%	11.7%	1.1%	0.6%	4.2	14.2	Jan 00	59.1	Dec 17 02:00	98.1%	0	0
<b>Annual</b>	<b>8645</b>	<b>45.3%</b>	<b>24.2%</b>	<b>22.5%</b>	<b>6.6%</b>	<b>0.8%</b>	<b>0.5%</b>	<b>3.9</b>	<b>23.5</b>	<b>MAXIMUM VALUES</b>		<b>98.8%</b>	<b>0</b>	<b>0</b>	

AAAQO Objectives: 24-Hr: 29 µg/m<sup>3</sup>, AAAQG Guideline: 1-Hr: 80 µg/m<sup>3</sup>

## 1.7 Temperature (ET) - Beaverlodge 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Beaverlodge

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-14.0	0.6	Jan 30	3.7	Jan 30 19:00	-32.5	Jan 15	-34.8	Jan 15 22:00	100.0%
February 2020	-5.4	3.8	Feb 27	5.8	Feb 27 15:00	-20.2	Feb 17	-21.8	Feb 17 09:00	100.0%
March 2020	-7.6	1.8	Mar 02	5.4	Mar 26 17:00	-21.7	Mar 14	-29.1	Mar 14 09:00	100.0%
April 2020	2.1	11.3	Apr 20	17.9	Apr 20 16:00	-14.2	Apr 02	-21.0	Apr 03 07:00	100.0%
May 2020	10.1	16.4	May 30	22.1	May 30 17:00	3.3	May 14	0.3	May 14 07:00	100.0%
June 2020	13.9	19.9	Jun 19	25.4	Jun 19 19:00	10.3	Jun 07	3.8	Jun 04 04:00	100.0%
July 2020	15.9	22.6	Jul 27	30.7	Jul 27 18:00	10.8	Jul 03	8.3	Jul 12 03:00	100.0%
August 2020	14.6	21.2	Aug 02	28.4	Aug 16 17:00	9.5	Aug 12	4.2	Aug 28 06:00	100.0%
September 2020	11.5	18.5	Sep 10	26.6	Sep 10 17:00	5.2	Sep 14	-1.1	Sep 16 07:00	100.0%
October 2020	1.7	15.9	Oct 03	24.7	Oct 03 15:00	-10.0	Oct 24	-13.9	Oct 25 04:00	100.0%
November 2020	-3.9	10.3	Nov 02	16.7	Nov 02 15:00	-16.9	Nov 19	-18.6	Nov 19 01:00	100.0%
December 2020	-4.7	5.6	Dec 07	8.5	Dec 06 15:00	-19.7	Dec 13	-21.2	Dec 13 09:00	99.9%
	<b>AVERAGE</b> 2.9	<b>22.6</b>	<b>MAXIMUM VALUES</b> Jul 27 30.7 Jul 27 18:00		<b>MINIMUM VALUES</b> -32.5 Jan 15 -34.8 Jan 15 22:00				<b>100.0%</b>	

## 1.8 Relative Humidity (RH) - Beaverlodge 2020 Summary and Frequency Distribution

Relative Humidity (RH) Frequency Distribution at Beaverlodge

Month	Monthly Average (%)	Maximum Values				Operational time (%)
		24-hr (%)	Date	1-hr (%)	Date	
January 2020	76.1	93.1	Jan 24	100.0	Jan 31 21:00	100.0%
February 2020	67.3	88.6	Feb 29	100.0	Feb 01 01:00	100.0%
March 2020	67.2	86.6	Mar 23	100.0	Mar 05 23:00	100.0%
April 2020	53.9	75.3	Apr 17	99.5	Apr 09 00:00	100.0%
May 2020	59.4	94.4	May 21	100.0	May 08 05:00	100.0%
June 2020	61.3	86.8	Jun 30	100.0	Jun 07 04:00	100.0%
July 2020	69.5	97.3	Jul 01	100.0	Jul 02 03:00	100.0%
August 2020	64.9	88.9	Aug 15	100.0	Aug 15 07:00	100.0%
September 2020	66.8	95.5	Sep 14	100.0	Sep 14 21:00	100.0%
October 2020	69.7	95.9	Oct 10	100.0	Oct 10 01:00	100.0%
November 2020	75.7	93.6	Nov 23	100.0	Nov 04 00:00	100.0%
December 2020	71.8	92.4	Dec 27	100.0	Dec 08 08:00	100.0%
	<b>AVERAGE</b> 67.0	<b>97.3</b>	<b>MAXIMUM VALUES</b> Jul 01 100.0 Jan 31 21:00		<b>100.0%</b>	

## 1.9 Wind Speed & Wind Direction (WS & WD) - Beaverlodge 2020 Summary and Frequency Distribution

### Wind Speed Frequency Distribution of 1-hr Averages - Beaverlodge

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	24-hr (km/hr)	MAXIMUM VALUES			Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)			Date	1-hr (km/hr)	Date	
January 2020	742	31.8%	26.0%	22.1%	12.7%	2.2%	5.3%	8.2	24.8	Jan 02	50.2	Jan 30 02:00	99.7%
February 2020	696	18.8%	22.3%	16.5%	20.8%	7.8%	13.8%	13.7	32.7	Feb 01	54.6	Feb 01 15:00	100.0%
March 2020	744	16.3%	19.6%	22.0%	28.5%	4.7%	8.9%	12.5	31.6	Mar 02	52.3	Mar 01 15:00	100.0%
April 2020	720	11.0%	21.4%	27.1%	20.3%	7.8%	12.5%	13.4	29.8	Apr 21	45.2	Apr 21 10:00	100.0%
May 2020	744	6.7%	13.3%	29.6%	39.2%	6.5%	4.7%	13.5	21.2	May 03	43.2	May 03 14:00	100.0%
June 2020	720	7.8%	18.2%	25.7%	30.7%	8.2%	9.4%	13.7	26.2	Jun 14	38.7	Jun 14 17:00	100.0%
July 2020	744	9.9%	17.7%	32.5%	31.3%	7.1%	1.3%	11.5	19.8	Jul 16	35.2	Jul 13 15:00	100.0%
August 2020	744	12.4%	15.7%	26.7%	26.1%	8.6%	10.5%	13.8	24.0	Aug 10	50.4	Aug 31 18:00	100.0%
September 2020	720	15.8%	22.6%	26.7%	23.2%	5.7%	6.0%	11.4	29.7	Sep 28	45.8	Sep 24 16:00	100.0%
October 2020	740	20.5%	18.0%	28.8%	22.6%	4.5%	5.7%	10.8	24.1	Oct 31	55.5	Oct 27 01:00	99.5%
November 2020	720	21.8%	23.3%	28.8%	20.0%	3.1%	3.1%	9.1	24.1	Nov 26	51.6	Nov 30 16:00	100.0%
December 2020	744	23.4%	27.2%	26.7%	14.9%	3.4%	4.4%	8.8	23.3	Dec 07	48.7	Dec 07 13:00	100.0%
<b>Annual</b>	<b>8778</b>	<b>16.4%</b>	<b>20.4%</b>	<b>26.1%</b>	<b>24.2%</b>	<b>5.8%</b>	<b>7.1%</b>	<b>11.7</b>	<b>32.7</b>	<b>Feb 01</b>	<b>55.5</b>	<b>Oct 27 01:00</b>	<b>99.9%</b>

### Wind Speed and Wind Direction Frequency Distribution at Beaverlodge

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	342	0.8%	0.9%	1.3%	0.8%	0.0%	0.0%	3.9%
NNE	470	1.2%	1.2%	1.8%	1.2%	0.1%	0.0%	5.4%
NE	488	1.4%	2.3%	1.2%	0.6%	0.0%	0.0%	5.6%
ENE	539	1.7%	2.4%	1.0%	0.9%	0.1%	0.0%	6.1%
E	637	1.7%	1.5%	1.5%	1.9%	0.3%	0.3%	7.3%
ESE	364	1.2%	1.0%	1.3%	0.7%	0.0%	0.0%	4.1%
SE	260	1.0%	0.9%	0.8%	0.3%	0.0%	0.0%	3.0%
SSE	228	1.2%	1.0%	0.4%	0.0%	0.0%	0.0%	2.6%
S	220	0.9%	1.1%	0.5%	0.0%	0.0%	0.0%	2.5%
SSW	268	1.0%	1.1%	0.8%	0.1%	0.0%	0.0%	3.1%
SW	515	1.1%	1.2%	2.5%	1.0%	0.1%	0.0%	5.9%
WSW	1333	0.6%	1.2%	2.9%	5.0%	2.1%	3.3%	15.2%
W	1243	0.6%	1.2%	1.7%	4.7%	2.4%	3.4%	14.2%
WNNW	574	0.7%	1.3%	2.3%	1.9%	0.3%	0.1%	6.5%
NW	669	0.6%	1.1%	3.0%	2.8%	0.2%	0.0%	7.6%
NNW	628	0.7%	1.1%	3.1%	2.2%	0.1%	0.0%	7.2%
<b>Total</b>	<b>8,778</b>	<b>16.4%</b>	<b>20.4%</b>	<b>26.1%</b>	<b>24.2%</b>	<b>5.8%</b>	<b>7.1%</b>	<b>100.0%</b>

### Wind Speed Standard Deviation (WSSTD) at Beaverlodge

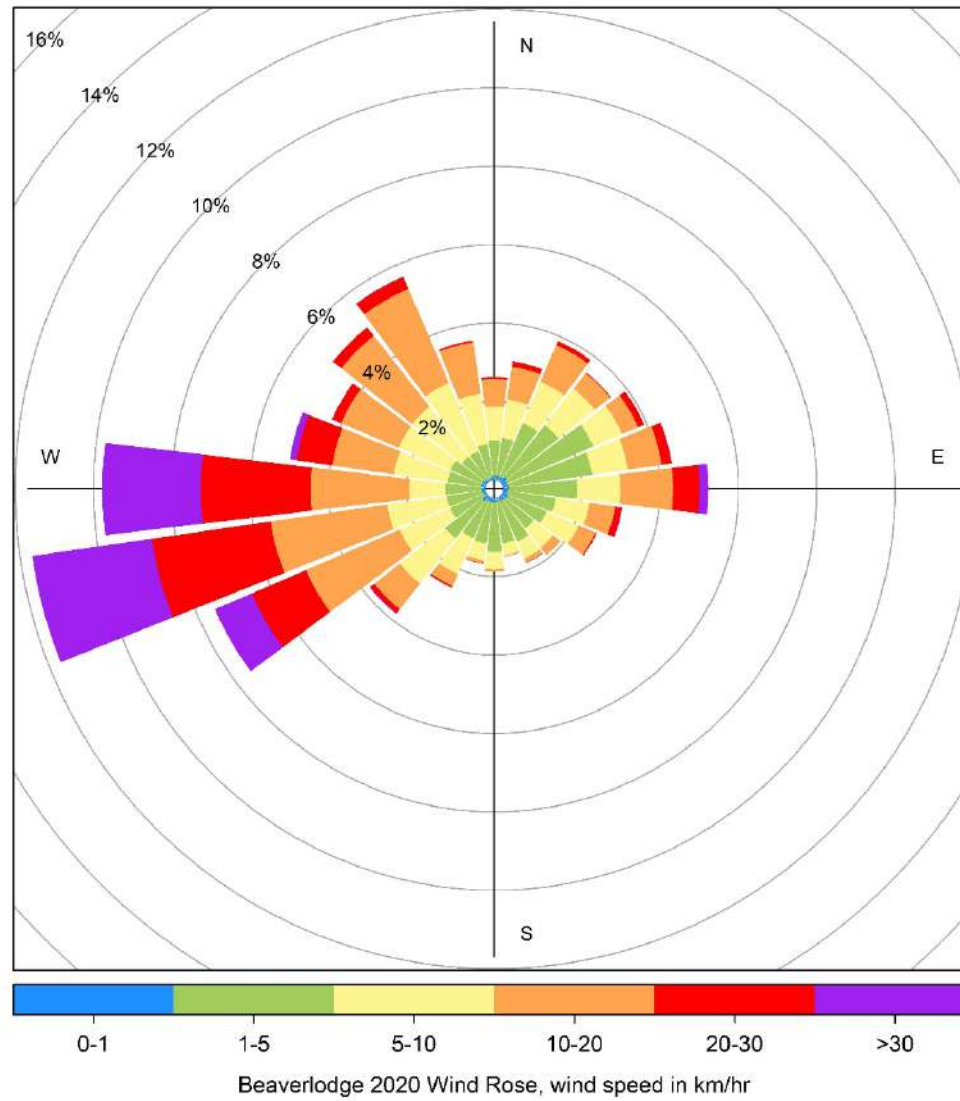
Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	2.2	4.6	Jan 02	9.9	Jan 05 15:00	1.2	Jan 16	0.5	Jan 01 11:00	99.9%
February 2020	2.9	5.9	Feb 01	17.3	Feb 01 07:00	1.1	Feb 18	0.4	Feb 18 13:00	99.9%
March 2020	2.6	5.2	Mar 03	16.3	Mar 03 04:00	1.1	Mar 07	0.5	Mar 16 14:00	100.0%
April 2020	2.9	5.1	Apr 21	15.5	Apr 25 21:00	1.3	Apr 02	0.4	Apr 02 22:00	100.0%
May 2020	3.1	4.3	May 26	9.7	May 19 16:00	1.7	May 18	0.5	May 13 01:00	100.0%
June 2020	3.2	4.7	Jun 15	11.5	Jun 08 19:00	1.7	Jun 17	0.6	Jun 22 02:00	100.0%
July 2020	2.8	4.2	Jul 13	10.5	Jul 13 16:00	2.0	Jul 27	0.6	Jul 27 07:00	100.0%
August 2020	3.2	4.7	Aug 08	19.9	Aug 18 16:00	1.4	Aug 15	0.5	Aug 15 03:00	100.0%
September 2020	2.8	5.5	Sep 28	10.1	Sep 28 06:00	1.3	Sep 18	0.5	Sep 10 07:00	100.0%
October 2020	2.5	4.4	Oct 27	11.8	Oct 01 10:00	1.2	Oct 23	0.4	Oct 23 19:00	99.5%
November 2020	2.4	4.3	Nov 30	12.4	Nov 05 14:00	1.1	Nov 11	0.4	Nov 14 07:00	100.0%
December 2020	2.4	4.6	Dec 07	10.9	Dec 19 03:00	1.3	Dec 27	0.6	Dec 13 00:00	100.0%
	<b>AVERAGE</b> 2.7	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
		5.9	Feb 01	19.9	Aug 18 16:00	1.1	Mar 07	0.4	Apr 02 22:00	99.9%

### Wind Direction Standard Deviation (WDSTD) at Beaverlodge

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	32.2	56.2	Jan 20	97.3	Jan 23 11:00	6.1	Jan 11	2.2	Jan 30 22:00	99.7%
February 2020	23.0	50.7	Feb 18	97.1	Feb 20 07:00	4.9	Feb 09	2.2	Feb 28 03:00	100.0%
March 2020	20.6	51.6	Mar 14	94.9	Mar 09 05:00	5.3	Mar 30	1.8	Mar 27 08:00	100.0%
April 2020	19.3	34.3	Apr 03	91.1	Apr 19 06:00	6.2	Apr 22	2.2	Apr 22 23:00	100.0%
May 2020	19.9	41.6	May 16	94.1	May 05 07:00	7.8	May 10	2.3	May 11 22:00	100.0%
June 2020	20.9	42.3	Jun 11	95.2	Jun 04 12:00	5.3	Jun 14	2.9	Jun 03 01:00	100.0%
July 2020	20.9	39.0	Jul 22	90.3	Jul 22 02:00	7.2	Jul 01	2.9	Jul 31 00:00	100.0%
August 2020	22.1	40.8	Aug 02	96.2	Aug 02 05:00	6.8	Aug 09	2.9	Aug 12 21:00	100.0%
September 2020	24.8	45.4	Sep 23	97.3	Sep 13 08:00	8.7	Sep 26	3.2	Sep 01 07:00	100.0%
October 2020	23.3	40.4	Oct 14	96.8	Oct 24 09:00	7.2	Oct 04	2.8	Oct 26 15:00	99.5%
November 2020	26.9	55.0	Nov 29	97.5	Nov 03 00:00	7.7	Nov 17	2.9	Nov 30 22:00	100.0%
December 2020	29.1	63.6	Dec 03	94.4	Dec 23 01:00	9.0	Dec 17	0.0	Jan 00 00:00	100.0%
	<b>AVERAGE</b> 23.6	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
		63.6	Dec 03	97.5	Nov 03 00:00	4.9	Feb 09	0.0	Jan 00 00:00	99.9%



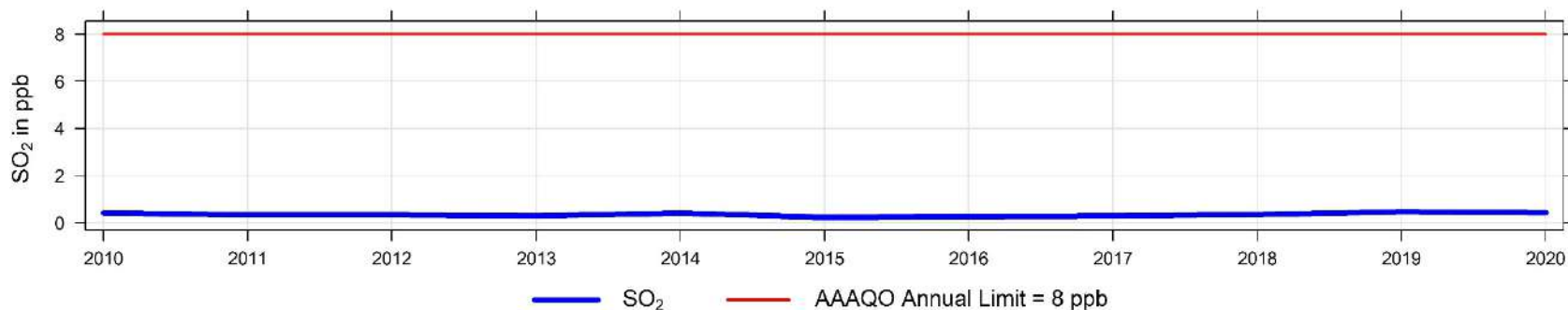
## 1.10 Wind Rose - Beaverlodge 2020 Summary and Frequency Distribution



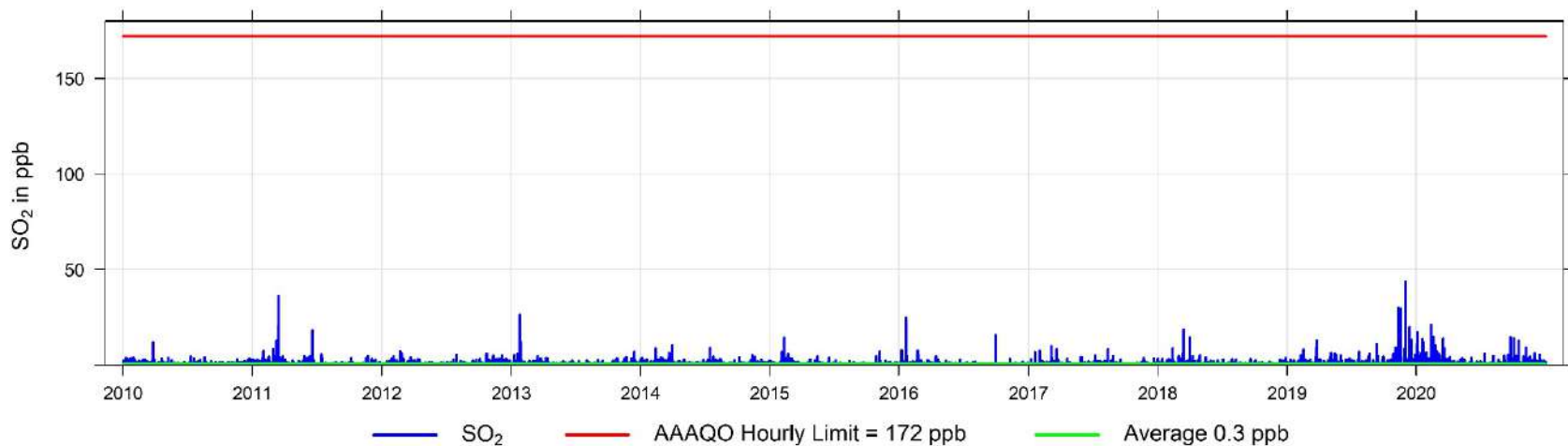
## 2 Beaverlodge Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Beaverlodge Station.

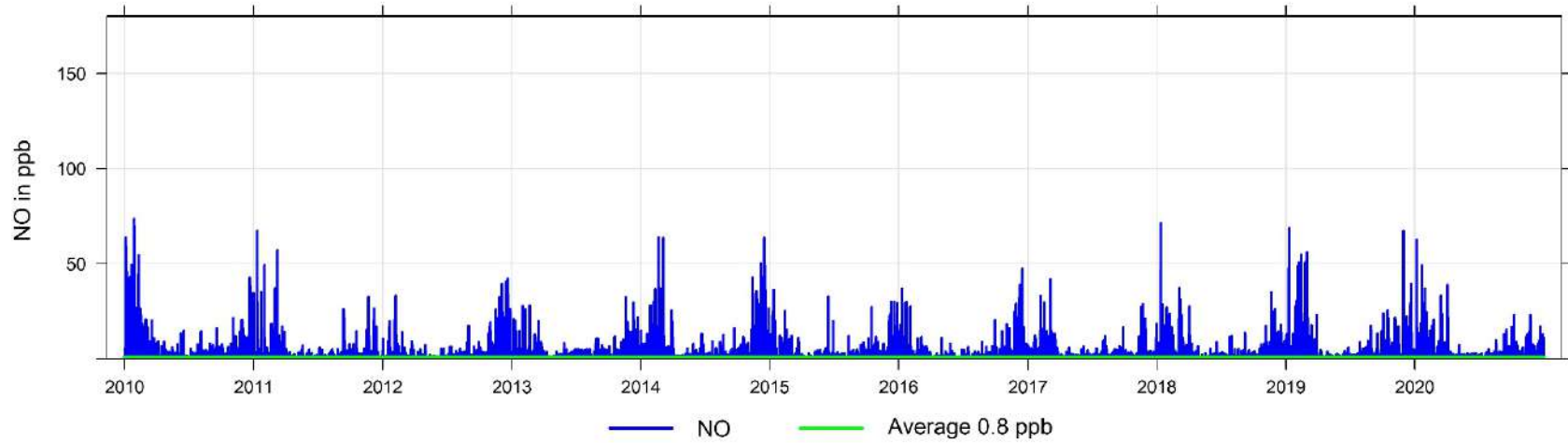
2010 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Beaverlodge



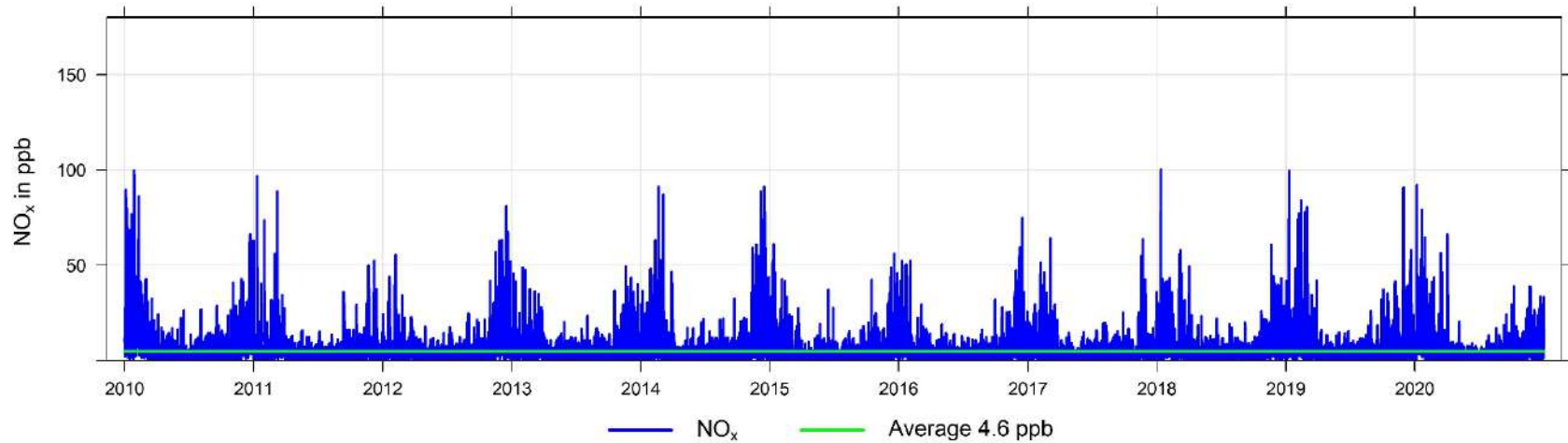
2010 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Beaverlodge



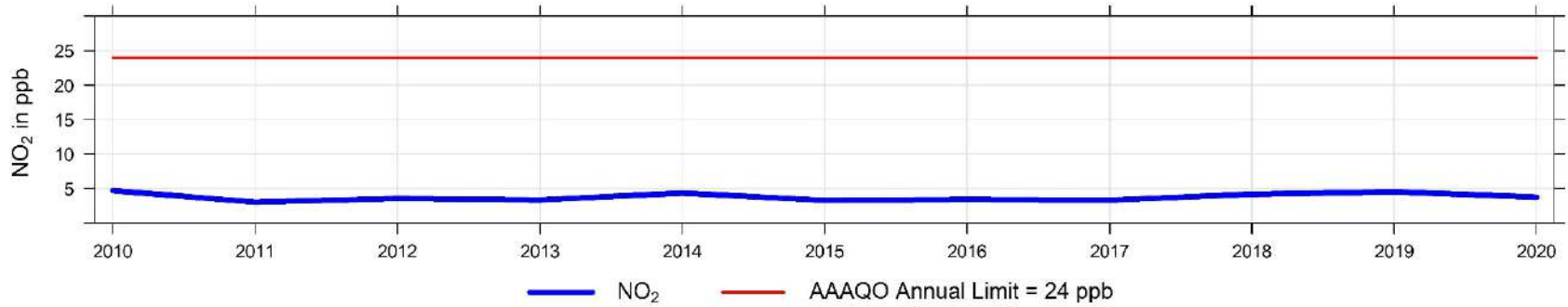
2010 to 2020 Hourly Concentration Readings of NO (in ppb) at Beaverlodge



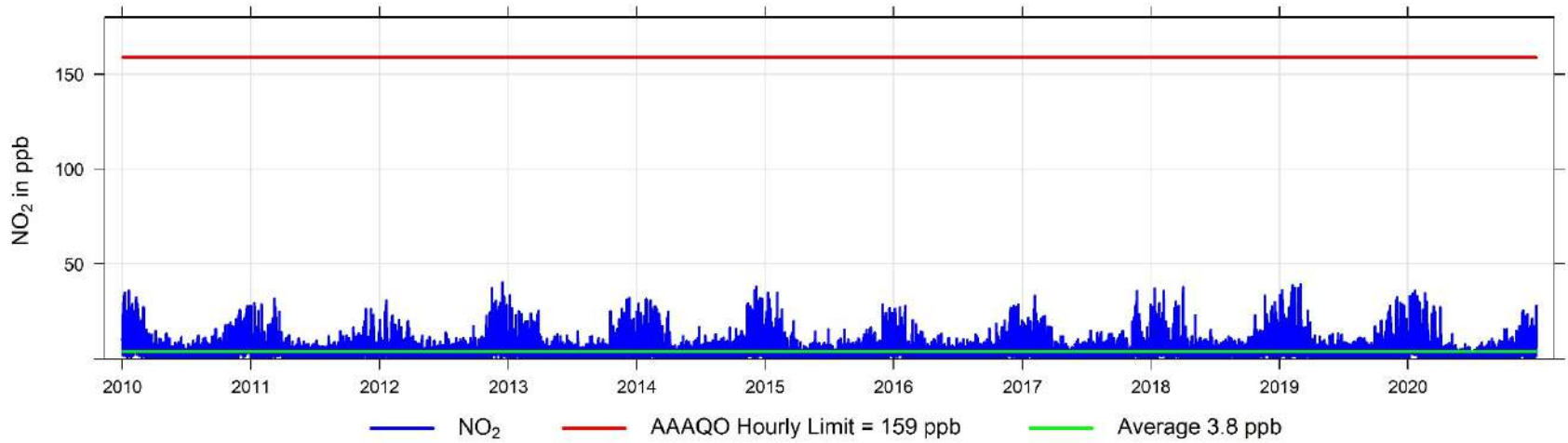
2010 to 2020 Hourly Concentration Readings of NO<sub>x</sub> (in ppb) at Beaverlodge



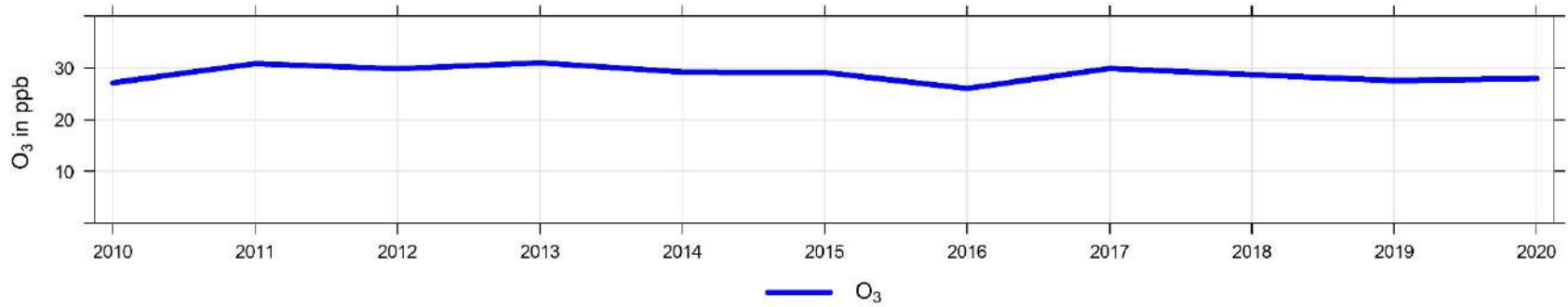
2010 to 2020 Annual Concentration Readings of NO<sub>2</sub> (in ppb) at Beaverlodge



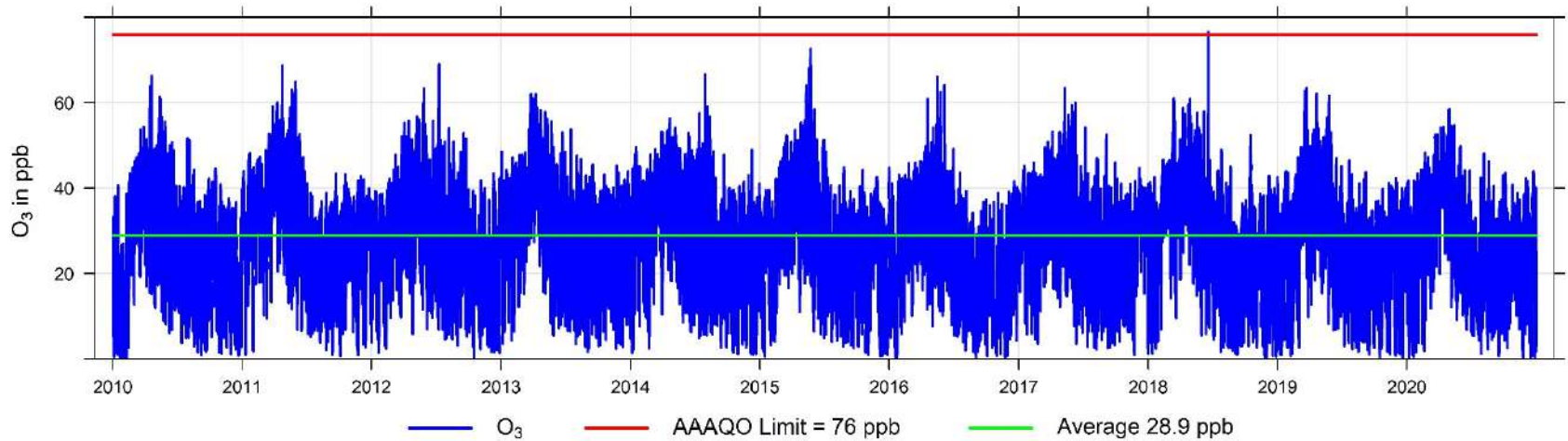
2010 to 2020 Hourly Concentration Readings of NO<sub>2</sub> (in ppb) at Beaverlodge



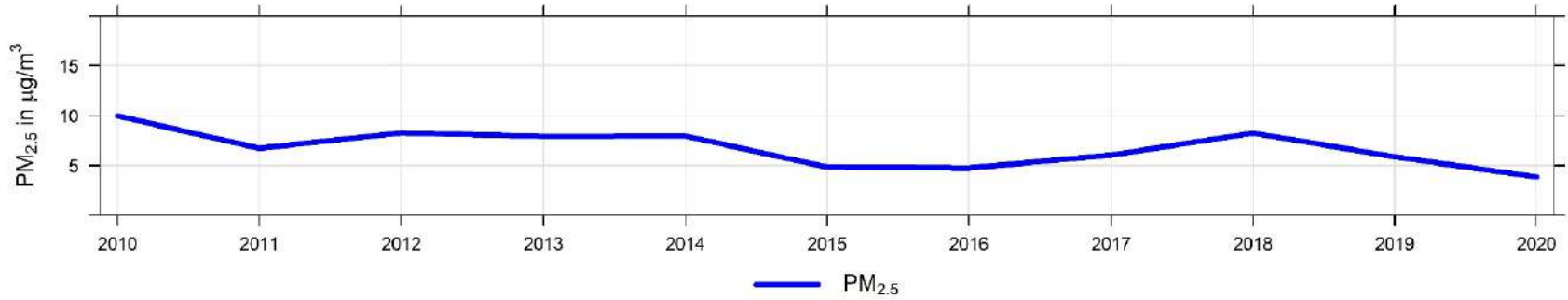
2010 to 2020 Annual Concentration Readings of O<sub>3</sub> (in ppb) at Beaverlodge



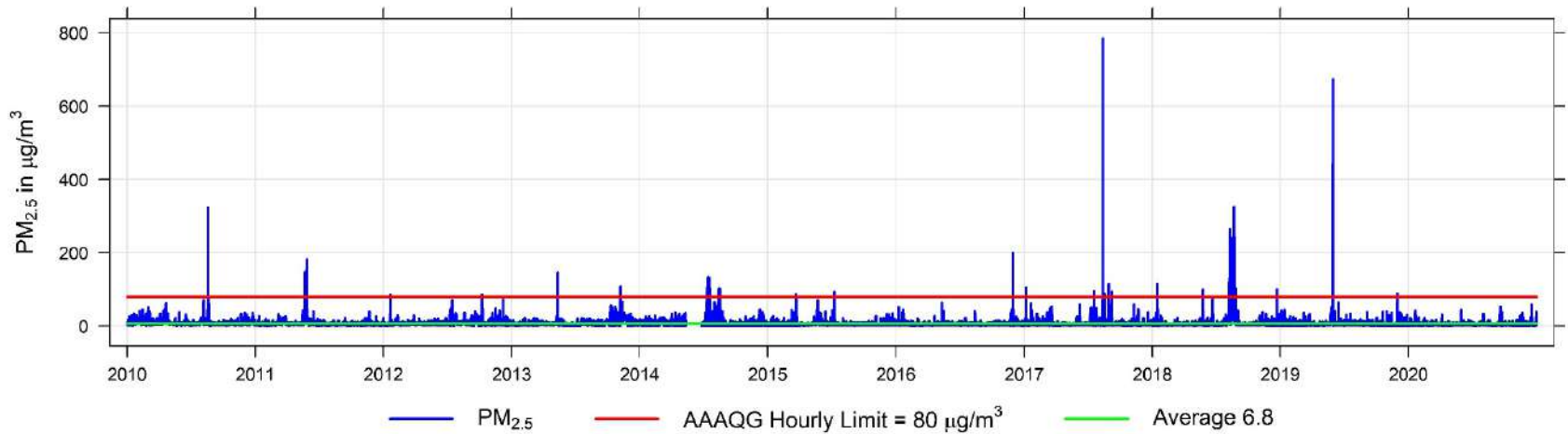
2010 to 2020 Hourly Concentration Readings of O<sub>3</sub> (in ppb) at Beaverlodge



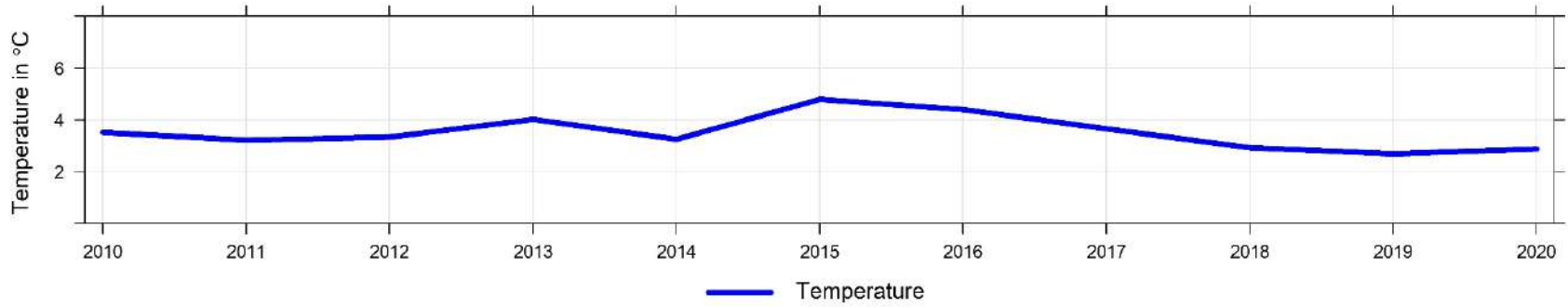
2010 to 2020 Annual Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Beaverlodge



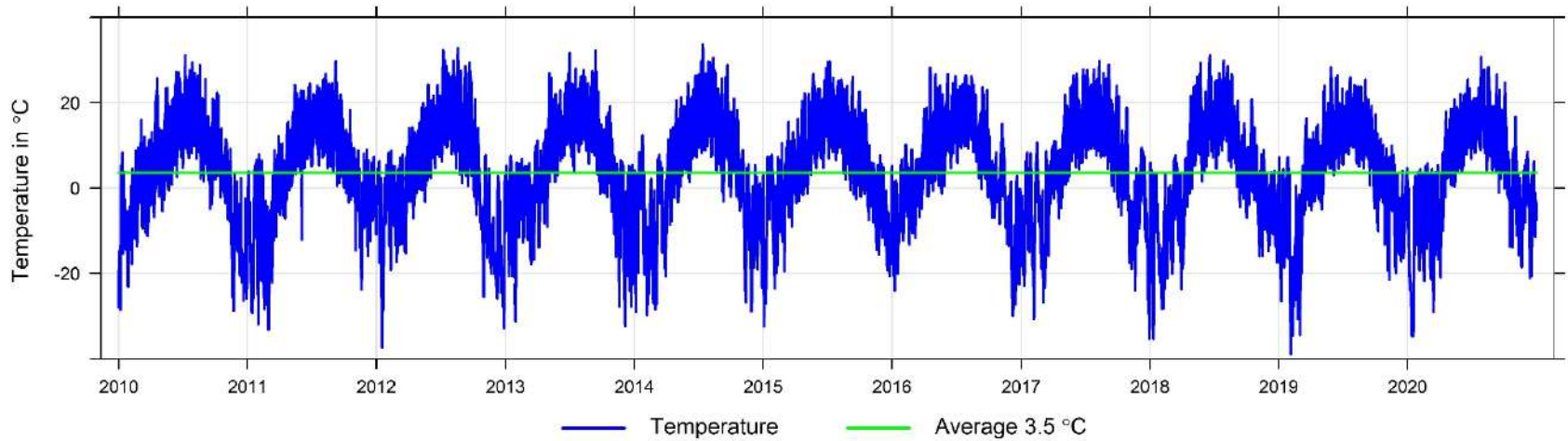
2010 to 2020 Hourly Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Beaverlodge



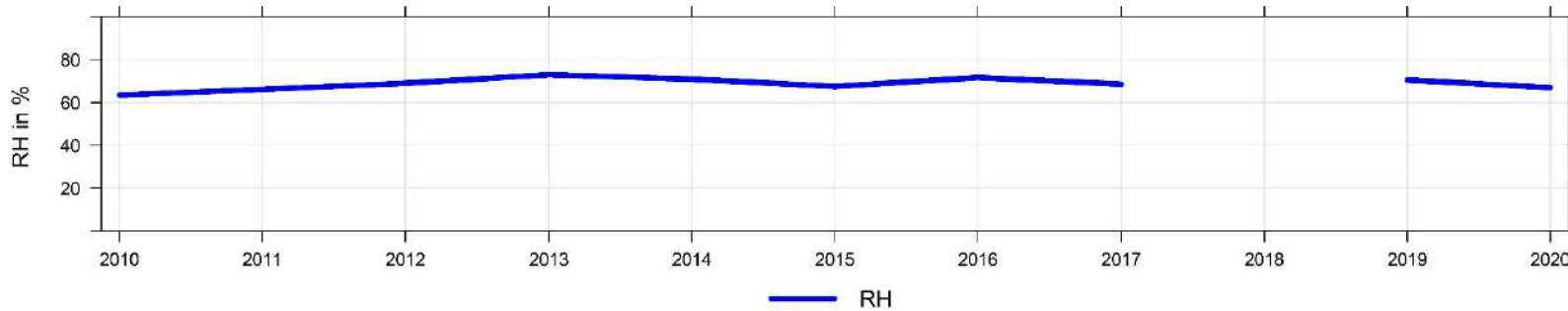
2010 to 2020 Annual Temperature Readings in °C at Beaverlodge



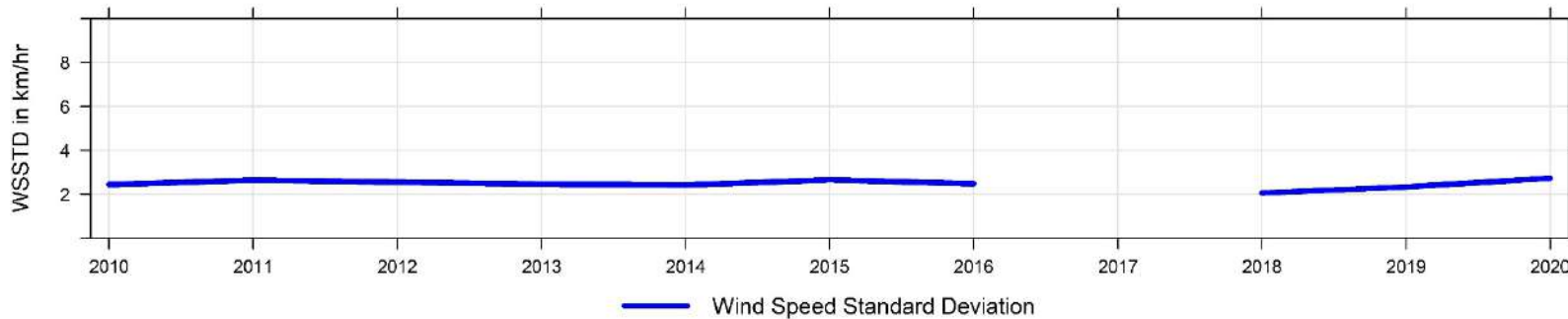
2010 to 2020 Hourly Temperature Readings (in °C) at Beaverlodge



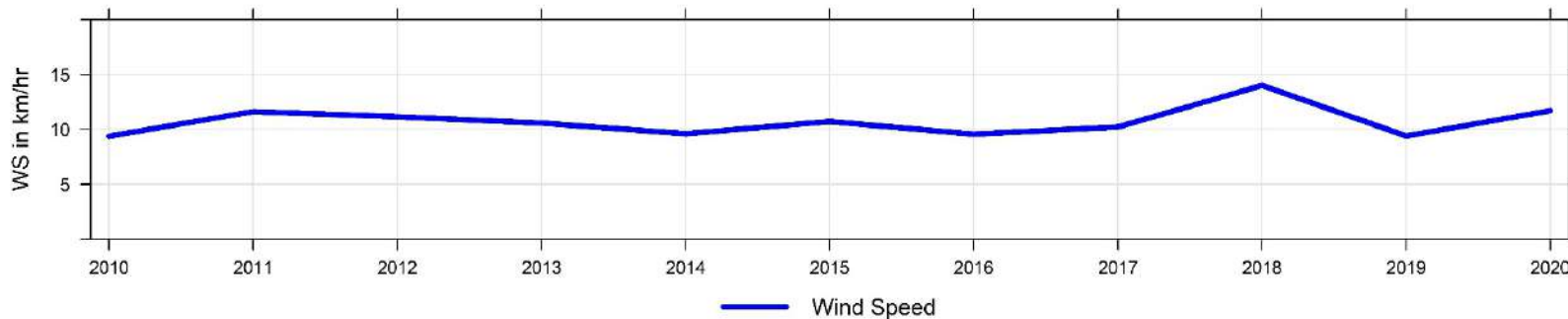
2010 to 2020 Annual Readings of Relative Humidity (in %) at Beaverlodge



2010 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Beaverlodge

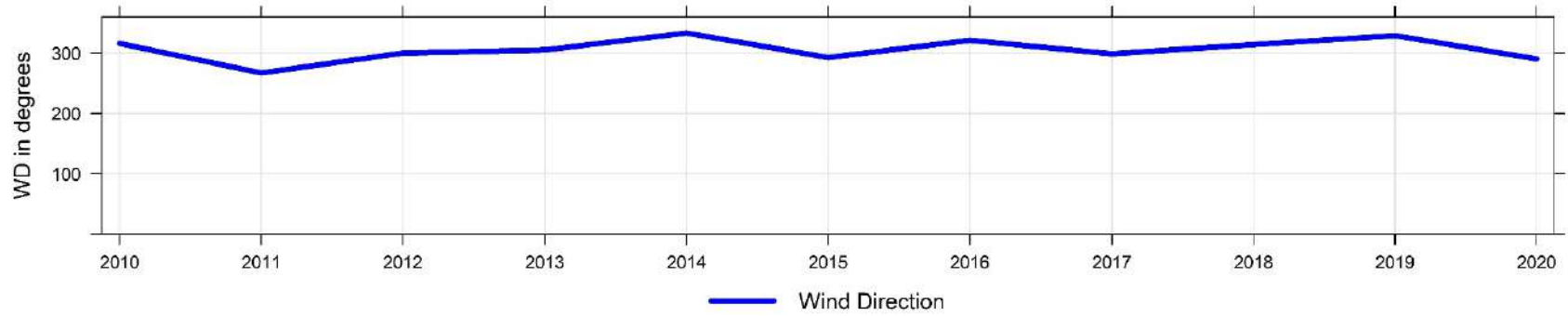


2010 to 2020 Annual Readings of Wind Speed (in km/hr) at Beaverlodge

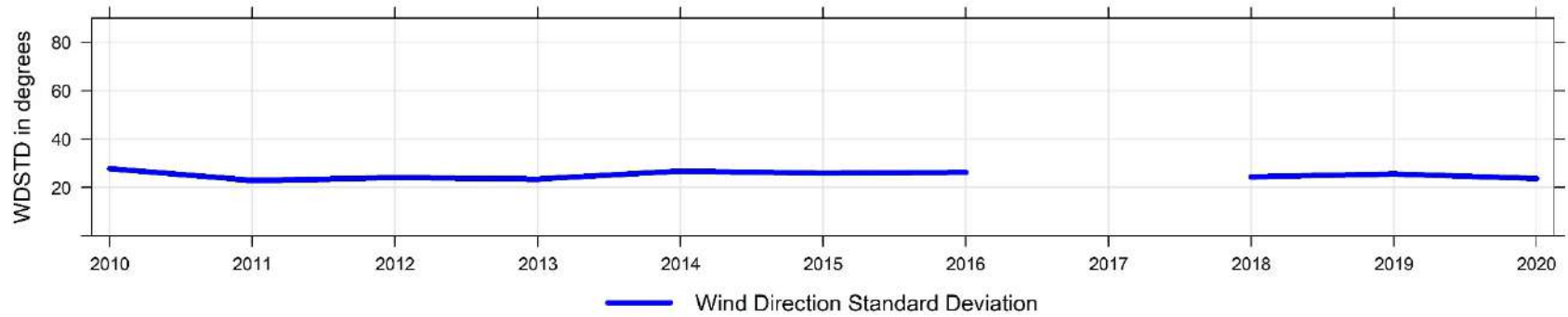


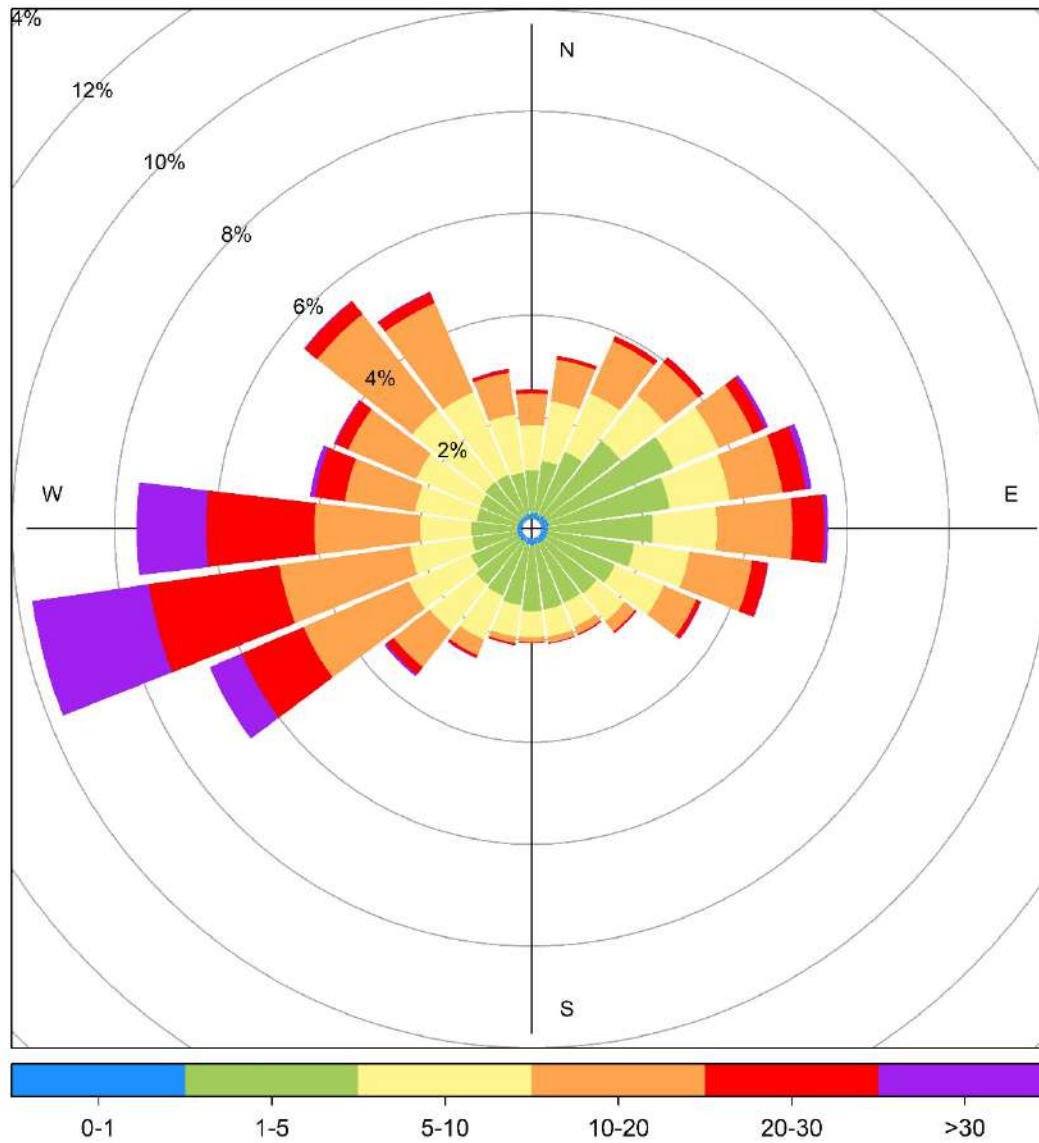


2010 to 2020 Annual Readings of Wind Direction (in degrees) at Beaverlodge



2010 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Beaverlodge





Beaverlodge 2010 to 2020 Wind Rose, wind speed in km/hr

### 3 Evergreen Park Key Parameters - Continuous Monitoring Data - 2020 Summary

Evergreen Park Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.3	5.7	Jan 12	44.1	Jan 12 13:00	99.8%	0	0	0	0
Total Reduced Sulphur TRS measured in ppb	0.5	1.8	Feb 19	6.2	May 06 07:00	99.7%	-	-	-	-
Particulate Matter PM <sub>2.5</sub> measured in µg/m <sup>3</sup>	3.6	24.5	Sep 19	50.4	Sep 19 12:00	99.0%	0	0	-	-

### 3.1 Sulphur Dioxide (SO<sub>2</sub>) - Evergreen Park 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Evergreen Park

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	708	75.8%	21.8%	1.3%	1.1%	0.0%	0.0%	1.1	5.7	Jan 12	44.1	Jan 12 13:00	99.9%	0	0	0
February 2020	662	94.6%	4.8%	0.5%	0.2%	0.0%	0.0%	0.3	1.4	Feb 18	16.2	Feb 06 15:00	100.0%	0	0	0
March 2020	706	93.5%	5.7%	0.4%	0.4%	0.0%	0.0%	0.4	2.0	Mar 25	15.7	Mar 25 12:00	100.0%	0	0	0
April 2020	686	96.5%	3.5%	0.0%	0.0%	0.0%	0.0%	0.2	0.6	Apr 01	3.1	Apr 11 15:00	100.0%	0	0	0
May 2020	710	99.3%	0.6%	0.1%	0.0%	0.0%	0.0%	0.1	0.6	May 02	5.5	May 02 09:00	100.0%	0	0	0
June 2020	678	97.3%	2.2%	0.4%	0.0%	0.0%	0.0%	0.2	1.5	Jun 11	9.8	Jun 11 04:00	99.3%	0	0	0
July 2020	710	97.6%	1.8%	0.4%	0.1%	0.0%	0.0%	0.2	1.1	Jul 28	10.1	Jul 28 10:00	100.0%	0	0	0
August 2020	708	97.2%	2.7%	0.1%	0.0%	0.0%	0.0%	0.2	0.7	Aug 03	6.4	Aug 03 21:00	99.9%	0	0	0
September 2020	685	96.8%	2.8%	0.4%	0.0%	0.0%	0.0%	0.2	0.8	Sep 18	8.3	Sep 18 17:00	99.9%	0	0	0
October 2020	709	95.1%	4.5%	0.3%	0.1%	0.0%	0.0%	0.3	1.1	Oct 19	14.2	Oct 19 16:00	100.0%	0	0	0
November 2020	686	97.2%	2.8%	0.0%	0.0%	0.0%	0.0%	0.3	1.0	Nov 07	4.9	Nov 07 14:00	100.0%	0	0	0
December 2020	697	98.1%	1.6%	0.1%	0.1%	0.0%	0.0%	0.2	1.2	Dec 17	10.1	Dec 17 16:00	98.5%	0	0	0
<b>Annual</b>	<b>8345</b>	<b>94.9%</b>	<b>4.6%</b>	<b>0.3%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.3</b>	<b>5.7</b>	<b>Jan 12</b>	<b>44.1</b>	<b>Jan 12 13:00</b>	<b>99.8%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

### 3.2 Total Reduced Sulphur (TRS) - Evergreen Park 2020 Summary and Frequency Distribution

Total Reduced Sulphur (TRS) Frequency Distribution at Evergreen Park

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 1 (ppb)	1 to 2.5 (ppb)	2.5 to 5 (ppb)	5 to 7.5 (ppb)	7.5 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	708	77.7%	21.9%	0.4%	0.0%	0.0%	0.0%	0.8	1.6	Jan 25	2.6	Jan 24 23:00	100.0%
February 2020	662	89.3%	9.5%	1.2%	0.0%	0.0%	0.0%	0.6	1.8	Feb 19	3.6	Feb 20 04:00	100.0%
March 2020	708	93.2%	6.6%	0.1%	0.0%	0.0%	0.0%	0.5	0.9	Mar 08	3.8	Mar 08 07:00	100.0%
April 2020	686	95.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.5	0.7	Apr 03	2.1	Apr 04 04:00	100.0%
May 2020	709	93.9%	4.4%	1.6%	0.1%	0.0%	0.0%	0.5	0.9	May 21	6.2	May 06 07:00	100.0%
June 2020	685	98.5%	1.3%	0.1%	0.0%	0.0%	0.0%	0.5	0.6	Jun 25	3.5	Jun 25 12:00	99.9%
July 2020	709	95.2%	4.8%	0.0%	0.0%	0.0%	0.0%	0.4	0.9	Jul 26	1.8	Jul 31 06:00	100.0%
August 2020	702	93.4%	6.4%	0.1%	0.0%	0.0%	0.0%	0.4	1.2	Aug 14	2.8	Aug 24 07:00	98.9%
September 2020	684	98.2%	1.6%	0.1%	0.0%	0.0%	0.0%	0.3	0.6	Sep 01	3.0	Sep 01 20:00	99.9%
October 2020	709	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.4	0.5	Oct 03	1.7	Oct 27 09:00	100.0%
November 2020	680	85.9%	14.0%	0.1%	0.0%	0.0%	0.0%	0.6	1.1	Nov 20	2.7	Nov 20 19:00	99.3%
December 2020	697	89.4%	10.3%	0.3%	0.0%	0.0%	0.0%	0.6	1.0	Dec 29	2.9	Dec 23 09:00	98.5%
<b>Annual</b>	<b>8339</b>	<b>92.4%</b>	<b>7.2%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.5</b>	<b>1.8</b>	<b>Feb 19</b>	<b>6.2</b>	<b>May 06 07:00</b>	<b>99.7%</b>

AAAQO Objectives: none

### 3.3 Particulate Matter (PM<sub>2.5</sub>) - Evergreen Park 2020 Summary and Frequency Distribution

Particulate Matter (PM<sub>2.5</sub>) Frequency Distribution at Evergreen Park

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (µg/m <sup>3</sup> )	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 2 (µg/m <sup>3</sup> )	2 to 4 (µg/m <sup>3</sup> )	4 to 10 (µg/m <sup>3</sup> )	10 to 20 (µg/m <sup>3</sup> )	20 to 29 (µg/m <sup>3</sup> )	> 29 (µg/m <sup>3</sup> )		24-hr (µg/m <sup>3</sup> )	Date	1-hr (µg/m <sup>3</sup> )	Date		24-hr 29 µg/m <sup>3</sup>	1-hr 80 µg/m <sup>3</sup>
January 2020	735	26.1%	27.5%	30.3%	14.7%	1.0%	0.4%	5.2	14.7	Jan 25	39.8	Jan 25 12:00	99.5%	0	0
February 2020	688	57.1%	18.6%	19.5%	4.8%	0.0%	0.0%	2.7	10.0	Feb 19	18.8	Feb 19 10:00	99.9%	0	0
March 2020	741	45.6%	25.0%	26.6%	2.4%	0.4%	0.0%	3.1	7.7	Mar 16	23.0	Mar 16 09:00	100.0%	0	0
April 2020	715	55.5%	24.6%	18.7%	1.1%	0.0%	0.0%	2.4	5.6	Apr 06	15.8	Apr 06 09:00	100.0%	0	0
May 2020	740	55.1%	27.8%	13.2%	3.0%	0.7%	0.1%	2.6	7.5	May 25	35.5	May 25 16:00	99.9%	0	0
June 2020	714	45.4%	24.8%	18.9%	9.0%	1.5%	0.4%	4.0	8.4	Jun 25	40.1	Jun 25 13:00	99.4%	0	0
July 2020	739	48.6%	24.0%	23.1%	4.2%	0.1%	0.0%	3.1	6.4	Jul 27	27.4	Jul 15 18:00	99.6%	0	0
August 2020	705	51.5%	18.2%	19.3%	9.2%	1.1%	0.7%	3.8	10.8	Aug 01	37.0	Aug 10 06:00	95.0%	0	0
September 2020	704	59.2%	13.5%	13.9%	9.5%	1.4%	2.4%	4.2	24.5	Sep 19	50.4	Sep 19 12:00	98.2%	0	0
October 2020	734	51.1%	23.7%	21.4%	3.4%	0.4%	0.0%	2.9	7.1	Oct 03	23.3	Oct 27 09:00	99.2%	0	0
November 2020	712	34.4%	19.4%	28.4%	14.6%	2.8%	0.4%	5.5	20.2	Nov 20	36.4	Nov 12 00:00	99.3%	0	0
December 2020	723	42.5%	16.7%	36.2%	4.4%	0.1%	0.0%	3.5	8.5	Dec 03	24.8	Dec 14 19:00	97.8%	0	0
<b>Annual</b>	<b>8650</b>	<b>47.7%</b>	<b>22.0%</b>	<b>22.5%</b>	<b>6.7%</b>	<b>0.8%</b>	<b>0.4%</b>	<b>3.6</b>	<b>24.5</b>	<b>MAXIMUM VALUES</b>		<b>99.0%</b>	<b>0</b>	<b>0</b>	

AAAQO Objectives: 24-Hr: 29 µg/m<sup>3</sup>, AAAQG Guideline: 1-Hr: 80 µg/m<sup>3</sup>

### 3.4 Temperature (ET) - Evergreen Park 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Evergreen Park

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-15.9	0.9	Jan 30	6.0	Jan 30 15:00	-35.1	Jan 15	-39.3	Jan 13 06:00	100.0%
February 2020	-6.3	5.0	Feb 27	8.1	Feb 27 15:00	-19.7	Feb 17	-24.2	Feb 18 09:00	100.0%
March 2020	-8.0	2.7	Mar 02	7.2	Mar 10 15:00	-23.5	Mar 14	-31.4	Mar 14 07:00	100.0%
April 2020	2.2	12.6	Apr 20	19.2	Apr 20 17:00	-16.7	Apr 02	-24.5	Apr 03 07:00	100.0%
May 2020	10.3	17.6	May 30	25.3	May 30 17:00	3.6	May 14	-3.3	May 11 05:00	100.0%
June 2020	14.7	19.3	Jun 19	26.9	Jun 19 17:00	10.6	Jun 07	3.1	Jun 09 06:00	99.9%
July 2020	16.7	22.0	Jul 27	32.5	Jul 27 16:00	12.7	Jul 03	7.0	Jul 09 05:00	100.0%
August 2020	15.4	22.4	Aug 02	30.0	Aug 17 14:00	10.5	Aug 12	1.7	Aug 12 06:00	99.9%
September 2020	11.1	17.3	Sep 10	27.8	Sep 10 15:00	5.8	Sep 14	-3.1	Sep 30 08:00	99.9%
October 2020	1.4	16.2	Oct 04	25.9	Oct 03 15:00	-11.2	Oct 24	-18.2	Oct 25 04:00	99.9%
November 2020	-5.2	8.6	Nov 01	16.6	Nov 02 16:00	-17.6	Nov 19	-20.8	Nov 20 02:00	100.0%
December 2020	-6.9	5.9	Dec 07	9.0	Dec 07 13:00	-21.5	Dec 13	-24.5	Dec 13 09:00	98.5%
	<b>AVERAGE</b> 2.5	<b>22.4</b>	<b>MAXIMUM VALUES</b> Aug 02		<b>32.5</b> Jul 27 16:00	<b>-35.1</b>	<b>MINIMUM VALUES</b> Jan 15		<b>-39.3</b> Jan 13 06:00	<b>99.8%</b>

### 3.5 Relative Humidity (RH) - Evergreen Park 2020 Summary and Frequency Distribution

Relative Humidity (RH) Frequency Distribution at Evergreen Park

Month	Monthly Average (%)	Maximum Values				Operational time (%)
		24-hr (%)	Date	1-hr (%)	Date	
January 2020	74.8	86.8	Jan 01	97.0	Jan 31 00:00	100.0%
February 2020	66.9	89.3	Feb 29	97.2	Feb 29 05:00	100.0%
March 2020	66.4	89.1	Mar 23	95.9	Mar 23 02:00	100.0%
April 2020	53.4	76.4	Apr 17	96.2	Apr 10 03:00	100.0%
May 2020	60.4	93.2	May 21	98.3	May 08 08:00	100.0%
June 2020	60.7	89.8	Jun 28	98.7	Jun 29 07:00	99.9%
July 2020	68.9	97.1	Jul 01	98.6	Jul 02 03:00	100.0%
August 2020	64.5	85.9	Aug 15	98.4	Aug 03 07:00	99.9%
September 2020	70.5	95.3	Sep 14	98.4	Sep 10 09:00	99.9%
October 2020	71.1	96.9	Oct 10	98.5	Oct 10 08:00	99.9%
November 2020	78.4	91.3	Nov 23	98.2	Nov 05 06:00	100.0%
December 2020	75.4	88.2	Dec 27	97.1	Dec 08 09:00	98.5%
	<b>AVERAGE</b> 67.6	<b>97.1</b>	<b>MAXIMUM VALUES</b> Jul 01		<b>98.7</b> Jun 29 07:00	<b>99.8%</b>

### 3.6 Wind Speed & Wind Direction (WS & WD) - Evergreen Park 2020 Summary and Frequency Distribution

Wind Speed Frequency Distribution of 1-hr Averages - Evergreen Park

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	24-hr (km/hr)	MAXIMUM VALUES			Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)			Date	1-hr (km/hr)	Date	
January 2020	744	73.9%	16.5%	6.2%	3.4%	0.0%	0.0%	2.5	10.2	Jan 02	16.3	Jan 02 06:00	100.0%
February 2020	696	52.4%	18.2%	21.6%	7.8%	0.0%	0.0%	4.6	11.4	Feb 22	20.0	Feb 01 17:00	100.0%
March 2020	744	45.3%	26.5%	21.5%	6.7%	0.0%	0.0%	4.5	12.0	Mar 02	18.1	Mar 03 10:00	100.0%
April 2020	720	35.4%	28.3%	27.6%	8.6%	0.0%	0.0%	5.4	12.4	Apr 22	18.9	Apr 21 17:00	100.0%
May 2020	744	37.8%	36.0%	23.8%	2.4%	0.0%	0.0%	4.4	8.0	May 21	17.1	May 03 14:00	100.0%
June 2020	719	32.4%	35.2%	29.9%	2.5%	0.0%	0.0%	4.9	9.5	Jun 01	14.8	Jun 14 17:00	99.9%
July 2020	744	40.3%	31.0%	28.0%	0.7%	0.0%	0.0%	4.3	8.2	Jul 12	13.1	Jul 12 13:00	100.0%
August 2020	743	39.2%	23.8%	32.0%	5.0%	0.0%	0.0%	5.0	9.5	Aug 07	17.1	Aug 31 19:00	99.9%
September 2020	719	53.3%	25.9%	16.8%	4.0%	0.0%	0.0%	3.7	10.2	Sep 28	18.0	Sep 28 14:00	99.9%
October 2020	744	51.1%	27.3%	18.4%	3.2%	0.0%	0.0%	3.8	9.0	Oct 04	18.6	Oct 27 05:00	100.0%
November 2020	720	64.7%	21.4%	12.2%	1.7%	0.0%	0.0%	2.8	6.8	Nov 30	18.9	Nov 30 16:00	100.0%
December 2020	733	71.1%	13.8%	13.0%	2.2%	0.0%	0.0%	2.9	8.8	Dec 20	15.5	Dec 20 08:00	98.5%
<b>Annual</b>	<b>8770</b>	<b>49.7%</b>	<b>25.3%</b>	<b>20.9%</b>	<b>4.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.1</b>	<b>12.4</b>	<b>MAXIMUM VALUES</b>			<b>99.8%</b>

Wind Speed and Wind Direction Frequency Distribution at Evergreen Park

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	235	2.0%	0.6%	0.1%	0.0%	0.0%	0.0%	2.7%
NNE	404	2.8%	1.2%	0.5%	0.0%	0.0%	0.0%	4.6%
NE	761	6.0%	2.4%	0.3%	0.0%	0.0%	0.0%	8.7%
ENE	545	5.0%	1.2%	0.0%	0.0%	0.0%	0.0%	6.2%
E	306	2.5%	0.8%	0.2%	0.0%	0.0%	0.0%	3.5%
ESE	186	1.6%	0.5%	0.1%	0.0%	0.0%	0.0%	2.1%
SE	155	1.6%	0.2%	0.0%	0.0%	0.0%	0.0%	1.8%
SSE	225	2.4%	0.2%	0.0%	0.0%	0.0%	0.0%	2.6%
S	385	4.0%	0.4%	0.0%	0.0%	0.0%	0.0%	4.4%
SSW	633	5.5%	1.5%	0.2%	0.0%	0.0%	0.0%	7.2%
SW	789	3.7%	2.6%	2.3%	0.3%	0.0%	0.0%	9.0%
WSW	2019	3.8%	5.6%	10.2%	3.4%	0.0%	0.0%	23.0%
W	895	3.2%	3.6%	3.2%	0.2%	0.0%	0.0%	10.2%
WNW	473	2.3%	1.7%	1.4%	0.0%	0.0%	0.0%	5.4%
NW	499	2.0%	1.6%	2.0%	0.0%	0.0%	0.0%	5.7%
NNW	260	1.5%	1.2%	0.3%	0.0%	0.0%	0.0%	3.0%
<b>Total</b>	<b>8,770</b>	<b>49.7%</b>	<b>25.3%</b>	<b>20.9%</b>	<b>4.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>

### Wind Speed Standard Deviation (WSSTD) at Evergreen Park

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	1.1	2.6	Jan 02	4.0	Jan 30 00:00	0.7	Jan 15	0.3	Jan 15 04:00	100.0%
February 2020	1.5	2.6	Feb 22	6.2	Feb 21 13:00	0.7	Feb 18	0.3	Feb 14 04:00	100.0%
March 2020	1.5	2.8	Mar 02	4.5	Mar 10 13:00	0.7	Mar 08	0.2	Mar 08 06:00	100.0%
April 2020	1.7	3.0	Apr 21	6.4	Apr 25 21:00	0.9	Apr 03	0.3	Apr 03 22:00	100.0%
May 2020	1.8	2.6	May 26	6.7	May 05 15:00	1.0	May 18	0.3	May 29 06:00	100.0%
June 2020	1.8	2.7	Jun 03	4.5	Jun 04 14:00	1.1	Jun 18	0.3	Jun 19 23:00	99.9%
July 2020	1.6	2.5	Jul 14	3.9	Jul 09 15:00	1.1	Jul 11	0.2	Jul 31 02:00	100.0%
August 2020	1.8	2.6	Aug 08	6.1	Aug 18 17:00	0.9	Aug 16	0.3	Aug 27 22:00	99.9%
September 2020	1.5	2.8	Sep 01	5.0	Sep 20 00:00	0.7	Sep 18	0.2	Sep 19 01:00	99.9%
October 2020	1.4	2.3	Oct 05	4.7	Oct 05 15:00	0.8	Oct 23	0.1	Oct 18 08:00	100.0%
November 2020	1.2	2.1	Nov 10	5.5	Nov 05 04:00	0.7	Nov 11	0.2	Nov 08 22:00	100.0%
December 2020	1.2	2.1	Dec 20	3.9	Dec 12 07:00	0.7	Dec 29	0.2	Dec 29 03:00	98.5%
	<b>AVERAGE</b>		<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>			
	<b>1.5</b>	<b>3.0</b>	<b>Apr 21</b>	<b>6.7</b>	<b>May 05 15:00</b>	<b>0.7</b>	<b>Jan 15</b>	<b>0.1</b>	<b>Oct 18 08:00</b>	<b>99.8%</b>

### Wind Direction Standard Deviation (WDSTD) at Evergreen Park

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	44.2	69.2	Jan 28	99.7	Jan 21 03:00	17.9	Jan 02	5.6	Jan 04 10:00	100.0%
February 2020	31.1	55.6	Feb 19	96.1	Feb 19 03:00	9.0	Feb 22	5.4	Feb 08 18:00	100.0%
March 2020	31.1	52.7	Mar 16	96.9	Mar 25 03:00	11.2	Mar 02	5.6	Mar 27 08:00	100.0%
April 2020	27.9	49.5	Apr 02	96.6	Apr 13 05:00	9.2	Apr 22	5.3	Apr 16 20:00	100.0%
May 2020	32.4	61.1	May 05	96.7	May 05 00:00	14.3	May 25	6.7	May 01 03:00	100.0%
June 2020	30.4	56.6	Jun 18	96.7	Jun 24 06:00	12.6	Jun 14	6.7	Jun 08 00:00	99.9%
July 2020	31.7	56.3	Jul 28	97.0	Jul 28 18:00	14.5	Jul 13	7.7	Jul 17 03:00	100.0%
August 2020	31.2	62.9	Aug 16	97.9	Aug 27 20:00	11.3	Aug 13	6.6	Aug 15 05:00	99.9%
September 2020	36.3	70.5	Sep 17	99.9	Sep 22 02:00	11.3	Sep 26	5.7	Sep 25 23:00	99.9%
October 2020	33.5	53.3	Oct 18	96.6	Oct 20 02:00	10.4	Oct 04	6.1	Oct 04 23:00	100.0%
November 2020	42.9	77.7	Nov 29	98.9	Nov 22 09:00	18.6	Nov 10	5.3	Nov 02 23:00	100.0%
December 2020	42.4	75.3	Dec 03	101.5	Dec 05 12:00	12.6	Dec 08	0.0	Jan 00 00:00	98.5%
	<b>AVERAGE</b>		<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>			
	<b>34.6</b>	<b>77.7</b>	<b>Nov 29</b>	<b>101.5</b>	<b>Dec 05 12:00</b>	<b>9.0</b>	<b>Feb 22</b>	<b>0.0</b>	<b>Jan 00 00:00</b>	<b>99.8%</b>

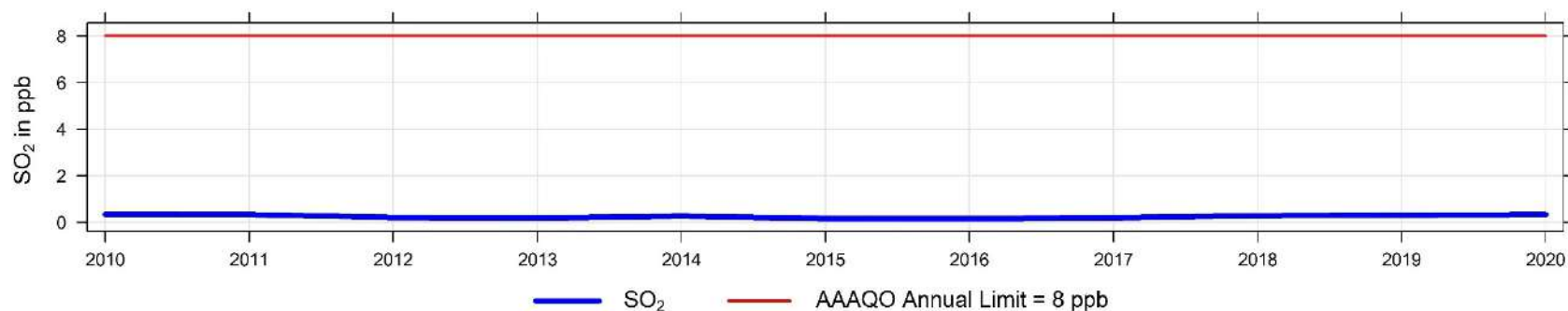




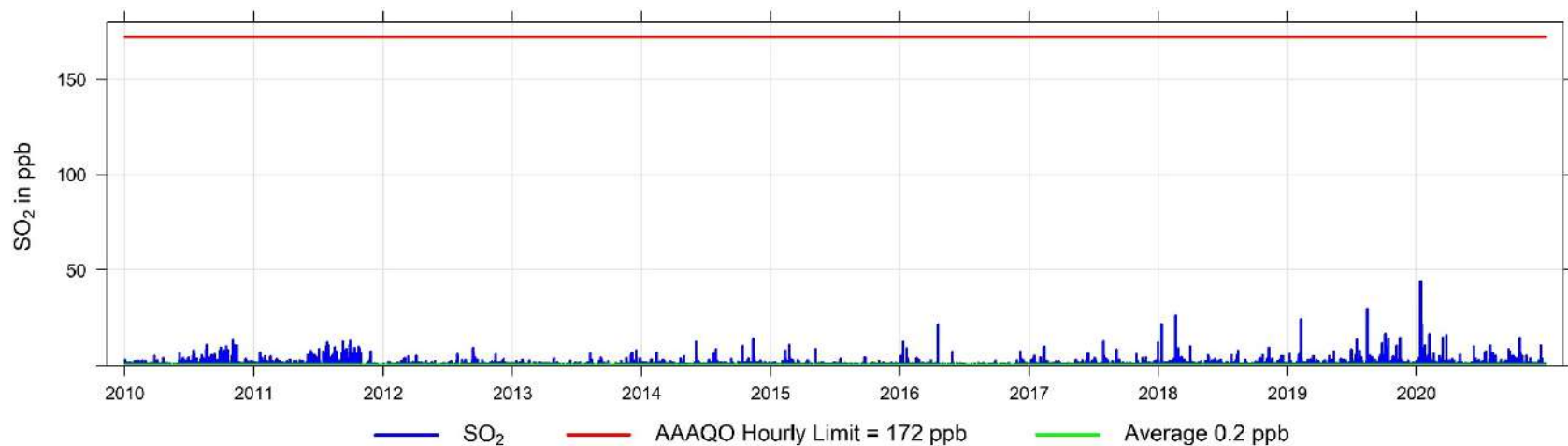
## 4 Evergreen Park Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Evergreen Park Station.

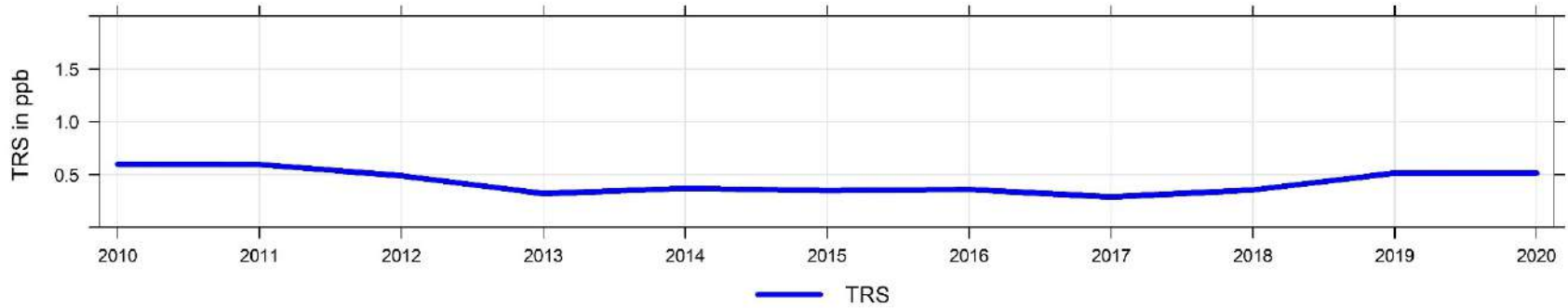
2010 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Evergreen Park



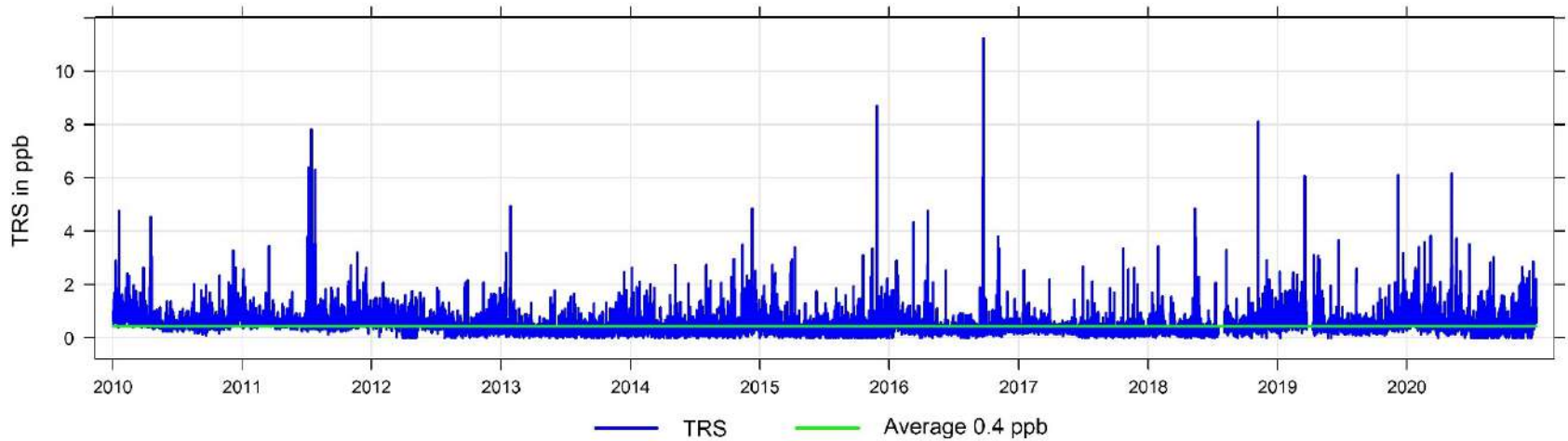
2010 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Evergreen Park



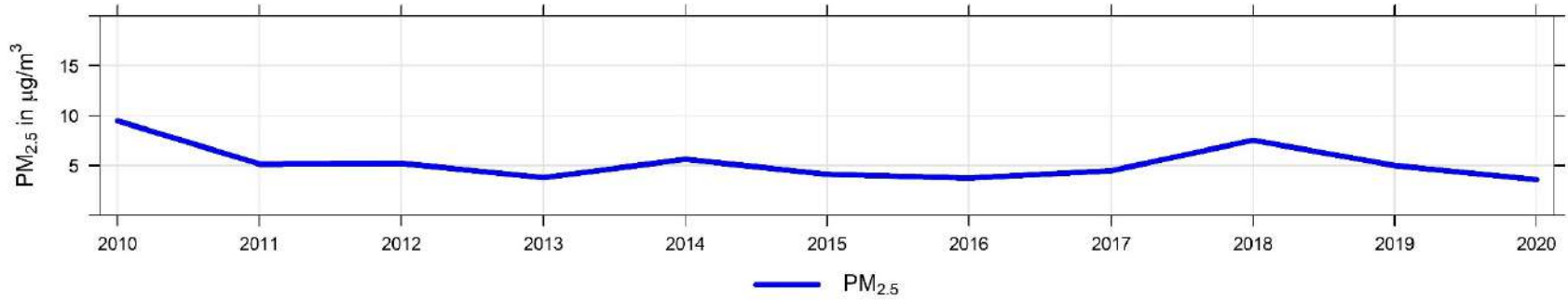
2010 to 2020 Annual Concentration Readings of TRS (in ppb) at Evergreen Park



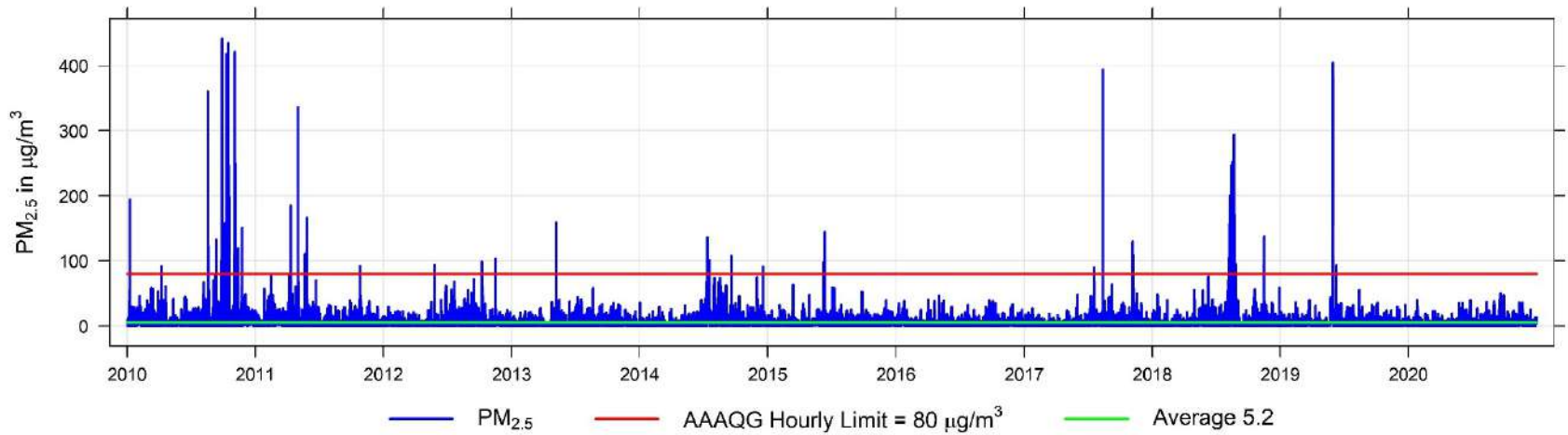
2010 to 2020 Hourly Concentration Readings of TRS (in ppb) at Evergreen Park



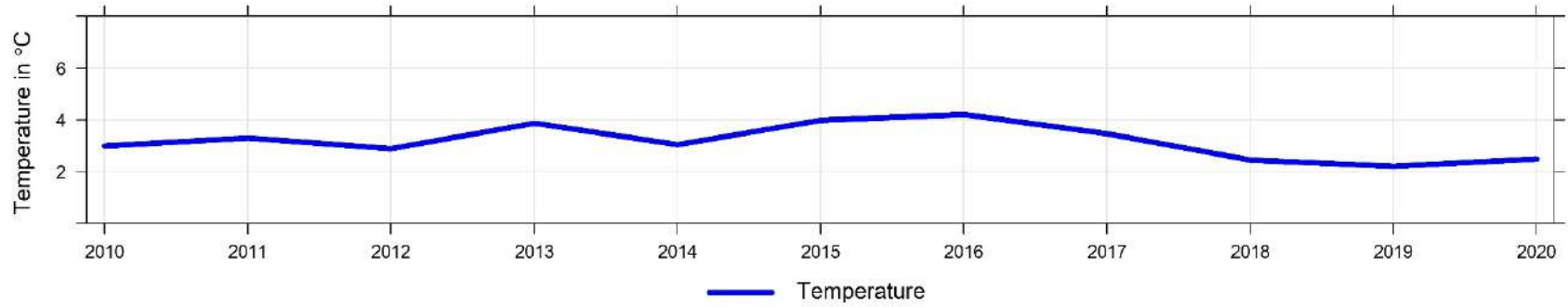
2010 to 2020 Annual Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Evergreen Park



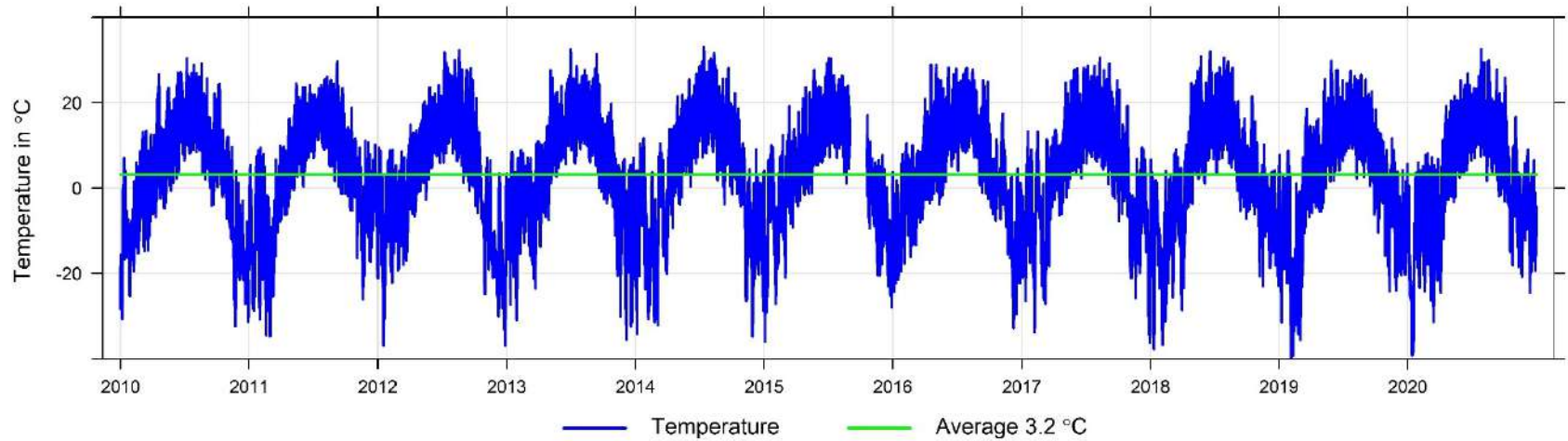
2010 to 2020 Hourly Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Evergreen Park



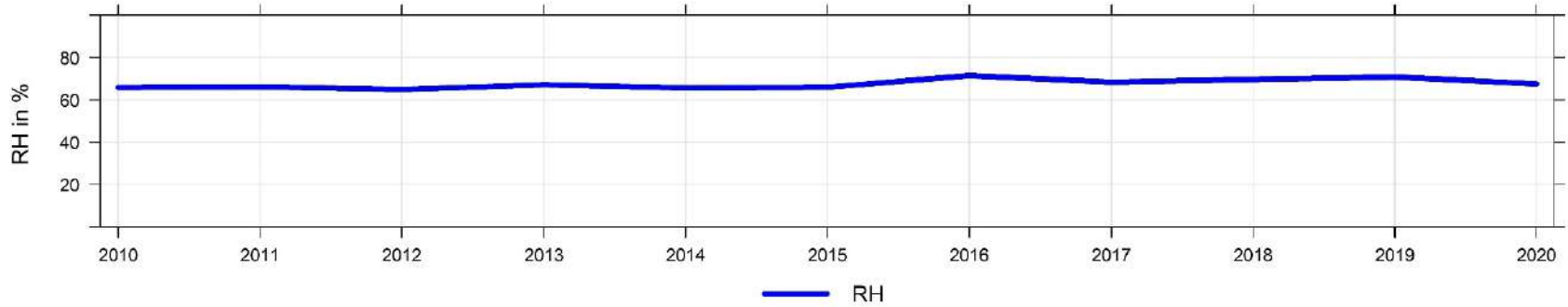
2010 to 2020 Annual Temperature Readings in °C at Evergreen Park



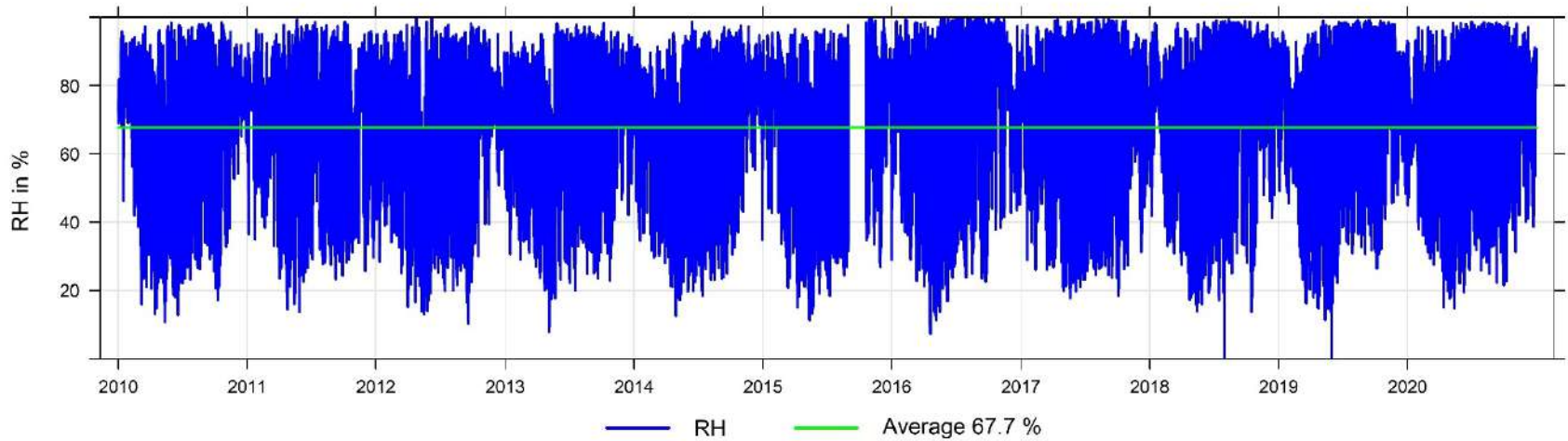
2010 to 2020 Hourly Temperature Readings (in °C) at Evergreen Park



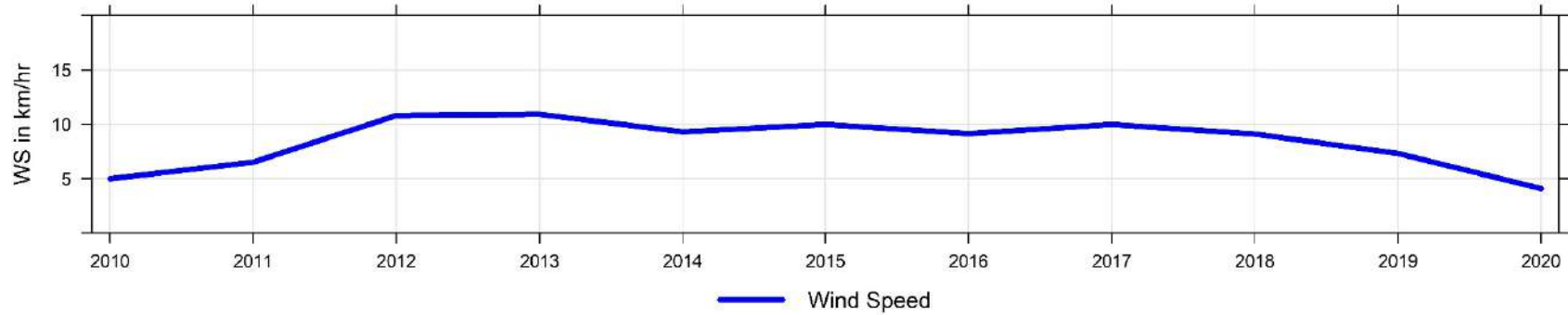
2010 to 2020 Annual Readings of Relative Humidity (in %) at Evergreen Park



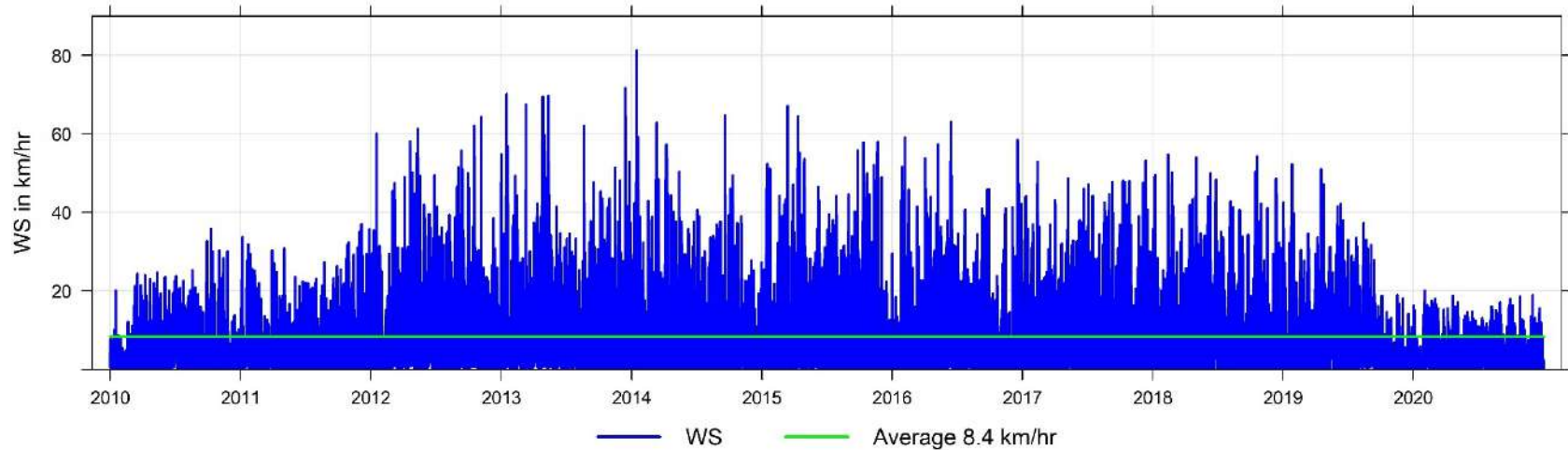
2010 to 2020 Hourly Readings of Relative Humidity (in %) at Evergreen Park



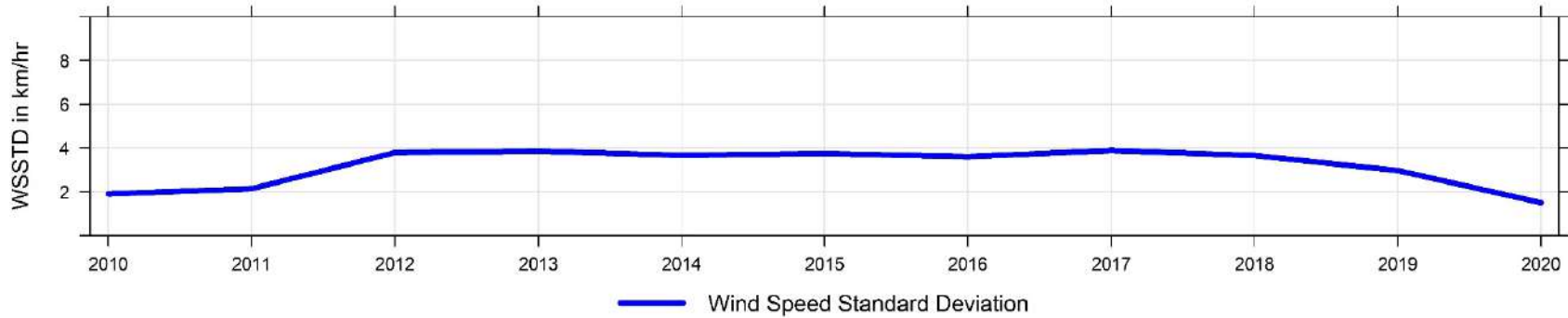
2010 to 2020 Annual Readings of Wind Speed (in km/hr) at Evergreen Park



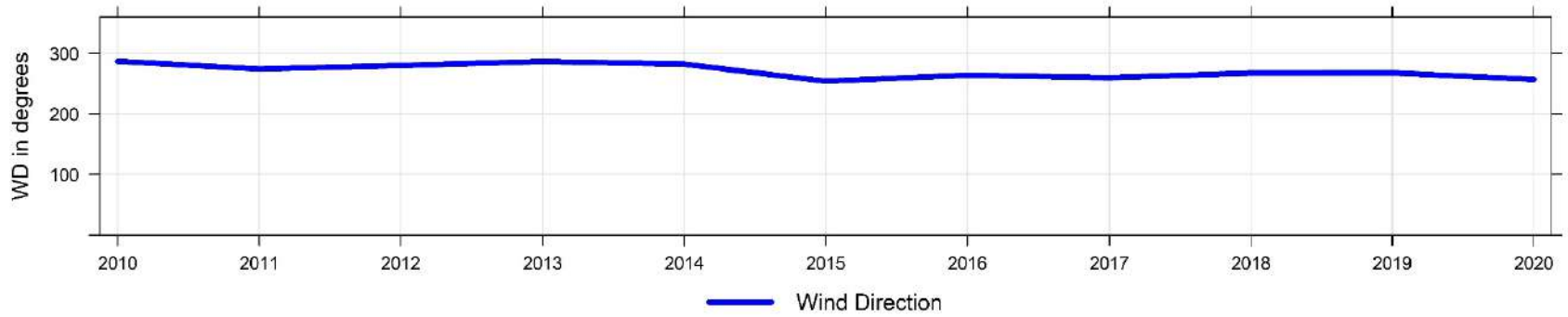
2010 to 2020 Hourly Readings of Wind Speed (in km/hr) at Evergreen Park



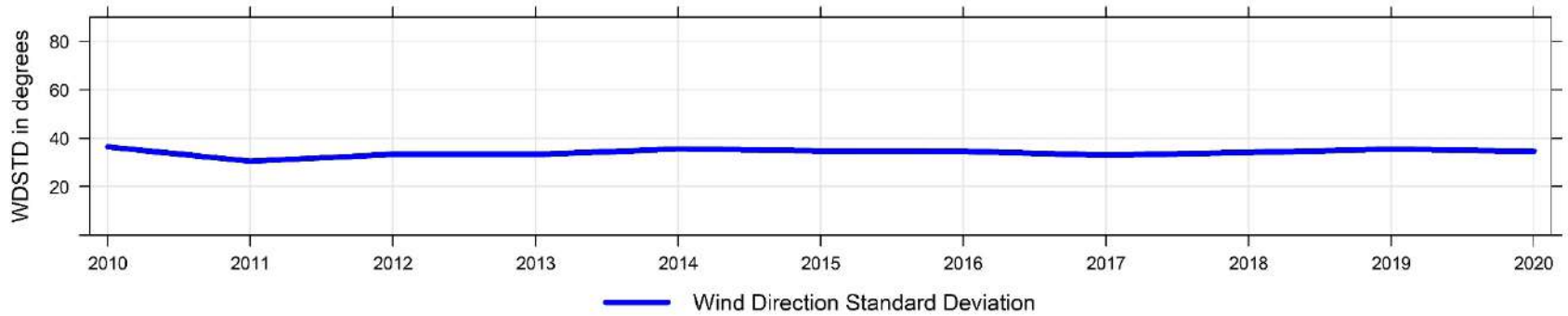
**2010 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Evergreen Park**



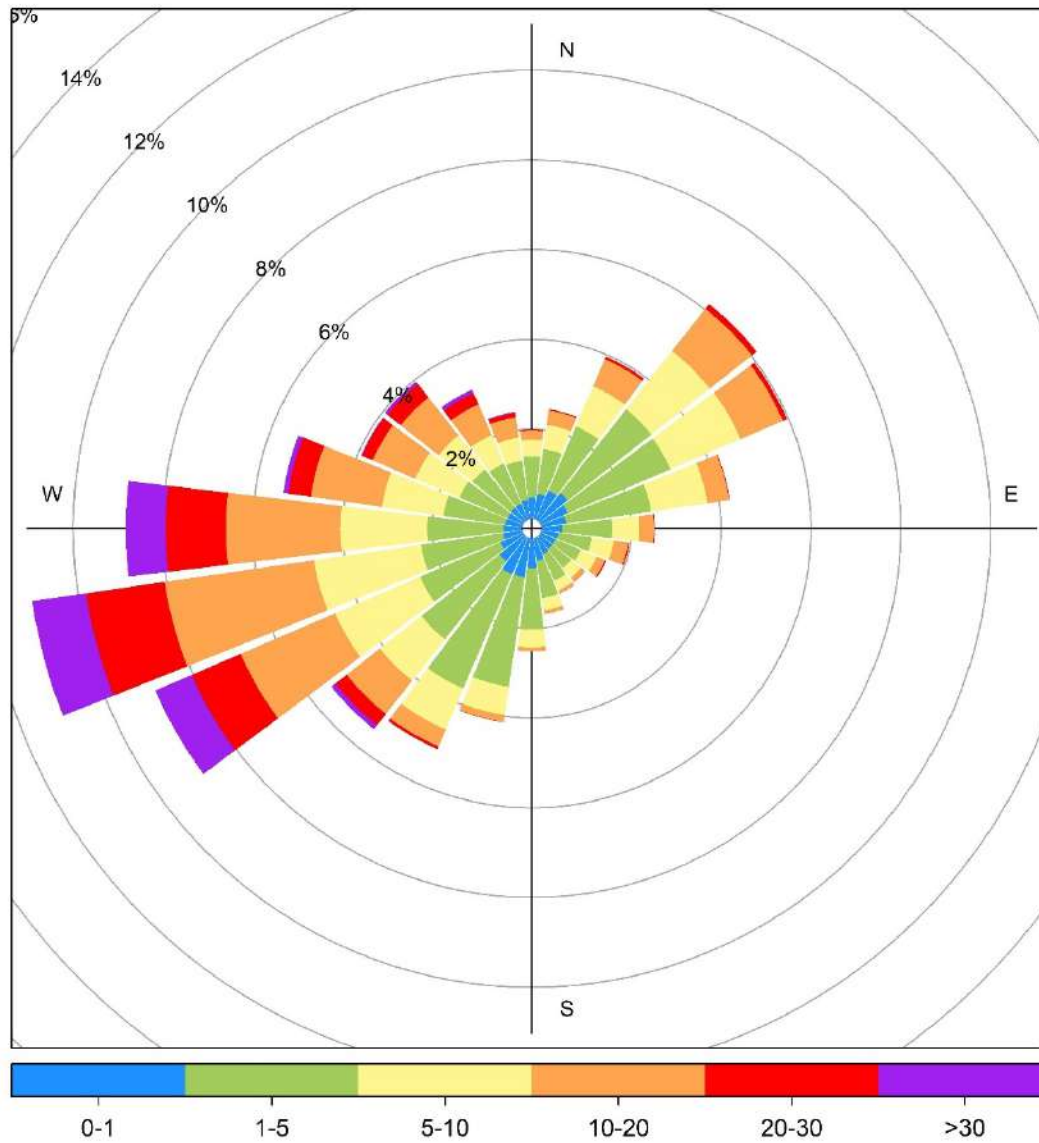
**2010 to 2020 Annual Readings of Wind Direction (in degrees) at Evergreen Park**



**2010 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Evergreen Park**







Evergreen Park 2010 to 2020 Wind Rose, wind speed in km/hr

## 5 Henry Pirker Key Parameters - Continuous Monitoring Data - 2020 Summary

### Henry Pirker Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr 8-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.3	7.9	Jan 20	28.0	Jan 20 04:00	99.9%	0	0	0	0
Nitrogen Dioxide NO <sub>2</sub> measured in ppb	9.2	38.8	Dec 03	65.1	Jan 21 09:00	98.7%	0	-	-	0
Oxides of Nitrogen NO <sub>x</sub> measured in ppb	14.3	112.3	Dec 03	269.4	Jan 21 09:00	98.7%	-	-	-	-
Nitric Oxide NO measured in ppb	5.0	73.0	Dec 03	203.4	Jan 21 09:00	98.7%	-	-	-	-
Ozone O <sub>3</sub> measured in ppb	23.0	47.1	Apr 15	62.5	Jul 27 14:00	99.9%	0	-	-	-
Carbon Monoxide CO measured in ppm	0.2	1.1	Jan 01	1.8	Dec 03 19:00	99.9%	0	0	-	-
Hydrogen Sulphide H <sub>2</sub> S measured in ppb	0.2	0.9	Feb 19	2.3	Jan 21 09:00	99.9%	0	0	-	-
Particulate Matter PM <sub>2.5</sub> measured in µg/m <sup>3</sup>	4.8	30.7	Sep 19	158.4	May 30 20:00	99.6%	2	2	-	-
Total Hydrocarbons THC measured in ppm	2.1	3.9	Jan 25	5.4	Jul 23 02:00	98.0%	-	-	-	-
Methane CH <sub>4</sub> measured in ppm	2.0	3.2	Jan 25	5.4	Jul 23 02:00	98.0%	-	-	-	-
Non Methane Hydrocarbons NMHC measured in ppm	0.02	0.6	Jan 25	1.4	Dec 02 06:00	98.0%	-	-	-	-

## 5.1 Sulphur Dioxide (SO<sub>2</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

### Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	708	60.7%	34.7%	3.4%	1.1%	0.0%	0.0%	1.4	7.9	Jan 20	28.0	Jan 20 04:00	100.0%	0	0	0
February 2020	657	87.4%	11.7%	0.9%	0.0%	0.0%	0.0%	0.5	1.7	Feb 18	9.4	Feb 18 17:00	99.4%	0	0	0
March 2020	707	92.8%	6.4%	0.8%	0.0%	0.0%	0.0%	0.4	1.5	Mar 15	9.6	Mar 11 15:00	100.0%	0	0	0
April 2020	680	96.6%	3.4%	0.0%	0.0%	0.0%	0.0%	0.2	0.8	Apr 01	3.2	Apr 08 12:00	99.6%	0	0	0
May 2020	709	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.5	May 18	3.2	May 18 19:00	100.0%	0	0	0
June 2020	684	96.1%	3.8%	0.1%	0.0%	0.0%	0.0%	0.1	1.1	Jun 01	6.7	Jun 11 06:00	99.7%	0	0	0
July 2020	705	98.9%	1.0%	0.1%	0.0%	0.0%	0.0%	0.1	0.4	Jul 03	6.5	Jul 03 01:00	99.9%	0	0	0
August 2020	707	98.9%	1.0%	0.1%	0.0%	0.0%	0.0%	0.1	0.5	Aug 25	5.4	Aug 24 00:00	100.0%	0	0	0
September 2020	687	97.4%	2.2%	0.1%	0.3%	0.0%	0.0%	0.2	0.9	Sep 18	11.5	Sep 21 02:00	100.0%	0	0	0
October 2020	708	93.6%	5.1%	1.1%	0.1%	0.0%	0.0%	0.3	1.5	Oct 22	11.5	Oct 22 04:00	99.9%	0	0	0
November 2020	686	95.2%	4.4%	0.3%	0.1%	0.0%	0.0%	0.3	1.6	Nov 28	11.7	Nov 28 13:00	100.0%	0	0	0
December 2020	709	93.8%	5.8%	0.3%	0.1%	0.0%	0.0%	0.3	2.0	Dec 11	10.2	Dec 11 20:00	99.9%	0	0	0
<b>Annual</b>	<b>8347</b>	<b>92.5%</b>	<b>6.7%</b>	<b>0.6%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.3</b>	<b>7.9</b>	<b>Jan 20</b>	<b>28.0</b>	<b>Jan 20 04:00</b>	<b>99.9%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

## 5.2 Hydrogen Sulphide (H<sub>2</sub>S) - Henry Pirker 2020 Summary and Frequency Distribution

### Hydrogen Sulphide (H<sub>2</sub>S) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 1 (ppb)	1 to 3 (ppb)	3 to 5 (ppb)	5 to 8 (ppb)	8 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		24-hr 3ppb	1-hr 10ppb
January 2020	708	92.8%	7.2%	0.0%	0.0%	0.0%	0.0%	0.4	0.8	Jan 24	2.3	Jan 21 09:00	99.9%	0	0
February 2020	662	95.2%	4.8%	0.0%	0.0%	0.0%	0.0%	0.3	0.9	Feb 19	2.2	Feb 10 12:00	100.0%	0	0
March 2020	707	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.2	0.7	Mar 20	1.6	Mar 09 08:00	99.7%	0	0
April 2020	686	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.2	0.5	Apr 18	2.1	Apr 18 08:00	100.0%	0	0
May 2020	709	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.5	May 05	1.2	May 20 06:00	100.0%	0	0
June 2020	686	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Jun 21	0.9	Jun 13 06:00	99.9%	0	0
July 2020	708	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Jul 29	1.5	Jul 23 04:00	99.9%	0	0
August 2020	710	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Aug 03	1.4	Aug 05 07:00	100.0%	0	0
September 2020	686	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Sep 18	1.3	Sep 05 08:00	100.0%	0	0
October 2020	706	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Oct 28	1.3	Oct 11 05:00	99.7%	0	0
November 2020	686	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.3	0.7	Nov 13	1.6	Nov 23 11:00	100.0%	0	0
December 2020	707	98.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.3	0.8	Dec 03	1.5	Dec 11 11:00	99.9%	0	0
<b>Annual</b>	<b>8361</b>	<b>98.4%</b>	<b>1.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2</b>	<b>0.9</b>	<b>Feb 19</b>	<b>2.3</b>	<b>Jan 21 09:00</b>	<b>99.9%</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: 24-Hr: 3ppb, 1-Hr: 10ppb

### 5.3 Nitrogen Dioxide (NO<sub>2</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

Nitrogen Dioxide (NO<sub>2</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents 1-hr 172ppb
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	691	7.7%	25.6%	39.4%	27.4%	0.0%	0.0%	22.1	34.6	Jan 28	65.1	Jan 21 09:00	97.7%	0
February 2020	624	23.7%	38.5%	19.4%	18.4%	0.0%	0.0%	15.5	34.5	Feb 19	52.4	Feb 02 08:00	97.8%	0
March 2020	656	41.0%	37.3%	18.0%	3.7%	0.0%	0.0%	10.0	27.3	Mar 16	46.9	Mar 09 21:00	94.6%	0
April 2020	684	60.7%	27.9%	10.1%	1.3%	0.0%	0.0%	6.4	15.0	Apr 03	42.3	Apr 01 23:00	100.0%	0
May 2020	708	85.3%	13.0%	1.7%	0.0%	0.0%	0.0%	3.1	8.1	May 05	20.6	May 04 00:00	100.0%	0
June 2020	681	83.7%	16.3%	0.0%	0.0%	0.0%	0.0%	2.9	4.6	Jun 17	11.9	Jun 05 06:00	99.4%	0
July 2020	707	84.2%	15.7%	0.1%	0.0%	0.0%	0.0%	2.9	5.8	Jul 27	15.4	Jul 22 23:00	99.9%	0
August 2020	672	79.3%	19.6%	1.0%	0.0%	0.0%	0.0%	3.4	6.5	Aug 28	19.1	Aug 06 07:00	95.4%	0
September 2020	685	63.4%	31.5%	5.1%	0.0%	0.0%	0.0%	5.3	12.3	Sep 17	27.4	Sep 25 08:00	100.0%	0
October 2020	706	44.3%	41.8%	13.5%	0.4%	0.0%	0.0%	7.8	19.5	Oct 28	33.7	Oct 28 21:00	99.9%	0
November 2020	684	23.4%	32.0%	34.1%	10.5%	0.0%	0.0%	15.0	32.3	Nov 13	47.0	Nov 20 18:00	100.0%	0
December 2020	707	18.1%	36.4%	29.4%	16.1%	0.0%	0.0%	16.1	38.8	Dec 03	56.9	Dec 03 15:00	99.9%	0
<b>Annual</b>	<b>8205</b>	<b>51.2%</b>	<b>28.0%</b>	<b>14.3%</b>	<b>6.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>9.2</b>	<b>38.8</b>	<b>Dec 03</b>	<b>65.1</b>	<b>Jan 21 09:00</b>	<b>98.7%</b>	<b>0</b>

AAAQO Objectives: Annual: 24ppb, 1-Hr: 159ppb

### 5.4 Nitric Oxide (NO) - Henry Pirker 2020 Summary and Frequency Distribution

Nitric Oxide (NO) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	691	44.4%	15.8%	14.9%	22.4%	2.3%	0.1%	19.2	57.4	Jan 24	203.4	Jan 21 09:00	97.7%	
February 2020	624	72.8%	10.6%	7.2%	8.3%	1.0%	0.2%	9.2	47.7	Feb 04	160.3	Feb 05 12:00	97.8%	
March 2020	656	88.0%	7.9%	3.0%	1.1%	0.0%	0.0%	2.7	13.8	Mar 01	69.4	Mar 01 11:00	94.6%	
April 2020	684	93.1%	5.0%	1.9%	0.0%	0.0%	0.0%	1.4	5.7	Apr 06	27.7	Apr 03 11:00	100.0%	
May 2020	708	98.2%	1.7%	0.1%	0.0%	0.0%	0.0%	0.5	1.8	May 20	16.4	May 06 07:00	100.0%	
June 2020	681	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.5	1.7	Jun 19	14.4	Jun 10 09:00	99.4%	
July 2020	707	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.5	1.6	Jul 27	8.0	Jul 22 08:00	99.9%	
August 2020	672	96.9%	2.5%	0.6%	0.0%	0.0%	0.0%	0.7	3.6	Aug 28	22.9	Aug 17 07:00	95.4%	
September 2020	685	92.3%	4.4%	1.6%	1.8%	0.0%	0.0%	2.0	11.7	Sep 18	57.4	Sep 18 08:00	100.0%	
October 2020	706	88.0%	7.1%	3.0%	2.0%	0.0%	0.0%	2.8	21.5	Oct 28	90.3	Oct 28 08:00	99.9%	
November 2020	684	67.1%	10.7%	10.7%	11.4%	0.1%	0.0%	9.9	33.2	Nov 20	114.6	Nov 20 18:00	100.0%	
December 2020	707	66.8%	12.4%	8.9%	10.7%	1.1%	0.0%	10.5	73.0	Dec 03	157.5	Dec 03 19:00	99.9%	
<b>Annual</b>	<b>8205</b>	<b>83.7%</b>	<b>6.7%</b>	<b>4.3%</b>	<b>4.8%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>5.0</b>	<b>73.0</b>	<b>Dec 03</b>	<b>203.4</b>	<b>Jan 21 09:00</b>	<b>98.7%</b>	

AAAQO Objectives: none

## 5.5 Oxides of Nitrogen (NO<sub>x</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

Oxides of Nitrogen (NO<sub>x</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	691	6.8%	22.6%	16.1%	48.3%	4.8%	1.4%	41.6	89.7	Jan 24	269.4	Jan 21 09:00	97.7%
February 2020	624	17.9%	38.8%	17.8%	21.3%	3.7%	0.5%	24.9	79.4	Feb 04	209.9	Feb 05 12:00	97.8%
March 2020	656	31.6%	43.1%	14.9%	10.2%	0.2%	0.0%	12.8	37.5	Mar 16	101.8	Mar 01 11:00	94.6%
April 2020	684	56.7%	28.5%	10.4%	4.4%	0.0%	0.0%	7.8	20.5	Apr 03	61.5	Apr 01 23:00	100.0%
May 2020	708	82.6%	14.1%	3.1%	0.1%	0.0%	0.0%	3.7	10.0	May 05	35.1	May 06 07:00	100.0%
June 2020	681	80.0%	18.8%	1.2%	0.0%	0.0%	0.0%	3.5	6.3	Jun 17	19.8	Jun 10 09:00	99.4%
July 2020	707	80.3%	19.1%	0.6%	0.0%	0.0%	0.0%	3.5	7.4	Jul 27	17.9	Jul 27 06:00	99.9%
August 2020	666	76.4%	19.8%	3.5%	0.3%	0.0%	0.0%	4.2	10.0	Aug 28	41.6	Aug 06 07:00	94.6%
September 2020	685	58.5%	29.5%	9.2%	2.8%	0.0%	0.0%	7.4	22.9	Sep 18	72.1	Sep 18 08:00	100.0%
October 2020	706	39.4%	39.1%	15.0%	6.4%	0.1%	0.0%	10.7	41.3	Oct 28	120.1	Oct 28 08:00	99.9%
November 2020	684	18.6%	32.3%	19.7%	27.3%	1.9%	0.1%	25.2	64.2	Nov 13	162.1	Nov 20 18:00	100.0%
December 2020	707	13.4%	38.2%	17.1%	27.9%	2.8%	0.6%	26.8	112.3	Dec 03	205.4	Dec 03 19:00	99.9%
<b>Annual</b>	<b>8199</b>	<b>46.9%</b>	<b>28.7%</b>	<b>10.7%</b>	<b>12.4%</b>	<b>1.1%</b>	<b>0.2%</b>	<b>14.3</b>	<b>112.3</b>	<b>MAXIMUM VALUES</b>			<b>98.7%</b>

AAAQO Objectives: none

## 5.6 Ozone (O<sub>3</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

Ozone (O<sub>3</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents 1-hr 76ppb
		0 to 10 (ppb)	10 to 20 (ppb)	20 to 40 (ppb)	40 to 60 (ppb)	60 to 76 (ppb)	> 76 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	708	50.4%	21.0%	25.6%	3.0%	0.0%	0.0%	13.1	33.3	Jan 02	42.8	Jan 31 01:00	99.9%	0
February 2020	658	20.7%	11.7%	60.3%	7.3%	0.0%	0.0%	24.5	38.6	Feb 09	45.1	Feb 28 02:00	100.0%	0
March 2020	708	8.6%	9.3%	63.8%	18.2%	0.0%	0.0%	29.5	41.4	Mar 26	48.4	Mar 26 14:00	100.0%	0
April 2020	687	0.9%	4.1%	49.5%	45.6%	0.0%	0.0%	37.2	47.1	Apr 15	56.6	Apr 29 17:00	100.0%	0
May 2020	708	4.5%	11.7%	63.0%	20.8%	0.0%	0.0%	31.2	41.9	May 02	56.0	May 05 18:00	99.7%	0
June 2020	680	5.6%	18.7%	69.9%	5.9%	0.0%	0.0%	26.4	36.6	Jun 11	48.6	Jun 11 16:00	99.2%	0
July 2020	708	11.2%	41.1%	46.8%	0.8%	0.1%	0.0%	20.0	28.9	Jul 11	62.5	Jul 27 14:00	99.9%	0
August 2020	709	9.7%	27.1%	60.5%	2.7%	0.0%	0.0%	22.4	28.9	Aug 19	55.5	Aug 18 16:00	100.0%	0
September 2020	686	19.8%	30.9%	47.7%	1.6%	0.0%	0.0%	19.9	32.1	Sep 01	46.5	Sep 28 15:00	100.0%	0
October 2020	708	18.5%	26.8%	53.5%	1.1%	0.0%	0.0%	20.5	35.7	Oct 06	44.0	Oct 04 16:00	99.9%	0
November 2020	686	35.6%	30.8%	33.7%	0.0%	0.0%	0.0%	15.3	29.9	Nov 27	38.4	Nov 01 02:00	100.0%	0
December 2020	709	36.2%	22.4%	39.8%	1.6%	0.0%	0.0%	16.6	33.2	Dec 20	43.6	Dec 23 00:00	100.0%	0
<b>Annual</b>	<b>8355</b>	<b>18.5%</b>	<b>21.3%</b>	<b>51.2%</b>	<b>9.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>23.0</b>	<b>47.1</b>	<b>MAXIMUM VALUES</b>			<b>99.9%</b>	<b>0</b>

AAAQO Objectives: 1-Hr: 76ppb

## 5.7 Particulate Matter (PM<sub>2.5</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

Particulate Matter (PM<sub>2.5</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (µg/m <sup>3</sup> )	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 2 (µg/m <sup>3</sup> )	2 to 4 (µg/m <sup>3</sup> )	4 to 10 (µg/m <sup>3</sup> )	10 to 20 (µg/m <sup>3</sup> )	20 to 29 (µg/m <sup>3</sup> )	> 29 (µg/m <sup>3</sup> )		24-hr (µg/m <sup>3</sup> )	Date	1-hr (µg/m <sup>3</sup> )	Date		24-hr 29 µg/m <sup>3</sup>	1-hr 80 µg/m <sup>3</sup>
January 2020	710	17.9%	16.6%	33.4%	25.9%	4.8%	1.4%	8.2	17.8	Jan 25	47.3	Jan 02 00:00	95.8%	0	0
February 2020	691	35.7%	28.4%	25.5%	10.1%	0.3%	0.0%	4.3	15.1	Feb 19	23.7	Feb 19 13:00	100.0%	0	0
March 2020	743	31.6%	34.1%	27.6%	6.3%	0.1%	0.3%	4.0	10.7	Mar 20	30.2	Mar 01 08:00	100.0%	0	0
April 2020	718	31.9%	42.1%	21.9%	3.5%	0.7%	0.0%	3.6	11.1	Apr 06	21.9	Apr 06 11:00	100.0%	0	0
May 2020	741	37.2%	29.0%	28.6%	4.2%	0.5%	0.4%	4.0	22.2	May 30	158.4	May 30 20:00	100.0%	0	2
June 2020	718	38.7%	30.5%	25.6%	4.0%	1.0%	0.1%	3.5	9.1	Jun 19	34.2	Jun 02 02:00	99.9%	0	0
July 2020	740	42.0%	31.6%	22.3%	4.1%	0.0%	0.0%	3.3	9.8	Jul 27	18.0	Jul 29 23:00	99.9%	0	0
August 2020	741	53.7%	14.4%	23.9%	8.0%	0.0%	0.0%	3.3	11.8	Aug 01	19.1	Aug 02 07:00	100.0%	0	0
September 2020	717	53.7%	16.2%	16.2%	8.6%	3.6%	1.7%	4.7	30.7	Sep 19	61.3	Sep 19 13:00	100.0%	1	0
October 2020	742	41.8%	23.0%	27.9%	6.6%	0.5%	0.1%	3.8	12.1	Oct 03	33.5	Oct 23 11:00	100.0%	0	0
November 2020	717	13.4%	22.0%	30.4%	24.8%	5.3%	4.0%	9.0	30.0	Nov 20	45.2	Nov 13 18:00	100.0%	1	0
December 2020	742	24.5%	19.5%	35.0%	17.4%	2.8%	0.7%	6.4	21.4	Dec 03	40.5	Dec 03 01:00	100.0%	0	0
<b>Annual</b>	<b>8720</b>	<b>35.2%</b>	<b>25.6%</b>	<b>26.5%</b>	<b>10.3%</b>	<b>1.6%</b>	<b>0.7%</b>	<b>4.9</b>	<b>30.7</b>	<b>MAXIMUM VALUES</b>		<b>99.6%</b>	<b>2</b>	<b>2</b>	

AAAQO Objectives: 24-Hr: 29 µg/m<sup>3</sup>, AAAQG Guideline: 1-Hr: 80 µg/m<sup>3</sup>

## 5.8 Carbon Monoxide (CO) - Henry Pirker 2020 Summary and Frequency Distribution

Carbon Monoxide (CO) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	MAXIMUM VALUES				Operational time (%)	8-hr 5ppm	1-hr 13ppm
		0 to 0.1 (ppm)	0.1 to 1 (ppm)	1 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 13 (ppm)	> 13 (ppm)		8-hr (ppm)	Date	1-hr (ppm)	Date			
January 2020	708	0.0%	98.6%	1.4%	0.0%	0.0%	0.0%	0.3	1.1	Jan 01	1.8	Jan 21 08:00	100.0%	0	0
February 2020	657	0.8%	98.5%	0.8%	0.0%	0.0%	0.0%	0.2	1.1	Feb 04	1.4	Feb 04 10:00	99.3%	0	0
March 2020	707	0.0%	99.7%	0.3%	0.0%	0.0%	0.0%	0.2	0.6	Mar 09	1.1	Mar 09 08:00	100.0%	0	0
April 2020	686	0.3%	99.7%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Apr 06	0.4	Apr 01 23:00	100.0%	0	0
May 2020	708	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	May 05	0.4	May 04 00:00	100.0%	0	0
June 2020	684	2.6%	97.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Jun 18	0.4	Jun 18 23:00	99.7%	0	0
July 2020	708	8.9%	91.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Jul 27	0.4	Jul 15 09:00	99.9%	0	0
August 2020	708	3.1%	96.9%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Aug 27	0.4	Aug 27 22:00	100.0%	0	0
September 2020	686	0.6%	99.3%	0.1%	0.0%	0.0%	0.0%	0.2	0.6	Sep 18	1.0	Sep 18 21:00	100.0%	0	0
October 2020	707	0.1%	99.7%	0.1%	0.0%	0.0%	0.0%	0.2	0.6	Oct 28	1.1	Oct 28 08:00	100.0%	0	0
November 2020	685	0.0%	99.4%	0.6%	0.0%	0.0%	0.0%	0.3	0.8	Nov 14	1.2	Nov 13 09:00	100.0%	0	0
December 2020	708	1.1%	97.2%	1.7%	0.0%	0.0%	0.0%	0.3	1.1	Dec 03	1.8	Dec 03 19:00	99.9%	0	0
<b>Annual</b>	<b>8352</b>	<b>1.5%</b>	<b>98.1%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2</b>	<b>1.1</b>	<b>MAXIMUM VALUES</b>		<b>99.9%</b>	<b>0</b>	<b>0</b>	

AAAQO Objectives: 8-Hr: 5ppm, 1-Hr: 13ppm

## 5.9 Total Hydrocarbons (THC) - Henry Pirker 2020 Summary and Frequency Distribution

Total Hydrocarbons (THC) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	MAXIMUM VALUES				Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)		24-hr (ppm)	Date	1-hr (ppm)	Date	
January 2020	707	0.0%	4.0%	55.3%	40.6%	0.1%	0.0%	2.6	3.9	Jan 25	5.1	Jan 21 08:00	99.9%
February 2020	655	0.0%	69.2%	18.6%	12.2%	0.0%	0.0%	2.0	3.0	Feb 19	4.0	Feb 19 09:00	99.4%
March 2020	707	0.0%	85.4%	10.2%	4.4%	0.0%	0.0%	1.8	2.3	Mar 16	3.1	Mar 16 07:00	100.0%
April 2020	686	0.0%	91.7%	6.9%	1.5%	0.0%	0.0%	1.7	2.0	Apr 03	4.2	Apr 18 06:00	100.0%
May 2020	697	24.1%	75.6%	0.3%	0.0%	0.0%	0.0%	1.6	1.7	May 05	2.0	May 05 06:00	99.2%
June 2020	659	3.2%	4.4%	92.1%	0.3%	0.0%	0.0%	2.1	2.1	Jun 19	2.5	Jun 20 08:00	96.4%
July 2020	582	0.0%	15.3%	82.5%	2.1%	0.2%	0.0%	2.1	2.2	Jul 07	5.4	Jul 23 02:00	82.7%
August 2020	710	0.0%	40.3%	55.5%	4.2%	0.0%	0.0%	2.1	2.3	Aug 28	4.2	Aug 28 02:00	100.0%
September 2020	681	0.0%	26.1%	68.3%	5.6%	0.0%	0.0%	2.1	2.4	Sep 18	3.5	Sep 25 07:00	99.3%
October 2020	708	0.0%	15.0%	81.5%	3.5%	0.0%	0.0%	2.1	2.4	Oct 28	3.7	Oct 13 08:00	100.0%
November 2020	682	0.0%	9.8%	73.2%	17.0%	0.0%	0.0%	2.2	2.7	Nov 20	3.3	Nov 29 08:00	99.4%
December 2020	707	0.1%	0.1%	78.4%	21.4%	0.0%	0.0%	2.3	3.2	Dec 03	4.6	Dec 03 19:00	99.9%
<b>Annual</b>	<b>8181</b>	<b>2.3%</b>	<b>36.4%</b>	<b>51.9%</b>	<b>9.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.1</b>	<b>3.9</b>	<b>Jan 25</b>	<b>5.4</b>	<b>Jul 23 02:00</b>	<b>98.0%</b>

AAAQO Objectives: none

## 5.10 Methane (CH<sub>4</sub>) - Henry Pirker 2020 Summary and Frequency Distribution

Methane (CH<sub>4</sub>) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	MAXIMUM VALUES				Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)		24-hr (ppm)	Date	1-hr (ppm)	Date	
January 2020	707	0.0%	4.0%	57.6%	38.5%	0.0%	0.0%	2.5	3.2	Jan 25	4.5	Jan 21 08:00	99.9%
February 2020	655	0.0%	69.3%	23.4%	7.3%	0.0%	0.0%	2.0	2.7	Feb 19	3.2	Feb 19 09:00	99.4%
March 2020	707	0.0%	86.3%	13.3%	0.4%	0.0%	0.0%	1.8	2.1	Mar 16	2.5	Mar 16 08:00	100.0%
April 2020	686	0.0%	91.7%	7.9%	0.4%	0.0%	0.0%	1.7	2.0	Apr 18	4.2	Apr 18 06:00	100.0%
May 2020	697	20.9%	78.8%	0.3%	0.0%	0.0%	0.0%	1.6	1.7	May 05	2.0	May 05 06:00	99.2%
June 2020	659	3.0%	4.6%	92.1%	0.3%	0.0%	0.0%	2.0	2.1	Jun 19	2.5	Jun 20 08:00	96.4%
July 2020	582	0.0%	15.5%	82.3%	2.1%	0.2%	0.0%	2.1	2.2	Jul 07	5.4	Jul 23 02:00	82.7%
August 2020	710	0.0%	40.6%	55.5%	3.9%	0.0%	0.0%	2.1	2.3	Aug 28	4.2	Aug 28 02:00	100.0%
September 2020	681	0.0%	26.1%	69.2%	4.7%	0.0%	0.0%	2.1	2.3	Sep 18	3.5	Sep 25 07:00	99.3%
October 2020	708	0.0%	15.3%	81.8%	3.0%	0.0%	0.0%	2.1	2.3	Oct 28	3.7	Oct 13 08:00	100.0%
November 2020	682	0.0%	10.6%	78.0%	11.4%	0.0%	0.0%	2.2	2.6	Nov 29	3.3	Nov 29 08:00	99.4%
December 2020	707	0.1%	0.1%	80.2%	19.5%	0.0%	0.0%	2.3	3.0	Dec 03	3.7	Dec 03 19:00	99.9%
<b>Annual</b>	<b>8181</b>	<b>2.0%</b>	<b>36.9%</b>	<b>53.5%</b>	<b>7.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.0</b>	<b>3.2</b>	<b>Jan 25</b>	<b>5.4</b>	<b>Jul 23 02:00</b>	<b>98.0%</b>

AAAQO Objectives: none

## 5.11 Non Methane Hydrocarbons (NMHC) - Henry Pirker 2020 Summary and Frequency Distribution

Nonmethane Hydrocarbons (NMHC) Frequency Distribution at Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	MAXIMUM VALUES				Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)		24-hr (ppm)	Date	1-hr (ppm)	Date	
January 2020	707	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.10	0.6	Jan 25	0.8	Jan 25 18:00	99.9%
February 2020	655	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.04	0.4	Feb 19	0.8	Feb 19 09:00	99.4%
March 2020	707	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.03	0.2	Mar 16	0.6	Mar 16 04:00	100.0%
April 2020	686	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.01	0.1	Apr 02	0.3	Apr 02 05:00	100.0%
May 2020	697	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.0	May 11	0.0	May 11 09:00	99.2%
June 2020	659	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.0	Jun 05	0.0	Jun 05 06:00	96.4%
July 2020	582	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.0	Jul 04	0.0	Jul 04 09:00	82.7%
August 2020	710	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.0	Aug 19	0.4	Aug 19 23:00	100.0%
September 2020	681	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.0	Sep 18	0.3	Sep 19 04:00	99.3%
October 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.01	0.1	Oct 28	0.3	Oct 28 22:00	100.0%
November 2020	682	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.03	0.2	Nov 20	0.4	Nov 29 15:00	99.4%
December 2020	707	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.04	0.2	Dec 03	1.4	Dec 02 06:00	99.9%
<b>Annual</b>	<b>8181</b>	<b>100.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.02</b>	<b>MAXIMUM VALUES</b>				<b>98.0%</b>

AAAQO Objectives: none

## 5.12 Temperature (ET) - Henry Pirker 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Henry Pirker

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-15.6	1.2	Jan 30	5.5	Jan 30 15:00	-34.9	Jan 15	-40.6	Jan 15 22:00	99.7%
February 2020	-6.3	4.3	Feb 27	8.3	Feb 21 15:00	-19.6	Feb 17	-25.7	Feb 03 06:00	100.0%
March 2020	-7.7	2.5	Mar 02	8.7	Mar 16 15:00	-22.9	Mar 14	-32.2	Mar 14 08:00	100.0%
April 2020	2.5	12.4	Apr 20	19.0	Apr 20 17:00	-16.1	Apr 02	-26.4	Apr 03 07:00	100.0%
May 2020	11.1	18.0	May 30	24.4	May 30 17:00	4.1	May 14	-0.5	May 06 06:00	100.0%
June 2020	15.3	21.2	Jun 19	27.9	Jun 19 17:00	10.6	Jun 07	4.1	Jun 04 05:00	99.9%
July 2020	17.4	23.4	Jul 27	33.0	Jul 27 15:00	12.7	Jul 03	9.1	Jul 09 05:00	99.9%
August 2020	16.1	23.2	Aug 02	31.0	Aug 16 16:00	10.9	Aug 12	4.6	Aug 12 06:00	100.0%
September 2020	12.1	19.2	Sep 10	28.1	Sep 10 15:00	5.8	Sep 14	-1.3	Sep 30 06:00	100.0%
October 2020	2.0	15.8	Oct 04	26.4	Oct 03 16:00	-9.6	Oct 24	-16.1	Oct 24 08:00	100.0%
November 2020	-4.8	9.0	Nov 01	16.3	Nov 02 16:00	-17.8	Nov 19	-21.6	Nov 19 00:00	100.0%
December 2020	-6.2	5.8	Dec 07	8.9	Dec 07 13:00	-19.4	Dec 13	-21.4	Dec 13 08:00	100.0%
	<b>AVERAGE</b>	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
	<b>3.0</b>	<b>23.4</b>	<b>Jul 27</b>	<b>33.0</b>	<b>Jul 27 15:00</b>	<b>-34.9</b>	<b>Jan 15</b>	<b>-40.6</b>	<b>Jan 15 22:00</b>	<b>100.0%</b>



## 5.13 Relative Humidity (RH) - Henry Pirker 2020 Summary and Frequency Distribution

Relative Humidity (RH) Frequency Distribution at Henry Pirker

Month	Monthly Average (%)	Maximum Values			Operational time (%)	
		24-hr (%)	Date	1-hr (%)		Date
January 2020	66.3	77.3	Jan 24	87.4	Jan 31 00:00	100.0%
February 2020	62.5	79.5	Feb 29	87.8	Feb 01 05:00	100.0%
March 2020	60.6	77.7	Mar 23	86.4	Mar 05 00:00	100.0%
April 2020	50.8	71.4	Apr 17	86.2	Apr 10 01:00	100.0%
May 2020	55.3	84.4	May 21	90.8	May 31 04:00	100.0%
June 2020	57.4	79.7	Jun 28	90.2	Jun 29 05:00	99.9%
July 2020	62.9	88.6	Jul 01	90.2	Jul 02 01:00	99.9%
August 2020	59.9	77.9	Aug 15	91.0	Aug 21 07:00	100.0%
September 2020	63.7	85.0	Sep 14	90.0	Sep 19 05:00	100.0%
October 2020	65.0	86.7	Oct 10	90.0	Oct 10 09:00	100.0%
November 2020	70.7	82.4	Nov 23	88.5	Nov 05 07:00	100.0%
December 2020	68.2	79.5	Dec 27	87.2	Dec 08 07:00	100.0%
	<b>AVERAGE</b> 62.0	<b>88.6</b>	<b>MAXIMUM VALUES</b> Jul 01	<b>91.0</b>	<b>Aug 21 07:00</b>	<b>100.0%</b>

## 5.14 Solar Radiation (SR) - Henry Pirker 2020 Summary and Frequency Distribution

Solar Radiation (SR) Frequency Distribution at Henry Pirker

Month	Monthly Average (W/m <sup>2</sup> )	Maximum Values			Operational time (%)	
		24-hr (W/m <sup>2</sup> )	Date	1-hr (W/m <sup>2</sup> )		Date
January 2020	17.3	41.4	Jan 28	220.1	Jan 28 14:00	100.0%
February 2020	50.8	82.0	Feb 22	348.5	Feb 26 13:00	100.0%
March 2020	98.2	170.8	Mar 25	575.8	Mar 25 13:00	100.0%
April 2020	178.0	232.1	Apr 18	712.2	Apr 29 12:00	100.0%
May 2020	182.2	280.9	May 12	770.2	May 27 12:00	100.0%
June 2020	190.6	291.6	Jun 18	780.7	Jun 18 13:00	99.9%
July 2020	185.1	264.2	Jul 10	787.3	Jul 05 13:00	99.9%
August 2020	169.3	243.2	Aug 07	683.4	Aug 09 13:00	100.0%
September 2020	100.3	163.9	Sep 09	542.6	Sep 04 12:00	100.0%
October 2020	53.0	109.4	Oct 02	409.1	Oct 02 13:00	100.0%
November 2020	25.1	48.8	Nov 08	251.1	Nov 05 13:00	100.0%
December 2020	15.3	27.9	Dec 13	160.4	Dec 02 12:00	100.0%
	<b>AVERAGE</b> 105.4	<b>291.6</b>	<b>MAXIMUM VALUES</b> Jun 18	<b>787.3</b>	<b>Jul 05 13:00</b>	<b>100.0%</b>

## 5.15 Wind Speed & Wind Direction (WS & WD) - Henry Pirker 2020 Summary and Frequency Distribution

### Wind Speed Frequency Distribution of 1-hr Averages - Henry Pirker

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	MAXIMUM VALUES				Operational time (%)		
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)		24-hr (km/hr)	Date	1-hr (km/hr)	Date			
January 2020	744	38.8%	34.4%	17.1%	9.0%	0.4%	0.3%	5.3	17.1	Jan 02	31.0	Jan 02 08:00	100.0%		
February 2020	693	20.8%	35.4%	19.3%	21.6%	2.6%	0.3%	8.0	19.0	Feb 09	31.5	Feb 01 10:00	99.6%		
March 2020	724	14.4%	34.3%	30.0%	20.2%	1.2%	0.0%	8.0	18.2	Mar 02	29.4	Mar 02 02:00	97.3%		
April 2020	709	10.6%	33.0%	29.1%	23.7%	3.4%	0.3%	9.1	20.5	Apr 21	30.4	Apr 21 11:00	98.5%		
May 2020	744	10.2%	23.0%	43.0%	21.9%	1.9%	0.0%	9.0	16.6	May 21	29.1	May 03 14:00	100.0%		
June 2020	719	10.2%	26.6%	32.7%	29.8%	0.8%	0.0%	9.3	17.1	Jun 03	26.7	Jun 25 11:00	99.9%		
July 2020	743	13.7%	29.1%	34.6%	22.5%	0.1%	0.0%	8.3	15.1	Jul 12	24.7	Jul 12 10:00	99.9%		
August 2020	744	16.9%	22.3%	31.0%	27.2%	2.2%	0.4%	9.3	17.0	Aug 29	32.7	Aug 31 19:00	100.0%		
September 2020	720	24.2%	28.9%	30.0%	13.9%	2.5%	0.6%	7.4	18.6	Sep 01	33.0	Sep 24 14:00	100.0%		
October 2020	743	25.7%	26.8%	29.9%	15.3%	1.5%	0.8%	7.4	15.6	Oct 04	33.9	Oct 05 14:00	99.9%		
November 2020	720	35.3%	31.3%	21.7%	11.1%	0.6%	0.1%	5.6	11.8	Nov 18	31.3	Nov 30 17:00	100.0%		
December 2020	744	42.9%	29.0%	15.3%	12.5%	0.3%	0.0%	5.4	12.9	Dec 20	25.5	Dec 11 22:00	100.0%		
<b>Annual</b>	<b>8747</b>	<b>22.0%</b>	<b>29.5%</b>	<b>27.8%</b>	<b>19.1%</b>	<b>1.5%</b>	<b>0.2%</b>	<b>7.7</b>	<b>20.5</b>	<b>MAXIMUM VALUES</b>		<b>Apr 21</b>	<b>33.9</b>	<b>Oct 05 14:00</b>	<b>99.6%</b>

### Wind Speed and Wind Direction Frequency Distribution at Henry Pirker

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	215	1.0%	0.7%	0.5%	0.2%	0.0%	0.0%	2.5%
NNE	232	0.8%	1.1%	0.7%	0.1%	0.0%	0.0%	2.7%
NE	337	1.0%	1.7%	1.1%	0.0%	0.0%	0.0%	3.9%
ENE	457	0.8%	2.3%	2.1%	0.0%	0.0%	0.0%	5.2%
E	517	1.1%	1.9%	2.4%	0.6%	0.0%	0.0%	5.9%
ESE	295	1.2%	1.4%	0.8%	0.0%	0.0%	0.0%	3.4%
SE	256	1.4%	1.1%	0.4%	0.0%	0.0%	0.0%	2.9%
SSE	265	1.3%	1.3%	0.4%	0.0%	0.0%	0.0%	3.0%
S	187	1.1%	0.7%	0.3%	0.0%	0.0%	0.0%	2.1%
SSW	238	0.9%	1.2%	0.6%	0.0%	0.0%	0.0%	2.7%
SW	635	1.1%	2.4%	3.0%	0.7%	0.0%	0.0%	7.3%
WSW	1476	1.1%	2.3%	5.2%	7.4%	0.8%	0.1%	16.9%
W	1093	1.4%	2.1%	3.5%	4.7%	0.5%	0.2%	12.5%
WNW	1079	2.8%	3.2%	3.2%	3.0%	0.0%	0.0%	12.3%
NW	1055	3.4%	4.3%	2.3%	2.0%	0.0%	0.0%	12.1%
NNW	410	1.8%	1.6%	1.1%	0.3%	0.0%	0.0%	4.7%
<b>Total</b>	<b>8,747</b>	<b>22.0%</b>	<b>29.5%</b>	<b>27.8%</b>	<b>19.1%</b>	<b>1.5%</b>	<b>0.2%</b>	<b>100.0%</b>
	<b>0</b>							<b>0.0%</b>

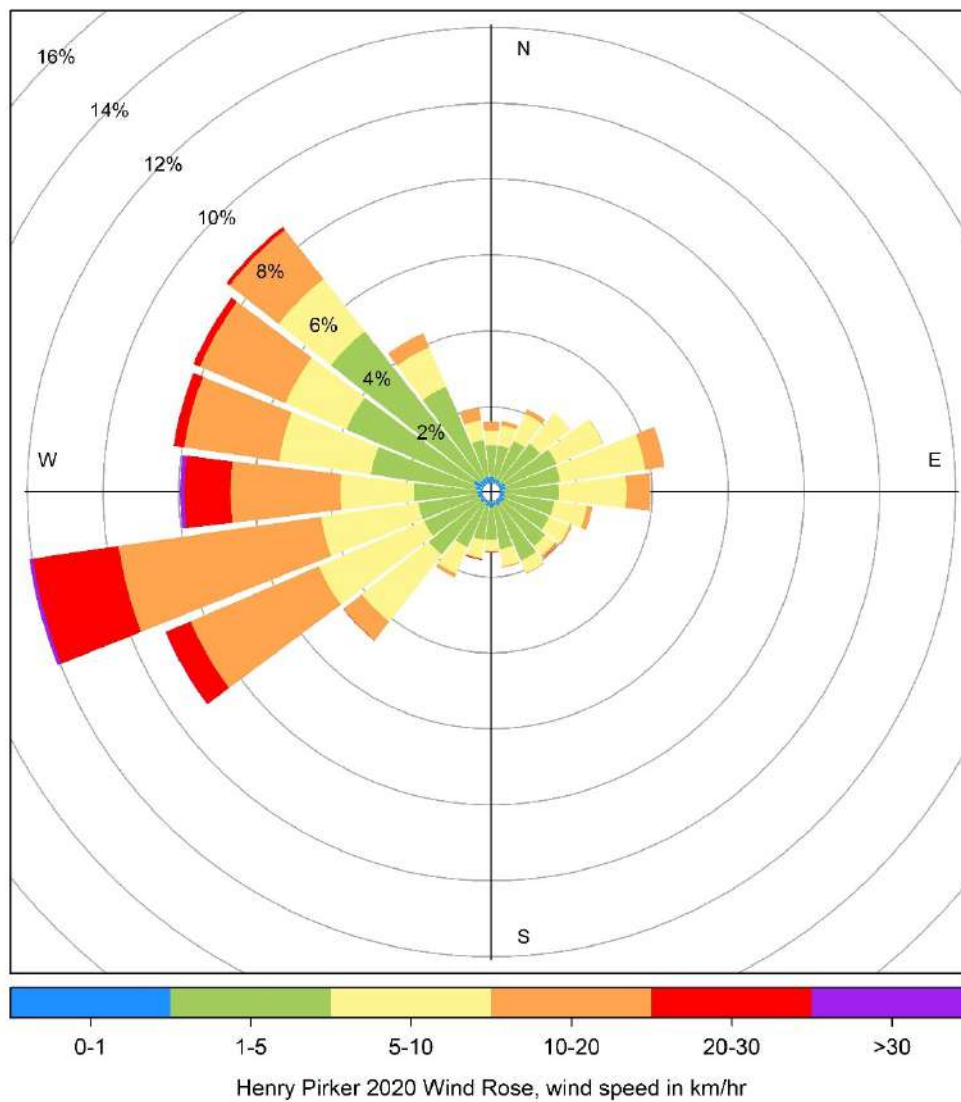
**Wind Speed Standard Deviation (WSSTD) at Henry Pirker**

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	1.7	4.0	Jan 02	6.5	Jan 02 08:00	0.8	Jan 15	0.5	Jan 15 09:00	100.0%
February 2020	2.4	7.0	Feb 19	45.4	Feb 19 01:00	1.2	Feb 03	0.4	Feb 23 19:00	99.6%
March 2020	2.4	3.8	Mar 02	21.5	Mar 13 08:00	1.4	Mar 08	0.4	Mar 07 00:00	97.3%
April 2020	2.5	4.9	Apr 21	11.2	Apr 25 21:00	1.3	Apr 12	0.4	Apr 18 08:00	98.5%
May 2020	2.7	4.4	May 26	9.2	May 05 15:00	1.5	May 18	0.6	May 06 07:00	100.0%
June 2020	2.8	4.5	Jun 03	7.1	Jun 14 18:00	1.5	Jun 17	0.4	Jun 17 01:00	99.9%
July 2020	2.6	4.0	Jul 13	8.0	Jul 19 22:00	1.6	Jul 27	0.6	Jul 30 01:00	99.9%
August 2020	2.9	4.4	Aug 07	10.3	Aug 18 17:00	1.3	Aug 16	0.5	Aug 05 07:00	100.0%
September 2020	2.3	4.6	Sep 28	10.9	Sep 20 00:00	0.9	Sep 18	0.4	Sep 15 20:00	100.0%
October 2020	2.2	3.9	Oct 05	10.4	Oct 26 19:00	1.2	Oct 02	0.3	Oct 18 07:00	99.9%
November 2020	1.9	3.0	Nov 30	13.5	Nov 05 04:00	1.1	Nov 19	0.4	Nov 11 22:00	100.0%
December 2020	1.8	3.1	Dec 12	6.9	Dec 19 13:00	0.9	Dec 29	0.3	Dec 29 03:00	100.0%
	<b>AVERAGE</b> 2.3	<b>MAXIMUM VALUES</b> 7.0 Feb 19 45.4 Feb 19 01:00				<b>MINIMUM VALUES</b> 0.8 Jan 15 0.3 Oct 18 07:00				99.6%

**Wind Direction Standard Deviation (WDSTD) at Henry Pirker**

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	28.1	50.5	Jan 24	92.9	Jan 20 09:00	10.4	Jan 13	3.4	Jan 12 01:00	100.0%
February 2020	21.9	39.1	Feb 25	96.3	Feb 13 01:00	5.7	Feb 09	3.4	Feb 09 20:00	99.6%
March 2020	19.4	34.7	Mar 09	95.7	Mar 09 05:00	9.8	Mar 02	3.8	Mar 03 02:00	97.3%
April 2020	18.4	47.6	Apr 18	87.4	Apr 18 06:00	8.7	Apr 22	4.4	Apr 29 01:00	98.5%
May 2020	22.3	55.4	May 20	94.9	May 30 20:00	9.7	May 22	5.6	May 21 19:00	100.0%
June 2020	21.6	39.0	Jun 18	90.1	Jun 05 02:00	10.1	Jun 14	5.8	Jun 13 18:00	99.9%
July 2020	21.3	40.4	Jul 28	92.7	Jul 11 07:00	8.9	Jul 01	6.0	Jul 01 06:00	99.9%
August 2020	22.9	43.0	Aug 02	98.3	Aug 05 01:00	11.0	Aug 13	5.5	Aug 29 22:00	100.0%
September 2020	24.1	52.2	Sep 17	95.6	Sep 17 17:00	10.3	Sep 01	5.9	Sep 18 19:00	100.0%
October 2020	23.4	50.0	Oct 28	96.6	Oct 18 13:00	10.6	Oct 06	5.0	Oct 06 04:00	99.9%
November 2020	29.8	56.4	Nov 22	100.4	Nov 11 20:00	9.9	Nov 18	3.8	Nov 08 23:00	100.0%
December 2020	31.4	66.5	Dec 06	98.2	Dec 06 16:00	11.9	Dec 20	0.0	Jan 00 00:00	100.0%
	<b>AVERAGE</b> 23.7	<b>MAXIMUM VALUES</b> 66.5 Dec 06 100.4 Nov 11 20:00				<b>MINIMUM VALUES</b> 5.7 Feb 09 0.0 Jan 00 00:00				99.6%

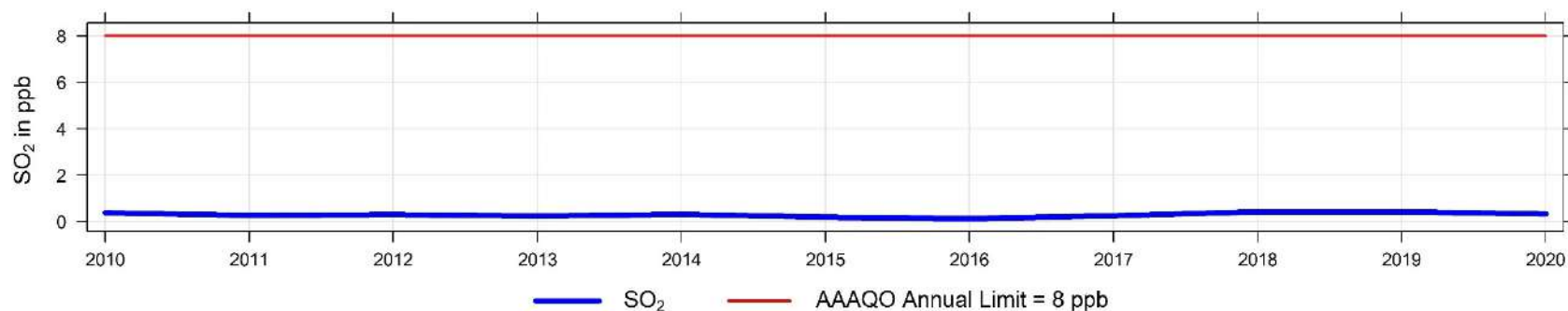
## 5.16 Wind Rose - Henry Pirker 2020 Summary and Frequency Distribution



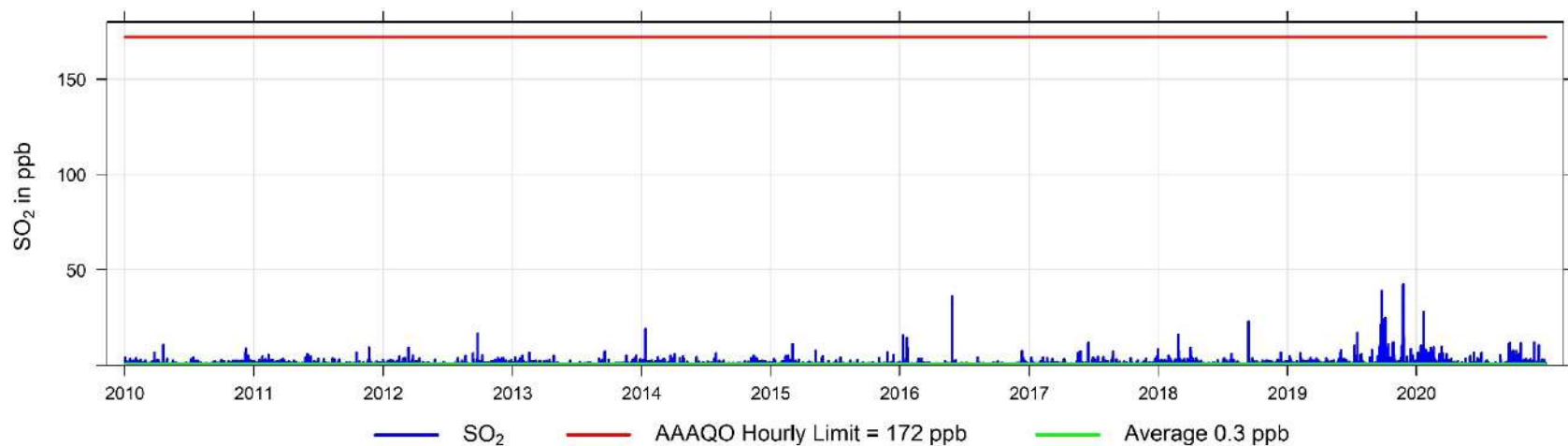
## 6 Henry Pirker Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Henry Pirker Station.

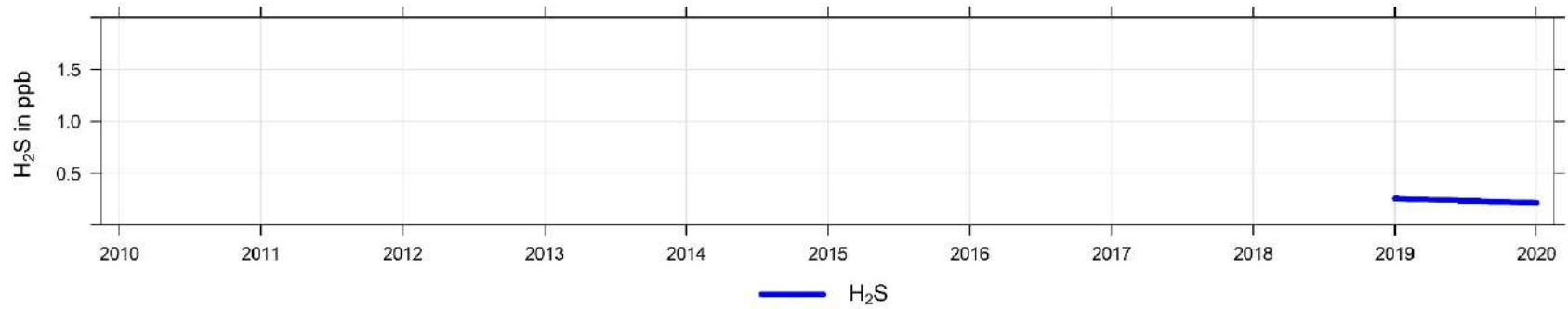
2010 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Henry Pirker



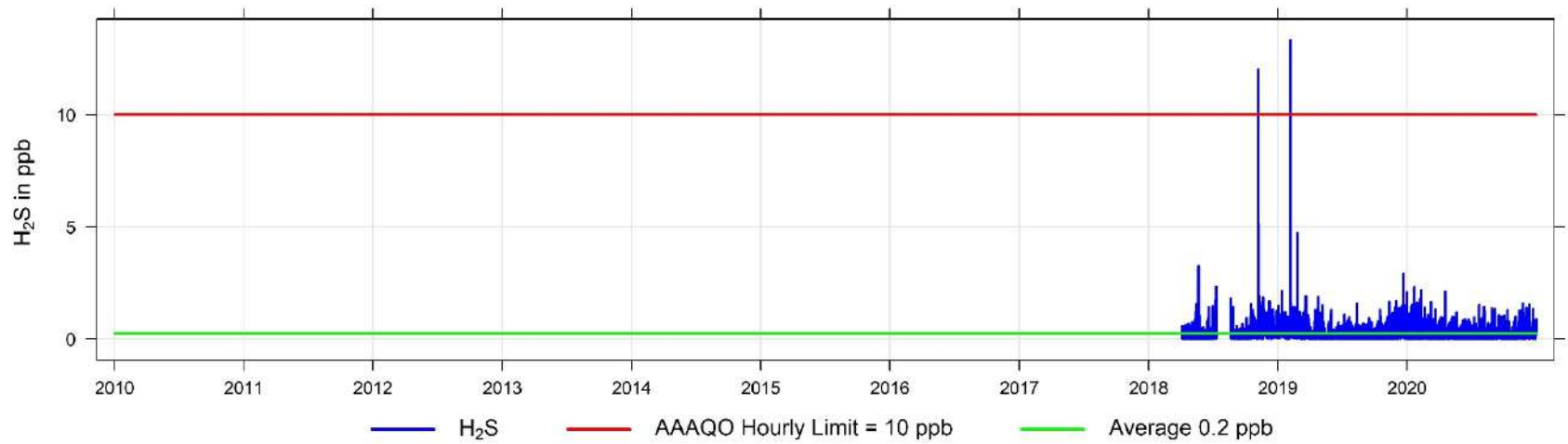
2010 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Henry Pirker



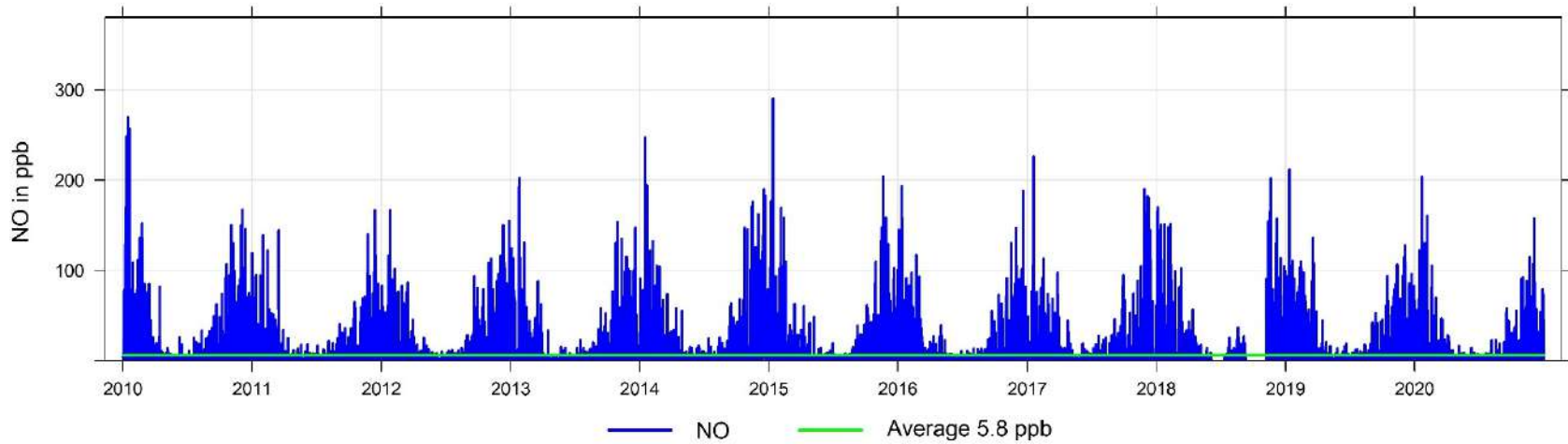
2010 to 2020 Annual Concentration Readings of H<sub>2</sub>S (in ppb) at Henry Pirker



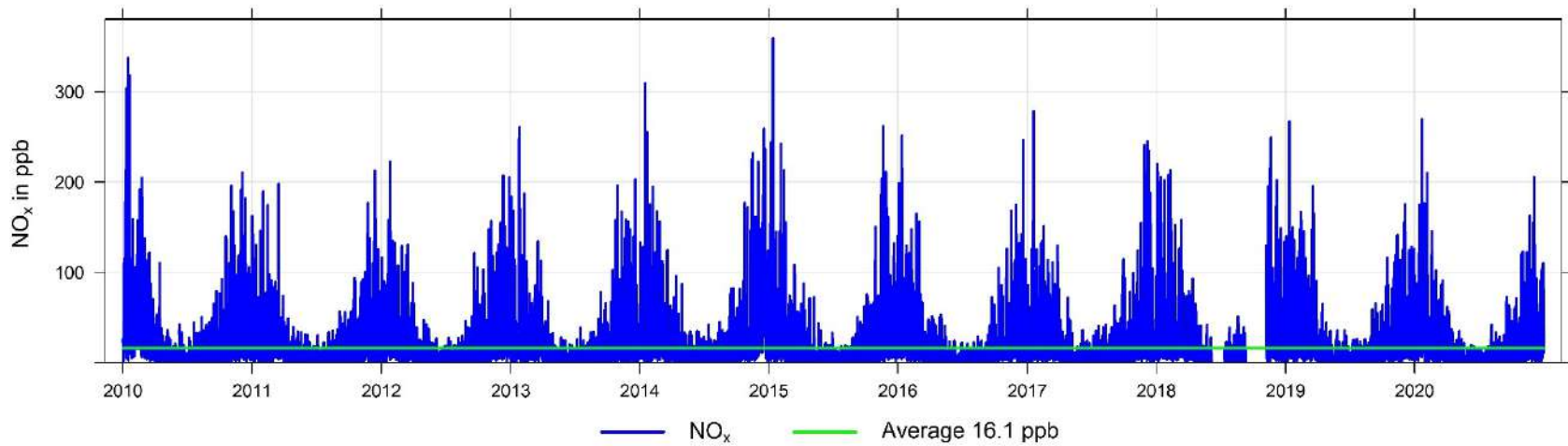
2010 to 2020 Hourly Concentration Readings of H<sub>2</sub>S (in ppb) at Henry Pirker



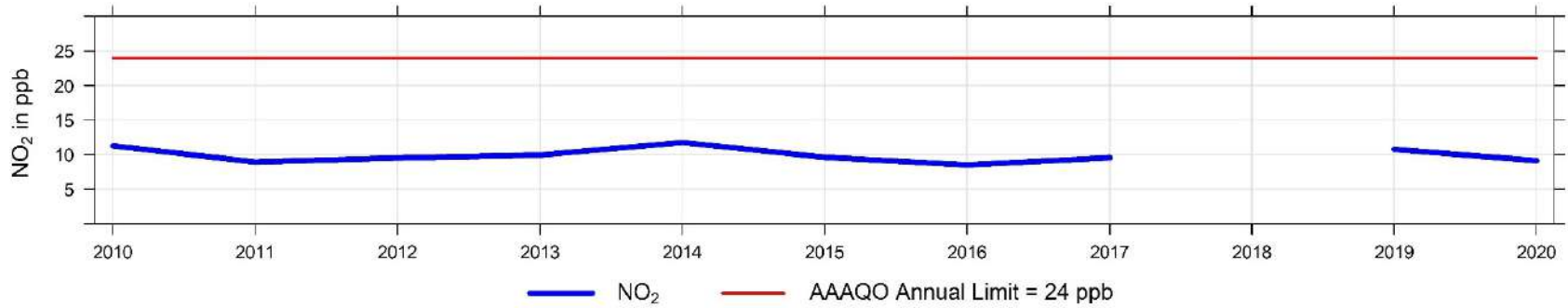
2010 to 2020 Hourly Concentration Readings of NO (in ppb) at Henry Pirker



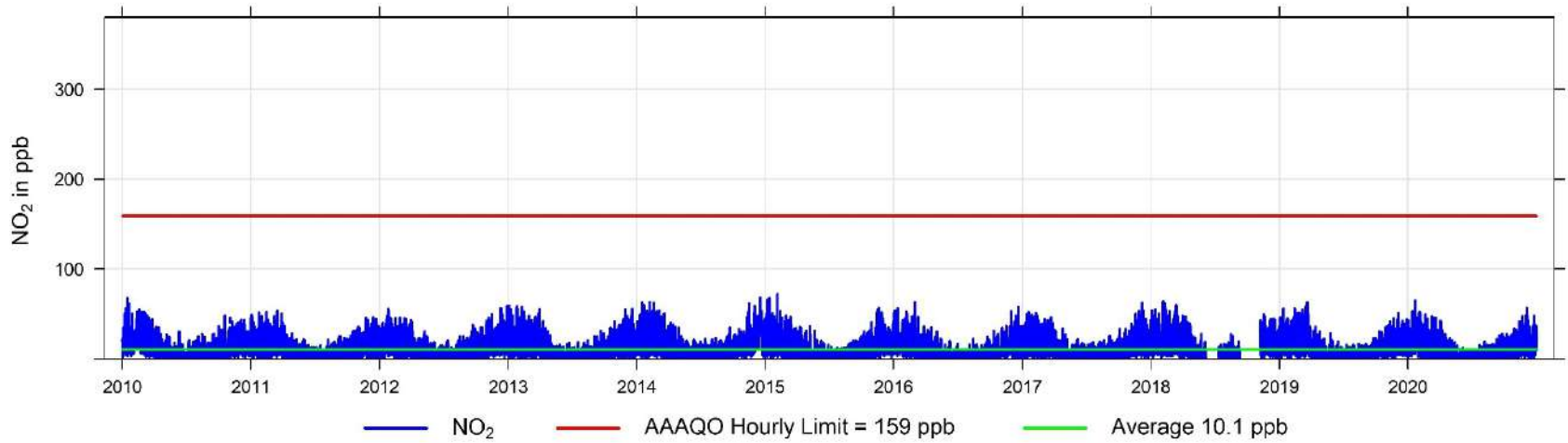
2010 to 2020 Hourly Concentration Readings of NO<sub>x</sub> (in ppb) at Henry Pirker



2010 to 2020 Annual Concentration Readings of NO<sub>2</sub> (in ppb) at Henry Pirker

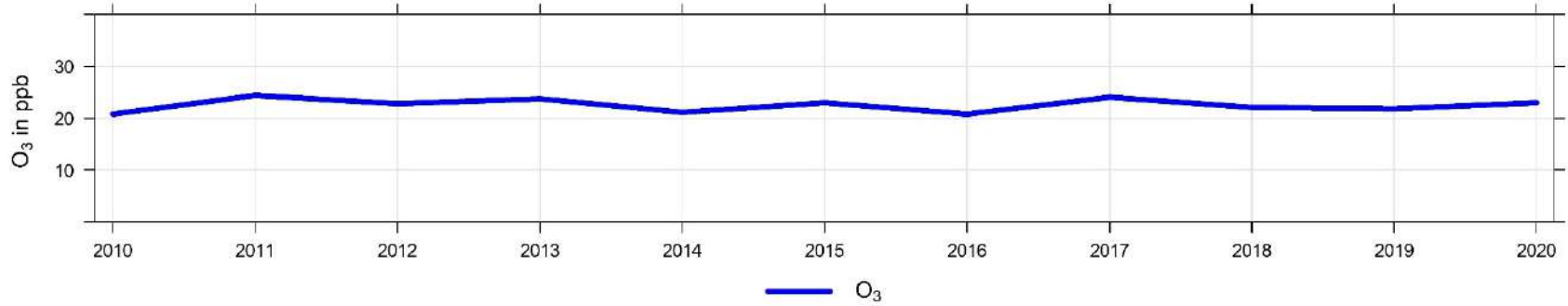


2010 to 2020 Hourly Concentration Readings of NO<sub>2</sub> (in ppb) at Henry Pirker

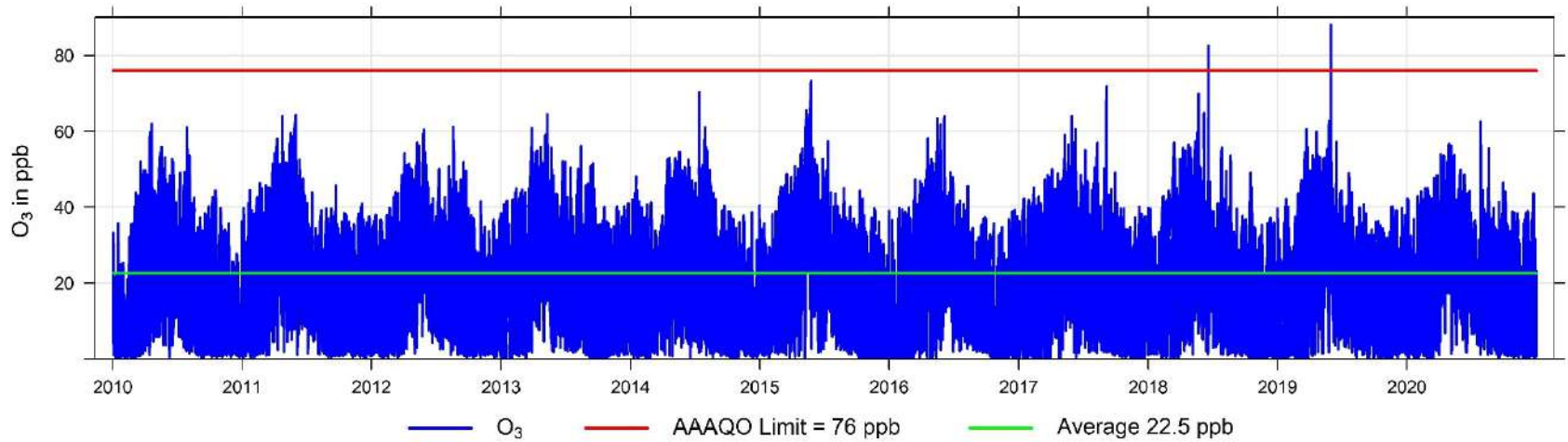




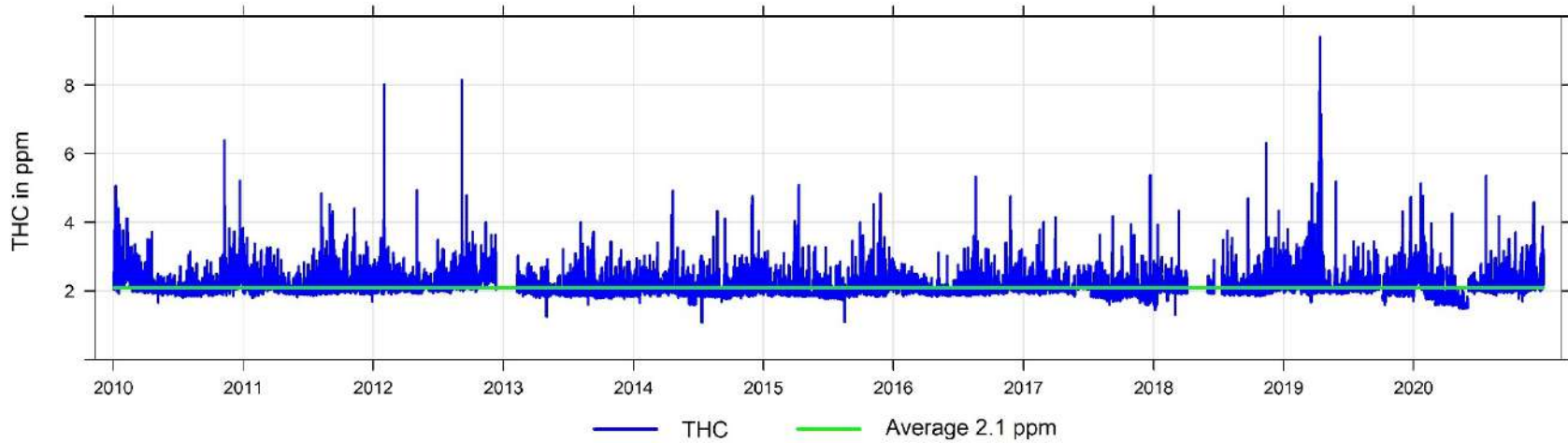
2010 to 2020 Annual Concentration Readings of O<sub>3</sub> (in ppb) at Henry Pirker



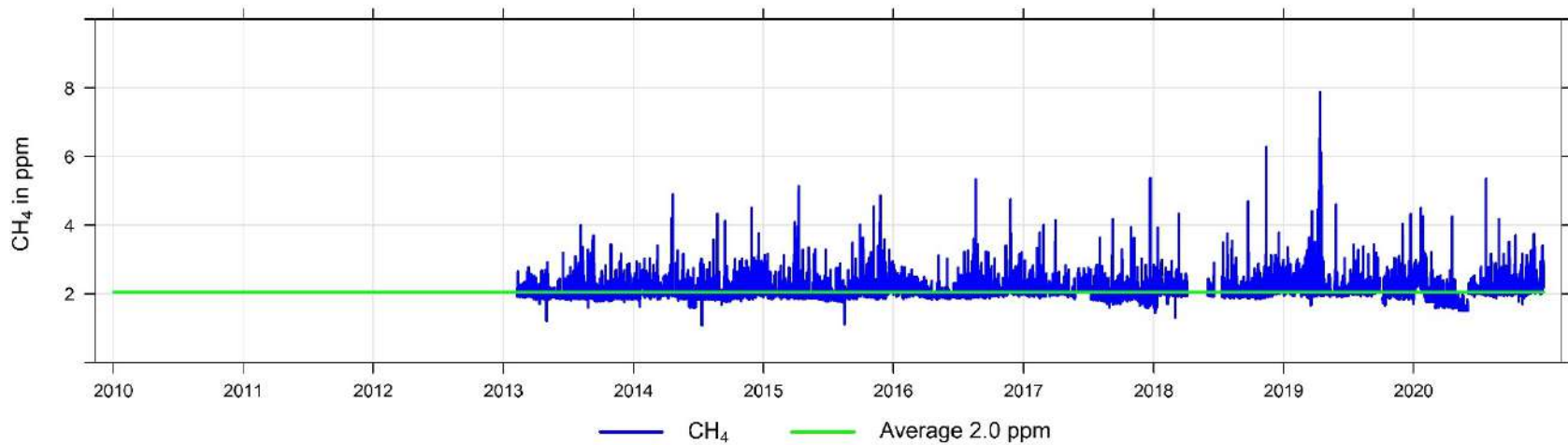
2010 to 2020 Hourly Concentration Readings of O<sub>3</sub> (in ppb) at Henry Pirker



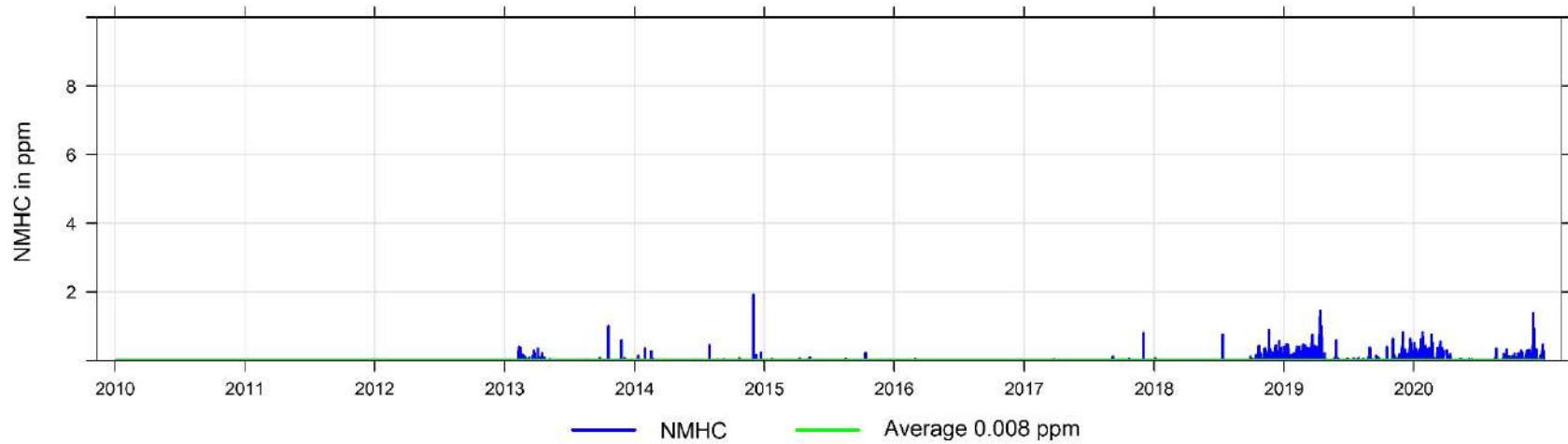
2010 to 2020 Hourly Concentration Readings of THC (in ppm) at Henry Pirker



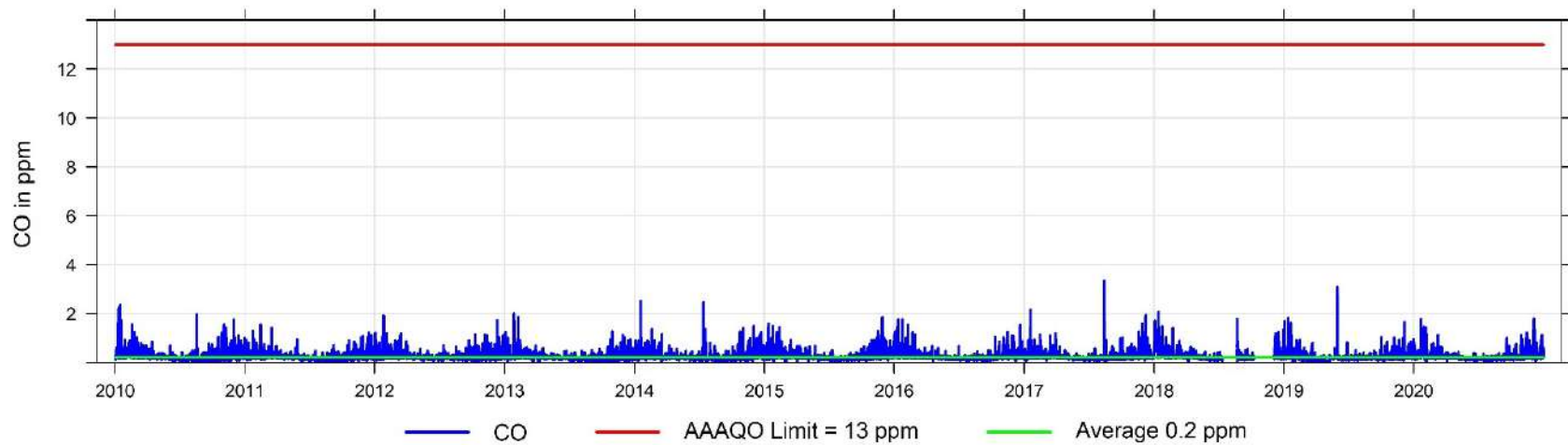
2010 to 2020 Hourly Concentration Readings of CH<sub>4</sub> (in ppm) at Henry Pirker



2010 to 2020 Hourly Concentration Readings of NMHC (in ppm) at Henry Pirker



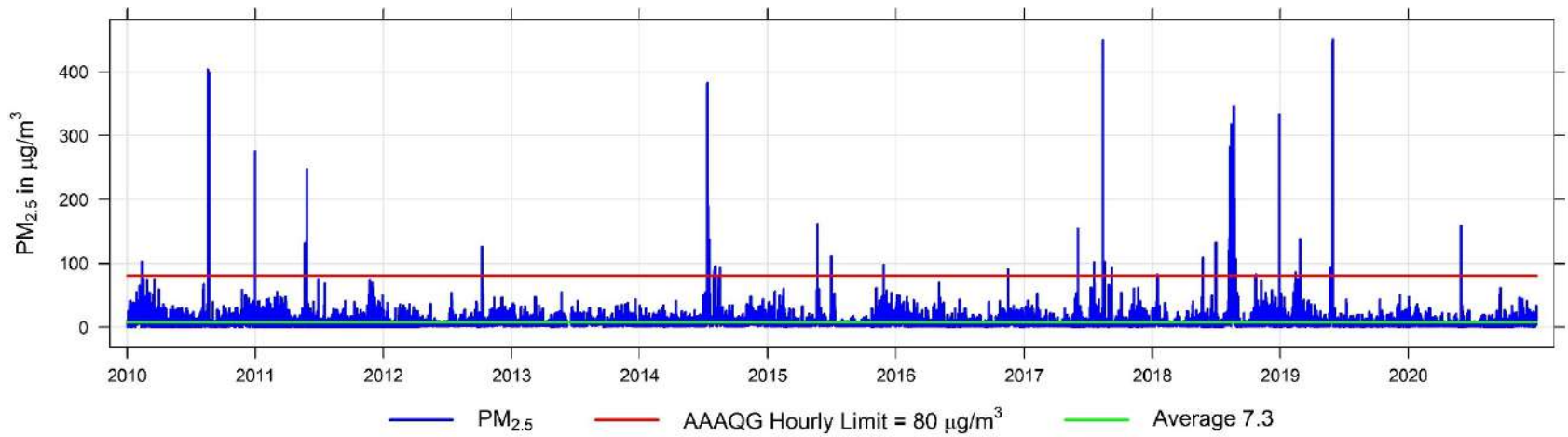
2010 to 2020 Hourly Concentration Readings of CO (in ppm) at Henry Pirker



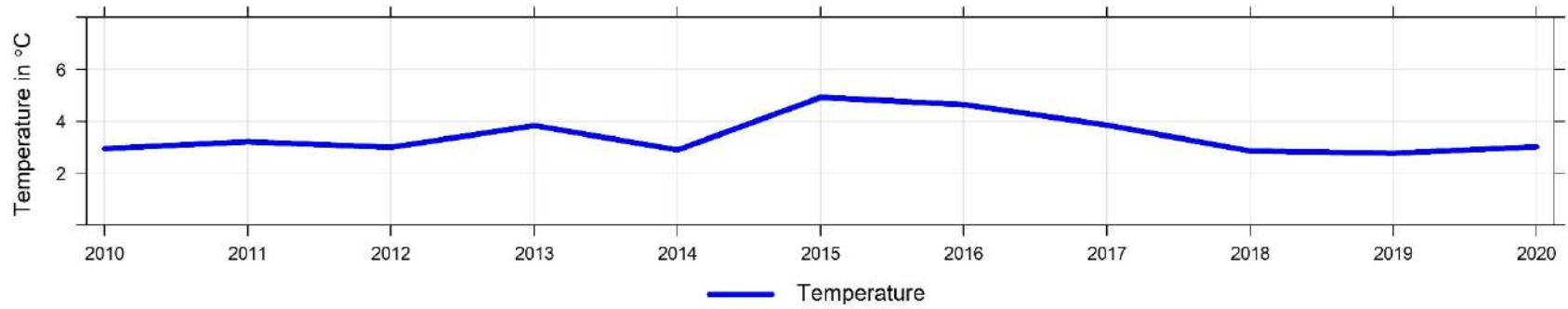
2010 to 2020 Annual Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Henry Pirker



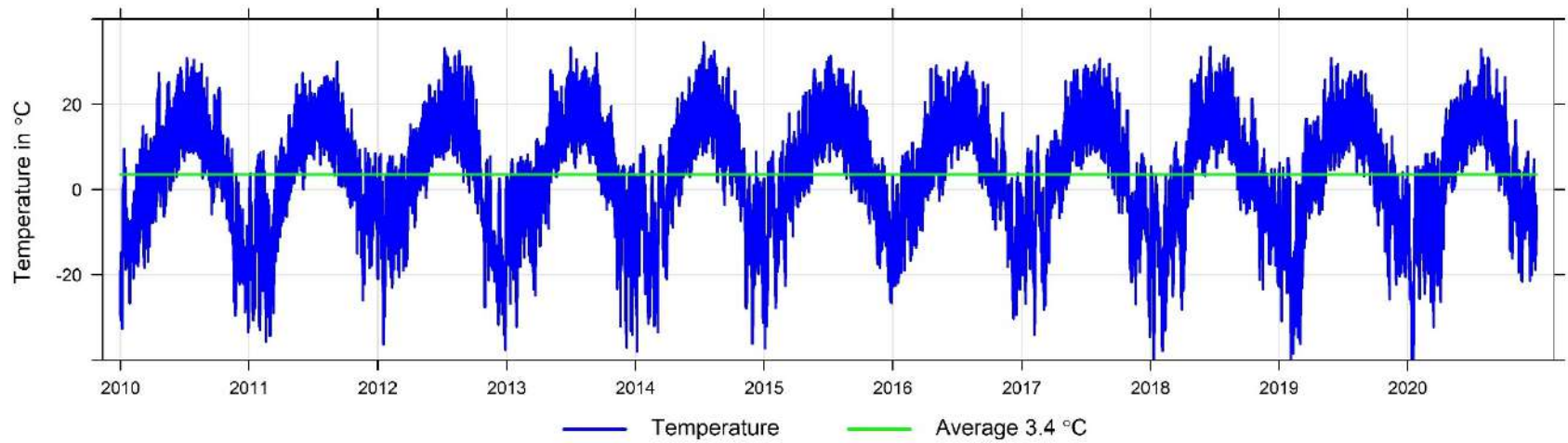
2010 to 2020 Hourly Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Henry Pirker



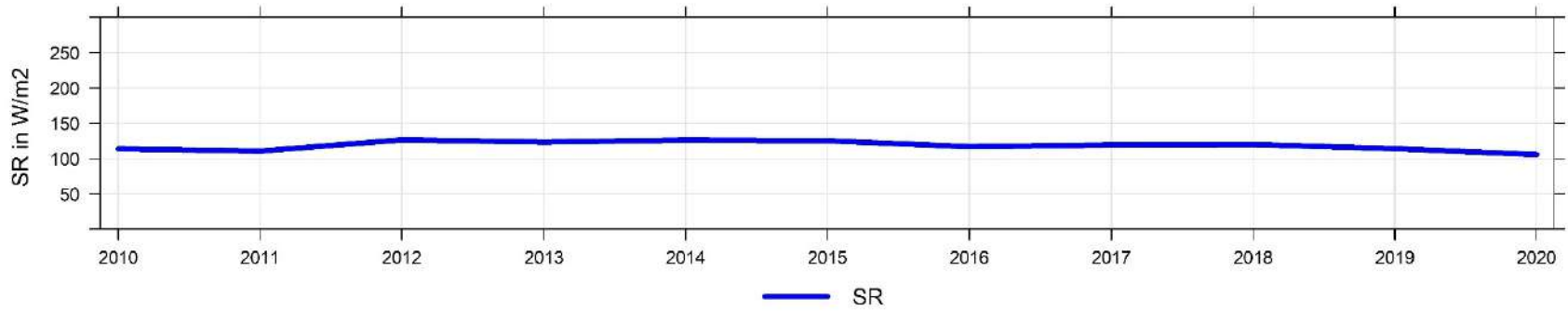
2010 to 2020 Annual Temperature Readings in °C at Henry Pirker



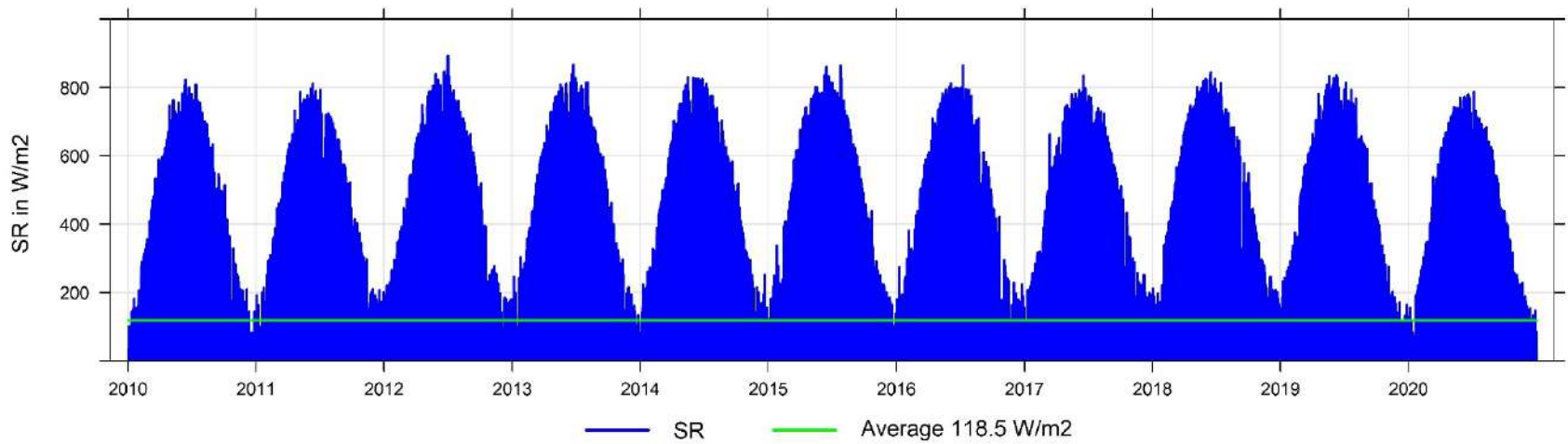
2010 to 2020 Hourly Temperature Readings (in °C) at Henry Pirker



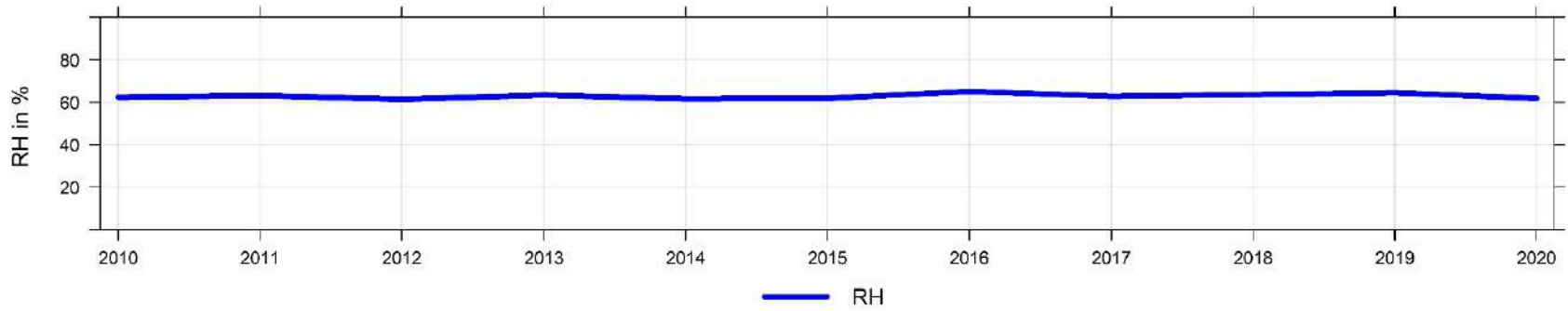
2010 to 2020 Annual Readings of Solar Radiation (in W/m<sup>2</sup>) at Henry Pirker



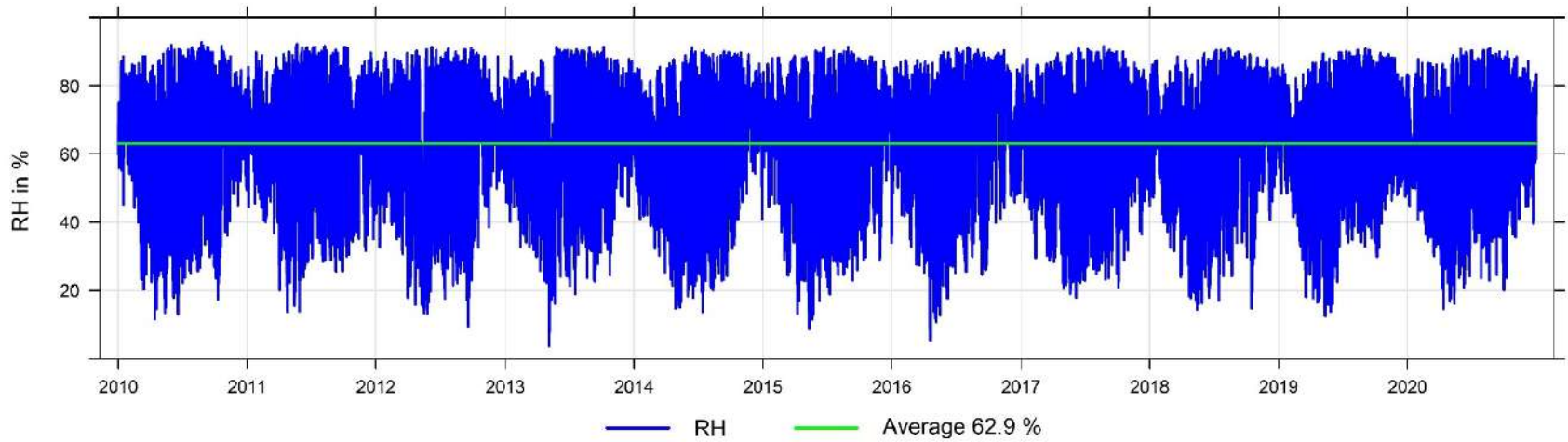
2010 to 2020 Hourly Readings of Solar Radiation (in W/m<sup>2</sup>) at Henry Pirker



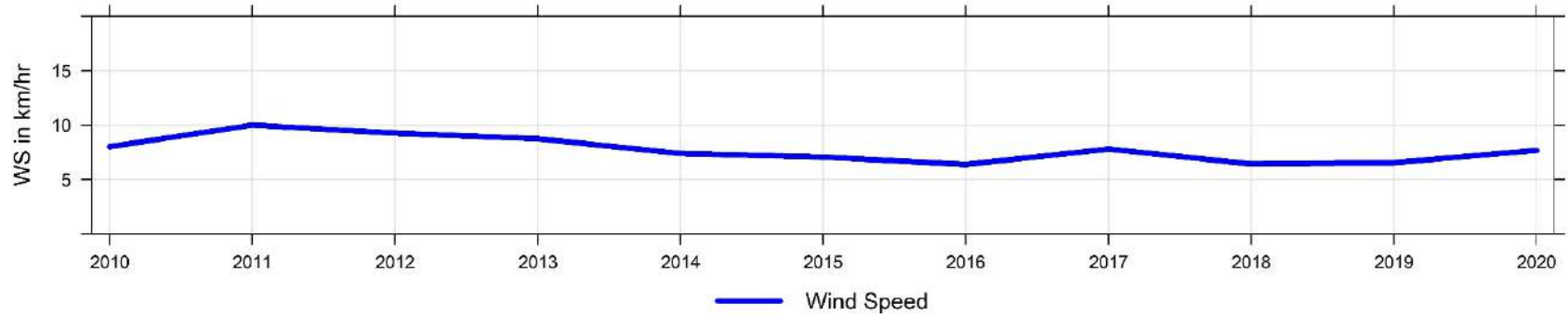
2010 to 2020 Annual Readings of Relative Humidity (in %) at Henry Pirker



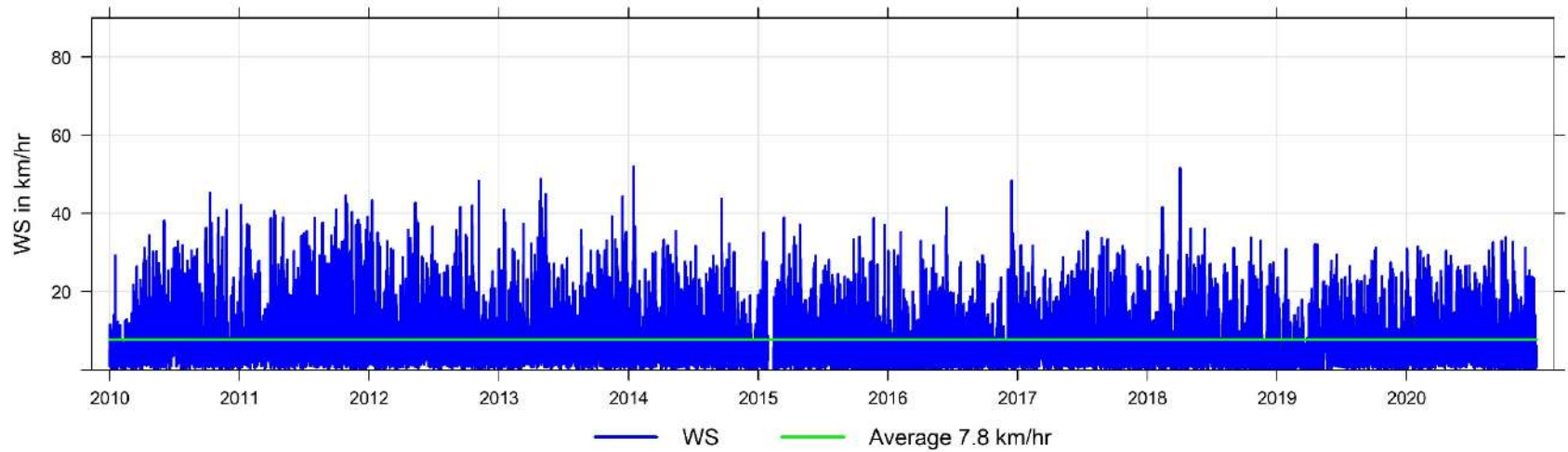
2010 to 2020 Hourly Readings of Relative Humidity (in %) at Henry Pirker



2010 to 2020 Annual Readings of Wind Speed (in km/hr) at Henry Pirker

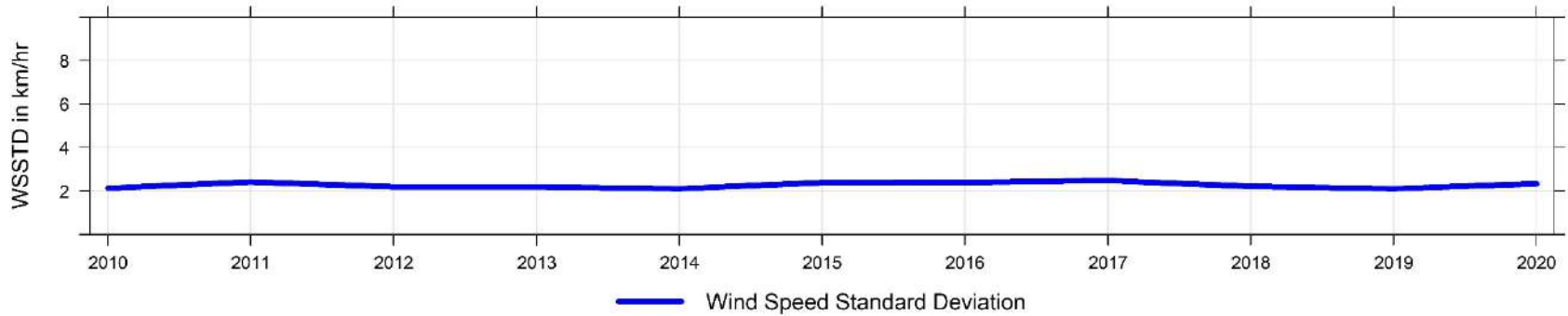


2010 to 2020 Hourly Readings of Wind Speed (in km/hr) at Henry Pirker

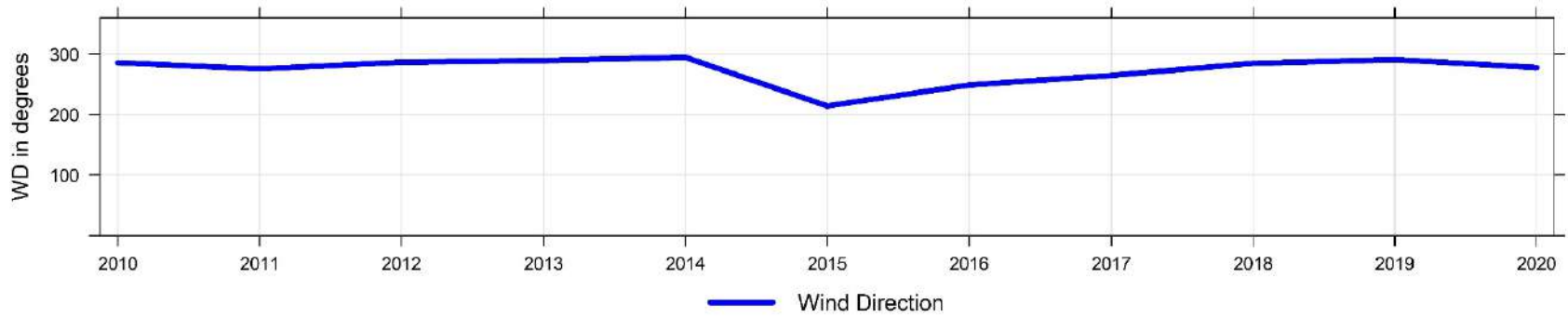




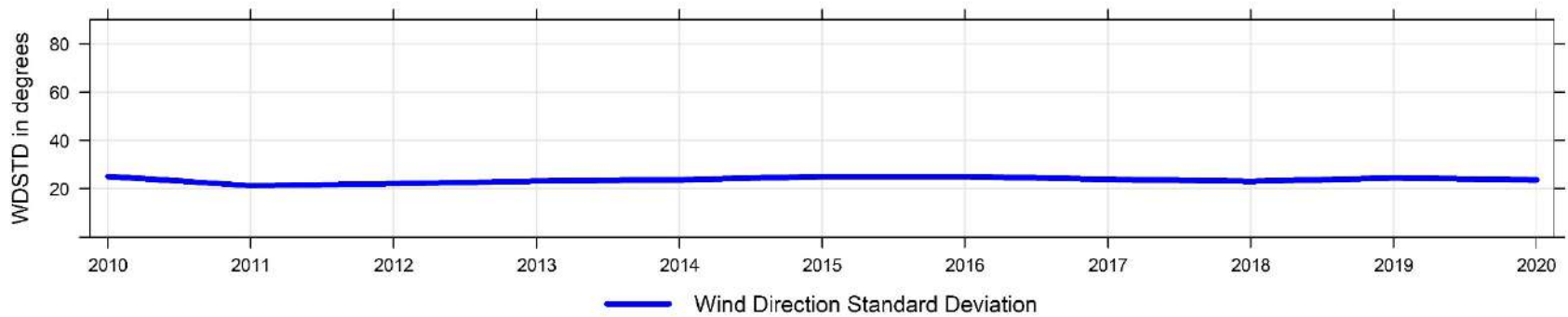
2010 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Henry Pirker

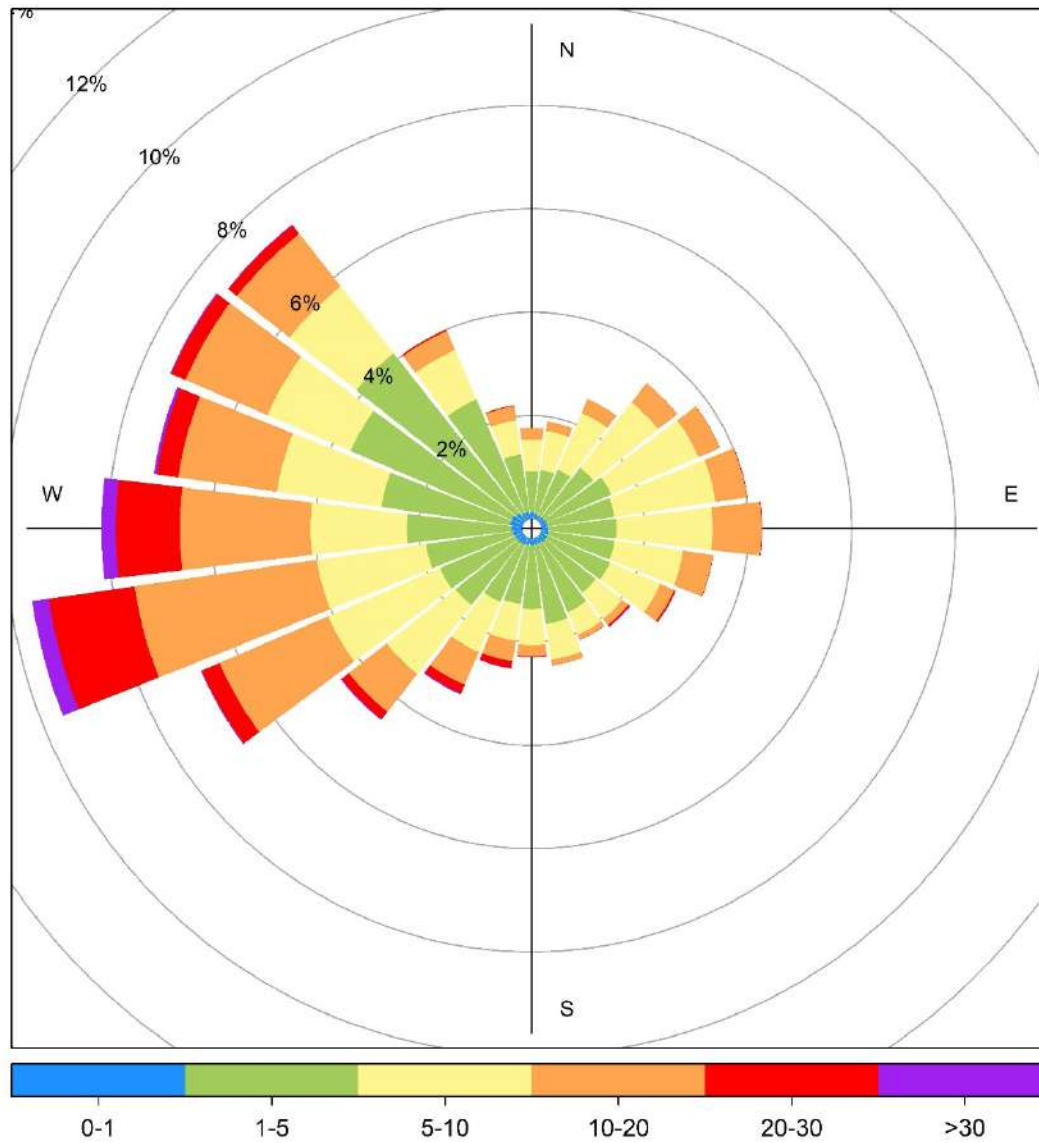


2010 to 2020 Annual Readings of Wind Direction (in degrees) at Henry Pirker



2010 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Henry Pirker





Henry Pirker 2010 to 2020 Wind Rose, wind speed in km/hr

## 7 Smoky Heights Key Parameters - Continuous Monitoring Data - 2020 Summary

### Smoky Heights Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.4	6.2	Jan 25	28.5	Jan 27 15:00	99.8%	0	0	0	0
Total Reduced Sulphur TRS measured in ppb	0.2	0.8	Aug 05	2.1	Jul 09 06:00	98.5%	0	0	-	-
Particulate Matter PM <sub>2.5</sub> measured in µg/m <sup>3</sup>	4.1	26.8	Sep 19	142.5	May 14 22:00	99.4%	2	0	-	-

## 7.1 Sulphur Dioxide (SO<sub>2</sub>) - Smoky Heights 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Smoky Heights

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	708	73.7%	21.3%	3.5%	1.4%	0.0%	0.0%	1.1	6.2	Jan 25	28.5	Jan 27 15:00	100.0%	0	0	0
February 2020	663	79.8%	18.9%	1.4%	0.0%	0.0%	0.0%	0.7	2.7	Feb 19	7.3	Feb 18 18:00	100.0%	0	0	0
March 2020	707	86.1%	12.2%	1.3%	0.4%	0.0%	0.0%	0.6	4.7	Mar 15	24.6	Mar 15 11:00	100.0%	0	0	0
April 2020	680	89.1%	10.7%	0.1%	0.0%	0.0%	0.0%	0.4	0.8	Apr 03	5.2	Apr 18 19:00	99.0%	0	0	0
May 2020	705	98.9%	1.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	May 23	2.5	May 23 07:00	99.3%	0	0	0
June 2020	687	96.8%	3.1%	0.1%	0.0%	0.0%	0.0%	0.2	0.9	Jun 21	9.8	Jun 21 05:00	100.0%	0	0	0
July 2020	710	91.1%	8.6%	0.3%	0.0%	0.0%	0.0%	0.5	1.5	Jul 04	9.2	Jul 04 04:00	100.0%	0	0	0
August 2020	710	93.0%	7.0%	0.0%	0.0%	0.0%	0.0%	0.3	0.9	Aug 07	3.8	Aug 07 01:00	100.0%	0	0	0
September 2020	684	91.2%	8.3%	0.1%	0.3%	0.0%	0.0%	0.4	2.2	Sep 28	16.6	Sep 28 19:00	100.0%	0	0	0
October 2020	704	96.3%	3.4%	0.3%	0.0%	0.0%	0.0%	0.3	0.6	Oct 25	8.1	Oct 30 23:00	99.5%	0	0	0
November 2020	685	96.5%	3.4%	0.1%	0.0%	0.0%	0.0%	0.2	0.6	Nov 07	5.9	Nov 07 07:00	100.0%	0	0	0
December 2020	709	92.0%	7.6%	0.3%	0.1%	0.0%	0.0%	0.4	1.6	Dec 11	13.9	Dec 11 22:00	100.0%	0	0	0
<b>Annual</b>	<b>8352</b>	<b>90.4%</b>	<b>8.8%</b>	<b>0.6%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.4</b>	<b>6.2</b>	<b>Jan 25</b>	<b>28.5</b>	<b>Jan 27 15:00</b>	<b>99.8%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

## 7.2 Total Reduced Sulphur (TRS) - Smoky Heights 2020 Summary and Frequency Distribution

Total Reduced Sulphur (TRS) Frequency Distribution at Smoky Heights

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 1 (ppb)	1 to 2.5 (ppb)	2.5 to 5 (ppb)	5 to 7.5 (ppb)	7.5 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	708	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.2	0.5	Jan 28	1.4	Jan 27 11:00	100.0%
February 2020	661	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Feb 07	1.1	Feb 07 09:00	100.0%
March 2020	706	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Mar 16	0.5	Mar 16 13:00	100.0%
April 2020	678	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Apr 03	1.6	Apr 03 07:00	99.0%
May 2020	679	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	May 14	1.3	May 24 04:00	97.2%
June 2020	685	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Jun 22	1.1	Jun 04 05:00	100.0%
July 2020	688	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.3	0.6	Jul 29	2.1	Jul 09 06:00	97.2%
August 2020	630	98.9%	1.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.8	Aug 05	1.4	Aug 05 09:00	89.1%
September 2020	685	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Sep 19	0.8	Sep 28 20:00	100.0%
October 2020	705	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Oct 08	1.1	Oct 08 19:00	99.5%
November 2020	685	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Nov 21	0.7	Nov 12 04:00	100.0%
December 2020	709	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Dec 03	1.1	Dec 31 01:00	100.0%
<b>Annual</b>	<b>8219</b>	<b>99.7%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2</b>	<b>0.8</b>	<b>Aug 05</b>	<b>2.1</b>	<b>Jul 09 06:00</b>	<b>98.5%</b>

AAAQO Objectives: none

### 7.3 Particulate Matter (PM<sub>2.5</sub>) - Smoky Heights 2020 Summary and Frequency Distribution

Particulate Matter (PM<sub>2.5</sub>) Frequency Distribution at Smoky Heights

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (µg/m <sup>3</sup> )	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 2 (µg/m <sup>3</sup> )	2 to 4 (µg/m <sup>3</sup> )	4 to 10 (µg/m <sup>3</sup> )	10 to 20 (µg/m <sup>3</sup> )	20 to 29 (µg/m <sup>3</sup> )	> 29 (µg/m <sup>3</sup> )		24-hr (µg/m <sup>3</sup> )	Date	1-hr (µg/m <sup>3</sup> )	Date		24-hr 29 µg/m <sup>3</sup>	1-hr 80 µg/m <sup>3</sup>
January 2020	702	34.6%	20.1%	24.8%	18.2%	1.3%	1.0%	5.5	14.2	Jan 27	50.8	Jan 26 19:00	94.6%	0	0
February 2020	695	57.1%	21.2%	18.1%	3.2%	0.1%	0.3%	2.8	9.0	Feb 02	127.1	Feb 02 19:00	100.0%	0	1
March 2020	741	50.9%	27.9%	17.1%	3.9%	0.1%	0.0%	2.8	12.0	Mar 20	27.0	Mar 20 23:00	100.0%	0	0
April 2020	711	55.1%	29.7%	12.4%	2.8%	0.0%	0.0%	2.5	8.2	Apr 05	19.5	Apr 24 18:00	99.0%	0	0
May 2020	736	40.4%	29.3%	24.7%	4.2%	0.8%	0.5%	3.8	11.0	May 14	142.5	May 14 22:00	99.3%	0	1
June 2020	718	41.6%	29.7%	24.4%	4.0%	0.3%	0.0%	3.4	7.3	Jun 20	28.7	Jun 20 05:00	100.0%	0	0
July 2020	742	29.6%	34.8%	33.8%	1.6%	0.1%	0.0%	3.5	7.2	Jul 14	21.1	Jul 14 15:00	100.0%	0	0
August 2020	741	20.0%	36.7%	35.4%	7.4%	0.4%	0.1%	4.8	13.1	Aug 01	29.2	Aug 02 22:00	100.0%	0	0
September 2020	717	34.0%	31.5%	22.2%	8.9%	1.4%	2.0%	4.9	26.8	Sep 19	44.9	Sep 19 13:00	100.0%	0	0
October 2020	737	41.7%	26.6%	25.2%	4.7%	1.4%	0.4%	3.8	12.3	Oct 03	46.2	Oct 03 20:00	99.5%	0	0
November 2020	715	38.2%	14.1%	20.7%	18.2%	5.5%	3.4%	7.2	23.8	Nov 20	58.1	Nov 03 19:00	99.9%	0	0
December 2020	741	49.7%	16.5%	20.8%	10.5%	2.0%	0.5%	4.2	20.6	Dec 03	34.3	Dec 03 13:00	100.0%	0	0
<b>Annual</b>	<b>8696</b>	<b>41.1%</b>	<b>26.5%</b>	<b>23.3%</b>	<b>7.3%</b>	<b>1.1%</b>	<b>0.7%</b>	<b>4.1</b>	<b>MAXIMUM VALUES</b>				<b>99.4%</b>	<b>0</b>	<b>2</b>

AAAQO Objectives: 24-Hr: 29 µg/m<sup>3</sup>, AAAQG Guideline: 1-Hr: 80 µg/m<sup>3</sup>

### 7.4 Temperature (ET) - Smoky Heights 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Smoky Heights

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-15.6	1.2	Jan 30	5.5	Jan 30 15:00	-34.9	Jan 15	-40.6	Jan 15 22:00	99.7%
February 2020	-6.3	4.3	Feb 27	8.3	Feb 21 15:00	-19.6	Feb 17	-25.7	Feb 03 06:00	100.0%
March 2020	-7.7	2.5	Mar 02	8.7	Mar 16 15:00	-22.9	Mar 14	-32.2	Mar 14 08:00	100.0%
April 2020	2.5	12.4	Apr 20	19.0	Apr 20 17:00	-16.1	Apr 02	-26.4	Apr 03 07:00	100.0%
May 2020	11.1	18.0	May 30	24.4	May 30 17:00	4.1	May 14	-0.5	May 06 06:00	100.0%
June 2020	15.3	21.2	Jun 19	27.9	Jun 19 17:00	10.6	Jun 07	4.1	Jun 04 05:00	99.9%
July 2020	17.4	23.4	Jul 27	33.0	Jul 27 15:00	12.7	Jul 03	9.1	Jul 09 05:00	99.9%
August 2020	16.1	23.2	Aug 02	31.0	Aug 16 16:00	10.9	Aug 12	4.6	Aug 12 06:00	100.0%
September 2020	12.1	19.2	Sep 10	28.1	Sep 10 15:00	5.8	Sep 14	-1.3	Sep 30 06:00	100.0%
October 2020	2.0	15.8	Oct 04	26.4	Oct 03 16:00	-9.6	Oct 24	-16.1	Oct 24 08:00	100.0%
November 2020	-4.8	9.0	Nov 01	16.3	Nov 02 16:00	-17.8	Nov 19	-21.6	Nov 19 00:00	100.0%
December 2020	-6.2	5.8	Dec 07	8.9	Dec 07 13:00	-19.4	Dec 13	-21.4	Dec 13 08:00	100.0%
	<b>AVERAGE 3.0</b>	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				<b>100.0%</b>
		<b>23.4</b>	<b>Jul 27</b>	<b>33.0</b>	<b>Jul 27 15:00</b>	<b>-34.9</b>	<b>Jan 15</b>	<b>-40.6</b>	<b>Jan 15 22:00</b>	

## 7.5 Wind Speed & Wind Direction (WS & WD) - Smoky Heights 2020 Summary and Frequency Distribution

### Wind Speed Frequency Distribution of 1-hr Averages - Smoky Heights

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	24-hr (km/hr)	MAXIMUM VALUES			Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)			Date	1-hr (km/hr)	Date	
January 2020	744	8.1%	15.6%	48.8%	20.4%	2.3%	4.8%	10.8	29.7	Jan 02	53.0	Jan 02 09:00	100.0%
February 2020	696	5.7%	9.8%	30.7%	39.7%	6.9%	7.2%	14.5	27.3	Feb 01	47.1	Feb 01 17:00	100.0%
March 2020	744	4.2%	11.8%	34.9%	36.7%	6.5%	5.9%	13.6	28.8	Mar 02	59.2	Mar 01 22:00	100.0%
April 2020	713	4.9%	9.1%	34.8%	37.2%	8.6%	5.5%	14.3	24.5	Apr 21	43.9	Apr 23 08:00	99.0%
May 2020	739	5.7%	13.9%	40.2%	32.2%	3.7%	4.3%	12.1	24.8	May 25	46.9	May 03 15:00	99.3%
June 2020	720	4.9%	15.6%	33.6%	33.2%	8.3%	4.4%	13.1	23.1	Jun 14	42.8	Jun 15 12:00	100.0%
July 2020	744	5.0%	14.1%	38.2%	35.2%	4.8%	2.7%	12.3	22.2	Jul 13	35.9	Jul 12 10:00	100.0%
August 2020	732	3.8%	14.1%	30.3%	34.0%	8.7%	9.0%	14.6	26.0	Aug 07	40.4	Aug 22 16:00	98.4%
September 2020	712	7.0%	17.0%	36.9%	31.0%	3.5%	4.5%	11.9	26.7	Sep 28	46.4	Sep 24 15:00	98.9%
October 2020	740	5.5%	21.8%	36.2%	29.6%	4.1%	2.8%	11.4	24.2	Oct 26	62.5	Oct 26 21:00	99.5%
November 2020	720	7.2%	17.9%	43.3%	25.7%	4.2%	1.7%	10.7	21.1	Nov 01	45.7	Nov 30 15:00	100.0%
December 2020	744	5.1%	15.2%	41.5%	30.8%	3.6%	3.8%	11.9	23.3	Dec 01	47.8	Dec 24 13:00	100.0%
<b>Annual</b>	<b>8748</b>	<b>5.6%</b>	<b>14.7%</b>	<b>37.5%</b>	<b>32.1%</b>	<b>5.4%</b>	<b>4.7%</b>	<b>12.6</b>	<b>29.7</b>	<b>MAXIMUM VALUES</b>			<b>99.6%</b>

### Wind Speed and Wind Direction Frequency Distribution at Smoky Heights

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	627	0.4%	1.5%	3.6%	1.7%	0.1%	0.0%	7.2%
NNE	880	0.4%	1.7%	5.0%	2.7%	0.1%	0.1%	10.1%
NE	272	0.3%	0.7%	1.5%	0.6%	0.0%	0.0%	3.1%
ENE	128	0.2%	0.3%	0.6%	0.3%	0.0%	0.0%	1.5%
E	112	0.2%	0.3%	0.3%	0.4%	0.0%	0.0%	1.3%
ESE	114	0.2%	0.4%	0.4%	0.3%	0.0%	0.0%	1.3%
SE	125	0.2%	0.3%	0.6%	0.2%	0.0%	0.0%	1.4%
SSE	153	0.2%	0.5%	0.8%	0.1%	0.0%	0.0%	1.7%
S	287	0.3%	0.8%	1.7%	0.5%	0.0%	0.0%	3.3%
SSW	566	0.4%	1.3%	3.4%	1.2%	0.1%	0.0%	6.5%
SW	1070	0.4%	1.7%	4.9%	4.1%	0.7%	0.4%	12.2%
WSW	2314	0.5%	1.6%	6.5%	11.2%	3.3%	3.4%	26.5%
W	938	0.5%	1.3%	3.3%	4.1%	0.8%	0.7%	10.7%
WNW	419	0.5%	0.8%	1.3%	1.8%	0.3%	0.1%	4.8%
NW	320	0.4%	0.5%	1.3%	1.4%	0.1%	0.0%	3.7%
NNW	423	0.4%	0.8%	2.1%	1.5%	0.0%	0.0%	4.8%
<b>Total</b>	<b>8,748</b>	<b>5.6%</b>	<b>14.7%</b>	<b>37.5%</b>	<b>32.1%</b>	<b>5.4%</b>	<b>4.7%</b>	<b>100.0%</b>

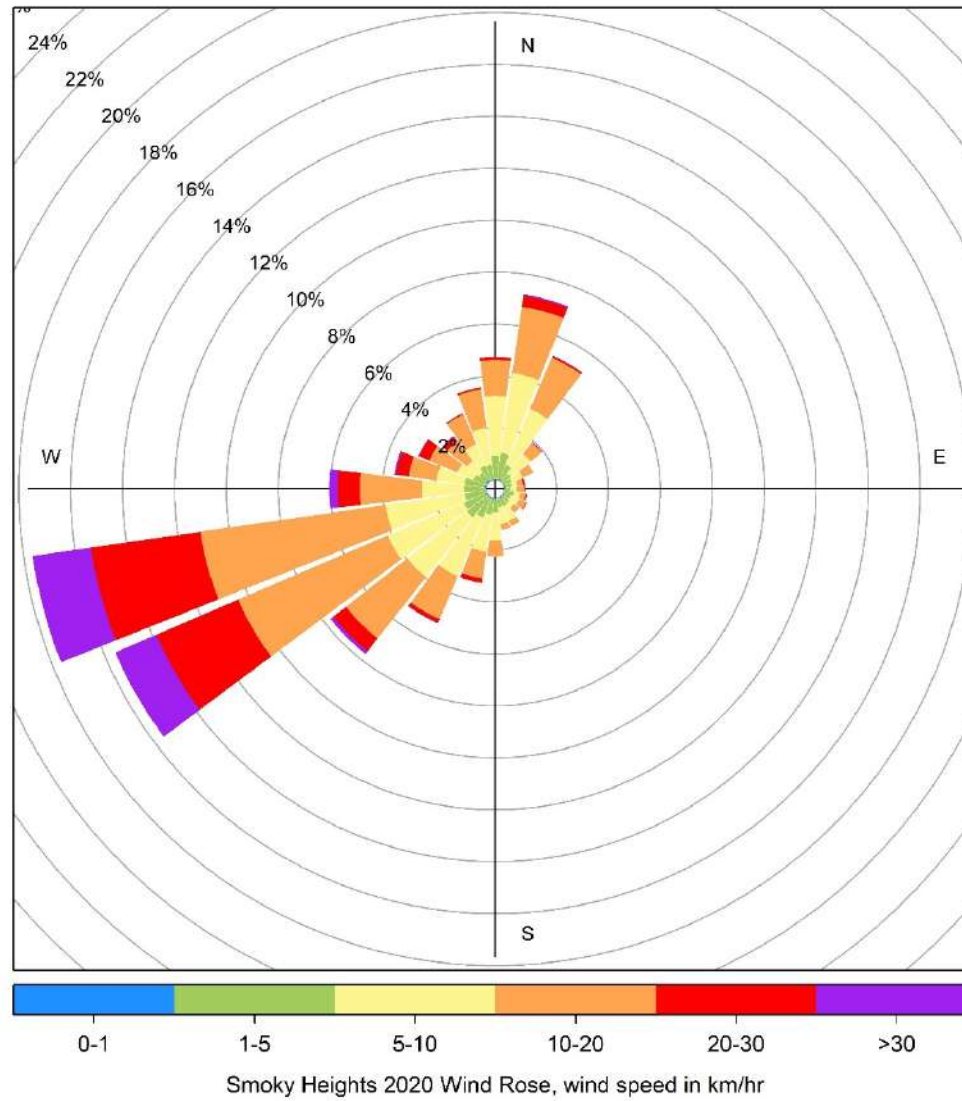
### Wind Speed Standard Deviation (WSSTD) at Smoky Heights

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	2.5	4.8	Jan 13	44.1	Jan 17 23:00	1.5	Jan 09	0.4	Jan 15 03:00	100.0%
February 2020	2.3	3.8	Feb 01	11.3	Feb 21 07:00	1.3	Feb 24	0.5	Feb 24 10:00	100.0%
March 2020	2.3	3.6	Mar 01	9.1	Mar 21 04:00	1.4	Mar 18	0.6	Mar 20 17:00	100.0%
April 2020	2.4	3.5	Apr 26	15.1	Apr 25 22:00	1.1	Apr 04	0.4	Apr 04 04:00	99.0%
May 2020	3.0	4.8	May 26	18.8	May 05 16:00	1.8	May 18	0.3	May 13 04:00	99.3%
June 2020	2.9	4.3	Jun 14	11.2	Jun 03 17:00	1.8	Jun 18	0.4	Jun 01 00:00	100.0%
July 2020	2.6	3.8	Jul 13	10.7	Jul 13 19:00	1.8	Jul 27	0.5	Jul 22 21:00	100.0%
August 2020	2.9	4.6	Aug 08	17.3	Aug 18 17:00	1.3	Aug 15	0.5	Aug 23 21:00	98.4%
September 2020	2.5	4.4	Sep 01	10.6	Sep 04 15:00	1.3	Sep 18	0.4	Sep 18 20:00	98.9%
October 2020	2.3	3.8	Oct 05	12.2	Oct 26 20:00	1.2	Oct 23	0.4	Oct 03 01:00	99.5%
November 2020	2.2	3.3	Nov 05	11.0	Nov 05 05:00	1.3	Nov 11	0.6	Nov 19 23:00	100.0%
December 2020	2.2	3.6	Dec 24	12.2	Dec 24 12:00	1.5	Dec 29	0.4	Dec 10 17:00	100.0%
	<b>AVERAGE</b> 2.5	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
		4.8	Jan 13	44.1	Jan 17 23:00	1.1	Apr 04	0.3	May 13 04:00	99.6%

### Wind Direction Standard Deviation (WDSTD) at Smoky Heights

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	17.3	36.4	Jan 15	96.4	Jan 04 23:00	5.4	Jan 02	2.1	Jan 31 10:00	100.0%
February 2020	12.3	28.9	Feb 24	86.1	Feb 08 03:00	4.5	Feb 06	1.5	Feb 10 10:00	100.0%
March 2020	13.4	27.0	Mar 14	93.1	Mar 14 03:00	5.5	Mar 30	1.7	Mar 03 09:00	100.0%
April 2020	13.3	33.3	Apr 03	93.6	Apr 03 11:00	4.2	Apr 22	1.6	Apr 07 05:00	99.0%
May 2020	20.0	45.3	May 20	98.5	May 16 01:00	7.2	May 25	2.3	May 12 21:00	99.3%
June 2020	18.3	34.8	Jun 30	94.1	Jun 04 12:00	8.3	Jun 01	1.9	Jun 10 04:00	100.0%
July 2020	17.1	47.5	Jul 08	87.4	Jul 08 11:00	7.0	Jul 25	2.1	Jul 26 04:00	100.0%
August 2020	16.1	35.4	Aug 02	91.4	Aug 03 02:00	6.0	Aug 13	1.8	Aug 31 02:00	98.4%
September 2020	16.7	32.6	Sep 19	98.1	Sep 19 03:00	7.2	Sep 26	2.2	Sep 02 22:00	98.9%
October 2020	16.0	30.1	Oct 02	83.3	Oct 27 21:00	6.0	Oct 26	2.0	Oct 05 01:00	99.5%
November 2020	17.5	34.3	Nov 02	92.5	Nov 14 06:00	7.2	Nov 17	1.7	Nov 11 15:00	100.0%
December 2020	14.4	30.6	Dec 05	95.1	Dec 31 14:00	5.2	Dec 09	0.0	Jan 00 00:00	100.0%
	<b>AVERAGE</b> 16.0	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
		47.5	Jul 08	98.5	May 16 01:00	4.2	Apr 22	0.0	Jan 00 00:00	99.6%

## 7.6 Wind Rose - Smoky Heights 2020 Summary and Frequency Distribution

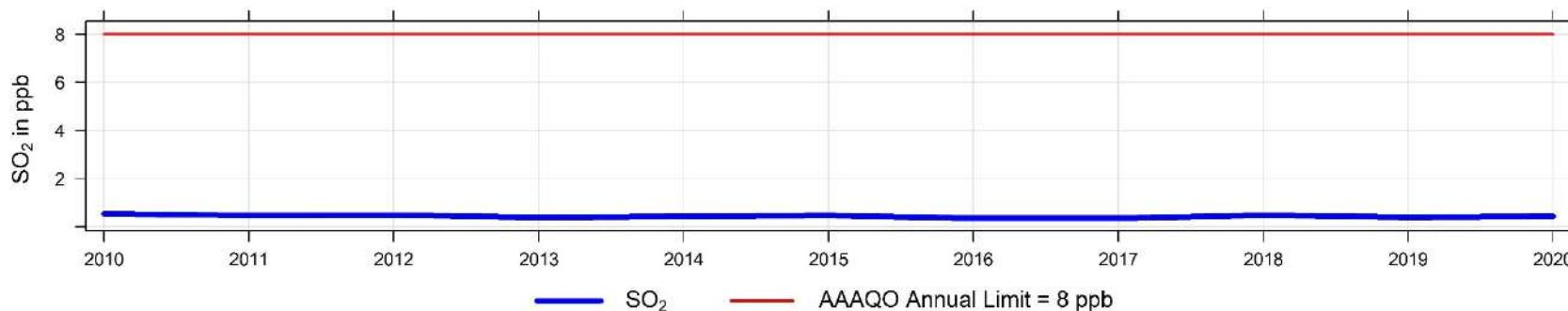




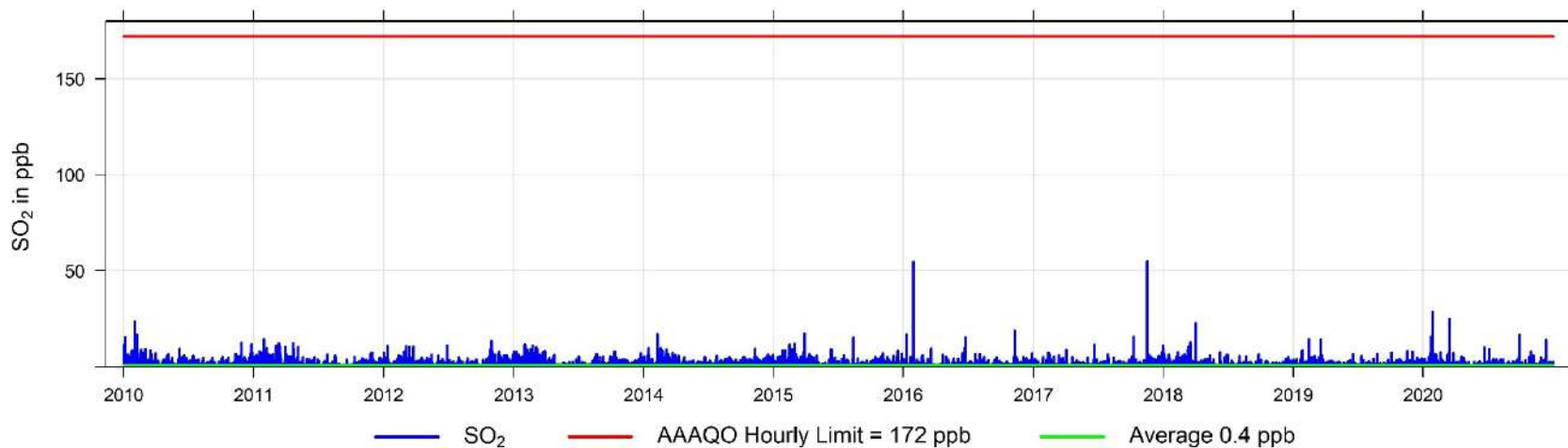
## 8 Smoky Heights Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Smoky Heights Station.

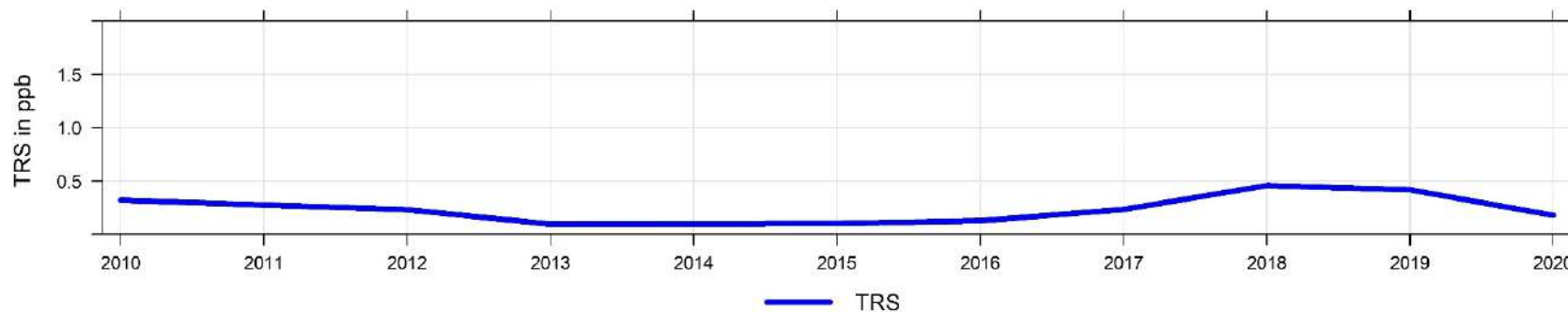
2010 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Smoky Heights



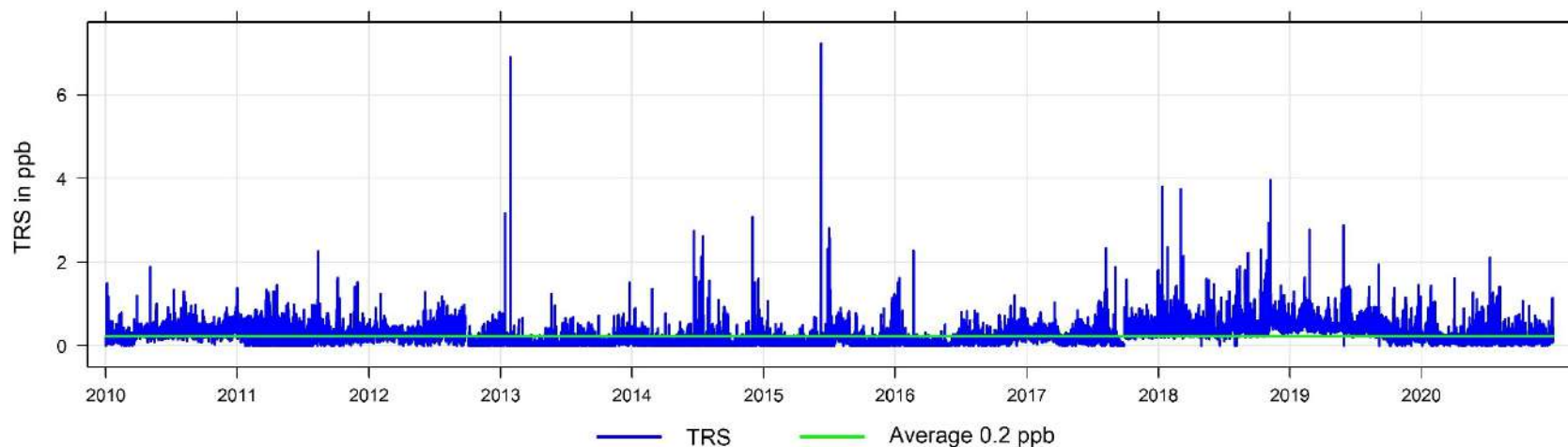
2010 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Smoky Heights



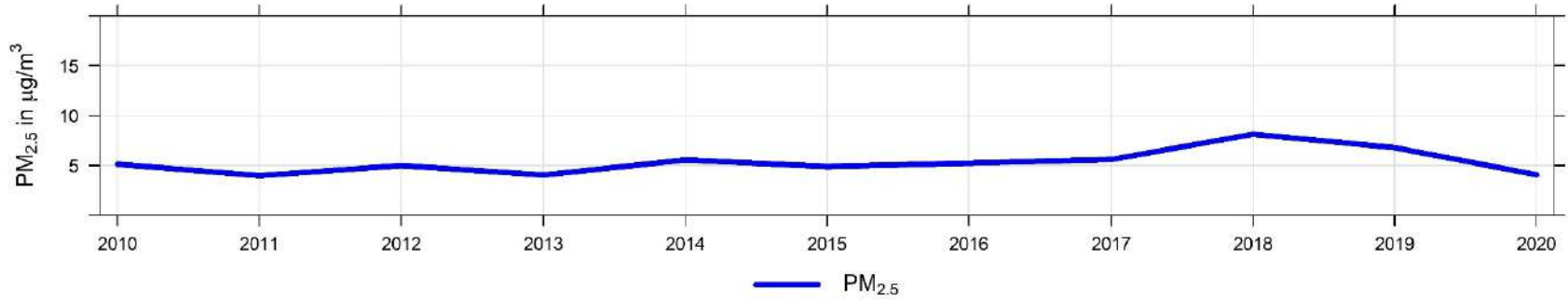
2010 to 2020 Annual Concentration Readings of TRS (in ppb) at Smoky Heights



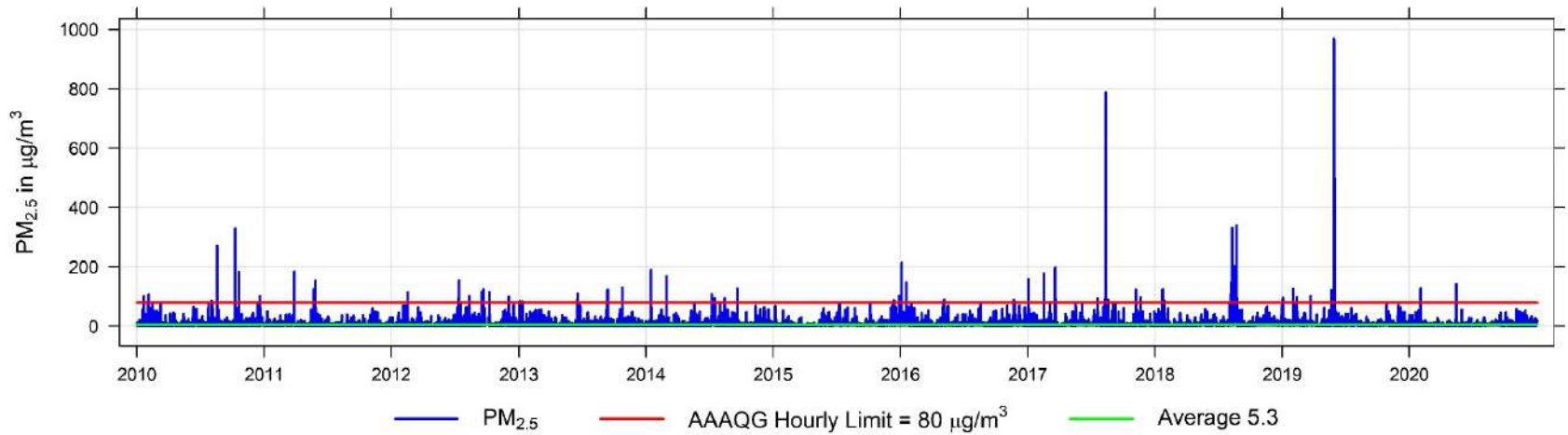
2010 to 2020 Hourly Concentration Readings of TRS (in ppb) at Smoky Heights



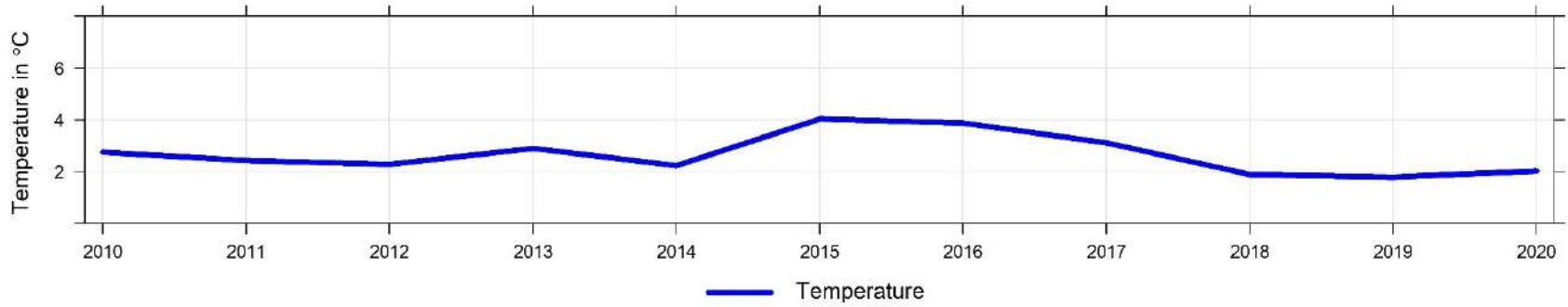
2010 to 2020 Annual Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Smoky Heights



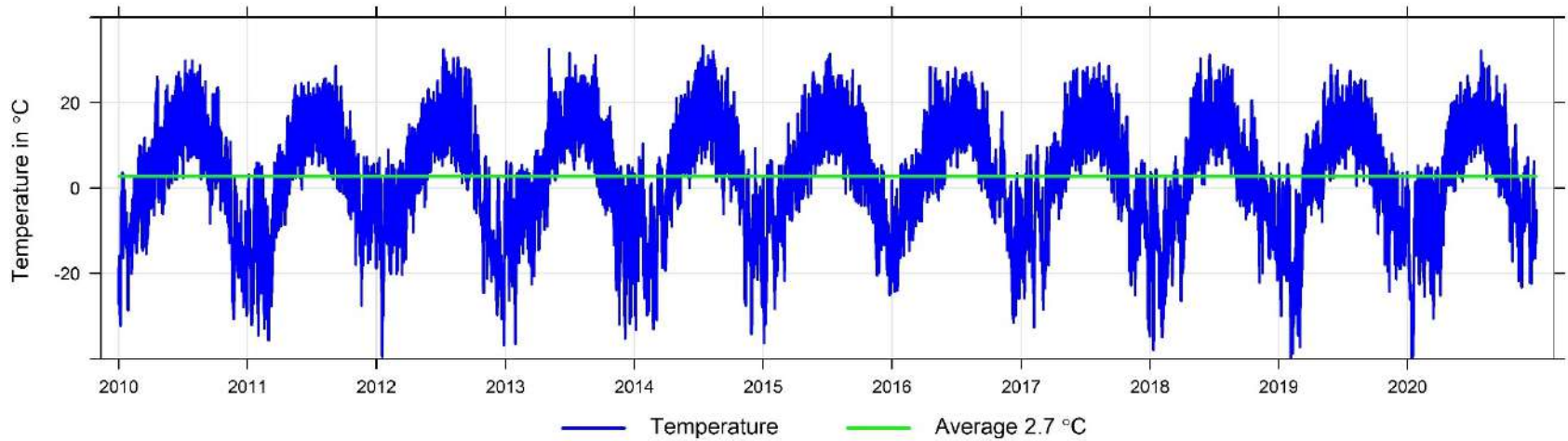
2010 to 2020 Hourly Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Smoky Heights



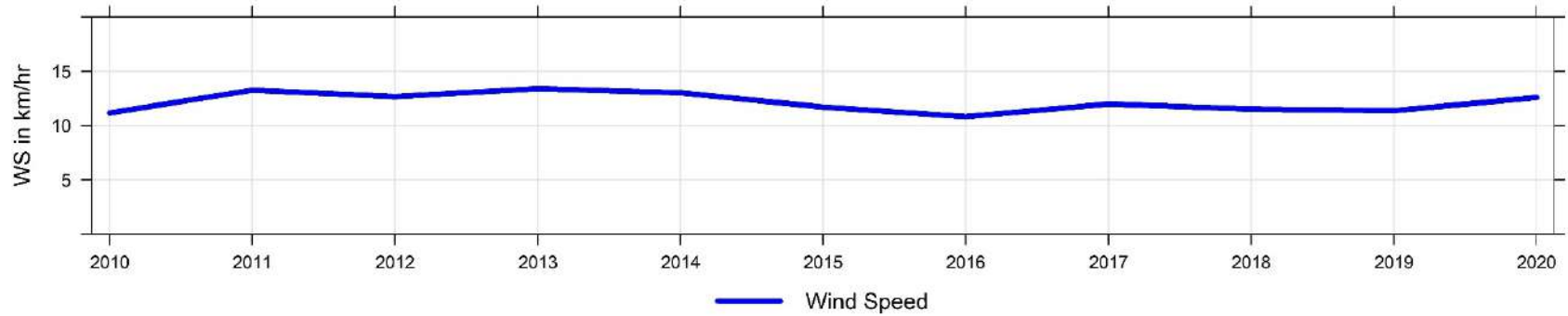
2010 to 2020 Annual Temperature Readings in °C at Smoky Heights



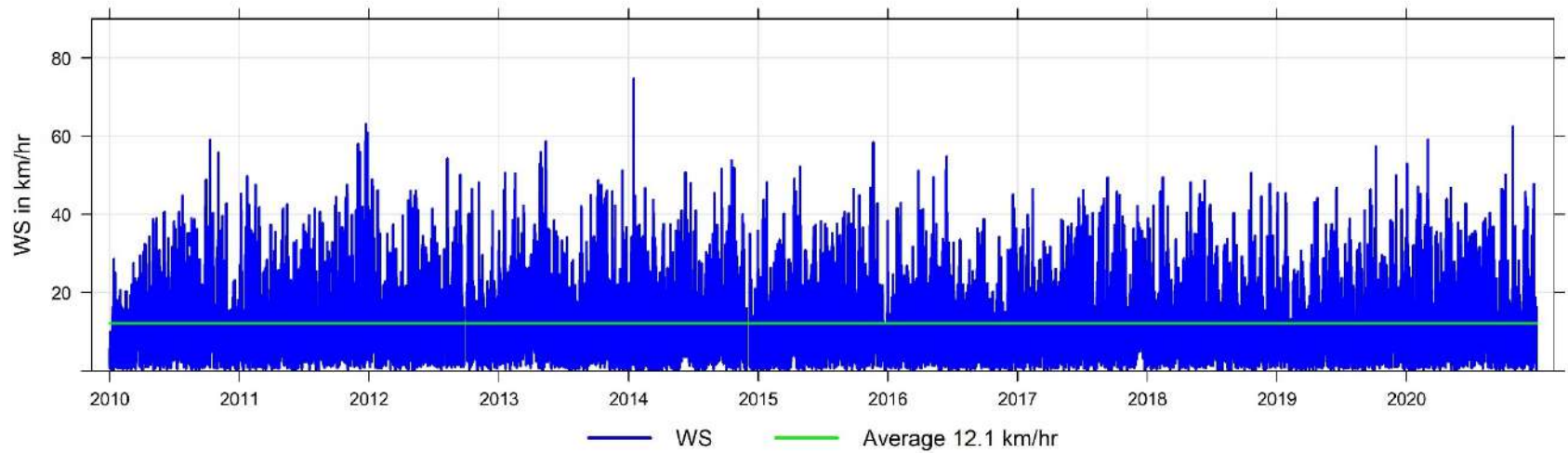
2010 to 2020 Hourly Temperature Readings (in °C) at Smoky Heights



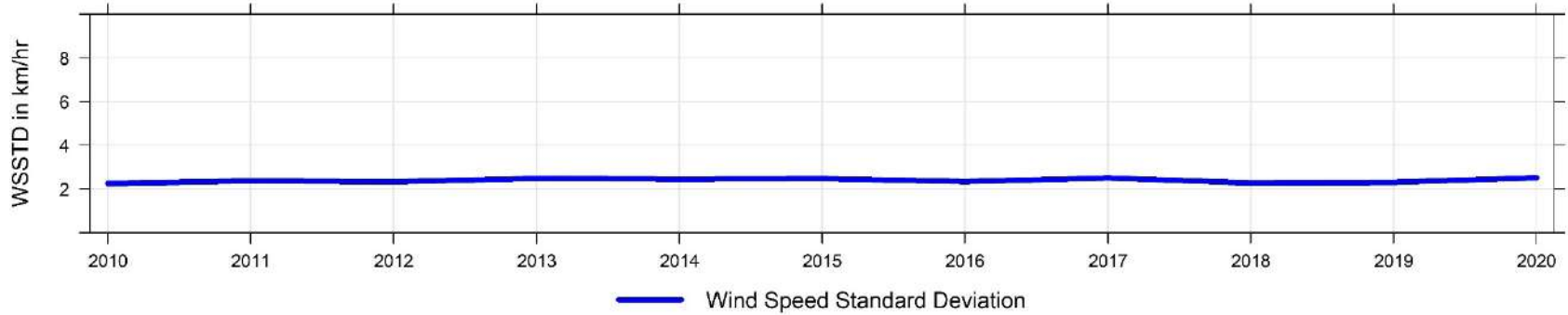
2010 to 2020 Annual Readings of Wind Speed (in km/hr) at Smoky Heights



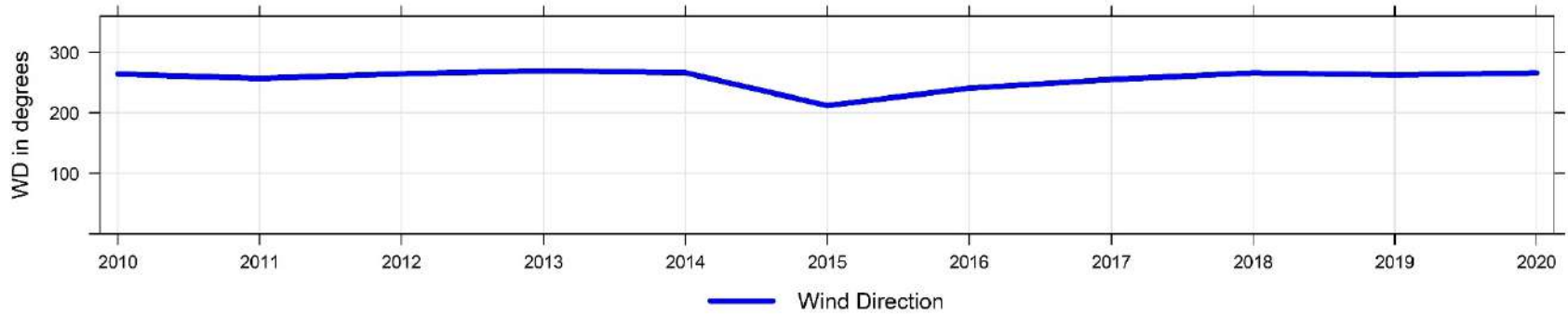
2010 to 2020 Hourly Readings of Wind Speed (in km/hr) at Smoky Heights



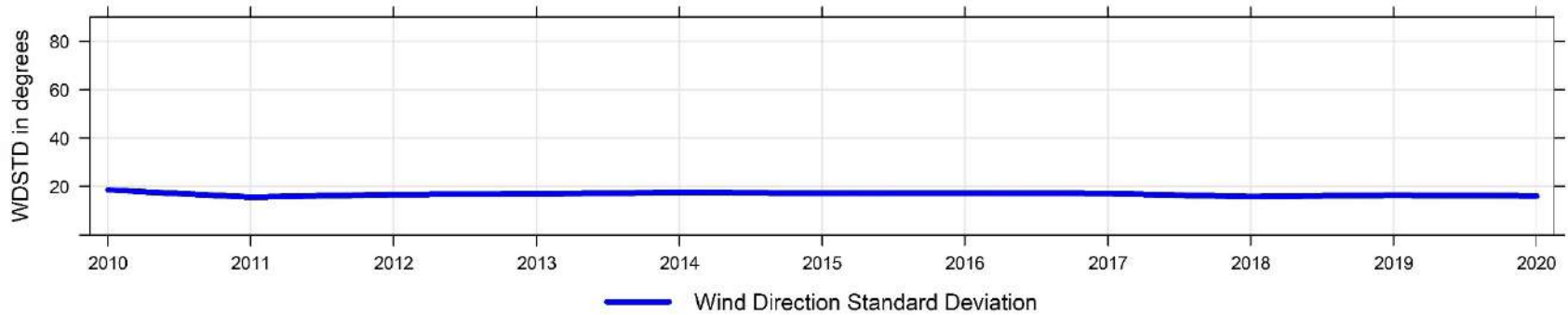
**2010 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Smoky Heights**

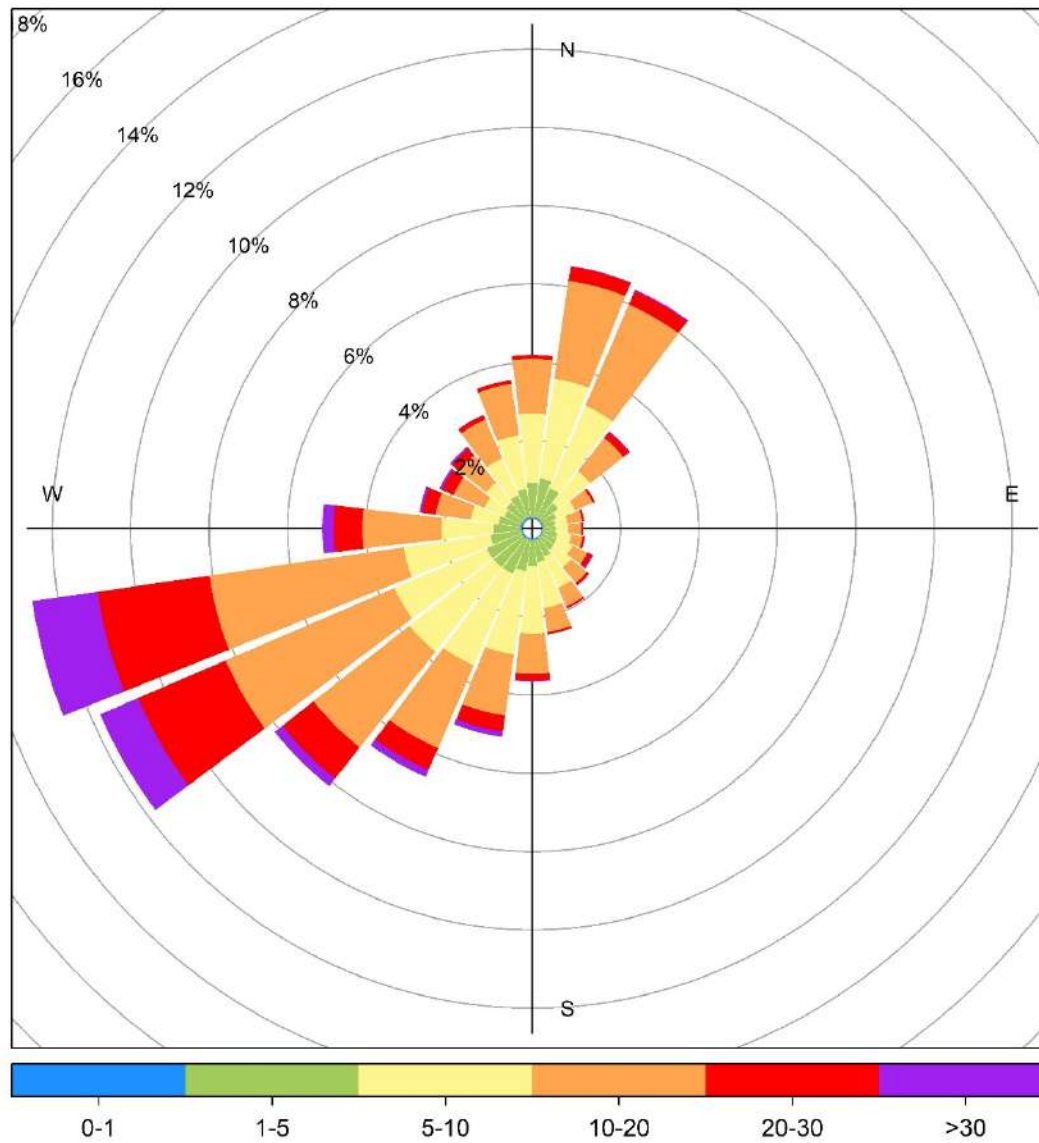


**2010 to 2020 Annual Readings of Wind Direction (in degrees) at Smoky Heights**



**2010 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Smoky Heights**





Smoky Heights 2010 to 2020 Wind Rose, wind speed in km/hr

## 9 Valleyview Key Parameters - Continuous Monitoring Data - 2020 Summary

### Valleyview Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.1	1.6	Jan 13	6.3	Jan 13 15:00	98.9%	0	0	0	0
Hydrogen Sulphide H <sub>2</sub> S measured in ppb	0.1	0.5	Mar 17	3.0	Jan 21 11:00	98.9%	0	0	-	-



## 9.1 Sulphur Dioxide (SO<sub>2</sub>) - Valleyview 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Valleyview

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	709	94.5%	5.1%	0.4%	0.0%	0.0%	0.0%	0.3	1.6	Jan 13	6.3	Jan 13 15:00	100.0%	0	0	0
February 2020	587	98.1%	1.9%	0.0%	0.0%	0.0%	0.0%	0.2	0.5	Feb 13	3.0	Feb 18 19:00	88.6%	0	0	0
March 2020	708	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.2	0.7	Mar 19	2.4	Mar 30 09:00	100.0%	0	0	0
April 2020	686	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Apr 05	1.3	Apr 09 04:00	100.0%	0	0	0
May 2020	709	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	May 30	2.6	May 02 18:00	100.0%	0	0	0
June 2020	685	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Jun 20	1.1	Jun 20 11:00	99.9%	0	0	0
July 2020	709	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Jul 08	1.4	Jul 15 09:00	100.0%	0	0	0
August 2020	709	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Aug 07	1.6	Aug 07 06:00	99.9%	0	0	0
September 2020	679	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Sep 17	0.9	Sep 17 23:00	98.9%	0	0	0
October 2020	710	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Oct 01	4.0	Oct 06 08:00	100.0%	0	0	0
November 2020	686	98.3%	1.7%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Nov 21	2.1	Nov 07 12:00	100.0%	0	0	0
December 2020	709	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Dec 27	1.2	Dec 27 14:00	100.0%	0	0	0
<b>Annual</b>	<b>8286</b>	<b>98.9%</b>	<b>1.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1</b>	<b>1.6</b>	<b>Jan 13</b>	<b>6.3</b>	<b>Jan 13 15:00</b>	<b>98.9%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

## 9.2 Hydrogen Sulphide (H<sub>2</sub>S) - Valleyview 2020 Summary and Frequency Distribution

Hydrogen Sulphide (H<sub>2</sub>S) Frequency Distribution at Valleyview

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 1 (ppb)	1 to 3 (ppb)	3 to 5 (ppb)	5 to 8 (ppb)	8 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		24-hr 3ppb	1-hr 10ppb
January 2020	709	98.4%	1.4%	0.1%	0.0%	0.0%	0.0%	0.2	0.4	Jan 15	3.0	Jan 21 11:00	99.9%	0	0
February 2020	588	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Feb 29	0.9	Feb 08 01:00	88.6%	0	0
March 2020	708	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.3	0.5	Mar 17	1.3	Mar 17 00:00	100.0%	0	0
April 2020	687	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Apr 18	1.7	Apr 18 23:00	100.0%	0	0
May 2020	709	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	May 17	0.8	May 28 04:00	100.0%	0	0
June 2020	686	99.1%	0.9%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Jun 20	2.0	Jun 18 02:00	99.9%	0	0
July 2020	709	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Jul 31	1.8	Jul 11 02:00	100.0%	0	0
August 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Aug 17	0.9	Aug 16 00:00	99.9%	0	0
September 2020	678	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Sep 13	1.1	Sep 15 12:00	98.9%	0	0
October 2020	709	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Oct 02	0.5	Oct 02 23:00	100.0%	0	0
November 2020	687	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Nov 15	0.6	Nov 13 20:00	100.0%	0	0
December 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Dec 25	0.7	Dec 25 11:00	100.0%	0	0
<b>Annual</b>	<b>8286</b>	<b>99.7%</b>	<b>0.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1</b>	<b>0.5</b>	<b>Mar 17</b>	<b>3.0</b>	<b>Jan 21 11:00</b>	<b>98.9%</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: 24-Hr: 3ppb, 1-Hr: 10ppb

### 9.3 Temperature (ET) - Valleyview 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Valleyview

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-15.0	1.4	Jan 30	4.6	Jan 30 15:00	-39.5	Jan 15	-44.5	Jan 15 09:00	98.7%
February 2020	-5.1	3.8	Feb 27	9.8	Feb 27 15:00	-18.2	Feb 18	-29.8	Feb 18 08:00	88.6%
March 2020	-7.7	3.1	Mar 02	8.5	Mar 16 16:00	-24.6	Mar 14	-36.0	Mar 14 07:00	100.0%
April 2020	2.2	12.1	Apr 29	20.3	Apr 20 15:00	-17.9	Apr 02	-29.3	Apr 02 07:00	100.0%
May 2020	10.8	19.6	May 30	27.0	May 30 13:00	3.8	May 22	-3.3	May 11 05:00	100.0%
June 2020	14.8	19.3	Jun 19	29.0	Jun 20 13:00	9.3	Jun 08	3.1	Jun 09 06:00	99.9%
July 2020	16.8	22.7	Jul 27	33.9	Jul 27 18:00	12.4	Jul 04	5.8	Jul 04 05:00	100.0%
August 2020	15.7	23.1	Aug 02	32.9	Aug 16 17:00	10.6	Aug 30	2.7	Aug 28 07:00	99.9%
September 2020	11.2	16.7	Sep 10	27.7	Sep 10 17:00	6.9	Sep 30	-3.9	Sep 30 07:00	98.9%
October 2020	1.8	16.0	Oct 04	25.1	Oct 03 16:00	-8.7	Oct 24	-15.3	Oct 18 08:00	100.0%
November 2020	-4.0	10.4	Nov 02	15.7	Nov 02 15:00	-15.4	Nov 19	-21.3	Nov 20 03:00	100.0%
December 2020	-6.6	6.7	Dec 07	9.8	Dec 07 14:00	-20.6	Dec 13	-26.4	Dec 13 10:00	100.0%
	<b>AVERAGE</b> 2.9	<b>23.1</b>	<b>MAXIMUM VALUES</b> Aug 02 33.9 Jul 27 18:00			<b>MINIMUM VALUES</b> -39.5 Jan 15		<b>-44.5</b>	<b>Jan 15 09:00</b>	<b>98.8%</b>

### 9.4 Relative Humidity (RH) - Valleyview 2020 Summary and Frequency Distribution

Relative Humidity (RH) Frequency Distribution at Valleyview

Month	Monthly Average (%)	Maximum Values				Operational time (%)
		24-hr (%)	Date	1-hr (%)	Date	
January 2020	79.7	94.9	Jan 01	100.0	Jan 22 01:00	100.0%
February 2020	72.6	95.4	Feb 29	100.0	Feb 01 06:00	88.6%
March 2020	72.2	92.7	Mar 23	100.0	Mar 03 00:00	100.0%
April 2020	58.8	77.2	Apr 14	99.7	Apr 10 02:00	100.0%
May 2020	65.0	97.1	May 22	100.0	May 21 03:00	100.0%
June 2020	70.7	91.8	Jun 28	100.0	Jun 22 04:00	99.9%
July 2020	75.2	98.0	Jul 01	100.0	Jul 27 08:00	100.0%
August 2020	71.3	90.7	Aug 24	100.0	Aug 26 02:00	99.9%
September 2020	74.3	94.4	Sep 19	100.0	Sep 16 06:00	98.9%
October 2020	75.0	96.0	Oct 10	100.0	Oct 28 08:00	100.0%
November 2020	82.2	96.3	Nov 23	100.0	Nov 28 05:00	100.0%
December 2020	79.6	92.5	Dec 26	100.0	Dec 08 10:00	100.0%
	<b>AVERAGE</b> 73.1	<b>98.0</b>	<b>MAXIMUM VALUES</b> Jul 01 100.0 Jun 22 04:00			<b>98.9%</b>

## 9.5 Wind Speed & Wind Direction (WS & WD) - Valleyview 2020 Summary and Frequency Distribution

### Wind Speed Frequency Distribution of 1-hr Averages - Valleyview

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	24-hr (km/hr)	MAXIMUM VALUES			Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)			Date	1-hr (km/hr)	Date	
January 2020	744	63.8%	23.3%	11.2%	1.7%	0.0%	0.0%	2.9	9.9	Jan 02	17.0	Jan 02 12:00	100.0%
February 2020	617	51.7%	23.3%	19.0%	5.8%	0.2%	0.0%	4.3	10.3	Feb 01	24.9	Feb 29 11:00	88.6%
March 2020	744	41.8%	22.4%	27.4%	8.3%	0.0%	0.0%	5.2	11.7	Mar 02	18.4	Mar 02 04:00	100.0%
April 2020	720	33.9%	30.8%	27.9%	7.4%	0.0%	0.0%	5.2	10.7	Apr 07	16.6	Apr 21 12:00	100.0%
May 2020	744	37.8%	33.5%	26.7%	2.0%	0.0%	0.0%	4.6	7.6	May 17	16.9	May 14 02:00	100.0%
June 2020	719	55.8%	24.1%	19.5%	0.7%	0.0%	0.0%	3.5	8.5	Jun 01	13.1	Jun 15 16:00	99.9%
July 2020	744	56.9%	20.0%	22.3%	0.8%	0.0%	0.0%	3.7	9.3	Jul 14	13.9	Jul 13 18:00	100.0%
August 2020	743	51.7%	20.2%	23.8%	4.3%	0.0%	0.0%	4.3	8.7	Aug 29	16.7	Aug 18 18:00	99.9%
September 2020	712	47.3%	28.9%	19.9%	3.8%	0.0%	0.0%	4.3	10.3	Sep 01	17.6	Sep 28 13:00	98.9%
October 2020	744	38.0%	32.9%	23.3%	5.8%	0.0%	0.0%	4.8	8.6	Oct 04	19.2	Oct 05 20:00	100.0%
November 2020	720	45.7%	35.1%	16.7%	2.5%	0.0%	0.0%	3.9	9.3	Nov 30	20.6	Nov 30 20:00	100.0%
December 2020	744	52.2%	32.3%	12.5%	3.1%	0.0%	0.0%	3.5	8.3	Dec 20	17.8	Dec 20 11:00	100.0%
<b>Annual</b>	<b>8695</b>	<b>48.0%</b>	<b>27.2%</b>	<b>20.8%</b>	<b>3.9%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.2</b>	<b>11.7</b>	<b>MAXIMUM VALUES</b>			<b>98.9%</b>
										<b>Mar 02</b>	<b>24.9</b>	<b>Feb 29 11:00</b>	

### Wind Speed and Wind Direction Frequency Distribution at Valleyview

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	750	2.6%	2.7%	2.7%	0.5%	0.0%	0.0%	8.6%
NNE	352	1.8%	1.3%	0.8%	0.1%	0.0%	0.0%	4.0%
NE	187	1.3%	0.7%	0.2%	0.0%	0.0%	0.0%	2.2%
ENE	79	0.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%
E	90	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%
ESE	142	0.9%	0.5%	0.2%	0.0%	0.0%	0.0%	1.6%
SE	413	2.7%	1.7%	0.3%	0.0%	0.0%	0.0%	4.7%
SSE	1112	8.9%	2.8%	1.0%	0.0%	0.0%	0.0%	12.8%
S	1210	8.9%	4.3%	0.7%	0.0%	0.0%	0.0%	13.9%
SSW	616	5.9%	1.2%	0.0%	0.0%	0.0%	0.0%	7.1%
SW	338	2.7%	1.0%	0.2%	0.0%	0.0%	0.0%	3.9%
WSW	527	1.8%	2.5%	1.6%	0.1%	0.0%	0.0%	6.1%
W	1010	1.6%	2.6%	5.7%	1.8%	0.0%	0.0%	11.6%
WNW	734	1.9%	2.2%	3.6%	0.8%	0.0%	0.0%	8.4%
NW	528	2.2%	1.5%	2.1%	0.3%	0.0%	0.0%	6.1%
NNW	607	3.1%	2.1%	1.6%	0.2%	0.0%	0.0%	7.0%
<b>Total</b>	<b>8,695</b>	<b>48.0%</b>	<b>27.2%</b>	<b>20.8%</b>	<b>3.9%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>
	<b>0</b>							<b>0.0%</b>

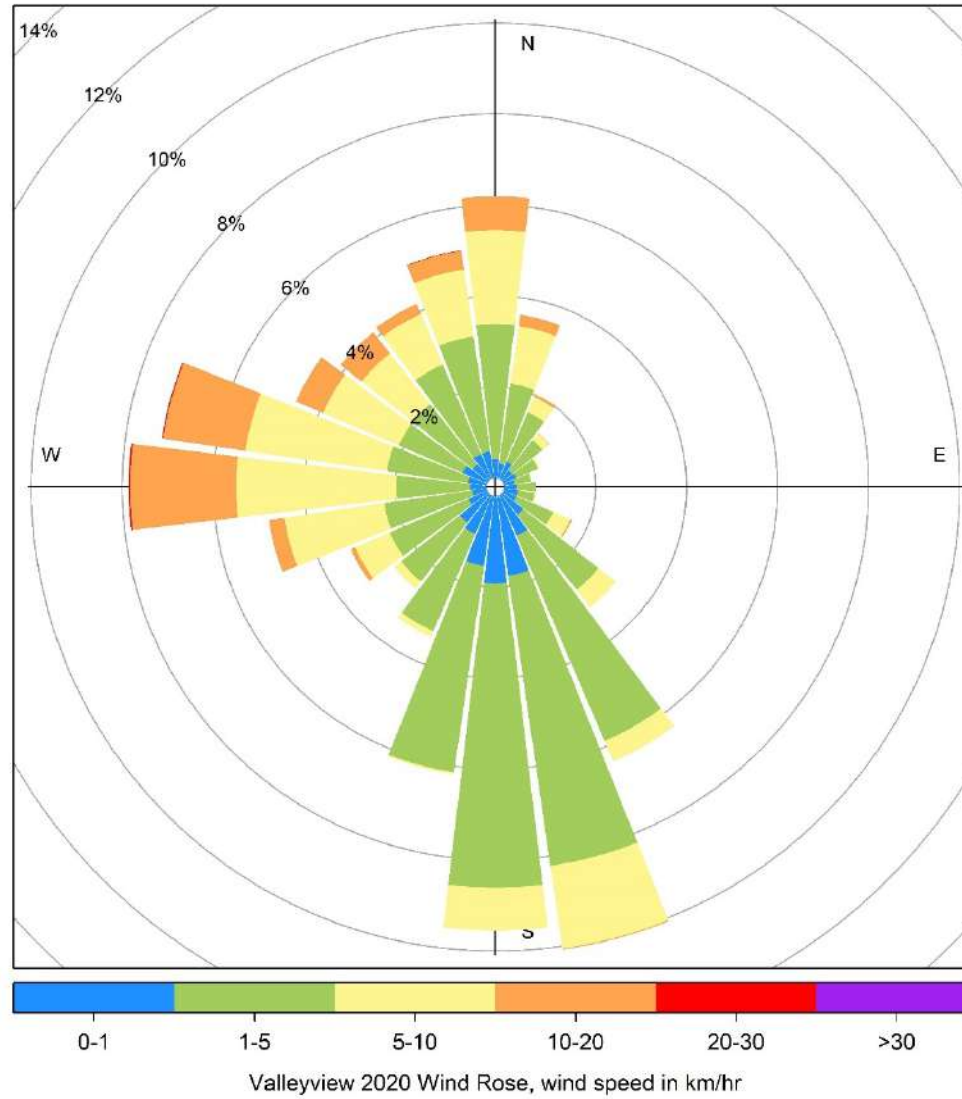
### Wind Speed Standard Deviation (WSSTD) at Valleyview

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	1.0	2.8	Jan 02	5.8	Jan 29 18:00	0.5	Jan 25	0.2	Jan 09 03:00	100.0%
February 2020	1.5	4.7	Feb 29	37.7	Feb 29 11:00	0.6	Feb 19	0.2	Feb 05 06:00	88.6%
March 2020	1.5	3.1	Mar 02	20.0	Mar 10 20:00	0.7	Mar 15	0.3	Mar 09 07:00	100.0%
April 2020	1.6	2.8	Apr 07	13.4	Apr 06 22:00	0.9	Apr 02	0.2	Apr 06 02:00	100.0%
May 2020	1.7	2.7	May 26	6.5	May 05 17:00	1.1	May 28	0.2	May 13 05:00	100.0%
June 2020	1.5	2.7	Jun 03	17.4	Jun 14 13:00	0.8	Jun 22	0.3	Jun 01 00:00	99.9%
July 2020	1.4	2.9	Jul 13	7.0	Jul 28 04:00	0.8	Jul 27	0.2	Jul 19 02:00	100.0%
August 2020	1.6	2.8	Aug 29	7.5	Aug 18 18:00	0.9	Aug 05	0.3	Aug 13 01:00	99.9%
September 2020	1.5	3.0	Sep 01	4.6	Sep 24 17:00	0.6	Sep 18	0.3	Sep 13 03:00	98.9%
October 2020	1.5	2.4	Oct 12	5.5	Oct 27 14:00	0.9	Oct 03	0.3	Oct 07 07:00	100.0%
November 2020	1.2	2.3	Nov 30	6.1	Nov 30 20:00	0.7	Nov 21	0.3	Nov 08 19:00	100.0%
December 2020	1.2	2.7	Dec 20	7.4	Dec 21 01:00	0.7	Dec 10	0.3	Dec 18 01:00	100.0%
	<b>AVERAGE</b>	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
	<b>1.4</b>	<b>4.7</b>	<b>Feb 29</b>	<b>37.7</b>	<b>Feb 29 11:00</b>	<b>0.5</b>	<b>Jan 25</b>	<b>0.2</b>	<b>May 13 05:00</b>	<b>98.9%</b>

### Wind Direction Standard Deviation (WDSTD) at Valleyview

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	33.9	59.4	Jan 28	99.2	Jan 23 08:00	8.9	Jan 19	4.6	Jan 06 15:00	100.0%
February 2020	26.2	45.6	Feb 03	95.3	Feb 26 14:00	12.8	Feb 22	3.7	Feb 23 16:00	88.6%
March 2020	24.2	46.3	Mar 14	97.8	Mar 14 03:00	10.6	Mar 31	4.7	Mar 01 06:00	100.0%
April 2020	25.4	45.5	Apr 03	98.0	Apr 09 09:00	11.7	Apr 17	1.2	Apr 03 14:00	100.0%
May 2020	30.3	53.6	May 15	98.8	May 06 05:00	17.5	May 22	4.8	May 13 01:00	100.0%
June 2020	36.1	63.4	Jun 18	97.9	Jun 20 07:00	15.1	Jun 01	4.6	Jun 02 02:00	99.9%
July 2020	32.5	53.7	Jul 07	96.4	Jul 08 02:00	14.4	Jul 14	6.6	Jul 27 02:00	100.0%
August 2020	32.3	59.2	Aug 02	98.1	Aug 27 00:00	15.7	Aug 14	4.8	Aug 23 03:00	99.9%
September 2020	29.6	51.6	Sep 05	96.1	Sep 18 20:00	14.2	Sep 01	4.5	Sep 03 05:00	98.9%
October 2020	25.5	49.8	Oct 02	97.7	Oct 18 04:00	12.5	Oct 21	5.0	Oct 25 03:00	100.0%
November 2020	27.8	61.7	Nov 20	95.8	Nov 22 06:00	11.1	Nov 10	5.1	Nov 01 21:00	100.0%
December 2020	30.9	58.1	Dec 05	98.2	Dec 05 03:00	14.3	Dec 17	0.0	Jan 00 00:00	100.0%
	<b>AVERAGE</b>	<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>				
	<b>29.6</b>	<b>63.4</b>	<b>Jun 18</b>	<b>99.2</b>	<b>Jan 23 08:00</b>	<b>8.9</b>	<b>Jan 19</b>	<b>0.0</b>	<b>Jan 00 00:00</b>	<b>98.9%</b>

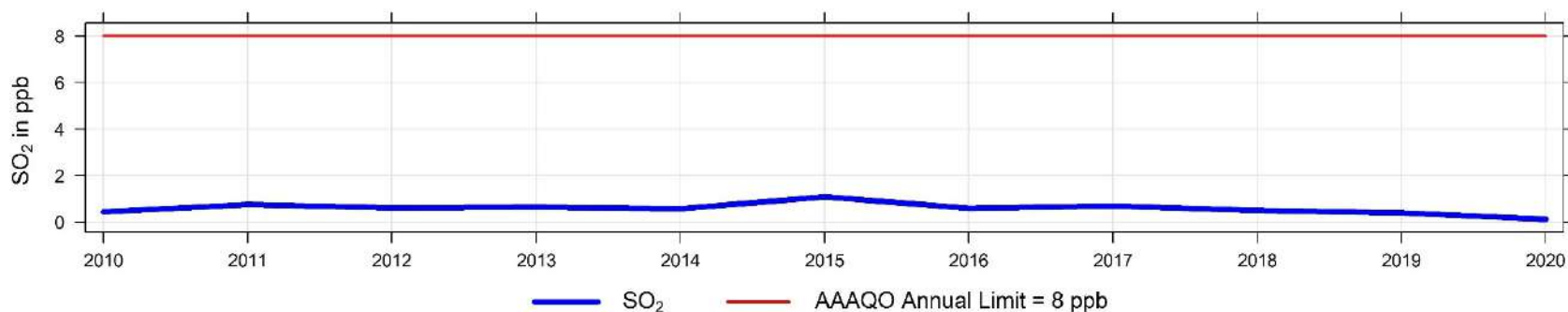
## 9.6 Wind Rose - Valleyview 2020 Summary and Frequency Distribution



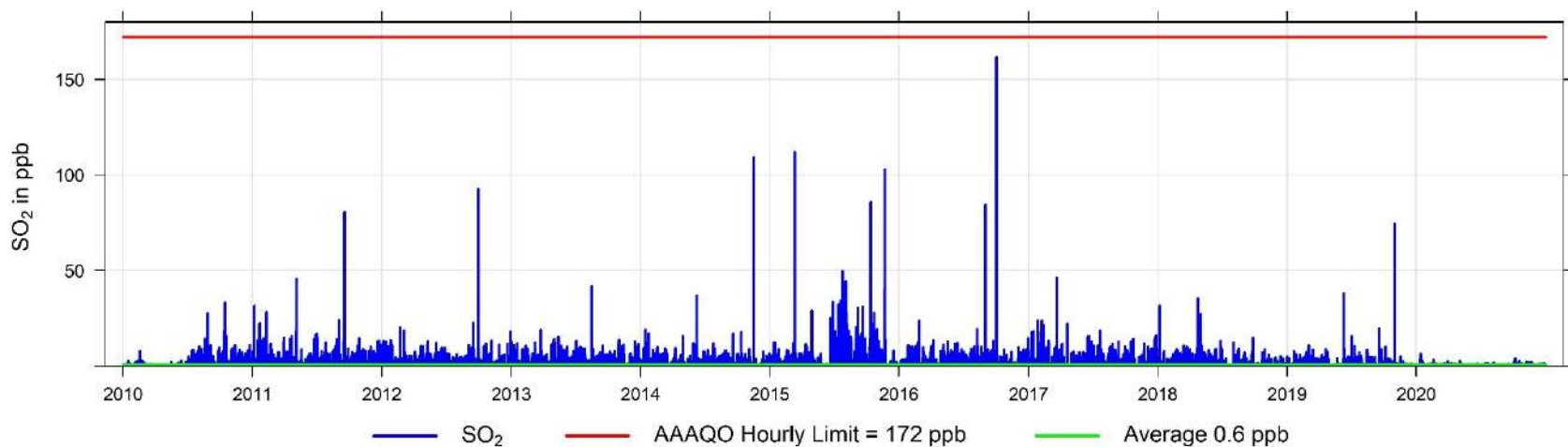
## 10 Valleyview Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Valleyview Station.

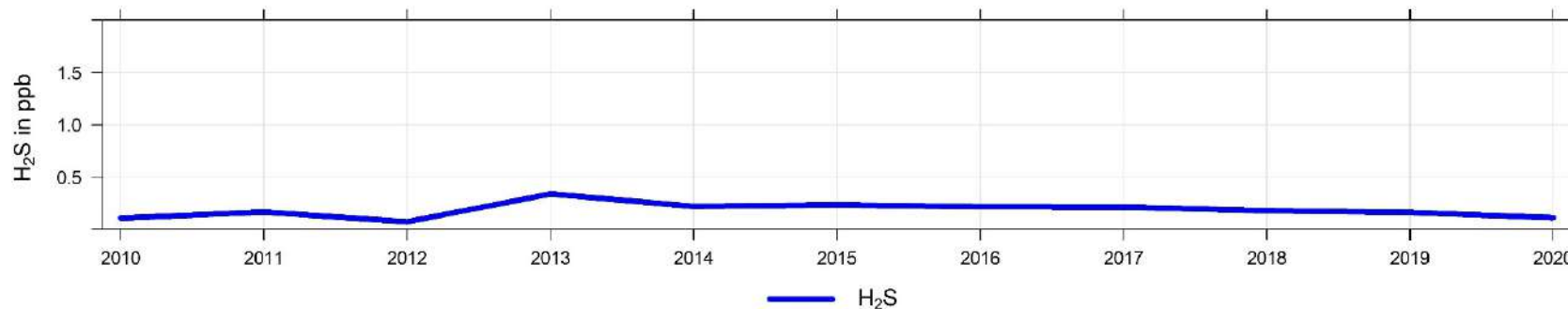
2010 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Valleyview



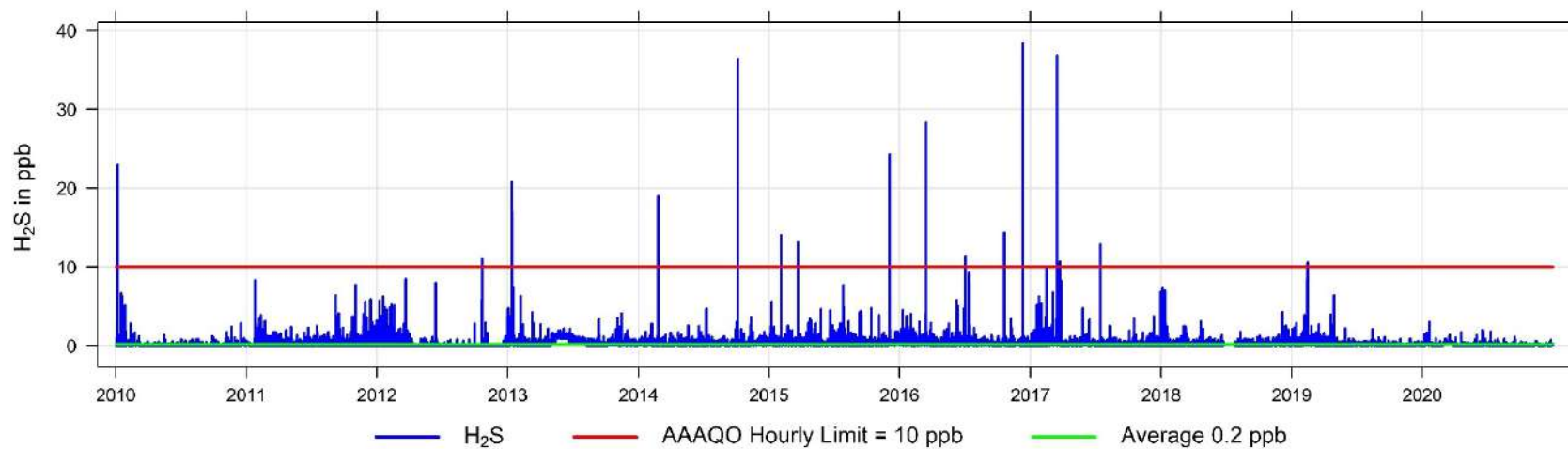
2010 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Valleyview



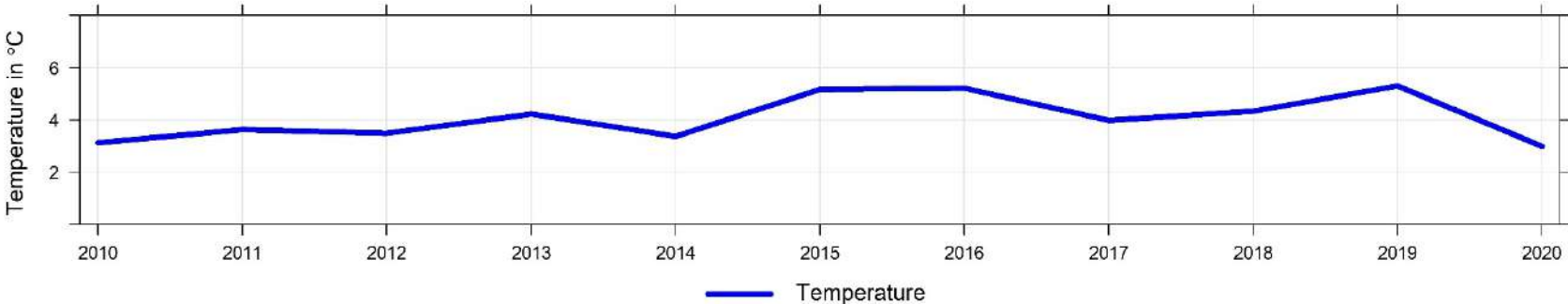
2010 to 2020 Annual Concentration Readings of H<sub>2</sub>S (in ppb) at Valleyview



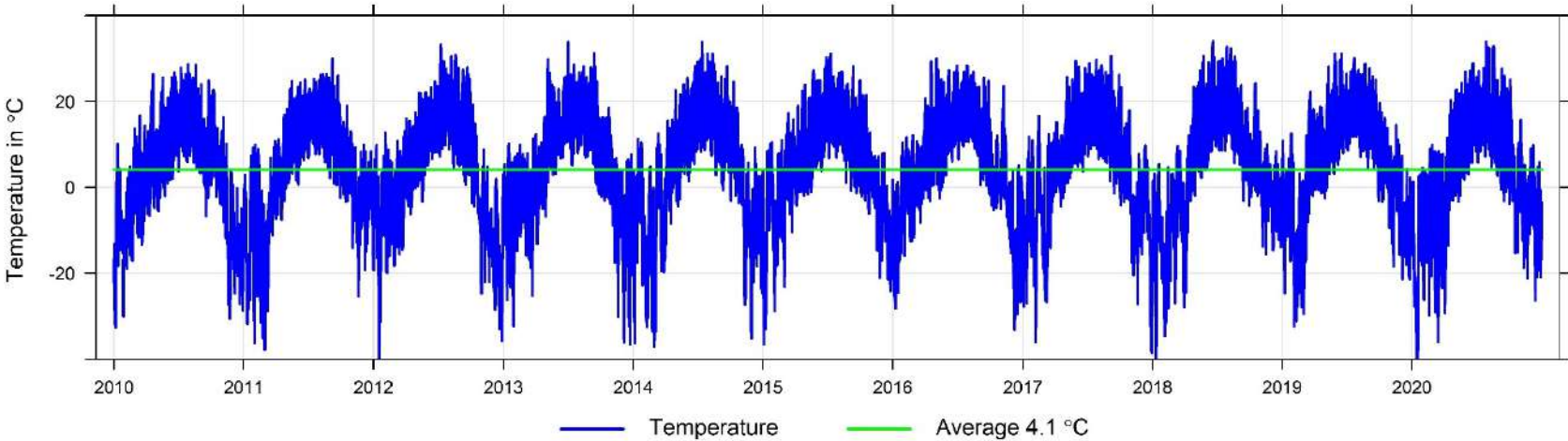
2010 to 2020 Hourly Concentration Readings of H<sub>2</sub>S (in ppb) at Valleyview



2010 to 2020 Annual Temperature Readings in °C at Valleyview

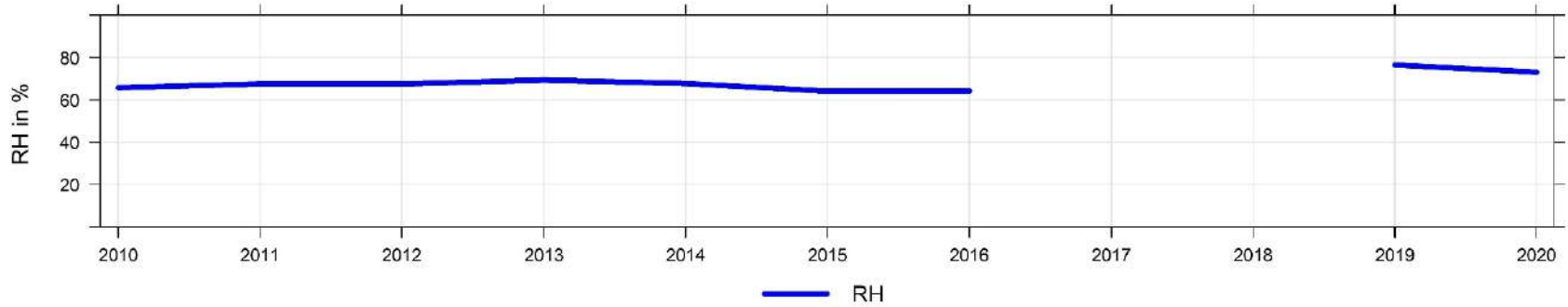


2010 to 2020 Hourly Temperature Readings (in °C) at Valleyview

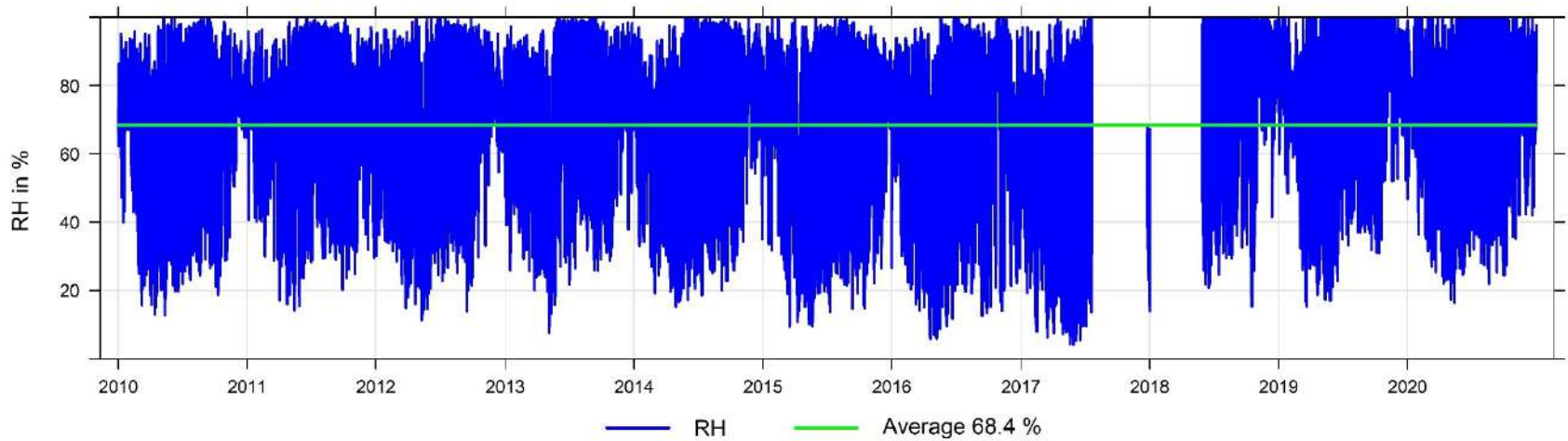




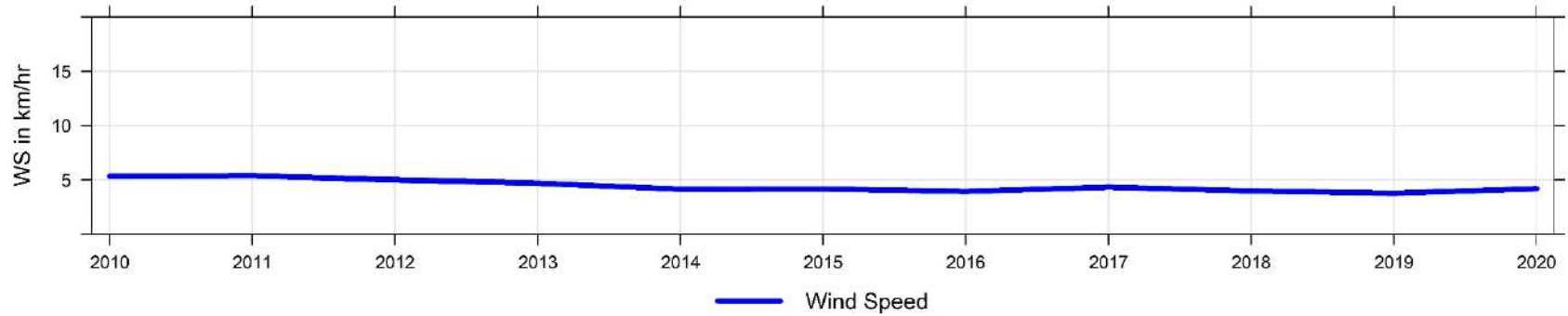
2010 to 2020 Annual Readings of Relative Humidity (in %) at Valleyview



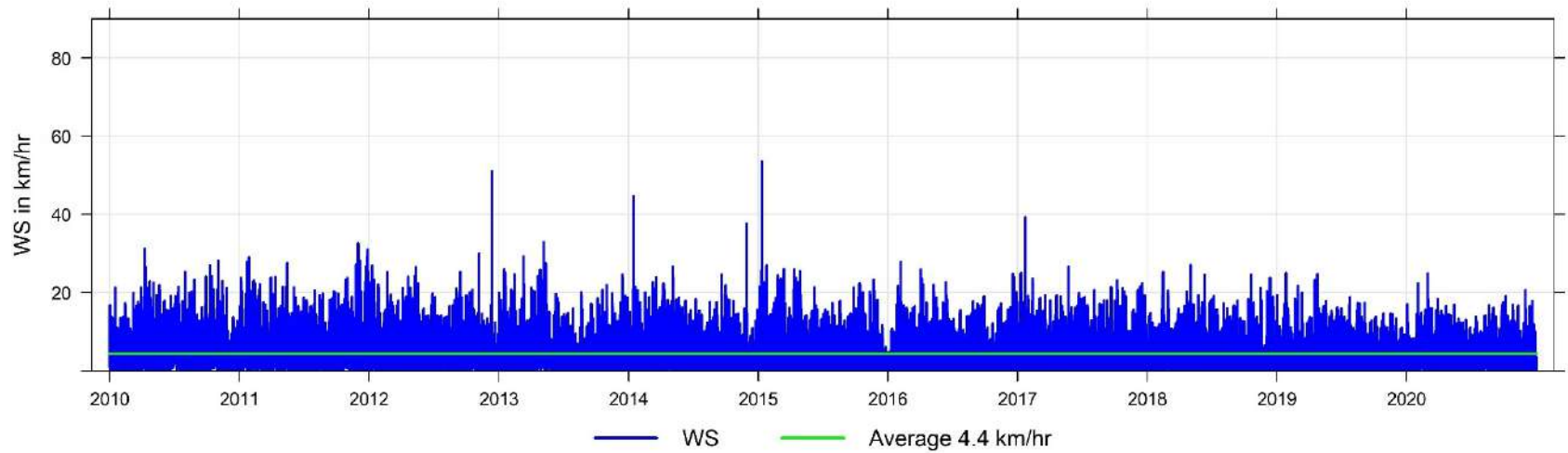
2010 to 2020 Hourly Readings of Relative Humidity (in %) at Valleyview



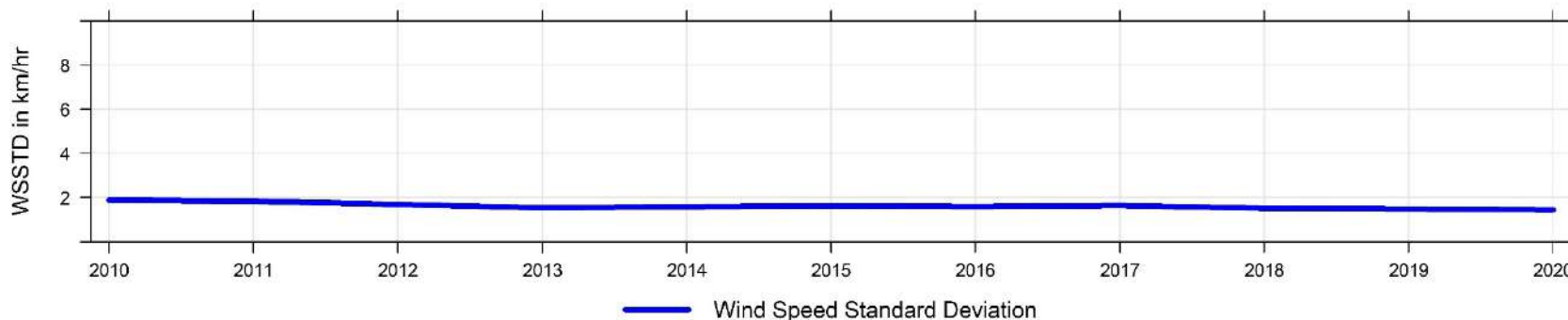
2010 to 2020 Annual Readings of Wind Speed (in km/hr) at Valleyview



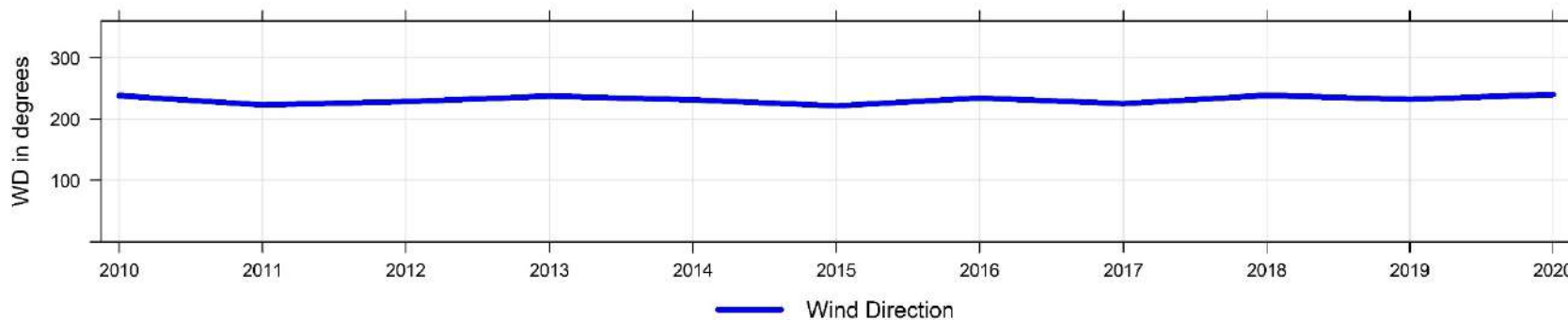
2010 to 2020 Hourly Readings of Wind Speed (in km/hr) at Valleyview



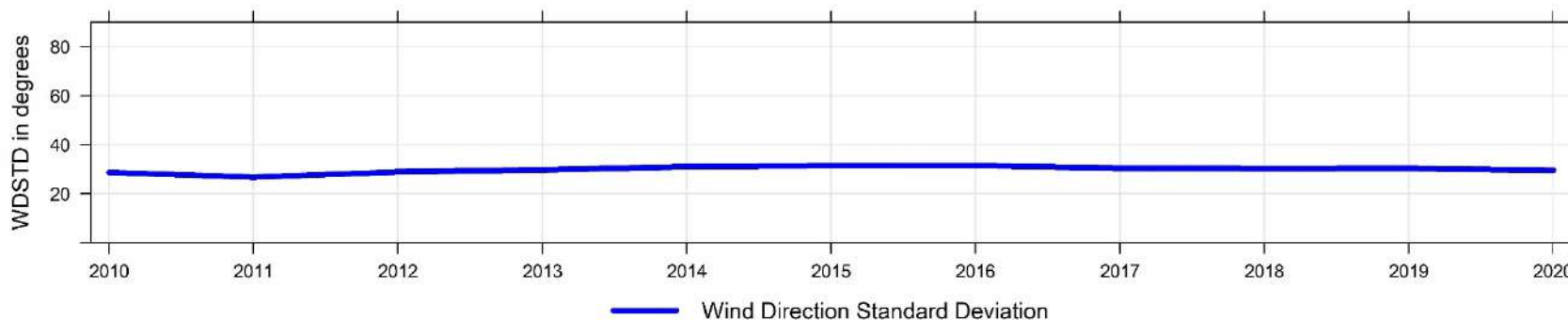
**2010 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Valleyview**

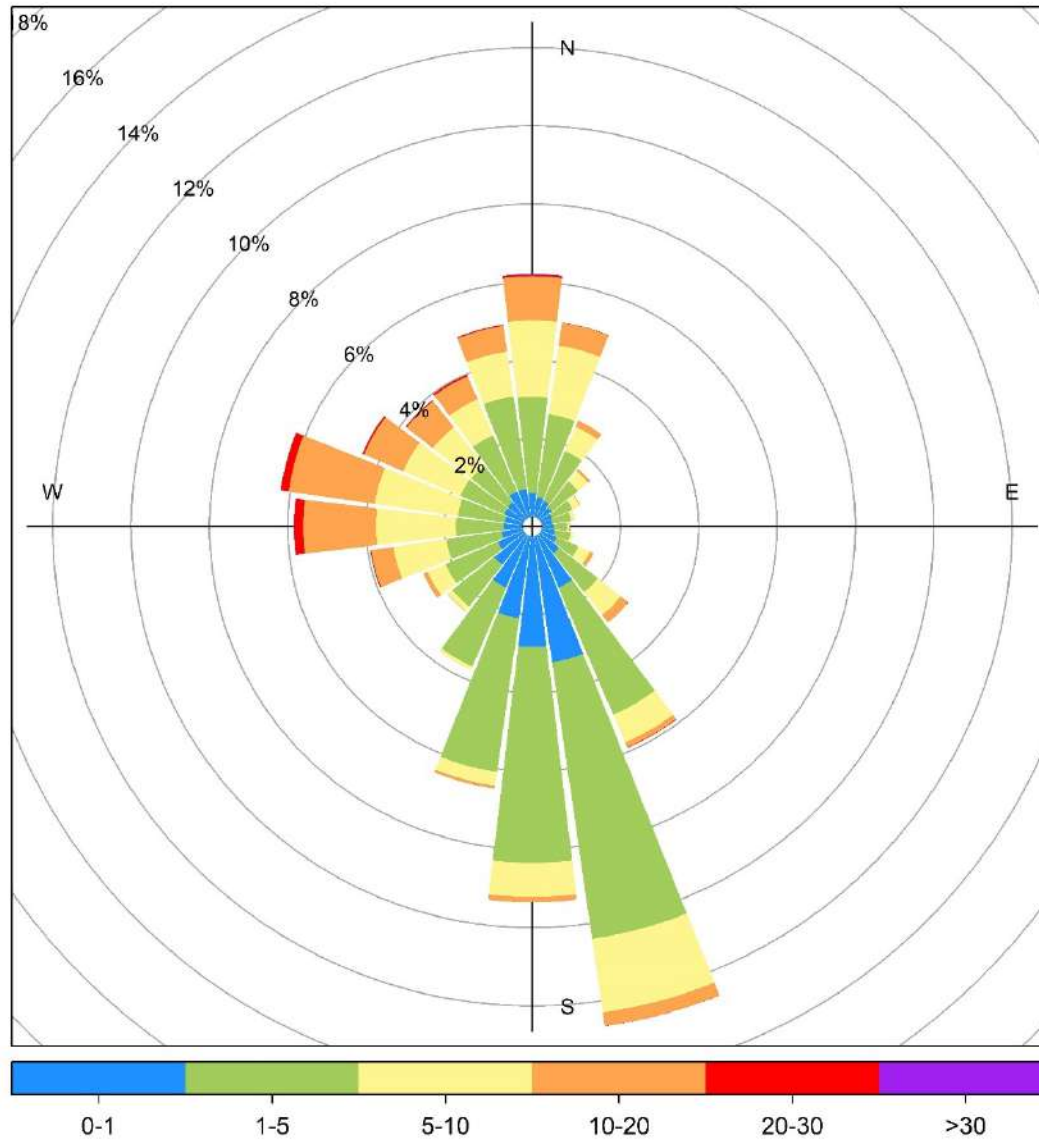


**2010 to 2020 Annual Readings of Wind Direction (in degrees) at Valleyview**



**2010 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Valleyview**





## 11 Donnelly Key Parameters - Continuous Monitoring Data - 2020 Summary

### Donnelly Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.2	1.9	Mar 15	6.6	Aug 04 08:00	99.1%	0	0	0	0
Hydrogen Sulphide H <sub>2</sub> S measured in ppb	0.1	1.1	Aug 06	10.1	Aug 06 11:00	99.6%	1	0	-	-

## 11.1 Sulphur Dioxide (SO<sub>2</sub>) - Donnelly 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Donnelly

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	708	96.8%	3.2%	0.0%	0.0%	0.0%	0.0%	0.3	1.1	Jan 19	3.2	Jan 19 07:00	100.0%	0	0	0
February 2020	663	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.3	0.6	Feb 15	1.1	Feb 19 07:00	100.0%	0	0	0
March 2020	708	96.6%	3.0%	0.4%	0.0%	0.0%	0.0%	0.3	1.9	Mar 15	5.8	Mar 15 22:00	100.0%	0	0	0
April 2020	677	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Apr 05	0.7	Apr 23 09:00	98.6%	0	0	0
May 2020	678	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	May 26	0.4	May 12 09:00	95.6%	0	0	0
June 2020	686	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.2	Jun 20	0.5	Jun 20 10:00	100.0%	0	0	0
July 2020	706	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.1	0.6	Jul 04	2.5	Jul 04 08:00	99.5%	0	0	0
August 2020	700	98.9%	1.0%	0.1%	0.0%	0.0%	0.0%	0.3	0.7	Aug 04	6.6	Aug 04 08:00	98.8%	0	0	0
September 2020	682	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.2	0.6	Sep 18	2.7	Sep 26 07:00	99.4%	0	0	0
October 2020	705	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.2	0.7	Oct 23	1.9	Oct 23 12:00	99.5%	0	0	0
November 2020	678	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Nov 21	1.6	Nov 26 20:00	98.6%	0	0	0
December 2020	707	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Dec 28	0.9	Dec 22 21:00	99.6%	0	0	0
<b>Annual</b>	<b>8298</b>	<b>99.0%</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.2</b>	<b>1.9</b>	<b>Mar 15</b>	<b>6.6</b>	<b>Aug 04 08:00</b>	<b>99.1%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

## 11.2 Hydrogen Sulphide (H<sub>2</sub>S) - Donnelly 2020 Summary and Frequency Distribution

Hydrogen Sulphide (H<sub>2</sub>S) Frequency Distribution at Donnelly

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 1 (ppb)	1 to 3 (ppb)	3 to 5 (ppb)	5 to 8 (ppb)	8 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		24-hr 3ppb	1-hr 10ppb
January 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.1	Jan 16	0.6	Jan 09 11:00	99.9%	0	0
February 2020	662	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0	0.2	Feb 29	1.0	Feb 11 22:00	100.0%	0	0
March 2020	707	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Mar 07	0.5	Mar 07 10:00	100.0%	0	0
April 2020	677	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Apr 30	0.6	Apr 29 23:00	98.6%	0	0
May 2020	707	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	May 08	2.3	May 08 02:00	99.7%	0	0
June 2020	684	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.1	Jun 30	1.3	Jun 30 20:00	100.0%	0	0
July 2020	705	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.1	0.4	Jul 31	2.0	Jul 31 04:00	99.5%	0	0
August 2020	708	98.3%	1.3%	0.3%	0.0%	0.0%	0.1%	0.2	1.1	Aug 06	10.1	Aug 06 11:00	99.9%	0	1
September 2020	683	99.3%	0.6%	0.1%	0.0%	0.0%	0.0%	0.2	0.7	Sep 13	4.5	Sep 13 09:00	99.4%	0	0
October 2020	706	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1	0.3	Oct 10	1.3	Oct 10 13:00	99.5%	0	0
November 2020	674	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.1	Nov 01	0.7	Nov 20 17:00	98.6%	0	0
December 2020	706	99.6%	0.1%	0.3%	0.0%	0.0%	0.0%	0.1	0.5	Dec 26	3.9	Dec 25 00:00	99.6%	0	0
<b>Annual</b>	<b>8327</b>	<b>99.7%</b>	<b>0.3%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.1</b>	<b>1.1</b>	<b>Aug 06</b>	<b>10.1</b>	<b>Aug 06 11:00</b>	<b>99.6%</b>	<b>0</b>	<b>1</b>

AAAQO Objectives: 24-Hr: 3ppb, 1-Hr: 10ppb

### 11.3 Temperature (ET) - Donnelly 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Donnelly

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-13.9	2.0	Jan 30	5.2	Jan 30 19:00	-37.0	Jan 15	-40.3	Jan 15 09:00	99.9%
February 2020	-7.2	3.3	Feb 27	5.8	Feb 21 15:00	-23.8	Feb 17	-28.4	Feb 18 08:00	100.0%
March 2020	-8.3	1.0	Mar 02	5.3	Mar 10 17:00	-22.4	Mar 13	-29.9	Mar 14 07:00	100.0%
April 2020	0.7	11.0	Apr 29	17.4	Apr 29 17:00	-20.4	Apr 02	-28.4	Apr 02 05:00	98.6%
May 2020	10.4	18.1	May 30	24.5	May 30 14:00	2.6	May 14	-1.9	May 14 08:00	99.7%
June 2020	14.5	19.4	Jun 19	27.4	Jun 19 20:00	7.0	Jun 08	3.2	Jun 05 05:00	100.0%
July 2020	16.7	23.7	Jul 27	31.4	Jul 27 18:00	13.0	Jul 04	8.7	Jul 25 05:00	99.5%
August 2020	15.7	22.9	Aug 01	31.1	Aug 18 16:00	9.2	Aug 30	4.0	Aug 30 06:00	99.9%
September 2020	11.5	17.9	Sep 10	25.6	Sep 10 17:00	6.3	Sep 14	-1.3	Sep 30 08:00	99.7%
October 2020	1.0	15.2	Oct 04	23.6	Oct 03 16:00	-9.8	Oct 21	-13.7	Oct 20 06:00	99.5%
November 2020	-4.2	10.7	Nov 02	13.1	Nov 02 15:00	-13.9	Nov 18	-21.5	Nov 11 05:00	98.6%
December 2020	-6.4	6.5	Dec 07	9.6	Dec 05 15:00	-20.4	Dec 13	-25.7	Dec 17 20:00	99.6%
	<b>AVERAGE</b>		<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>			
	2.5	23.7	Jul 27	31.4	Jul 27 18:00	-37.0	Jan 15	-40.3	Jan 15 09:00	99.6%

## 11.4 Wind Speed & Wind Direction (WS & WD) - Donnelly 2020 Summary and Frequency Distribution

### Wind Speed Frequency Distribution of 1-hr Averages - Donnelly

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	24-hr (km/hr)	MAXIMUM VALUES			Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)			Date	1-hr (km/hr)	Date	
January 2020	744	11.8%	24.3%	34.7%	21.5%	3.2%	4.4%	10.2	27.4	Jan 02	48.9	Jan 31 01:00	100.0%
February 2020	696	10.2%	9.3%	26.6%	44.5%	4.5%	4.9%	13.5	26.5	Feb 01	44.8	Feb 01 18:00	100.0%
March 2020	744	11.0%	14.9%	28.0%	36.8%	5.4%	3.9%	12.3	24.9	Mar 10	49.1	Mar 02 01:00	100.0%
April 2020	710	8.0%	15.6%	35.1%	35.1%	5.4%	0.8%	11.4	22.7	Apr 28	34.5	Apr 28 11:00	98.6%
May 2020	742	6.2%	19.1%	39.6%	29.8%	3.8%	1.5%	10.8	21.3	May 24	35.5	May 24 12:00	99.7%
June 2020	720	5.0%	18.2%	40.1%	29.2%	6.0%	1.5%	11.4	24.8	Jun 15	34.6	Jun 02 09:00	100.0%
July 2020	740	7.4%	16.5%	44.6%	27.0%	3.5%	0.9%	10.5	21.7	Jul 14	32.0	Jul 14 15:00	99.5%
August 2020	743	6.7%	15.5%	28.9%	37.7%	8.7%	2.4%	13.1	21.9	Aug 10	38.0	Aug 08 13:00	99.9%
September 2020	718	10.4%	17.5%	32.6%	32.6%	4.7%	2.1%	11.2	24.2	Sep 28	38.6	Sep 28 13:00	99.7%
October 2020	740	8.4%	17.2%	36.8%	31.2%	5.4%	1.1%	11.1	22.4	Oct 05	44.3	Oct 05 15:00	99.5%
November 2020	710	9.2%	17.6%	30.6%	38.6%	2.1%	2.0%	11.5	24.5	Nov 01	46.3	Nov 30 17:00	98.6%
December 2020	741	10.3%	19.3%	29.6%	37.8%	1.2%	1.9%	10.8	24.3	Dec 07	48.7	Dec 07 14:00	99.6%
<b>Annual</b>	<b>8748</b>	<b>8.7%</b>	<b>17.1%</b>	<b>33.9%</b>	<b>33.5%</b>	<b>4.5%</b>	<b>2.3%</b>	<b>11.5</b>	<b>27.4</b>	<b>MAXIMUM VALUES</b>			<b>99.6%</b>

### Wind Speed and Wind Direction Frequency Distribution at Donnelly

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	317	0.3%	0.6%	1.7%	1.1%	0.0%	0.0%	3.6%
NNE	264	0.4%	0.5%	1.2%	0.9%	0.1%	0.0%	3.0%
NE	169	0.4%	0.4%	0.6%	0.5%	0.0%	0.0%	1.9%
ENE	245	0.5%	0.8%	0.8%	0.7%	0.0%	0.0%	2.8%
E	422	1.1%	1.9%	1.5%	0.3%	0.0%	0.0%	4.8%
ESE	968	1.0%	3.6%	5.6%	0.8%	0.0%	0.0%	11.1%
SE	441	0.8%	2.1%	1.9%	0.2%	0.0%	0.0%	5.0%
SSE	276	0.7%	0.7%	1.3%	0.5%	0.0%	0.0%	3.2%
S	497	0.4%	0.7%	2.2%	2.3%	0.1%	0.0%	5.7%
SSW	1024	0.5%	1.1%	3.6%	6.4%	0.1%	0.0%	11.7%
SW	868	0.5%	1.1%	4.0%	4.3%	0.1%	0.0%	9.9%
WSW	899	0.4%	0.8%	2.4%	4.7%	1.3%	0.8%	10.3%
W	942	0.5%	0.9%	2.6%	4.5%	1.2%	1.0%	10.8%
WNW	822	0.5%	0.7%	2.0%	4.2%	1.5%	0.5%	9.4%
NW	334	0.4%	0.7%	1.3%	1.3%	0.1%	0.0%	3.8%
NNW	259	0.3%	0.7%	1.2%	0.8%	0.0%	0.0%	3.0%
<b>Total</b>	<b>8,747</b>	<b>8.7%</b>	<b>17.1%</b>	<b>33.9%</b>	<b>33.5%</b>	<b>4.5%</b>	<b>2.3%</b>	<b>100.0%</b>
	<b>0</b>							<b>0.0%</b>



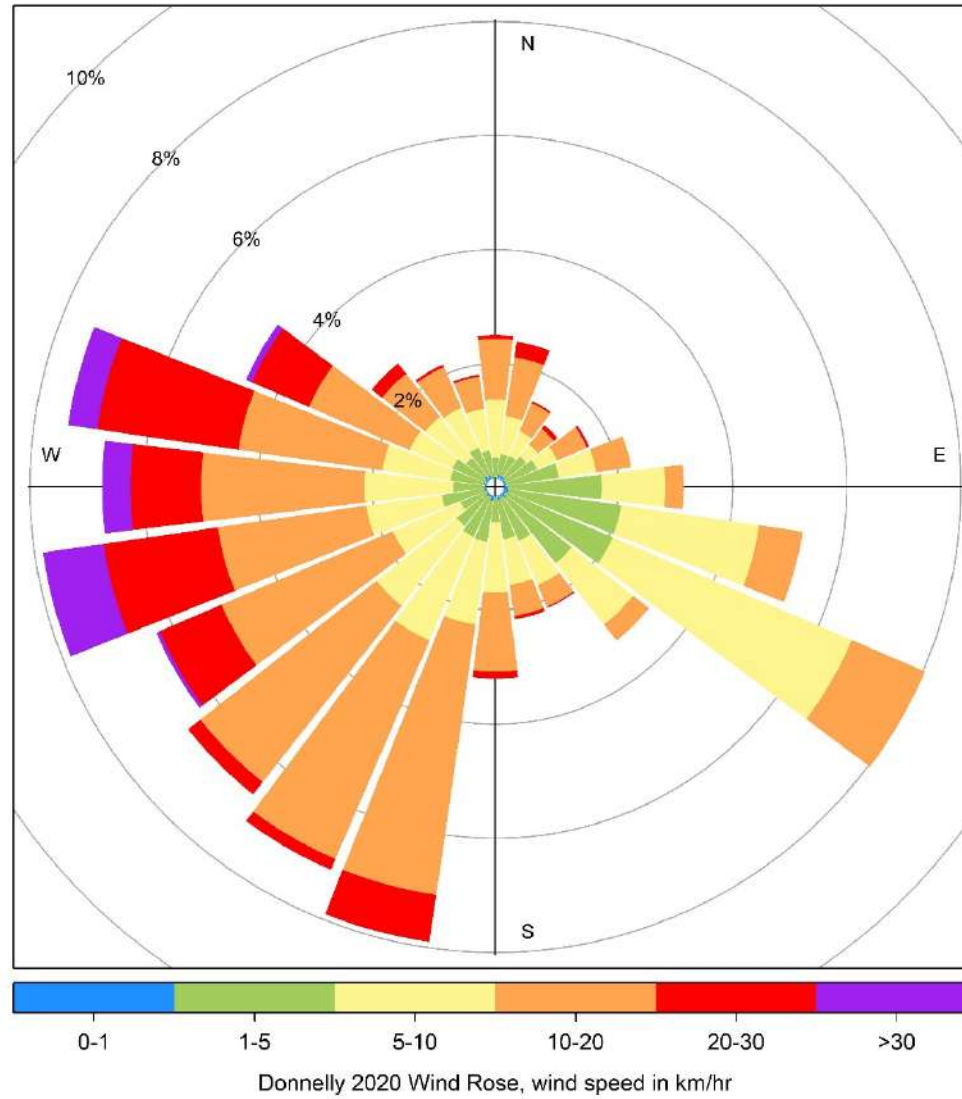
### Wind Speed Standard Deviation (WSSTD) at Donnelly

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	2.0	3.9	Jan 02	10.9	Jan 30 00:00	0.9	Jan 13	0.4	Jan 13 21:00	100.0%
February 2020	2.1	3.3	Feb 21	7.8	Feb 27 22:00	1.2	Feb 24	0.0	Feb 24 12:00	100.0%
March 2020	2.1	3.3	Mar 01	7.1	Mar 10 15:00	1.1	Mar 07	0.5	Mar 27 17:00	100.0%
April 2020	2.1	3.3	Apr 28	8.4	Apr 06 18:00	1.3	Apr 02	0.4	Apr 03 14:00	98.6%
May 2020	2.7	3.5	May 26	9.3	May 20 19:00	1.7	May 18	0.6	May 22 00:00	99.7%
June 2020	2.6	3.8	Jun 15	9.0	Jun 04 19:00	1.6	Jun 17	0.6	Jun 24 22:00	100.0%
July 2020	2.3	3.6	Jul 13	9.4	Jul 25 17:00	1.5	Jul 30	0.6	Jul 24 03:00	99.5%
August 2020	2.6	3.7	Aug 03	13.5	Aug 03 02:00	1.6	Aug 15	0.6	Aug 23 23:00	99.9%
September 2020	2.3	3.5	Sep 28	7.0	Sep 01 07:00	1.6	Sep 06	0.4	Sep 21 20:00	99.7%
October 2020	2.0	3.0	Oct 05	6.7	Oct 05 14:00	1.1	Oct 23	0.5	Oct 28 19:00	99.5%
November 2020	2.1	3.7	Nov 30	8.3	Nov 04 03:00	1.3	Nov 08	0.5	Nov 08 07:00	98.6%
December 2020	2.0	3.4	Dec 07	7.6	Dec 07 12:00	1.1	Dec 26	0.2	Dec 26 14:00	99.6%
	<b>AVERAGE</b> 2.3	<b>MAXIMUM VALUES</b> 3.9 Jan 02 13.5 Aug 03 02:00				<b>MINIMUM VALUES</b> 0.9 Jan 13 0.0 Feb 24 12:00				99.6%

### Wind Direction Standard Deviation (WDSTD) at Donnelly

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	15.3	3.9	Jan 02	91.9	Jan 24 19:00	0.9	Jan 13	1.4	Jan 22 19:00	100.0%
February 2020	12.4	3.3	Feb 21	95.8	Feb 24 10:00	1.2	Feb 24	0.0	Feb 24 12:00	100.0%
March 2020	14.1	3.3	Mar 01	96.4	Mar 20 16:00	1.1	Mar 07	2.0	Mar 21 18:00	100.0%
April 2020	14.7	3.3	Apr 28	89.0	Apr 12 06:00	1.3	Apr 02	2.2	Apr 18 23:00	98.6%
May 2020	19.1	3.5	May 26	92.6	May 28 14:00	1.7	May 18	2.6	May 26 23:00	99.7%
June 2020	17.3	3.8	Jun 15	96.0	Jun 09 21:00	1.6	Jun 17	2.3	Jun 01 23:00	100.0%
July 2020	17.2	3.6	Jul 13	91.5	Jul 16 23:00	1.5	Jul 30	2.7	Jul 14 05:00	99.5%
August 2020	16.2	3.7	Aug 03	93.5	Aug 02 06:00	1.6	Aug 15	2.1	Aug 23 06:00	99.9%
September 2020	16.5	3.5	Sep 28	94.5	Sep 13 07:00	1.6	Sep 06	2.5	Sep 03 01:00	99.7%
October 2020	14.3	3.0	Oct 05	89.2	Oct 29 01:00	1.1	Oct 23	2.1	Oct 24 22:00	99.5%
November 2020	14.8	3.7	Nov 30	97.5	Nov 27 22:00	1.3	Nov 08	2.3	Nov 01 09:00	98.6%
December 2020	15.4	3.4	Dec 07	94.2	Dec 01 20:00	1.1	Dec 26	2.4	Dec 23 05:00	99.6%
	<b>AVERAGE</b> 15.6	<b>MAXIMUM VALUES</b> 3.9 Jan 02 97.5 Nov 27 22:00				<b>MINIMUM VALUES</b> 0.9 Jan 13 0.0 Feb 24 12:00				99.6%

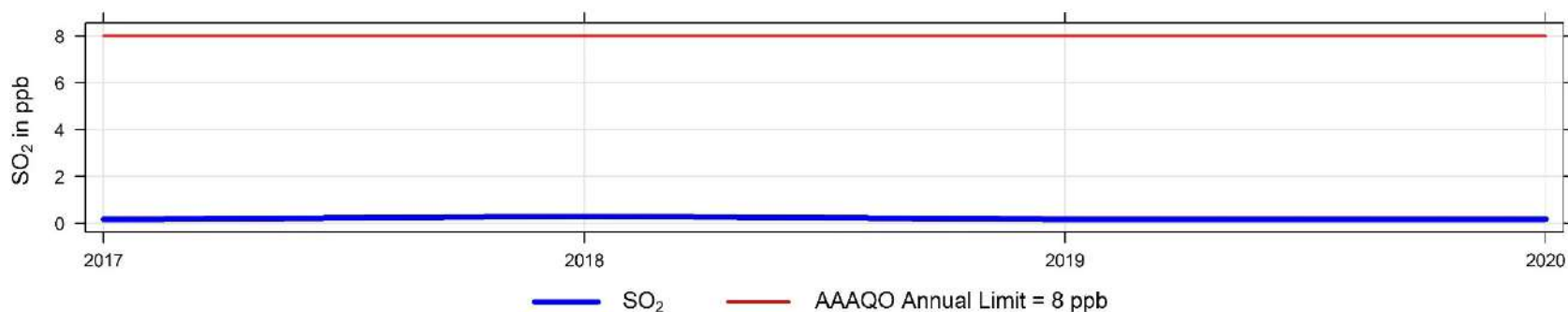
## 11.5 Wind Rose - Donnelly 2020 Summary and Frequency Distribution



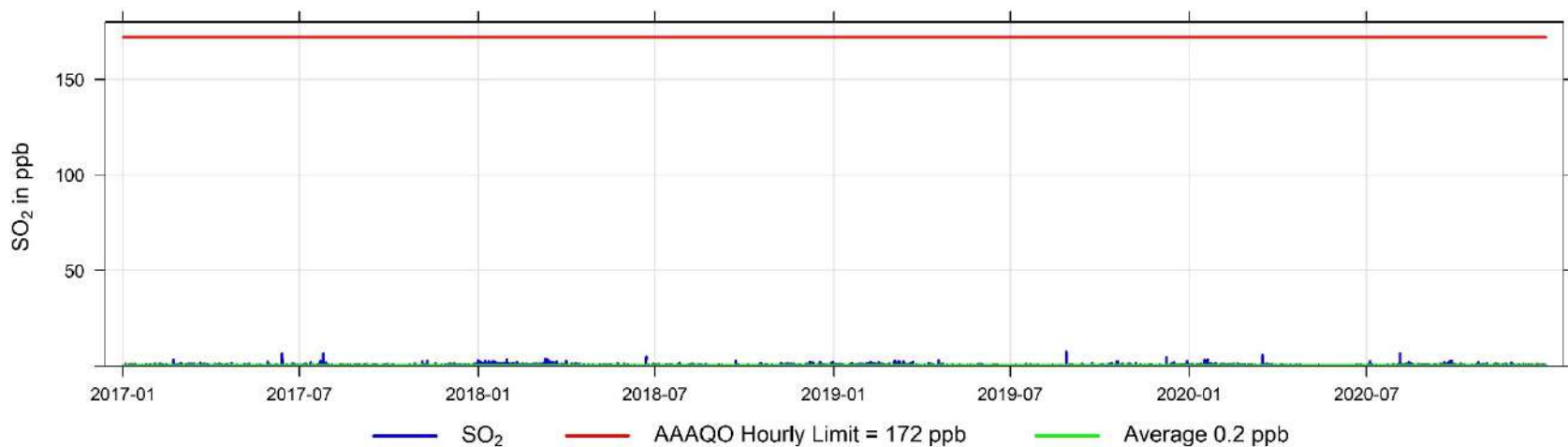
## 12 Donnelly Annual Charts, 2017 to 2020

The following pages include the annual charts and hourly charts for Donnelly Station.

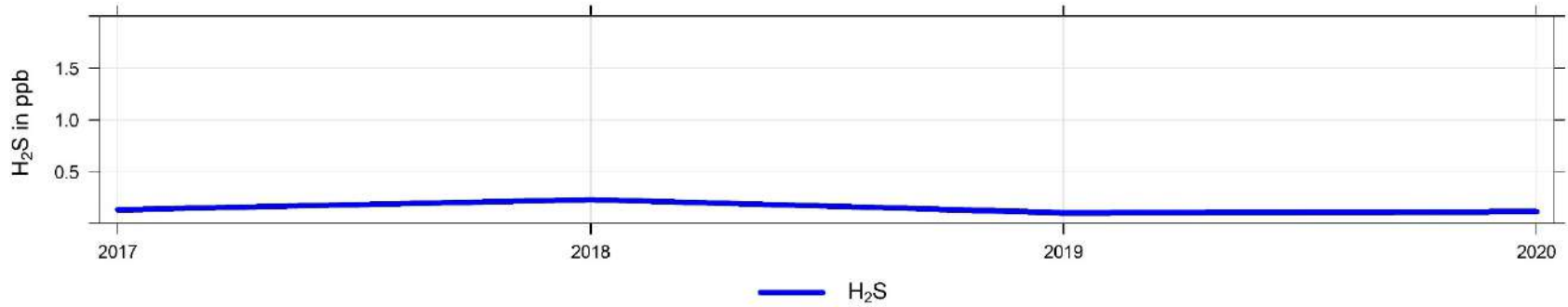
2017 to 2020 Annual Concentration Readings of SO<sub>2</sub> (in ppb) at Donnelly



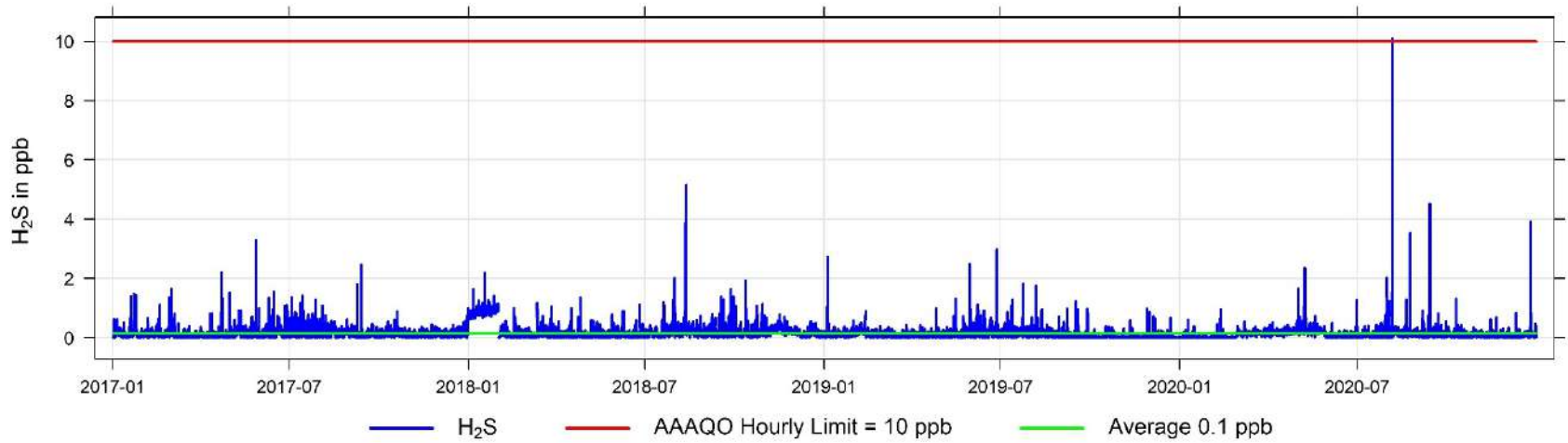
2017 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Donnelly



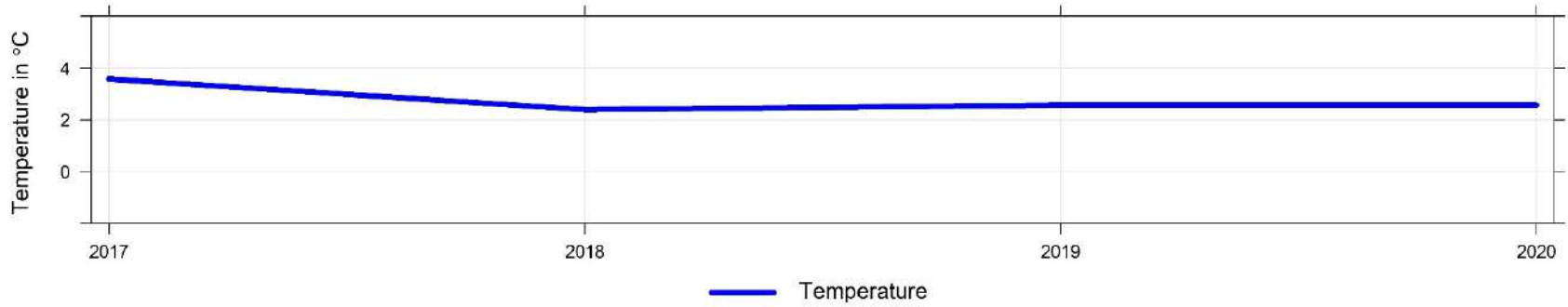
2017 to 2020 Annual Concentration Readings of H<sub>2</sub>S (in ppb) at Donnelly



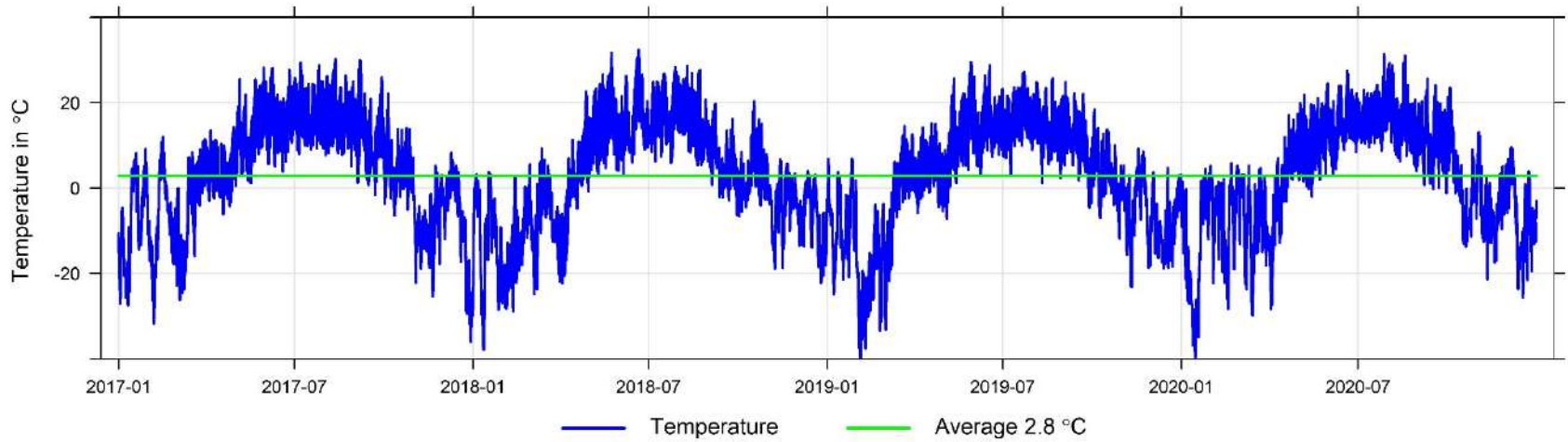
2017 to 2020 Hourly Concentration Readings of H<sub>2</sub>S (in ppb) at Donnelly



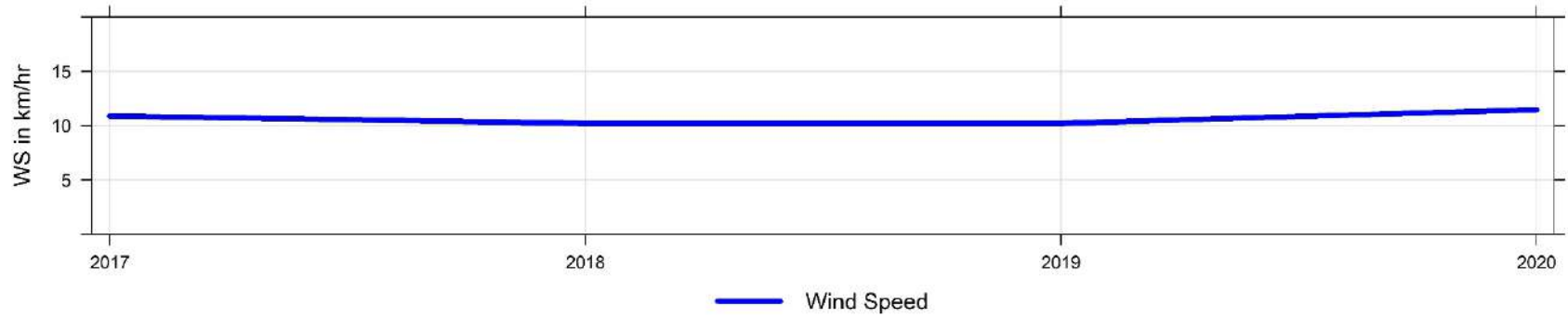
2017 to 2020 Annual Temperature Readings in °C at Donnelly



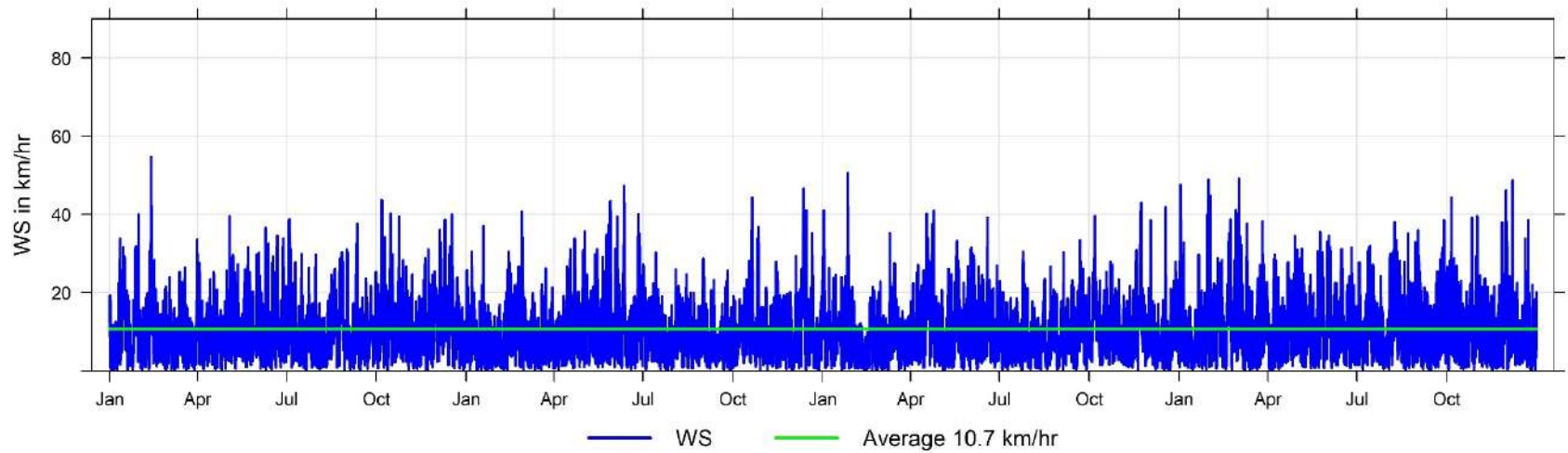
2017 to 2020 Hourly Temperature Readings (in °C) at Donnelly



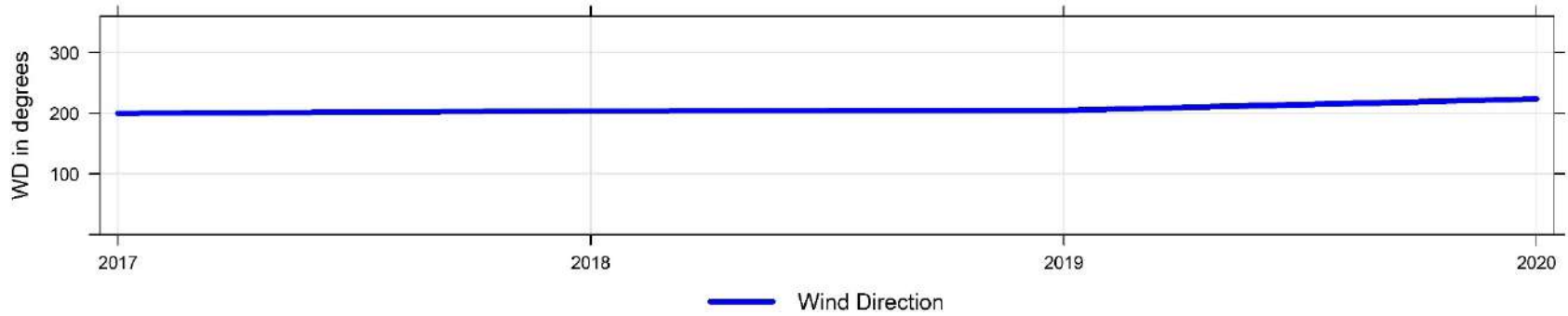
2017 to 2020 Annual Readings of Wind Speed (in km/hr) at Donnelly



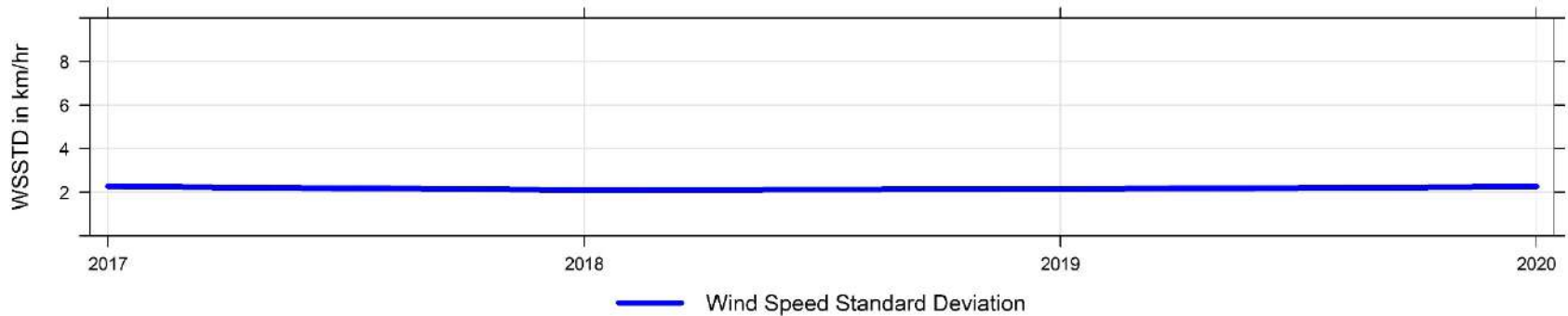
2017 to 2020 Hourly Readings of Wind Speed (in km/hr) at Donnelly



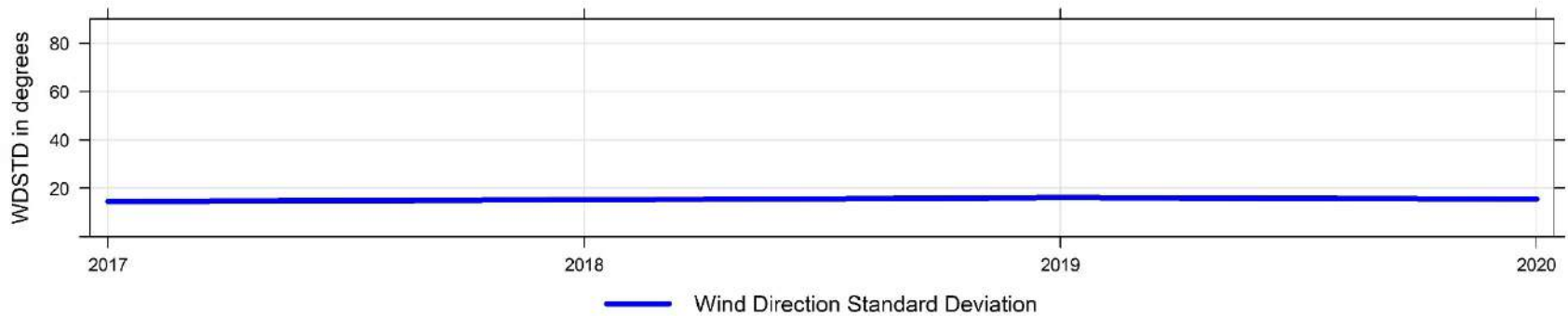
**2017 to 2020 Annual Readings of Wind Direction (in degrees) at Donnelly**

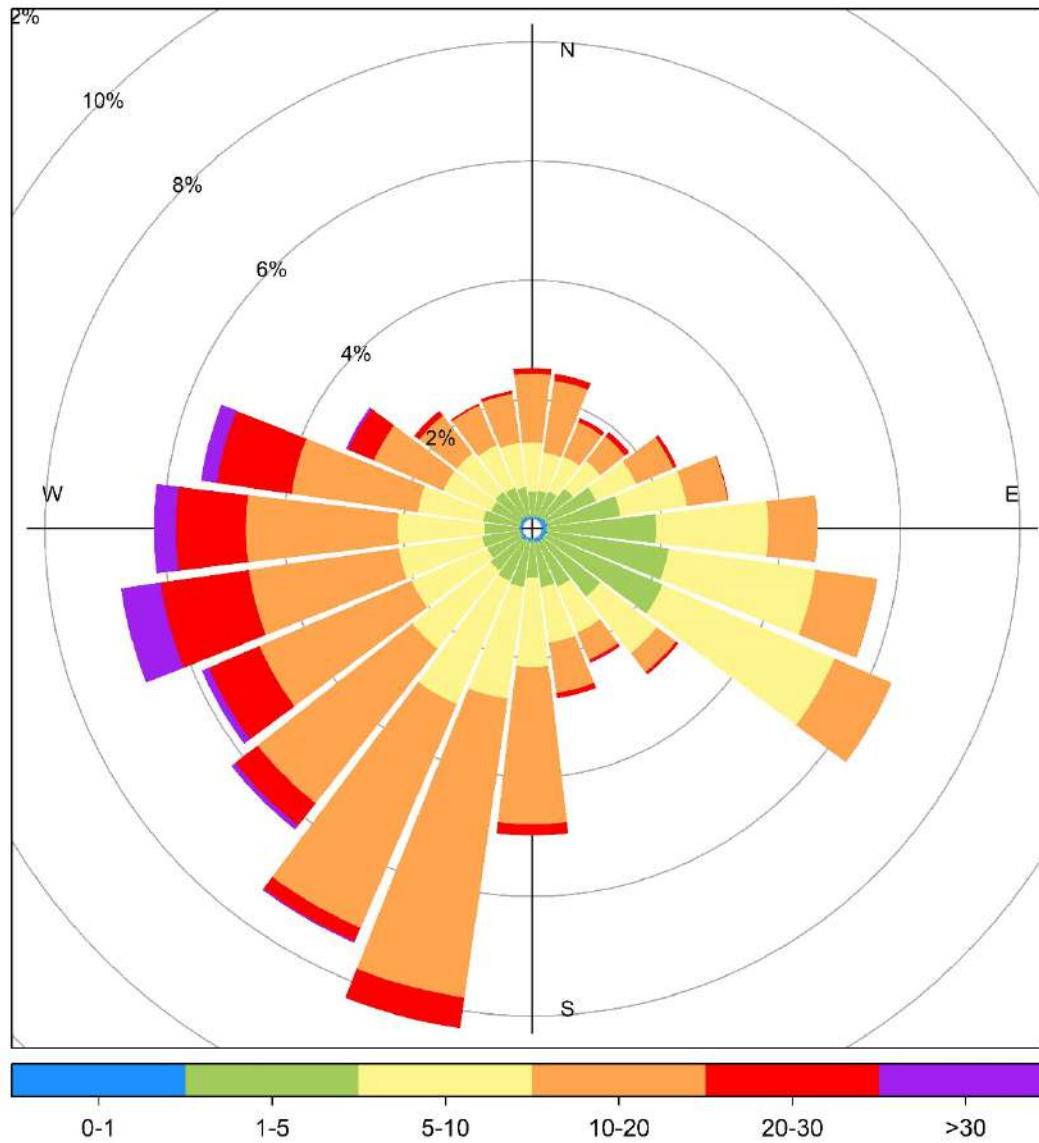


**2017 to 2020 Annual Readings of Wind Speed Standard Deviation (in km/hr) at Donnelly**



**2017 to 2020 Annual Readings of Wind Direction Standard Deviation (in degrees) at Donnelly**





Donnelly 2017 to 2020 Wind Rose, wind speed in km/hr



## 13 Wembley Key Parameters - Continuous Monitoring Data - 2020 Summary

### Wembley Key Parameters - Continuous Monitoring Data - 2020 Summary

Parameter	Annual Average	Maximum Values				Operational Time (%)	Readings above AAAQO & AAAQG			
		24-hr	Date	1-hr	Date		1-hr	24-hr	30-d	Annual
Sulphur Dioxide SO <sub>2</sub> measured in ppb	0.4	5.4	Mar 24	44.4	Mar 24 13:00	99.2%	0	0	0	0
Nitrogen Dioxide NO <sub>2</sub> measured in ppb	3.4	23.2	Feb 19	47.4	Feb 19 20:00	99.4%	0	-	-	0
Oxides of Nitrogen NO <sub>x</sub> measured in ppb	4.0	29.8	Feb 19	65.2	Feb 19 20:00	99.4%	-	-	-	-
Nitric Oxide NO measured in ppb	0.6	7.5	Jan 29	30.1	Jan 07 16:00	99.4%	-	-	-	-
Ozone O <sub>3</sub> measured in ppb	27.7	50.0	Mar 26	60.8	Apr 29 18:00	99.4%	0	-	-	-
Total Reduced Sulphur TRS measured in ppb	0.3	0.9	-	2.3	Aug 17 21:00	94.7%	0	0	-	-
Particulate Matter PM <sub>2.5</sub> measured in µg/m <sup>3</sup>	2.2	21.9	Sep 19	77.1	Mar 25 11:00	97.8%	0	0	-	-
Total Hydrocarbons THC measured in ppm	2.1	2.8	Jan 25	3.7	Feb 24 06:00	96.8%	-	-	-	-
Methane CH <sub>4</sub> measured in ppm	2.1	2.8	Jan 25	3.7	Feb 24 06:00	96.8%	-	-	-	-
Non Methane Hydrocarbons NMHC measured in ppm	0.0004	0.0	Oct 25	0.6	Oct 25 17:00	96.8%	-	-	-	-

### 13.1 Sulphur Dioxide (SO<sub>2</sub>) - Wembley 2020 Summary and Frequency Distribution

Sulphur Dioxide (SO<sub>2</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents		
		0 to 1 (ppb)	1 to 5 (ppb)	5 to 10 (ppb)	10 to 57 (ppb)	57 to 172 (ppb)	> 172 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		30-d 11ppb	24-hr 48ppb	1-hr 172ppb
January 2020	707	71.4%	26.3%	1.7%	0.6%	0.0%	0.0%	1.0	3.2	Jan 19	11.9	Jan 30 00:00	100.0%	0	0	0
February 2020	659	88.0%	9.6%	1.8%	0.6%	0.0%	0.0%	0.6	3.7	Feb 18	41.3	Feb 11 10:00	100.0%	0	0	0
March 2020	707	84.9%	13.3%	1.1%	0.7%	0.0%	0.0%	0.7	5.4	Mar 24	44.4	Mar 24 13:00	100.0%	0	0	0
April 2020	683	96.0%	3.8%	0.1%	0.0%	0.0%	0.0%	0.3	0.9	Apr 03	5.3	Apr 03 11:00	99.4%	0	0	0
May 2020	707	96.3%	3.3%	0.4%	0.0%	0.0%	0.0%	0.2	1.1	May 14	6.4	May 14 15:00	99.7%	0	0	0
June 2020	684	98.0%	1.9%	0.1%	0.0%	0.0%	0.0%	0.2	0.8	Jun 30	7.8	Jun 30 10:00	100.0%	0	0	0
July 2020	710	96.2%	3.4%	0.3%	0.1%	0.0%	0.0%	0.2	1.5	Jul 29	19.9	Jul 29 09:00	100.0%	0	0	0
August 2020	700	97.1%	2.6%	0.3%	0.0%	0.0%	0.0%	0.2	0.9	Aug 24	9.6	Aug 24 16:00	98.9%	0	0	0
September 2020	676	96.7%	3.3%	0.0%	0.0%	0.0%	0.0%	0.2	1.0	Sep 15	4.8	Sep 15 16:00	98.5%	0	0	0
October 2020	671	93.9%	5.4%	0.3%	0.4%	0.0%	0.0%	0.4	2.0	Oct 19	27.5	Oct 19 15:00	95.0%	0	0	0
November 2020	685	96.2%	3.8%	0.0%	0.0%	0.0%	0.0%	0.3	1.0	Nov 19	3.3	Nov 05 07:00	100.0%	0	0	0
December 2020	703	95.9%	4.0%	0.1%	0.0%	0.0%	0.0%	0.3	1.0	Dec 14	6.0	Dec 10 17:00	99.2%	0	0	0
<b>Annual</b>	<b>8292</b>	<b>92.6%</b>	<b>6.7%</b>	<b>0.5%</b>	<b>0.2%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.4</b>	<b>5.4</b>	<b>Mar 24</b>	<b>44.4</b>	<b>Mar 24 13:00</b>	<b>99.2%</b>	<b>0</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: Annual: 8ppb, 30-Day: 11ppb, 24-Hr: 48ppb, 1-Hr: 172ppb

### 13.2 Total Reduced Sulphur (TRS) - Wembley 2020 Summary and Frequency Distribution

Total Reduced Sulphur (TRS) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 1 (ppb)	1 to 2.5 (ppb)	2.5 to 5 (ppb)	5 to 7.5 (ppb)	7.5 to 10 (ppb)	> 10 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3	0.5	Jan 18	0.9	Jan 29 09:00	100.0%
February 2020	649	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.3	0.5	Feb 19	2.1	Feb 10 11:00	100.0%
March 2020	706	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Mar 08	1.0	Mar 16 12:00	100.0%
April 2020	677	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Apr 12	1.0	Apr 05 09:00	99.6%
May 2020	706	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	May 15	1.1	May 05 02:00	99.7%
June 2020	686	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Jun 06	0.9	Jun 18 21:00	100.0%
July 2020	662	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.3	Jul 30	0.5	Jul 15 00:00	93.5%
August 2020	323	99.1%	0.9%	0.0%	0.0%	0.0%	0.0%	0.3	0.5	Aug 21	2.3	Aug 17 21:00	46.2%
September 2020	676	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.3	0.4	Sep 23	1.4	Sep 23 07:00	98.6%
October 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.4	Oct 09	0.8	Oct 08 23:00	100.0%
November 2020	686	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3	0.5	Nov 23	1.3	Nov 21 22:00	100.0%
December 2020	703	97.3%	2.7%	0.0%	0.0%	0.0%	0.0%	0.3	0.9	Jan 00	1.7	Dec 31 16:00	99.2%
<b>Annual</b>	<b>7890</b>	<b>99.5%</b>	<b>0.5%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.3</b>	<b>0.9</b>	<b>Jan 00</b>	<b>2.3</b>	<b>Aug 17 21:00</b>	<b>94.7%</b>

AAAQO Objectives: none

### 13.3 Nitrogen Dioxide (NO<sub>2</sub>) - Wembley 2020 Summary and Frequency Distribution

Nitrogen Dioxide (NO<sub>2</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents 1-hr 172ppb
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	706	38.1%	33.0%	25.6%	3.3%	0.0%	0.0%	10.4	22.1	Jan 23	37.9	Jan 23 20:00	100.0%	0
February 2020	658	68.5%	23.3%	7.6%	0.6%	0.0%	0.0%	5.1	23.2	Feb 19	47.4	Feb 19 20:00	100.0%	0
March 2020	702	77.8%	20.9%	1.3%	0.0%	0.0%	0.0%	3.3	10.4	Mar 08	23.0	Mar 08 20:00	100.0%	0
April 2020	685	91.5%	8.5%	0.0%	0.0%	0.0%	0.0%	1.8	6.0	Apr 03	11.9	Apr 03 01:00	100.0%	0
May 2020	701	98.9%	1.1%	0.0%	0.0%	0.0%	0.0%	1.4	2.6	May 05	7.2	May 05 10:00	99.2%	0
June 2020	683	96.3%	3.7%	0.0%	0.0%	0.0%	0.0%	1.4	2.9	Jun 20	13.2	Jun 20 01:00	100.0%	0
July 2020	708	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	1.2	2.6	Jul 30	7.1	Jul 30 04:00	100.0%	0
August 2020	692	97.0%	3.0%	0.0%	0.0%	0.0%	0.0%	1.5	2.7	Aug 18	14.8	Aug 19 05:00	97.8%	0
September 2020	675	93.3%	6.7%	0.0%	0.0%	0.0%	0.0%	1.8	4.5	Sep 23	10.7	Sep 22 05:00	98.5%	0
October 2020	707	94.9%	5.1%	0.0%	0.0%	0.0%	0.0%	1.9	4.5	Oct 09	8.4	Oct 09 16:00	100.0%	0
November 2020	679	64.2%	26.1%	9.4%	0.3%	0.0%	0.0%	5.6	16.0	Nov 20	30.9	Nov 29 22:00	99.3%	0
December 2020	696	64.9%	30.5%	4.5%	0.1%	0.0%	0.0%	5.0	11.5	Jan 00	32.5	Dec 02 18:00	98.5%	0
<b>Annual</b>	<b>8292</b>	<b>82.1%</b>	<b>13.5%</b>	<b>4.0%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>3.4</b>	<b>MAXIMUM VALUES</b>				<b>99.4%</b>	<b>0</b>

AAAQO Objectives: Annual: 24ppb, 1-Hr: 159ppb

### 13.4 Nitric Oxide (NO) - Wembley 2020 Summary and Frequency Distribution

Nitric Oxide (NO) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	706	86.8%	9.9%	3.1%	0.1%	0.0%	0.0%	2.1	7.5	Jan 29	30.1	Jan 07 16:00	100.0%
February 2020	658	95.1%	4.4%	0.5%	0.0%	0.0%	0.0%	0.9	6.3	Feb 19	17.3	Feb 19 20:00	100.0%
March 2020	702	97.7%	2.3%	0.0%	0.0%	0.0%	0.0%	0.7	2.5	Mar 08	13.4	Mar 20 11:00	100.0%
April 2020	685	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.3	1.3	Apr 04	6.0	Apr 06 13:00	100.0%
May 2020	701	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.9	May 20	9.8	May 20 08:00	99.2%
June 2020	683	99.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.2	0.6	Jun 19	6.6	Jun 12 06:00	100.0%
July 2020	708	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2	0.6	Jul 27	2.4	Jul 05 07:00	100.0%
August 2020	692	99.1%	0.7%	0.1%	0.0%	0.0%	0.0%	0.3	1.1	Aug 19	18.2	Aug 19 05:00	97.8%
September 2020	675	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.4	1.7	Sep 22	13.7	Sep 22 05:00	98.5%
October 2020	707	99.9%	0.0%	0.1%	0.0%	0.0%	0.0%	0.4	1.5	Oct 13	18.2	Oct 13 10:00	100.0%
November 2020	679	95.9%	3.8%	0.3%	0.0%	0.0%	0.0%	0.9	2.8	Nov 24	20.7	Nov 13 10:00	99.3%
December 2020	696	98.9%	1.0%	0.1%	0.0%	0.0%	0.0%	0.5	1.4	Jan 00	15.2	Dec 15 19:00	98.5%
<b>Annual</b>	<b>8292</b>	<b>97.6%</b>	<b>2.0%</b>	<b>0.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.6</b>	<b>MAXIMUM VALUES</b>				<b>99.4%</b>

AAAQO Objectives: none

### 13.5 Oxides of Nitrogen (NO<sub>x</sub>) - Wembley 2020 Summary and Frequency Distribution

Oxides of Nitrogen (NO<sub>x</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)
		0 to 5 (ppb)	5 to 15 (ppb)	15 to 30 (ppb)	30 to 100 (ppb)	100 to 159 (ppb)	> 159 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date	
January 2020	706	32.7%	31.6%	27.3%	8.4%	0.0%	0.0%	12.6	27.9	Jan 29	57.7	Jan 23 20:00	100.0%
February 2020	658	65.0%	22.9%	10.8%	1.2%	0.0%	0.0%	6.0	29.8	Feb 19	65.2	Feb 19 20:00	100.0%
March 2020	702	70.5%	27.8%	1.7%	0.0%	0.0%	0.0%	4.0	13.1	Mar 08	23.9	Mar 08 20:00	100.0%
April 2020	685	88.8%	11.2%	0.0%	0.0%	0.0%	0.0%	2.0	7.2	Apr 03	14.4	Apr 06 13:00	100.0%
May 2020	701	97.3%	2.6%	0.1%	0.0%	0.0%	0.0%	1.6	3.4	May 05	16.6	May 20 08:00	99.2%
June 2020	683	94.7%	5.1%	0.1%	0.0%	0.0%	0.0%	1.6	3.4	Jun 20	17.1	Jun 20 01:00	100.0%
July 2020	708	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	1.4	3.0	Jul 30	9.0	Jul 30 04:00	100.0%
August 2020	692	94.4%	5.1%	0.4%	0.1%	0.0%	0.0%	1.8	3.8	Aug 19	33.1	Aug 19 05:00	97.8%
September 2020	675	90.2%	9.6%	0.1%	0.0%	0.0%	0.0%	2.1	5.6	Sep 23	24.4	Sep 22 05:00	98.5%
October 2020	707	90.9%	8.9%	0.1%	0.0%	0.0%	0.0%	2.3	5.7	Oct 09	24.7	Oct 13 10:00	100.0%
November 2020	679	58.9%	28.6%	11.2%	1.3%	0.0%	0.0%	6.6	18.5	Nov 20	40.3	Nov 19 22:00	99.3%
December 2020	696	59.9%	33.2%	6.5%	0.4%	0.0%	0.0%	5.6	13.1	Jan 00	38.3	Dec 02 18:00	98.5%
<b>Annual</b>	<b>8292</b>	<b>78.5%</b>	<b>15.7%</b>	<b>4.9%</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.0</b>	<b>29.8</b>	<b>MAXIMUM VALUES</b>			<b>99.4%</b>

AAAQO Objectives: none

### 13.6 Ozone (O<sub>3</sub>) - Wembley 2020 Summary and Frequency Distribution

Ozone (O<sub>3</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppb)	MAXIMUM VALUES				Operational time (%)	Reportable Incidents 1-hr 76ppb
		0 to 10 (ppb)	10 to 20 (ppb)	20 to 40 (ppb)	40 to 60 (ppb)	60 to 76 (ppb)	> 76 (ppb)		24-hr (ppb)	Date	1-hr (ppb)	Date		
January 2020	679	20.8%	24.4%	47.1%	7.7%	0.0%	0.0%	21.4	41.6	Jan 30	45.2	Jan 30 16:00	96.4%	0
February 2020	662	2.7%	6.2%	58.6%	32.5%	0.0%	0.0%	34.2	48.3	Feb 21	50.3	Feb 21 04:00	100.0%	0
March 2020	707	0.0%	3.7%	52.5%	43.8%	0.0%	0.0%	37.3	50.0	Mar 26	52.0	Mar 26 09:00	100.0%	0
April 2020	687	0.0%	0.3%	25.6%	73.9%	0.1%	0.0%	43.1	49.7	Apr 15	60.8	Apr 29 18:00	100.0%	0
May 2020	706	2.0%	16.0%	56.9%	25.1%	0.0%	0.0%	32.0	41.3	May 06	58.5	May 05 18:00	99.6%	0
June 2020	686	3.4%	20.0%	71.9%	4.8%	0.0%	0.0%	26.7	35.8	Jun 11	45.8	Jun 25 19:00	100.0%	0
July 2020	710	6.5%	43.9%	48.9%	0.7%	0.0%	0.0%	20.3	27.5	Jul 31	48.0	Jul 27 19:00	100.0%	0
August 2020	701	7.7%	22.7%	67.3%	2.3%	0.0%	0.0%	23.5	28.7	Aug 04	46.5	Aug 05 13:00	98.9%	0
September 2020	676	14.9%	32.2%	50.7%	2.1%	0.0%	0.0%	20.9	33.6	Sep 28	46.7	Sep 28 15:00	98.5%	0
October 2020	708	5.5%	24.7%	67.7%	2.1%	0.0%	0.0%	24.7	37.1	Oct 06	42.0	Oct 04 16:00	100.0%	0
November 2020	686	12.1%	29.7%	57.6%	0.6%	0.0%	0.0%	22.0	36.5	Nov 27	40.5	Nov 01 01:00	100.0%	0
December 2020	704	6.5%	27.4%	58.2%	7.8%	0.0%	0.0%	26.0	41.4	Dec 24	45.7	Dec 24 01:00	99.3%	0
<b>Annual</b>	<b>8312</b>	<b>6.8%</b>	<b>20.9%</b>	<b>55.3%</b>	<b>16.9%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>27.7</b>	<b>50.0</b>	<b>MAXIMUM VALUES</b>			<b>99.4%</b>	<b>0</b>

AAAQO Objectives: 1-Hr: 76ppb

## 13.7 Particulate Matter (PM<sub>2.5</sub>) - Wembley 2020 Summary and Frequency Distribution

Particulate Matter (PM<sub>2.5</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (µg/m <sup>3</sup> )	MAXIMUM VALUES				Operational time (%)	Reportable Incidents	
		0 to 2 (µg/m <sup>3</sup> )	2 to 4 (µg/m <sup>3</sup> )	4 to 10 (µg/m <sup>3</sup> )	10 to 20 (µg/m <sup>3</sup> )	20 to 29 (µg/m <sup>3</sup> )	> 29 (µg/m <sup>3</sup> )		24-hr (µg/m <sup>3</sup> )	Date	1-hr (µg/m <sup>3</sup> )	Date		24-hr 29 µg/m <sup>3</sup>	1-hr 80 µg/m <sup>3</sup>
January 2020	716	39.8%	29.7%	26.1%	4.3%	0.0%	0.0%	3.4	8.0	Jan 25	14.9	Jan 24 00:00	96.6%	0	0
February 2020	675	68.9%	21.9%	8.9%	0.3%	0.0%	0.0%	1.4	5.1	Feb 18	10.8	Feb 19 20:00	97.3%	0	0
March 2020	723	70.5%	18.3%	9.7%	1.2%	0.1%	0.1%	1.9	7.8	Mar 25	77.1	Mar 25 11:00	97.6%	0	0
April 2020	715	77.3%	11.6%	10.8%	0.3%	0.0%	0.0%	1.4	6.7	Apr 06	13.8	Apr 06 16:00	99.9%	0	0
May 2020	737	66.2%	19.8%	13.2%	0.8%	0.0%	0.0%	1.8	5.7	May 30	13.7	May 31 05:00	99.5%	0	0
June 2020	712	77.0%	16.2%	6.2%	0.7%	0.0%	0.0%	1.3	4.4	Jun 05	15.0	Jun 19 22:00	99.2%	0	0
July 2020	729	75.2%	14.7%	10.2%	0.0%	0.0%	0.0%	1.5	5.9	Jul 31	9.4	Jul 20 11:00	98.3%	0	0
August 2020	720	70.4%	12.6%	14.6%	2.4%	0.0%	0.0%	1.8	10.8	Aug 01	16.1	Aug 01 15:00	97.0%	0	0
September 2020	690	69.3%	14.6%	8.4%	5.9%	0.7%	1.0%	2.9	21.9	Sep 19	50.3	Sep 19 11:00	96.4%	0	0
October 2020	735	67.6%	21.8%	10.3%	0.3%	0.0%	0.0%	1.7	6.0	Oct 03	12.5	Oct 07 16:00	99.2%	0	0
November 2020	692	47.7%	14.5%	24.1%	11.3%	1.9%	0.6%	4.4	16.5	Nov 20	56.5	Nov 21 22:00	96.4%	0	0
December 2020	714	58.3%	17.6%	21.0%	2.9%	0.1%	0.0%	2.5	7.2	Jan 00	20.9	Dec 31 21:00	96.1%	0	0
<b>Annual</b>	<b>8558</b>	<b>65.7%</b>	<b>17.8%</b>	<b>13.6%</b>	<b>2.5%</b>	<b>0.2%</b>	<b>0.1%</b>	<b>2.2</b>	<b>MAXIMUM VALUES</b>				<b>97.8%</b>	<b>0</b>	<b>0</b>

AAAQO Objectives: 24-Hr: 29 µg/m<sup>3</sup>, AAAQG Guideline: 1-Hr: 80 µg/m<sup>3</sup>

## 13.8 Total Hydrocarbons (THC) - Wembley 2020 Summary and Frequency Distribution

Total Hydrocarbons (THC) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	MAXIMUM VALUES				Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)		24-hr (ppm)	Date	1-hr (ppm)	Date	
January 2020	702	0.0%	11.5%	71.9%	16.5%	0.0%	0.0%	2.2	2.8	Jan 25	3.5	Jan 27 11:00	99.3%
February 2020	661	0.0%	5.6%	89.3%	5.1%	0.0%	0.0%	2.1	2.7	Feb 24	3.7	Feb 24 06:00	100.0%
March 2020	701	0.0%	66.8%	31.7%	1.6%	0.0%	0.0%	2.0	2.2	Mar 01	2.8	Mar 01 07:00	99.5%
April 2020	685	0.3%	40.9%	58.0%	0.9%	0.0%	0.0%	2.0	2.2	Apr 06	2.8	Apr 06 08:00	100.0%
May 2020	627	0.0%	13.9%	86.1%	0.0%	0.0%	0.0%	2.1	2.1	May 28	2.4	May 06 07:00	91.1%
June 2020	673	0.0%	18.1%	81.3%	0.6%	0.0%	0.0%	2.1	2.2	Jun 18	2.7	Jun 20 04:00	98.1%
July 2020	709	0.0%	82.9%	16.8%	0.3%	0.0%	0.0%	1.9	2.0	Jul 30	2.6	Jul 27 05:00	100.0%
August 2020	695	0.0%	32.4%	67.3%	0.3%	0.0%	0.0%	2.0	2.2	Aug 28	2.6	Aug 05 06:00	97.8%
September 2020	676	0.0%	31.2%	68.3%	0.4%	0.0%	0.0%	2.1	2.2	Sep 30	2.5	Sep 30 09:00	98.5%
October 2020	702	0.0%	45.0%	54.7%	0.3%	0.0%	0.0%	2.0	2.2	Oct 09	2.7	Oct 25 17:00	99.1%
November 2020	560	0.0%	18.4%	77.7%	3.9%	0.0%	0.0%	2.2	2.4	Nov 20	2.9	Nov 30 10:00	82.2%
December 2020	678	0.1%	9.1%	89.7%	1.0%	0.0%	0.0%	2.1	2.3	Dec 30	2.8	Dec 30 19:00	95.7%
<b>Annual</b>	<b>8069</b>	<b>0.0%</b>	<b>31.3%</b>	<b>66.1%</b>	<b>2.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.1</b>	<b>MAXIMUM VALUES</b>				<b>96.8%</b>

AAAQO Objectives: none

### 13.9 Methane (CH<sub>4</sub>) - Wembley 2020 Summary and Frequency Distribution

Methane (CH<sub>4</sub>) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	24-hr (ppm)	MAXIMUM VALUES			Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)			Date	1-hr (ppm)	Date	
January 2020	702	0.0%	9.1%	75.4%	15.5%	0.0%	0.0%	2.2	2.8	Jan 25	3.0	Jan 26 12:00	99.3%
February 2020	661	0.0%	8.0%	86.8%	5.1%	0.0%	0.0%	2.1	2.6	Feb 24	3.7	Feb 24 06:00	100.0%
March 2020	701	0.0%	68.0%	30.5%	1.4%	0.0%	0.0%	2.0	2.2	Mar 01	2.8	Mar 01 07:00	99.5%
April 2020	685	0.3%	43.2%	55.8%	0.7%	0.0%	0.0%	2.0	2.2	Apr 06	2.8	Apr 06 08:00	100.0%
May 2020	627	0.0%	16.4%	83.6%	0.0%	0.0%	0.0%	2.1	2.1	May 28	2.4	May 06 07:00	91.1%
June 2020	673	0.0%	20.8%	78.6%	0.6%	0.0%	0.0%	2.1	2.2	Jun 18	2.7	Jun 20 04:00	98.1%
July 2020	709	0.0%	84.5%	15.2%	0.3%	0.0%	0.0%	1.9	2.0	Jul 30	2.6	Jul 27 05:00	100.0%
August 2020	695	0.0%	35.7%	64.0%	0.3%	0.0%	0.0%	2.0	2.2	Aug 28	2.6	Aug 05 06:00	98.0%
September 2020	676	0.0%	33.4%	66.1%	0.4%	0.0%	0.0%	2.0	2.2	Sep 30	2.5	Sep 30 09:00	98.5%
October 2020	702	0.0%	47.3%	52.6%	0.1%	0.0%	0.0%	2.0	2.2	Oct 09	2.5	Oct 18 08:00	99.1%
November 2020	560	0.0%	18.8%	78.2%	3.0%	0.0%	0.0%	2.1	2.4	Nov 20	2.9	Nov 30 10:00	82.2%
December 2020	678	0.1%	10.2%	88.6%	1.0%	0.0%	0.0%	2.1	2.3	Dec 30	2.8	Dec 30 19:00	95.7%
<b>Annual</b>	<b>8069</b>	<b>0.0%</b>	<b>33.0%</b>	<b>64.6%</b>	<b>2.4%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>2.1</b>	<b>2.8</b>	<b>MAXIMUM VALUES</b>			<b>96.8%</b>

AAAQO Objectives: none

### 13.10 Non Methane Hydrocarbons (NMHC) - Wembley 2020 Summary and Frequency Distribution

Nonmethane Hydrocarbons (NMHC) Frequency Distribution at Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (ppm)	24-hr (ppm)	MAXIMUM VALUES			Operational time (%)
		0 to 1.5 (ppm)	1.5 to 2 (ppm)	2 to 2.5 (ppm)	2.5 to 5 (ppm)	5 to 10 (ppm)	> 10 (ppm)			Date	1-hr (ppm)	Date	
January 2020	702	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0014	0.03	Jan 27	0.61	Jan 27 11:00	99.3%
February 2020	661	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	Feb 23	0.02	Feb 27 12:00	100.0%
March 2020	701	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	Mar 28	0.00	Mar 11 00:00	99.5%
April 2020	685	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0000	0.00	Apr 02	0.00	Apr 02 15:00	100.0%
May 2020	627	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	May 29	0.01	May 29 06:00	91.1%
June 2020	673	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	Jun 10	0.04	Jun 10 21:00	98.1%
July 2020	709	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	Jul 12	0.00	Jul 11 15:00	100.0%
August 2020	695	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0003	0.00	Aug 12	0.02	Aug 27 20:00	98.0%
September 2020	676	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0003	0.00	Sep 29	0.02	Sep 29 20:00	98.5%
October 2020	702	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0016	0.04	Oct 25	0.61	Oct 25 17:00	99.1%
November 2020	560	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0001	0.00	Nov 29	0.05	Nov 29 16:00	82.2%
December 2020	678	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0003	0.01	Dec 03	0.13	Dec 03 17:00	95.7%
<b>Annual</b>	<b>8069</b>	<b>100.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0004</b>	<b>0.04</b>	<b>MAXIMUM VALUES</b>			<b>96.8%</b>

AAAQO Objectives: none

### 13.11 Temperature (ET) - Wembley 2020 Summary and Frequency Distribution

Temperature (ET) Frequency Distribution at Wembley

Month	Monthly Average (°C)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (°C)	Date	1-hr (°C)	Date	24-hr (°C)	Date	1-hr (°C)	Date	
January 2020	-15.6	2.0	Jan 30	6.1	Jan 30 15:00	-34.8	Jan 15	-38.8	Jan 15 22:00	100.0%
February 2020	-5.9	5.0	Feb 27	8.3	Feb 27 16:00	-19.5	Feb 17	-25.5	Feb 18 08:00	100.0%
March 2020	-8.0	2.6	Mar 02	7.4	Mar 10 15:00	-24.7	Mar 14	-32.9	Mar 14 07:00	100.0%
April 2020	2.2	12.6	Apr 20	18.3	Apr 20 17:00	-16.5	Apr 02	-25.2	Apr 03 06:00	100.0%
May 2020	10.2	17.1	May 30	23.8	May 30 18:00	3.8	May 14	-2.4	May 06 05:00	100.0%
June 2020	14.6	19.9	Jun 19	27.1	Jun 19 20:00	10.6	Jun 07	3.2	Jun 05 05:00	100.0%
July 2020	16.4	21.9	Jul 27	31.4	Jul 27 17:00	12.0	Jul 03	7.0	Jul 26 05:00	100.0%
August 2020	15.2	21.8	Aug 02	29.7	Aug 17 18:00	10.4	Aug 12	3.4	Aug 12 06:00	99.1%
September 2020	11.2	18.4	Sep 10	26.9	Sep 10 17:00	5.6	Sep 14	-3.6	Sep 30 07:00	98.6%
October 2020	1.7	15.8	Oct 04	25.7	Oct 03 16:00	-10.3	Oct 24	-17.6	Oct 25 04:00	100.0%
November 2020	-4.6	10.0	Nov 01	16.4	Nov 02 15:00	-17.5	Nov 19	-21.8	Nov 20 01:00	100.0%
December 2020	-5.7	6.7	Dec 07	8.8	Dec 07 13:00	-20.6	Dec 13	-23.2	Dec 13 08:00	99.3%
	<b>AVERAGE</b> 2.6	<b>21.9</b>	<b>MAXIMUM VALUES</b> Jul 27	<b>31.4</b>	<b>Jul 27 17:00</b>	<b>-34.8</b>	<b>MINIMUM VALUES</b> Jan 15	<b>-38.8</b>	<b>Jan 15 22:00</b>	<b>99.7%</b>

### 13.12 Wind Speed & Wind Direction (WS & WD) - Wembley 2020 Summary and Frequency Distribution

Wind Speed Frequency Distribution of 1-hr Averages - Wembley

Month	Valid Hours	% of Readings in Concentration Range						Monthly Average (km/hr)	MAXIMUM VALUES				Operational time (%)
		0 to 3 (km/hr)	3 to 6 (km/hr)	6 to 12 (km/hr)	12 to 24 (km/hr)	24 to 30 (km/hr)	> 30 (km/hr)		24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	735	21.6%	30.9%	32.4%	13.9%	1.1%	0.1%	7.1	17.9	Jan 02	30.5	Jan 02 06:00	98.8%
February 2020	696	11.4%	25.1%	32.5%	24.4%	5.2%	1.4%	10.0	19.7	Feb 09	32.9	Feb 01 15:00	100.0%
March 2020	744	7.7%	21.6%	36.6%	28.6%	5.4%	0.1%	10.5	21.5	Mar 23	34.2	Mar 27 20:00	100.0%
April 2020	720	7.6%	17.2%	39.9%	30.8%	3.9%	0.6%	11.0	22.2	Apr 21	33.5	Apr 21 16:00	100.0%
May 2020	744	11.8%	15.2%	39.4%	32.5%	1.1%	0.0%	10.1	16.2	May 21	28.7	May 03 13:00	100.0%
June 2020	720	8.2%	25.4%	34.9%	31.1%	0.4%	0.0%	9.7	17.3	Jun 15	24.6	Jun 15 12:00	100.0%
July 2020	744	10.5%	30.2%	37.0%	22.0%	0.3%	0.0%	8.3	16.5	Jul 01	28.7	Jul 01 11:00	100.0%
August 2020	740	15.5%	22.0%	34.5%	25.4%	2.6%	0.0%	9.3	16.7	Aug 08	29.9	Aug 18 17:00	99.5%
September 2020	710	19.4%	29.0%	32.0%	16.9%	2.3%	0.4%	7.8	20.9	Sep 28	32.5	Sep 28 14:00	98.6%
October 2020	744	13.7%	26.7%	36.0%	21.9%	1.2%	0.4%	8.6	16.8	Oct 04	32.5	Oct 05 16:00	100.0%
November 2020	720	20.1%	29.0%	35.0%	15.1%	0.4%	0.3%	7.3	13.6	Nov 10	32.0	Nov 30 16:00	100.0%
December 2020	739	18.1%	33.2%	36.1%	11.6%	0.9%	0.0%	6.8	15.4	Dec 20	27.5	Dec 20 07:00	99.3%
<b>Annual</b>	<b>8756</b>	<b>13.8%</b>	<b>25.5%</b>	<b>35.5%</b>	<b>22.9%</b>	<b>2.1%</b>	<b>0.3%</b>	<b>8.9</b>	<b>22.2</b>	<b>MAXIMUM VALUES</b> Apr 21	<b>34.2</b>	<b>Mar 27 20:00</b>	<b>99.7%</b>

### Wind Speed and Wind Direction Frequency Distribution at Wembley

Direction	Number of Readings	% of wind speed range (km/hr)						Total %
		0 to 3	3 to 6	6 to 12	12 to 24	24 to 30	> 30	
N	299	0.7%	0.8%	1.0%	0.7%	0.1%	0.0%	3.4%
NNE	306	0.8%	0.9%	0.9%	0.7%	0.1%	0.0%	3.5%
NE	243	0.6%	0.6%	1.0%	0.5%	0.0%	0.0%	2.8%
ENE	527	1.1%	1.6%	2.4%	1.0%	0.0%	0.0%	6.0%
E	610	0.8%	2.2%	3.0%	1.0%	0.0%	0.0%	7.0%
ESE	405	0.9%	1.6%	1.3%	0.8%	0.0%	0.0%	4.6%
SE	208	0.7%	0.9%	0.6%	0.1%	0.0%	0.0%	2.4%
SSE	113	0.5%	0.5%	0.3%	0.0%	0.0%	0.0%	1.3%
S	94	0.4%	0.5%	0.1%	0.0%	0.0%	0.0%	1.1%
SSW	123	0.6%	0.6%	0.2%	0.0%	0.0%	0.0%	1.4%
SW	230	0.8%	1.2%	0.7%	0.0%	0.0%	0.0%	2.6%
WSW	612	1.2%	2.0%	2.8%	1.0%	0.0%	0.0%	7.0%
W	1848	1.3%	4.0%	7.9%	6.9%	0.9%	0.1%	21.1%
WNW	2030	1.4%	4.7%	9.2%	7.0%	0.8%	0.1%	23.2%
NW	694	1.2%	2.4%	2.5%	1.9%	0.0%	0.0%	7.9%
NNW	414	1.0%	1.0%	1.5%	1.2%	0.0%	0.0%	4.7%
<b>Total</b>	<b>8,756</b>	<b>13.8%</b>	<b>25.5%</b>	<b>35.5%</b>	<b>22.9%</b>	<b>2.1%</b>	<b>0.3%</b>	<b>100.0%</b>



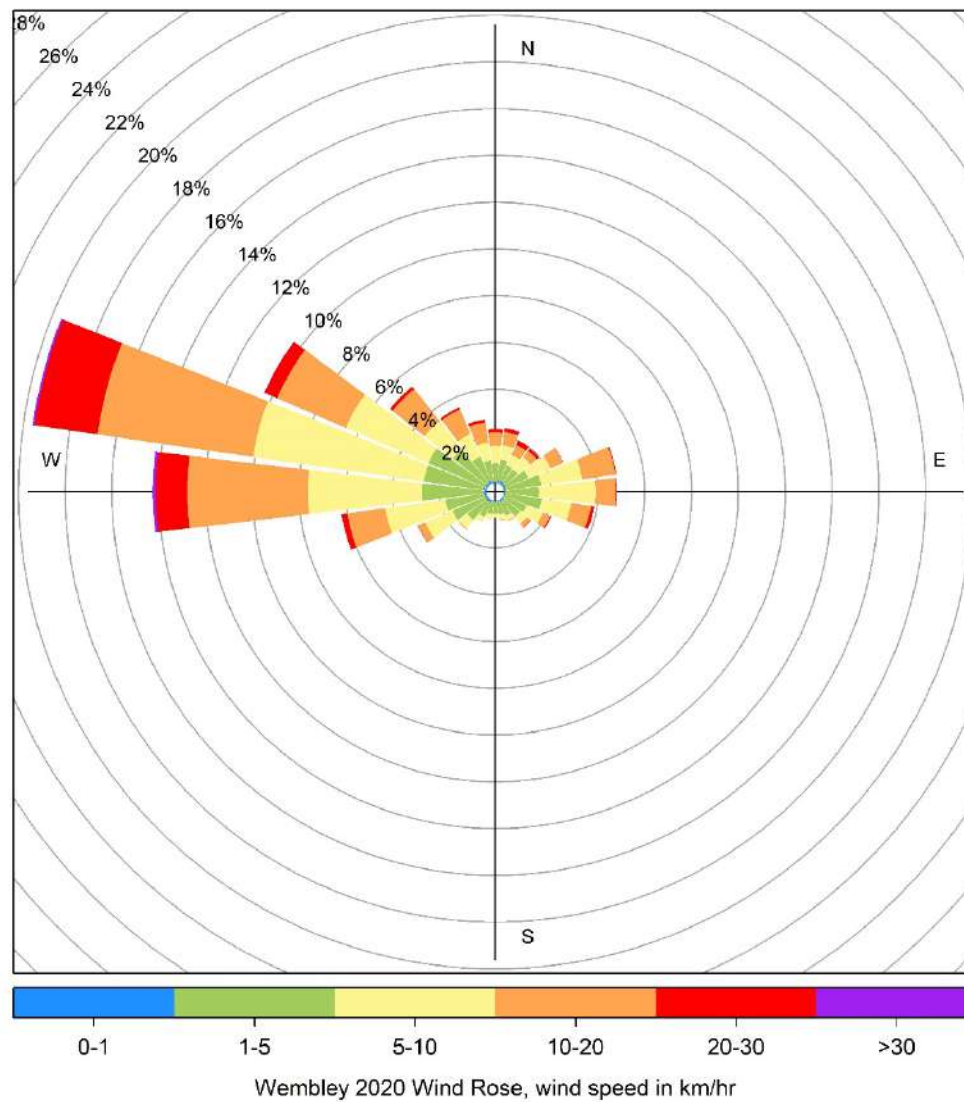
### Wind Speed Standard Deviation (WSSTD) at Wembley

Month	Monthly Average (km/hr)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (km/hr)	Date	1-hr (km/hr)	Date	24-hr (km/hr)	Date	1-hr (km/hr)	Date	
January 2020	2.4	6.7	Jan 15	25.2	Jan 15 08:00	1.5	Jan 22	0.5	Jan 09 01:00	98.8%
February 2020	2.5	4.5	Feb 01	10.5	Feb 14 06:00	1.3	Feb 24	0.5	Feb 18 04:00	100.0%
March 2020	2.5	4.8	Mar 02	25.2	Mar 14 03:00	1.2	Mar 07	0.5	Mar 08 01:00	100.0%
April 2020	2.8	4.9	Apr 21	8.6	Apr 25 21:00	1.4	Apr 01	0.5	Apr 05 00:00	100.0%
May 2020	2.9	4.2	May 26	8.0	May 13 22:00	1.6	May 18	0.5	May 15 01:00	100.0%
June 2020	2.9	4.8	Jun 15	7.5	Jun 10 23:00	1.7	Jun 18	0.4	Jun 19 22:00	100.0%
July 2020	2.6	3.8	Jul 12	8.4	Jul 19 22:00	1.7	Jul 11	0.5	Jul 10 02:00	100.0%
August 2020	2.9	4.4	Aug 08	15.5	Aug 18 16:00	1.4	Aug 16	0.5	Aug 27 23:00	99.6%
September 2020	2.4	5.3	Sep 28	12.4	Sep 06 21:00	1.0	Sep 18	0.5	Sep 15 21:00	98.5%
October 2020	2.3	4.2	Oct 04	9.3	Oct 14 15:00	1.3	Oct 23	0.3	Oct 02 20:00	100.0%
November 2020	2.2	3.5	Nov 30	13.0	Nov 05 04:00	1.4	Nov 21	0.5	Nov 21 15:00	100.0%
December 2020	2.0	3.7	Dec 20	6.5	Dec 07 14:00	1.3	Dec 16	0.5	Dec 27 02:00	99.3%
	<b>AVERAGE</b> 2.5		<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>			
		6.7	Jan 15	25.2	Jan 15 08:00	1.0	Sep 18	0.3	Oct 02 20:00	99.7%

### Wind Direction Standard Deviation (WDSTD) at Wembley

Month	Monthly Average (deg)	Maximum Values				Minimum Values				Operational time (%)
		24-hr (deg)	Date	1-hr (deg)	Date	24-hr (deg)	Date	1-hr (deg)	Date	
January 2020	26.2	52.5	Jan 19	96.0	Jan 25 19:00	6.8	Jan 14	3.0	Jan 04 10:00	100.0%
February 2020	18.8	38.6	Feb 19	97.9	Feb 23 11:00	6.7	Feb 09	2.9	Feb 29 07:00	100.0%
March 2020	15.8	33.0	Mar 15	94.1	Mar 15 11:00	4.6	Mar 23	3.0	Mar 30 23:00	100.0%
April 2020	16.3	35.4	Apr 29	92.6	Apr 25 20:00	8.7	Apr 21	2.1	Apr 11 01:00	100.0%
May 2020	22.0	50.6	May 20	93.1	May 19 23:00	9.7	May 10	3.0	May 11 00:00	100.0%
June 2020	21.1	42.5	Jun 11	98.1	Jun 18 14:00	10.5	Jun 14	3.8	Jun 20 01:00	100.0%
July 2020	21.2	42.8	Jul 27	95.7	Jul 22 02:00	7.2	Jul 01	4.3	Jul 01 02:00	100.0%
August 2020	22.7	42.8	Aug 19	94.5	Aug 19 17:00	11.1	Aug 09	4.6	Aug 01 01:00	99.5%
September 2020	22.9	44.7	Sep 17	93.1	Sep 12 12:00	12.5	Sep 02	3.6	Sep 30 20:00	98.6%
October 2020	18.9	33.3	Oct 09	90.9	Oct 14 02:00	9.0	Oct 04	4.0	Oct 29 18:00	100.0%
November 2020	24.4	52.8	Nov 22	95.4	Nov 03 20:00	8.5	Nov 17	4.7	Nov 19 18:00	100.0%
December 2020	23.6	48.7	Dec 03	95.0	Dec 24 06:00	9.6	Dec 26	0.0	Jan 00 00:00	99.3%
	<b>AVERAGE</b> 21.2		<b>MAXIMUM VALUES</b>				<b>MINIMUM VALUES</b>			
		52.8	Nov 22	98.1	Jun 18 14:00	4.6	Mar 23	0.0	Jan 00 00:00	99.8%

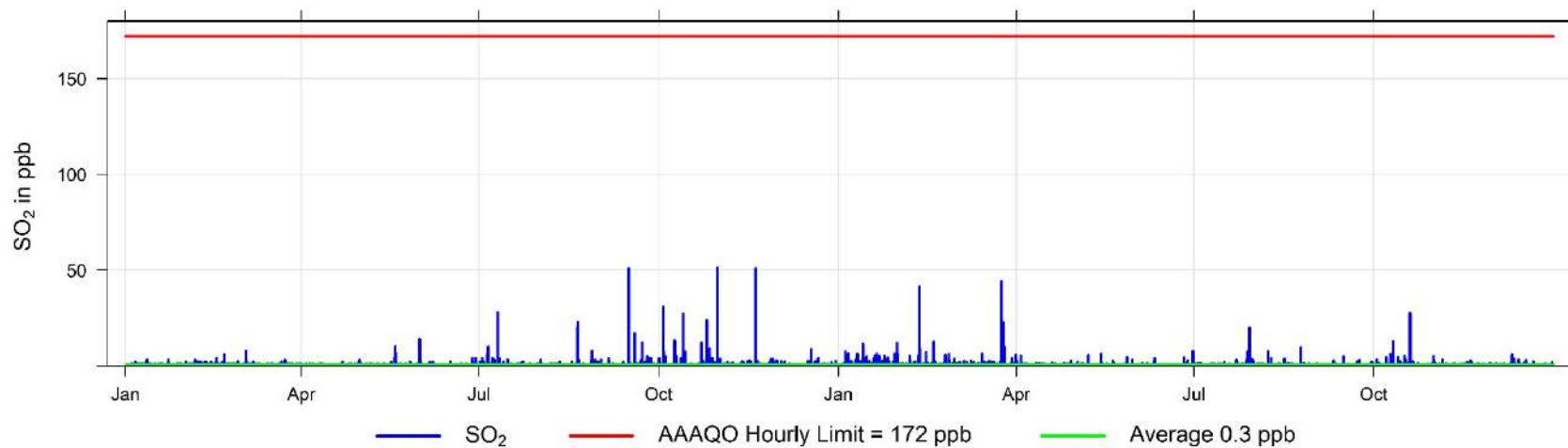
### 13.13 Wind Rose - Wembley 2020 Summary and Frequency Distribution



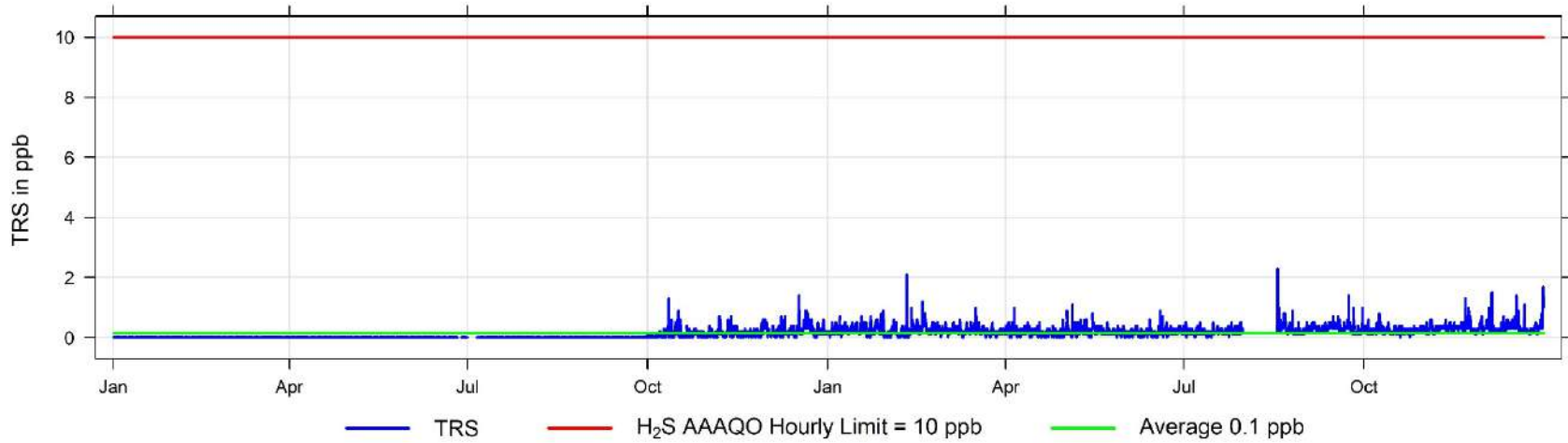
## 14 Wembley Annual Charts, 2010 to 2020

The following pages include the annual charts and hourly charts for Wembley Station.

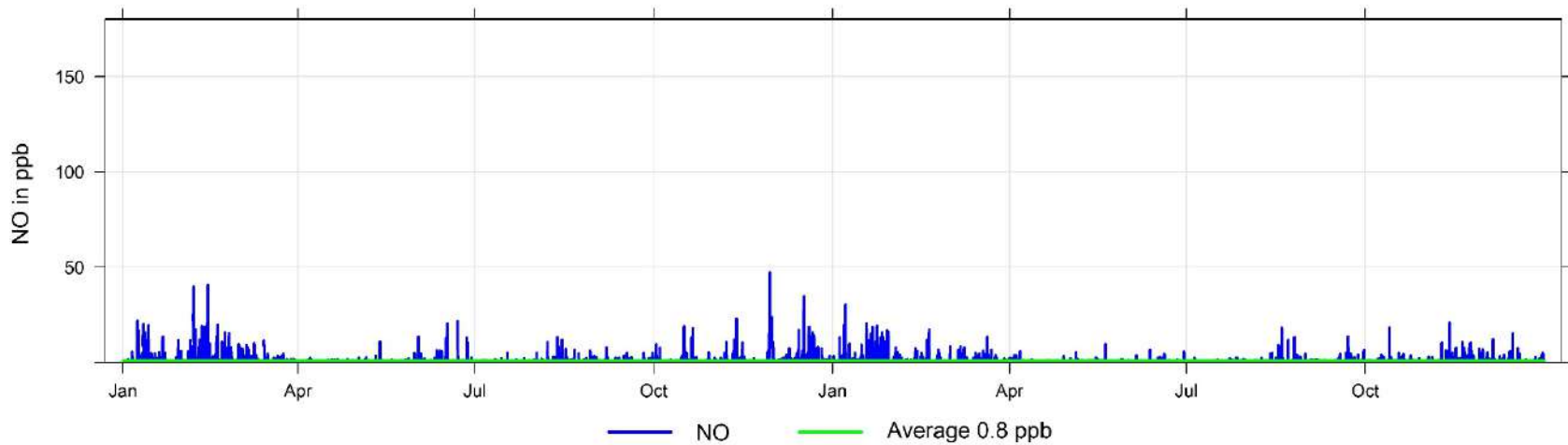
2019 to 2020 Hourly Concentration Readings of SO<sub>2</sub> (in ppb) at Wembley



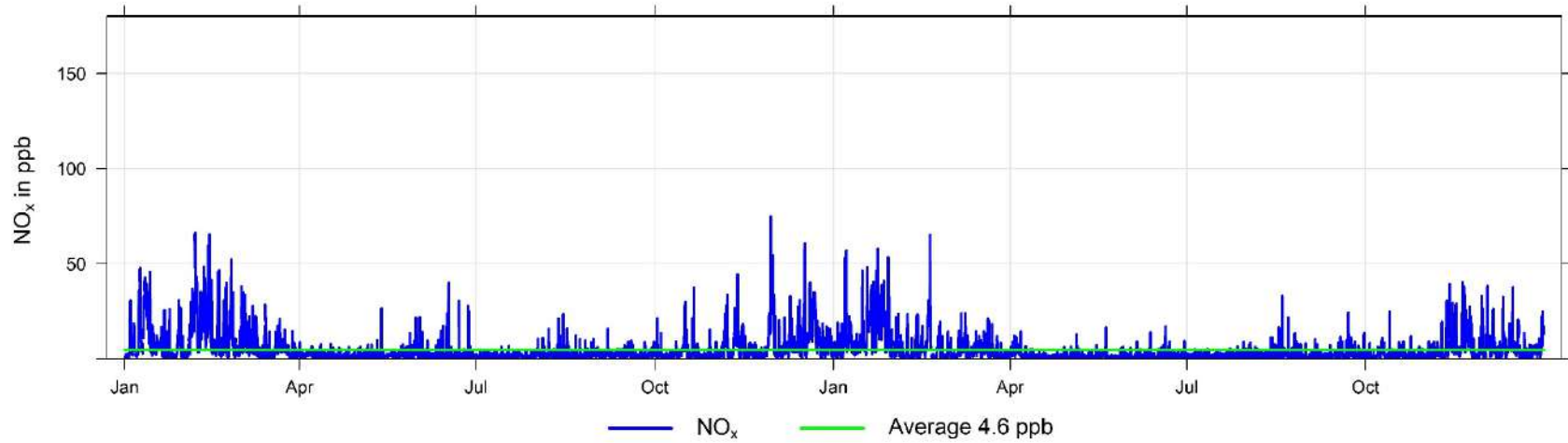
2019 to 2020 Hourly Concentration Readings of TRS (in ppb) at Wembley



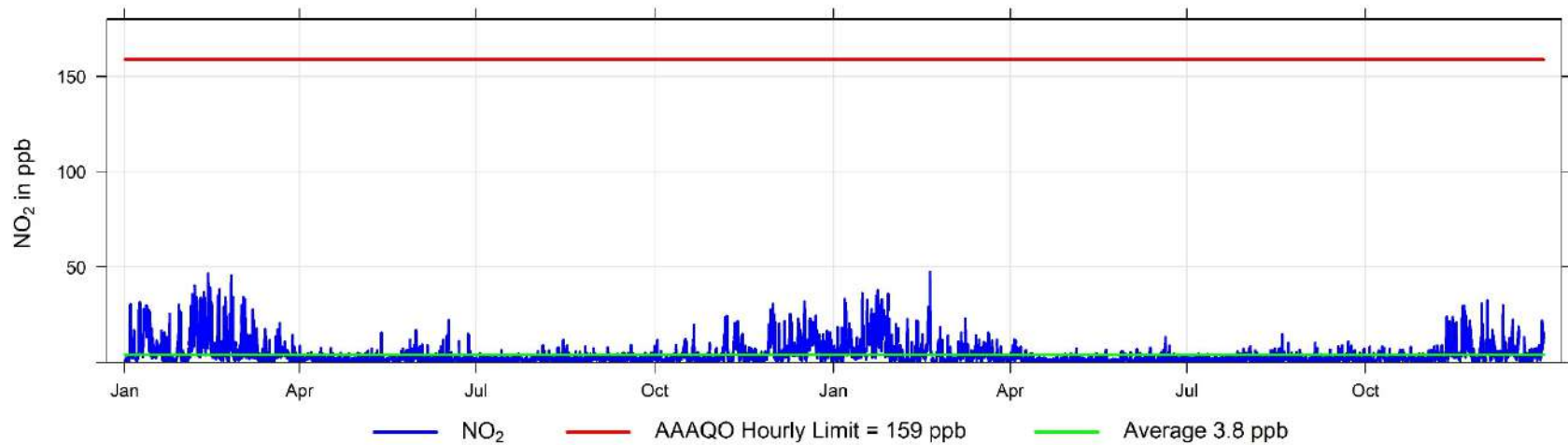
2019 to 2020 Hourly Concentration Readings of NO (in ppb) at Wembley



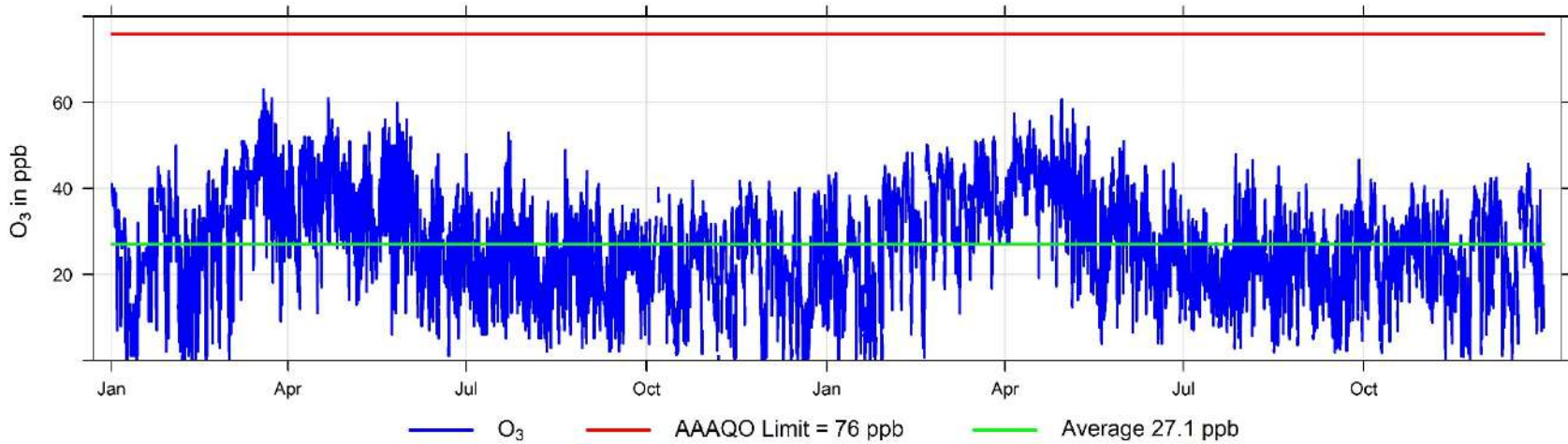
2019 to 2020 Hourly Concentration Readings of NO<sub>x</sub> (in ppb) at Wembley



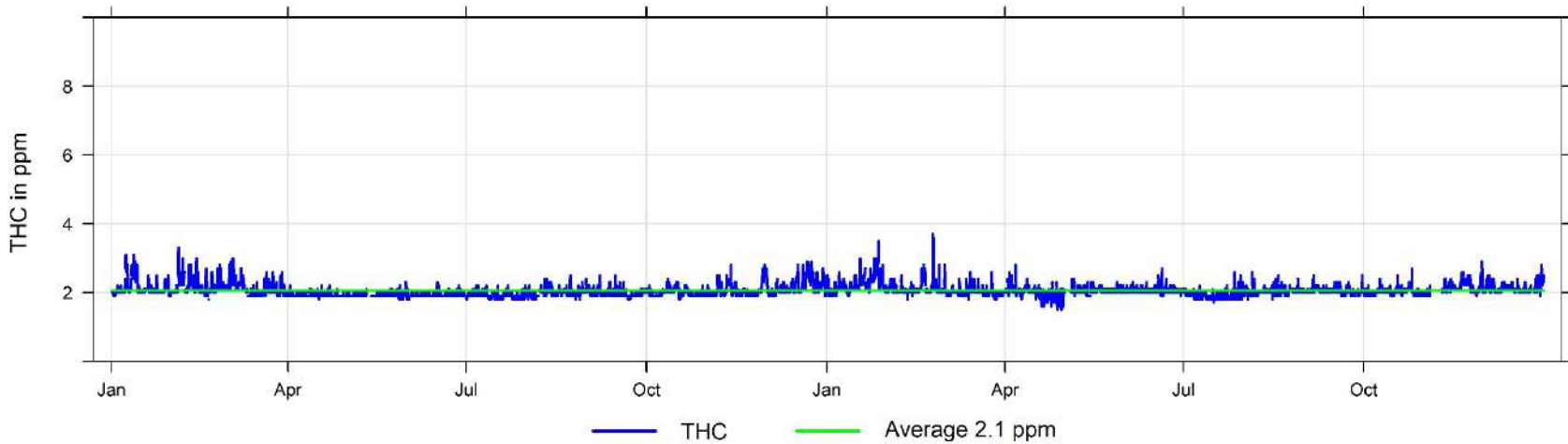
2019 to 2020 Hourly Concentration Readings of NO<sub>2</sub> (in ppb) at Wembley



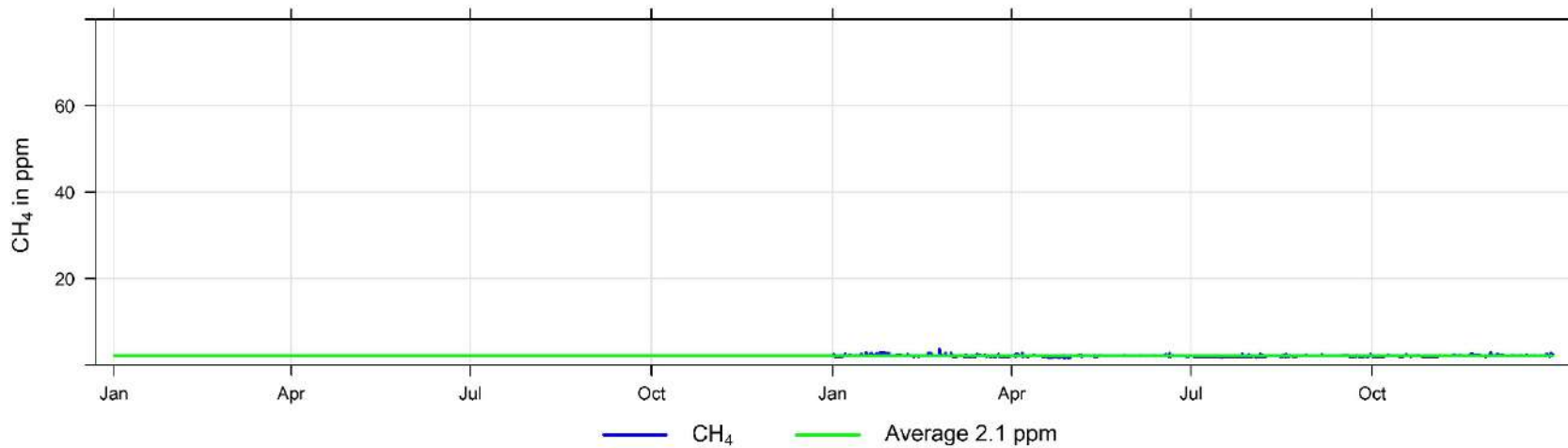
2019 to 2020 Hourly Concentration Readings of O<sub>3</sub> (in ppb) at Wembley



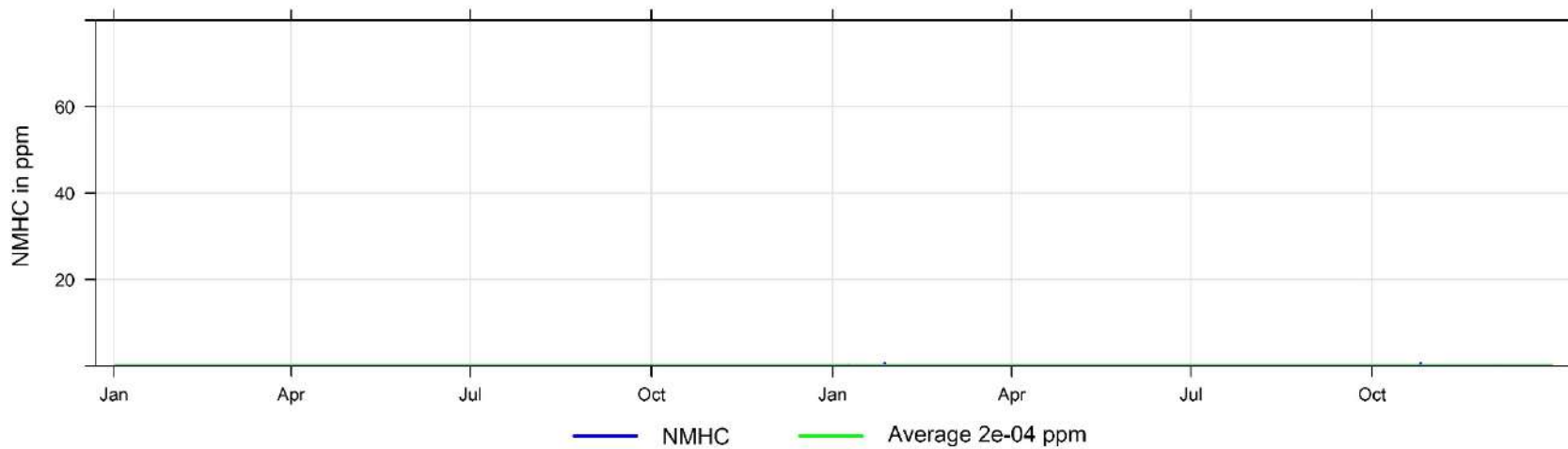
2019 to 2020 Hourly Concentration Readings of THC (in ppm) at Wembley



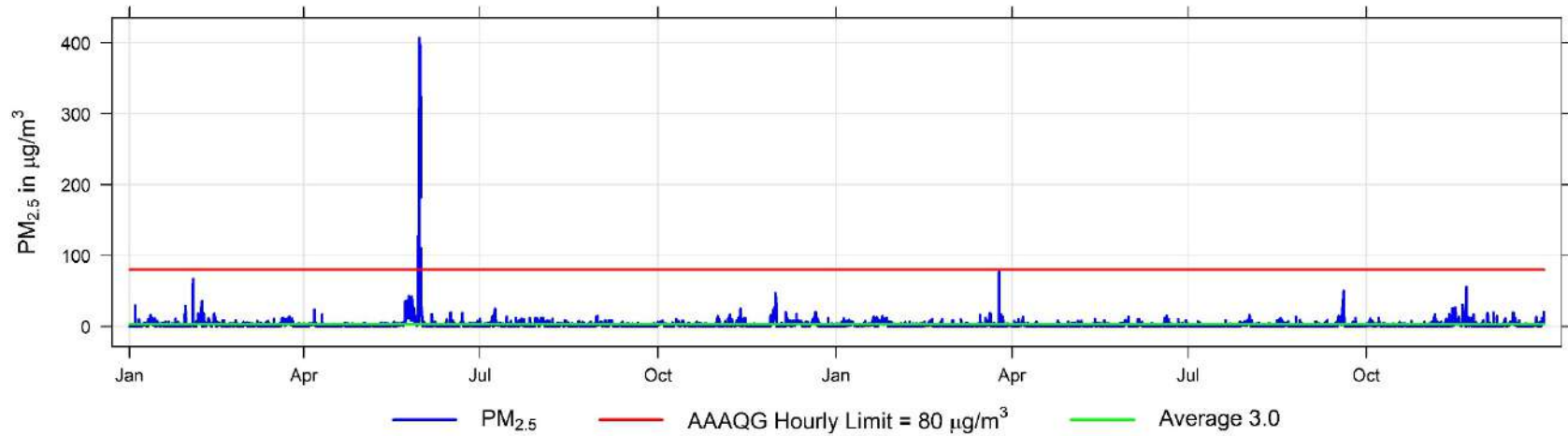
2019 to 2020 Hourly Concentration Readings of CH<sub>4</sub> (in ppm) at Wembley



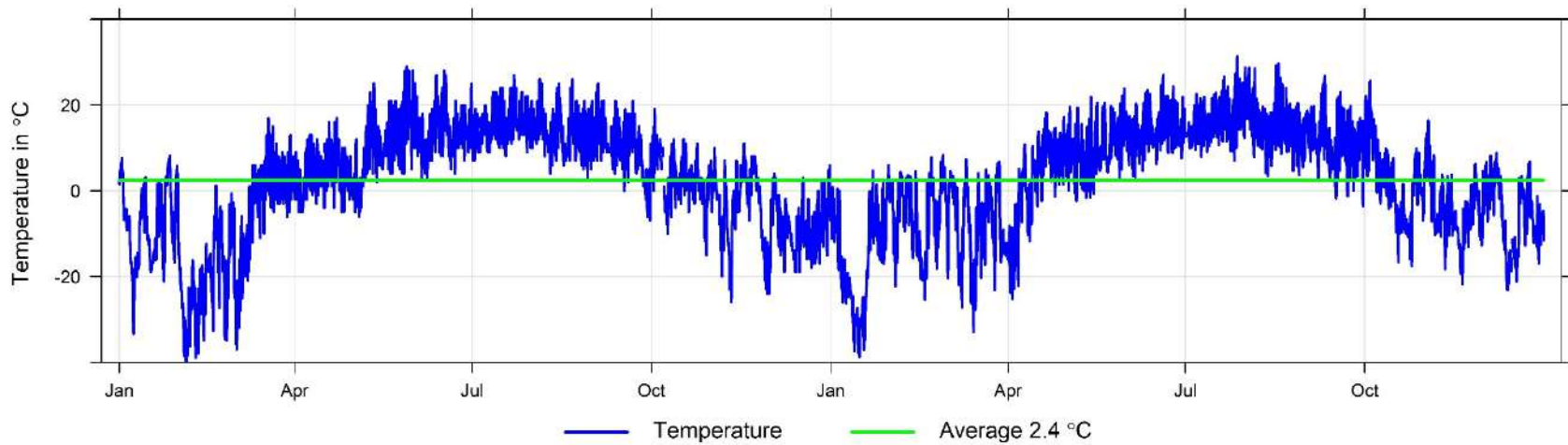
2019 to 2020 Hourly Concentration Readings of NMHC (in ppm) at Wembley



2017 to 2020 Hourly Concentration Readings of PM<sub>2.5</sub> in  $\mu\text{g}/\text{m}^3$  at Wembley

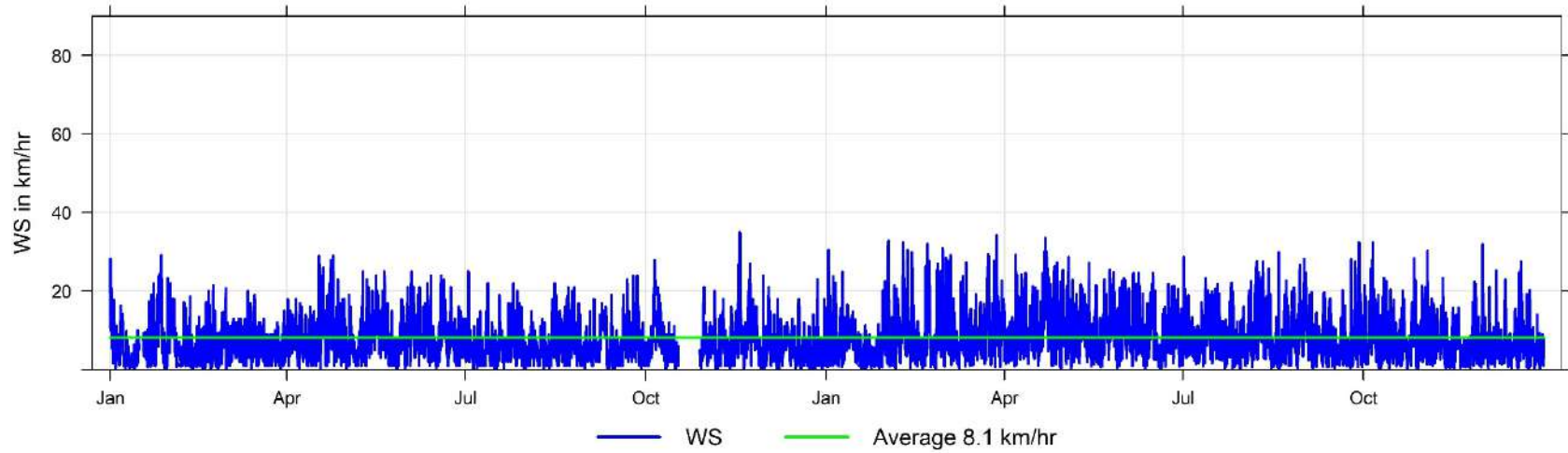


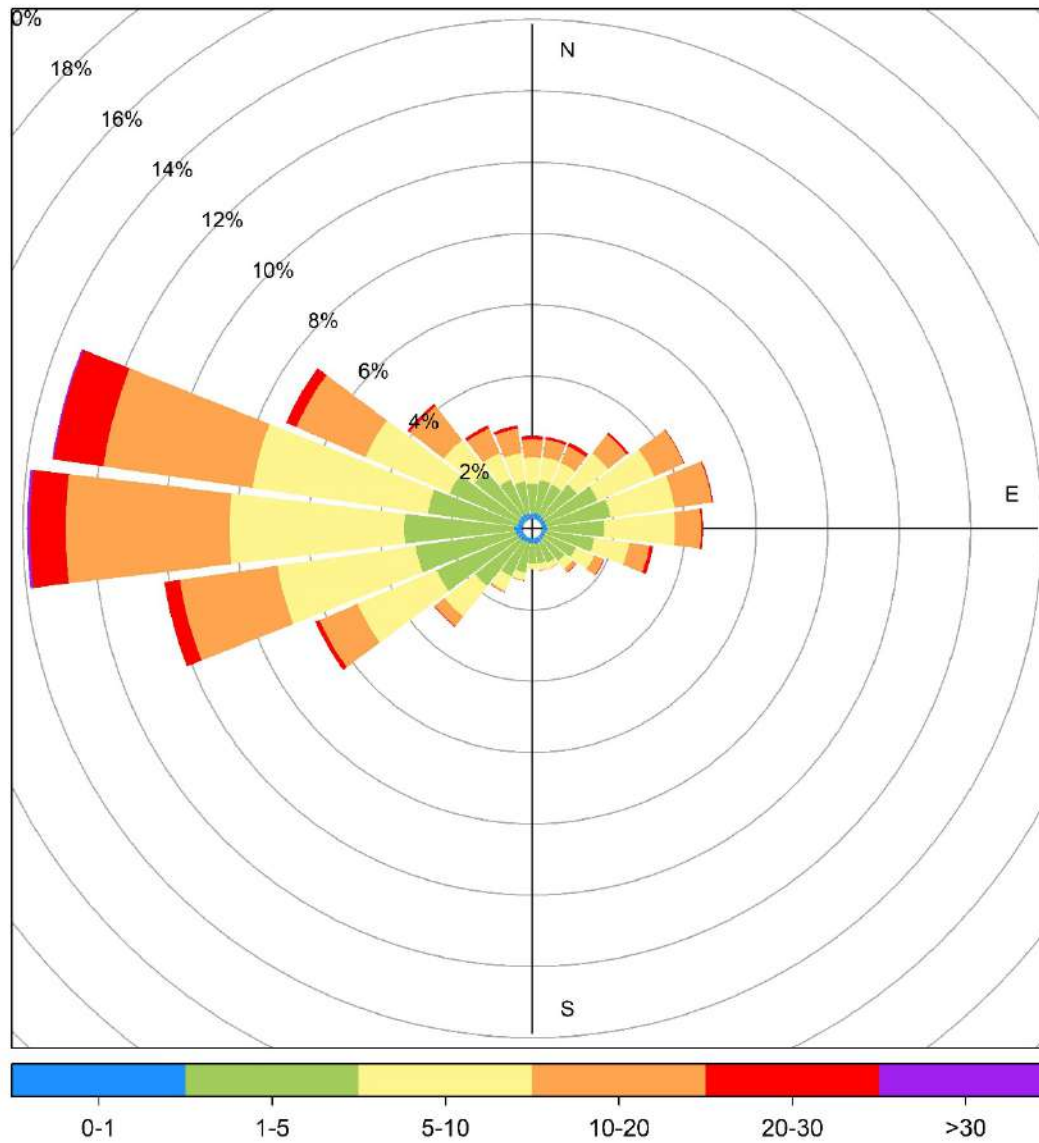
2019 to 2020 Hourly Temperature Readings (in  $^{\circ}\text{C}$ ) at Wembley





2019 to 2020 Hourly Readings of Wind Speed (in km/hr) at Wembley

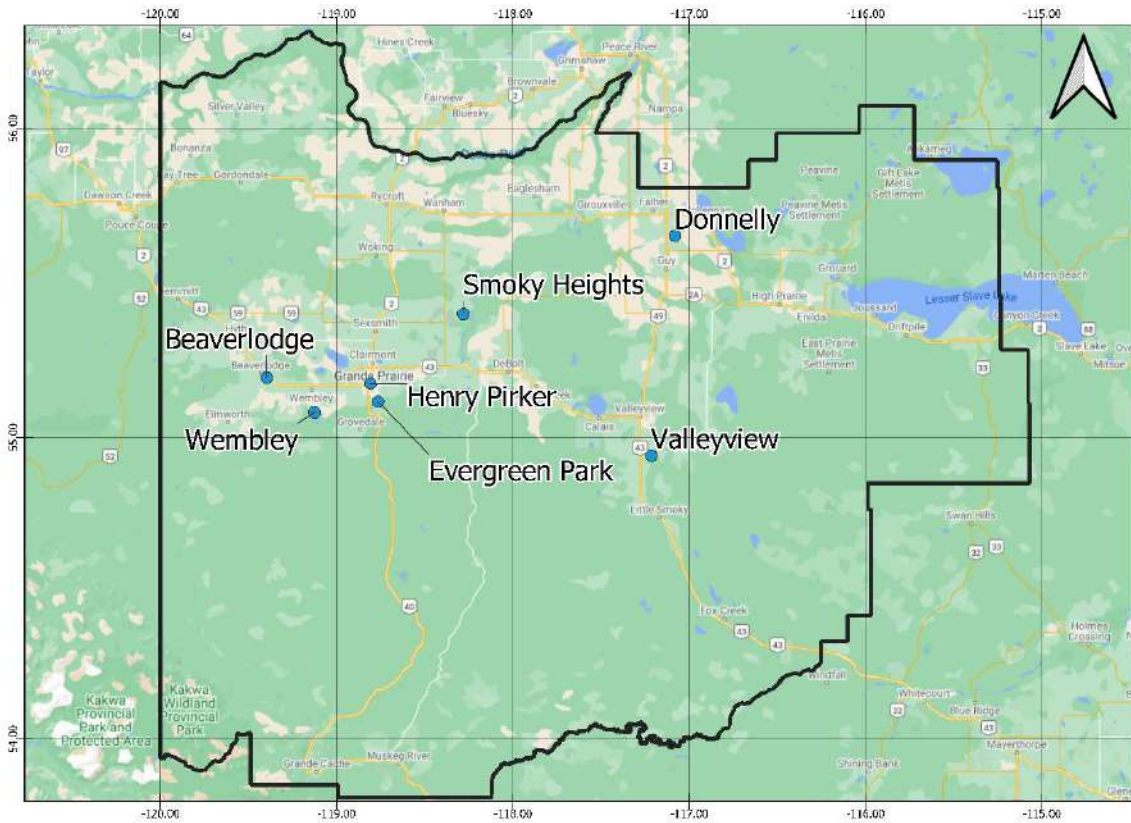
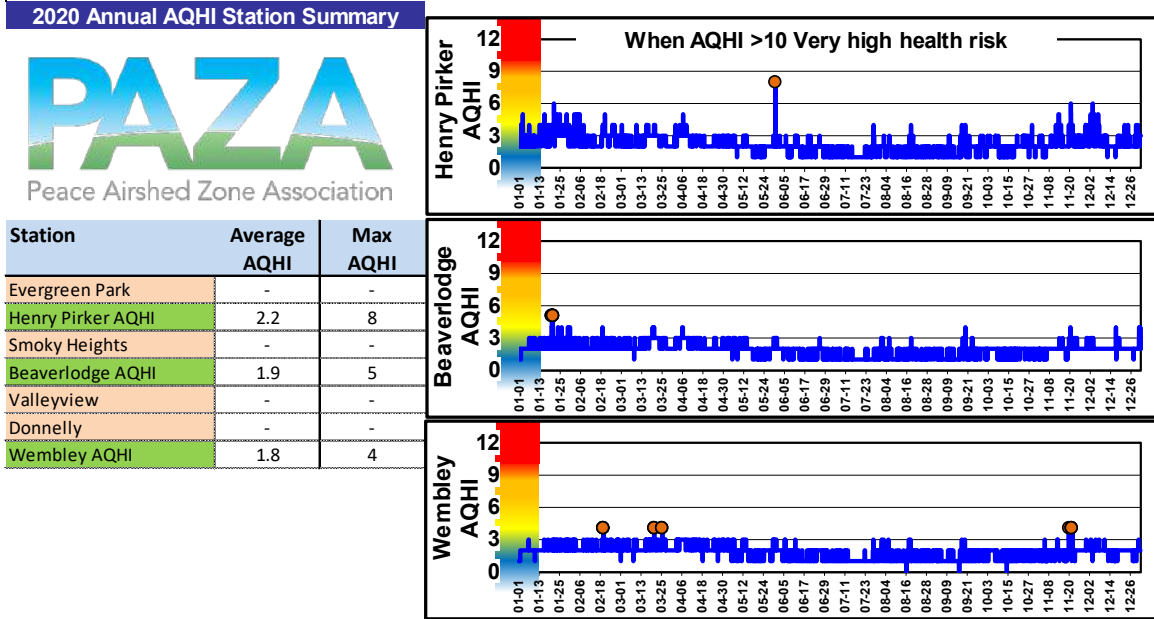




Wembley 2019 to 2020 Wind Rose, wind speed in km/hr

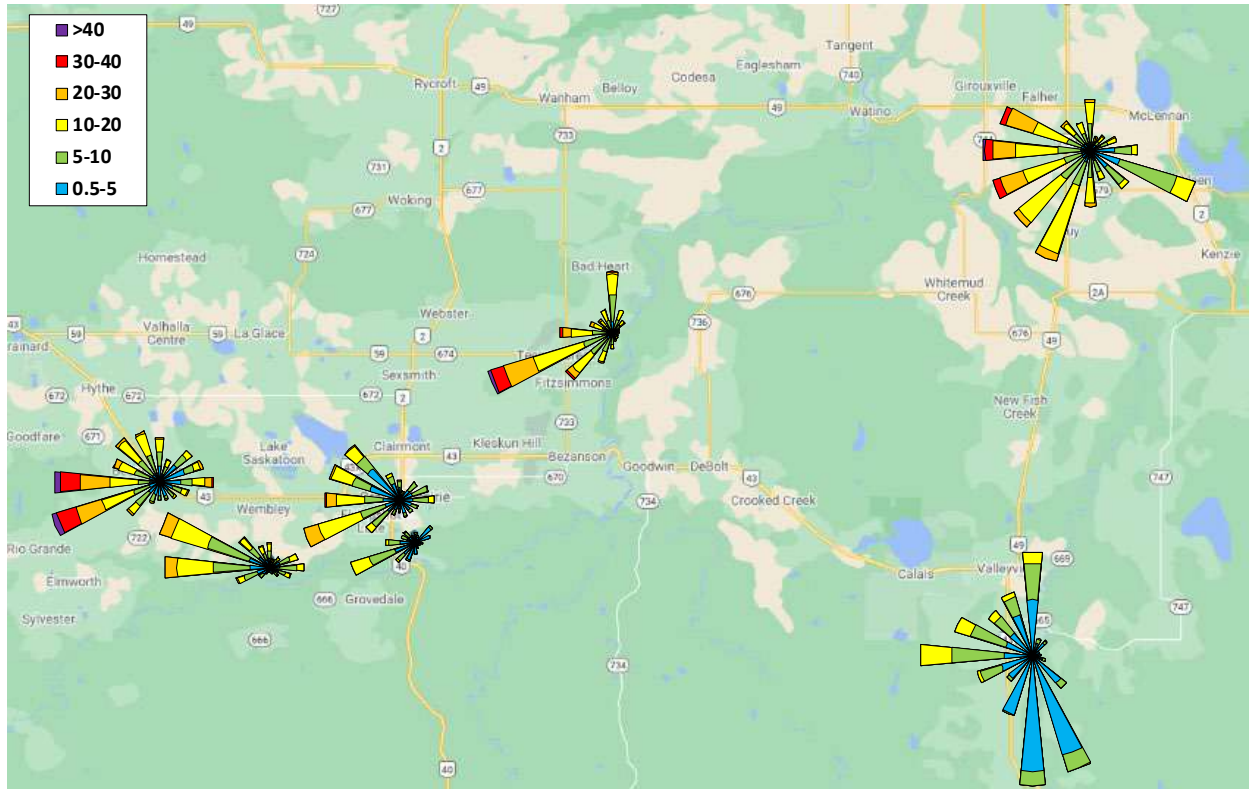
# 15 Concentration Roses for PAZA

## 15.1 2020 AQHI



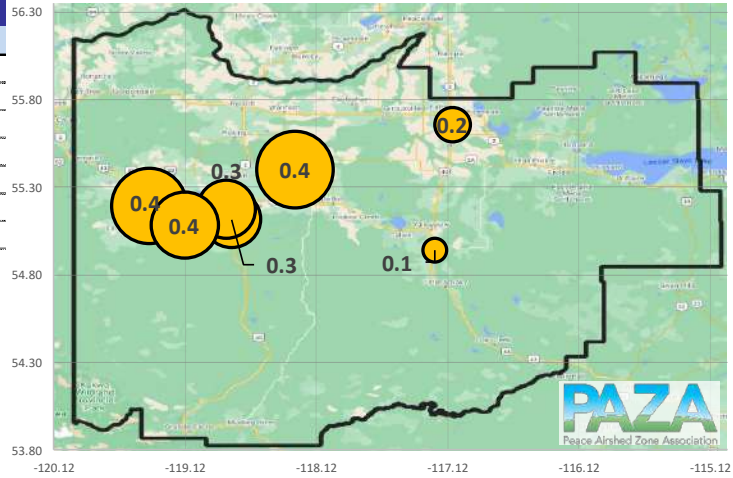
## 15.2 2020 Wind Roses

Wind Roses in km/hr

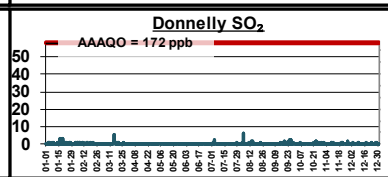
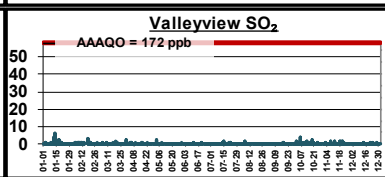
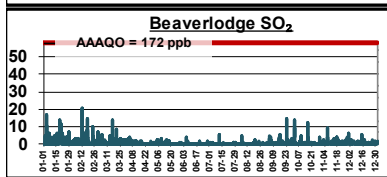
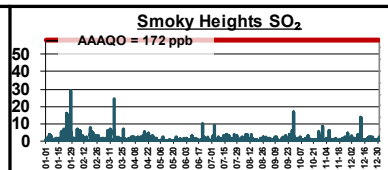
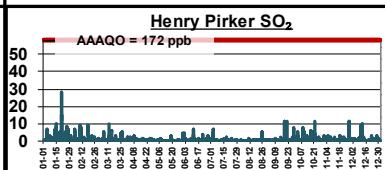
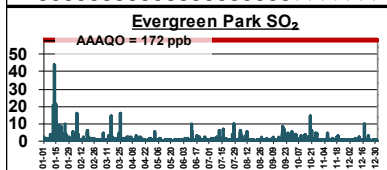
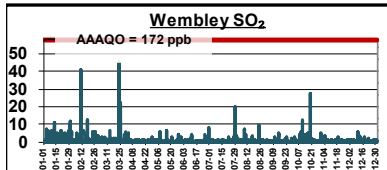


### 15.3 2020 Sulphur Dioxide (SO<sub>2</sub>)

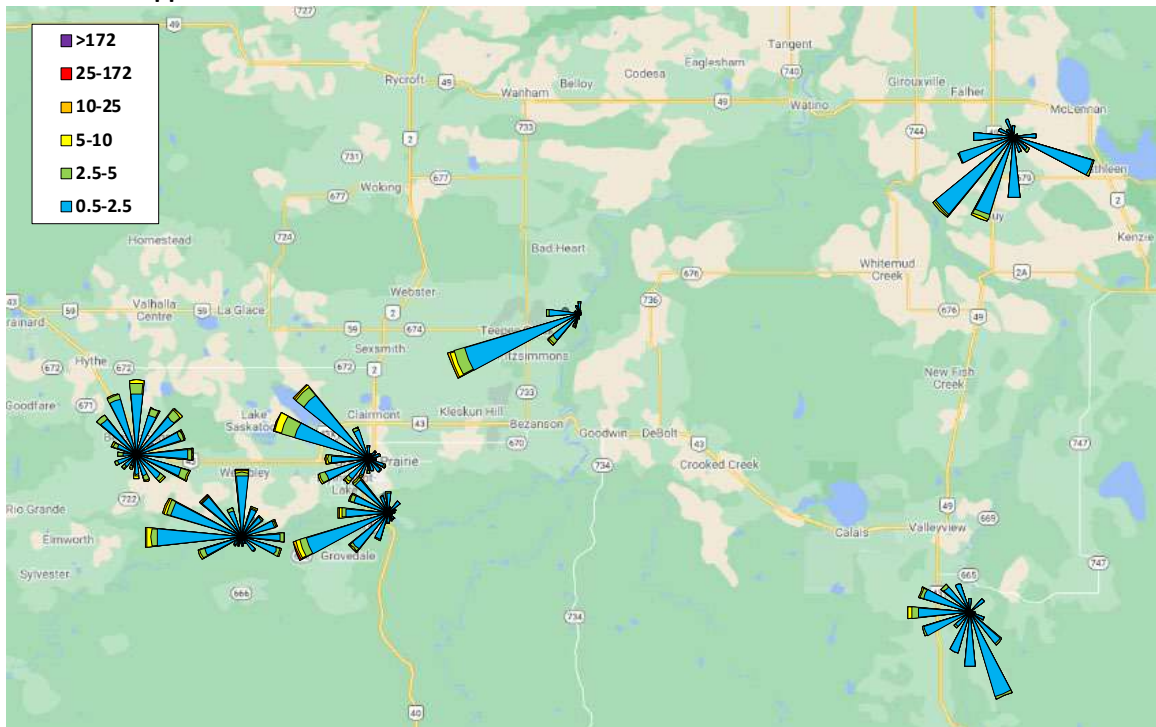
2020 Annual SO <sub>2</sub> Station Summary		
Station	Avg (ppb)	Max (ppb)
Evergreen Park SO <sub>2</sub>	0.3	44.1
Henry Pirker SO <sub>2</sub>	0.3	28.0
Smoky Heights SO <sub>2</sub>	0.4	28.5
Beaverlodge SO <sub>2</sub>	0.4	20.7
Valleyview SO <sub>2</sub>	0.1	6.3
Donnelly SO <sub>2</sub>	0.2	6.6
Wembley SO <sub>2</sub>	0.4	44.4



#### Sulphur Dioxide in ppb

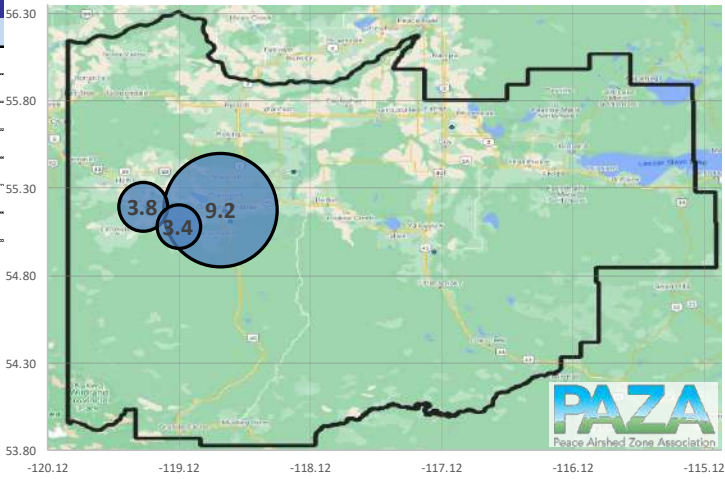


#### SO<sub>2</sub> Roses in ppb

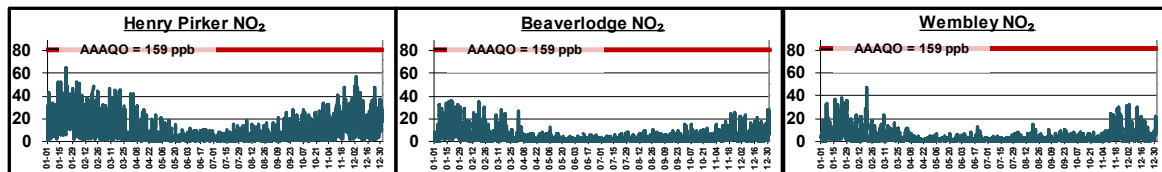


## 15.4 2020 Nitrogen Dioxide (NO<sub>2</sub>)

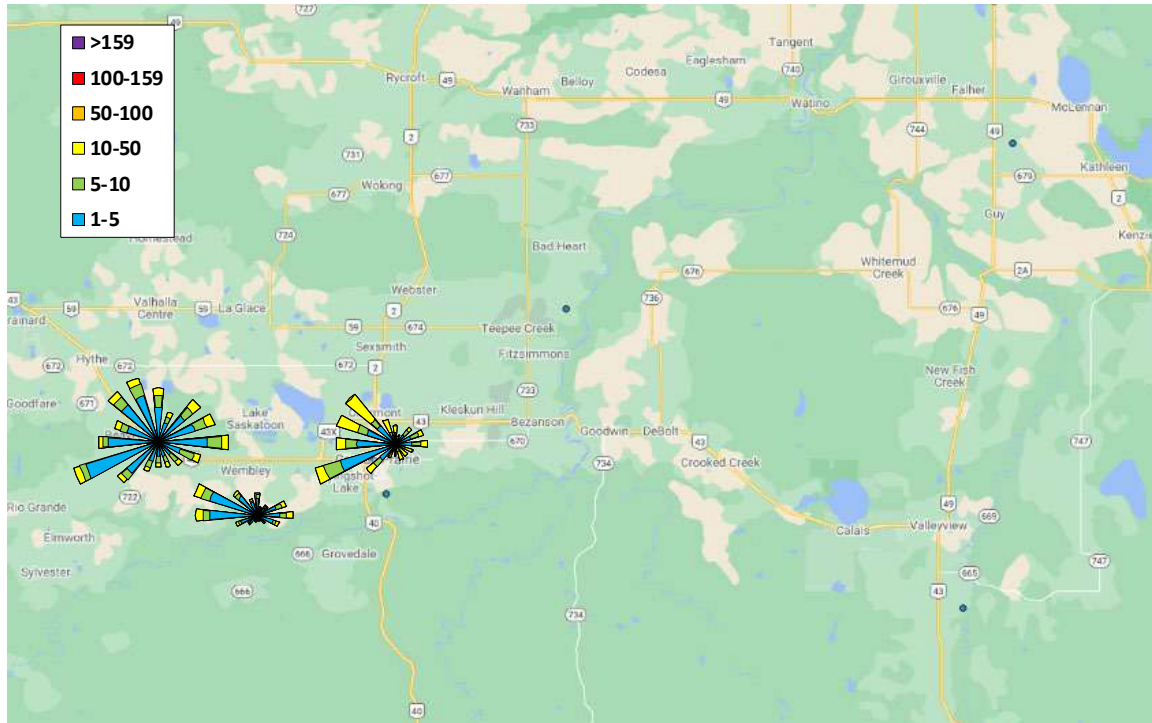
2020 Annual NO <sub>2</sub> Station Summary		
Station	Avg (ppb)	Max (ppb)
Evergreen Park NO <sub>2</sub>	-	-
Henry Pirker NO <sub>2</sub>	9.2	65.1
Smoky Heights NO <sub>2</sub>	-	-
Beaverlodge NO <sub>2</sub>	3.8	36.0
Valleyview NO <sub>2</sub>	-	-
Donnelly NO <sub>2</sub>	-	-
Wembley NO <sub>2</sub>	3.4	47.4



Nitrogen Dioxide in ppb

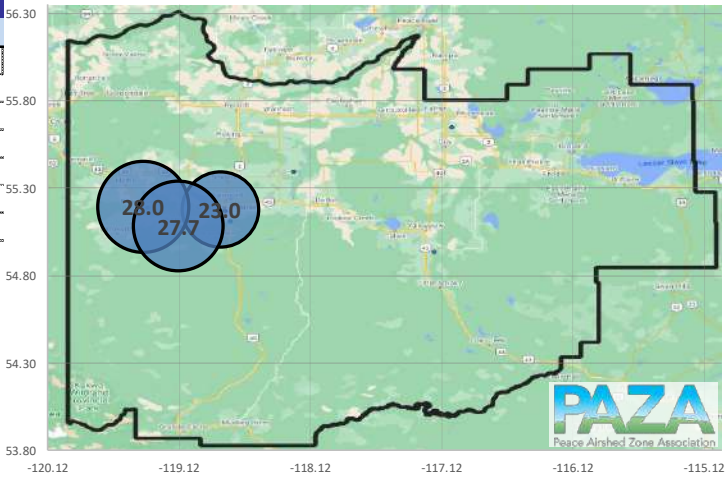


NO<sub>2</sub> Roses in ppb

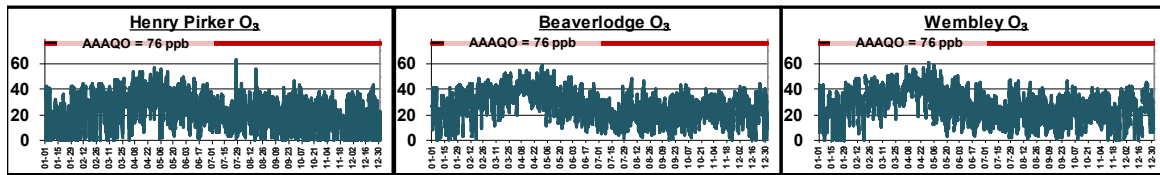


## 15.5 2020 Ozone (O<sub>3</sub>)

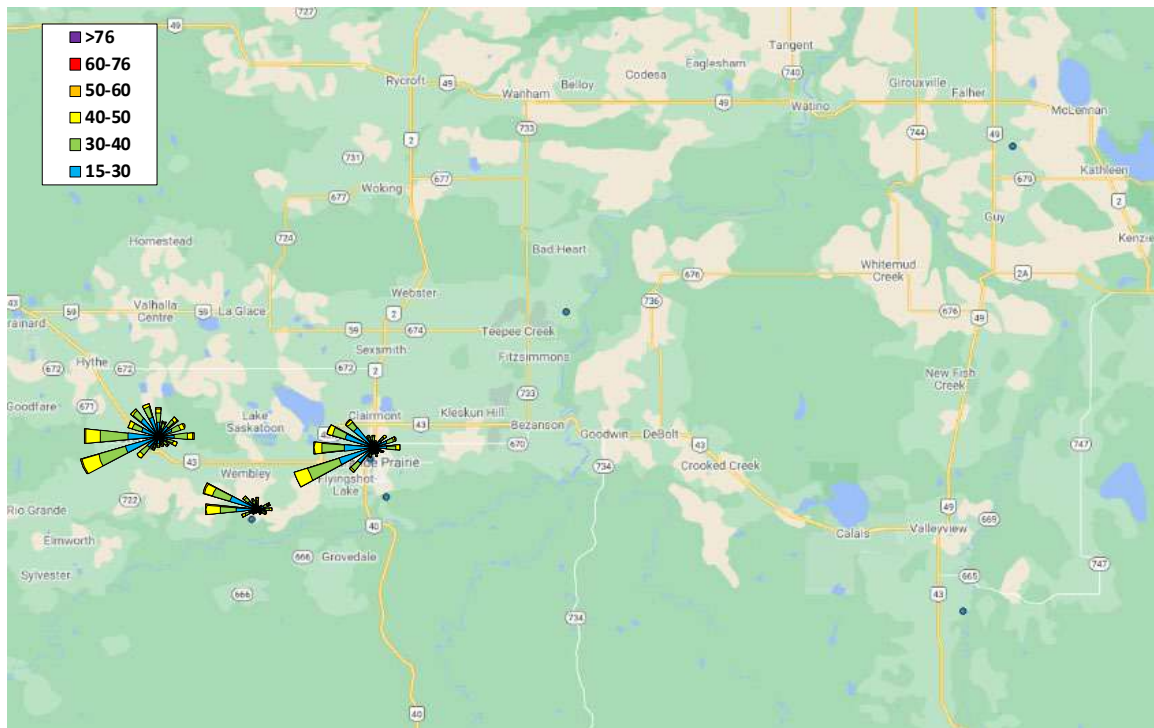
Annual 2020 O <sub>3</sub> Station Summary		
Station	Avg (ppb)	Max (ppb)
Evergreen Park O <sub>3</sub>	-	-
Henry Pirkler O <sub>3</sub>	23.0	62.5
Smoky Heights O <sub>3</sub>	-	-
Beaverlodge O <sub>3</sub>	28.0	58.5
Valleyview O <sub>3</sub>	-	-
Donnelly O <sub>3</sub>	-	-
Wembley O <sub>3</sub>	27.7	60.8



Ozone in ppb

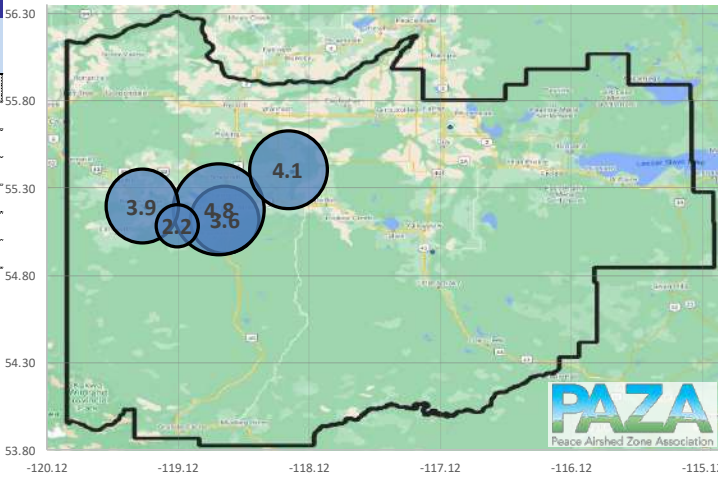


O<sub>3</sub> Roses in ppb

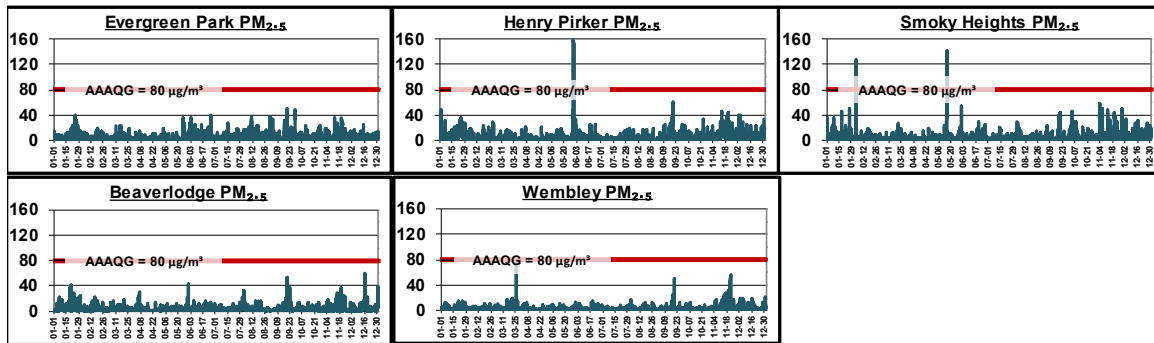


## 15.6 2020 Fine Particulate Matter (PM<sub>2.5</sub>)

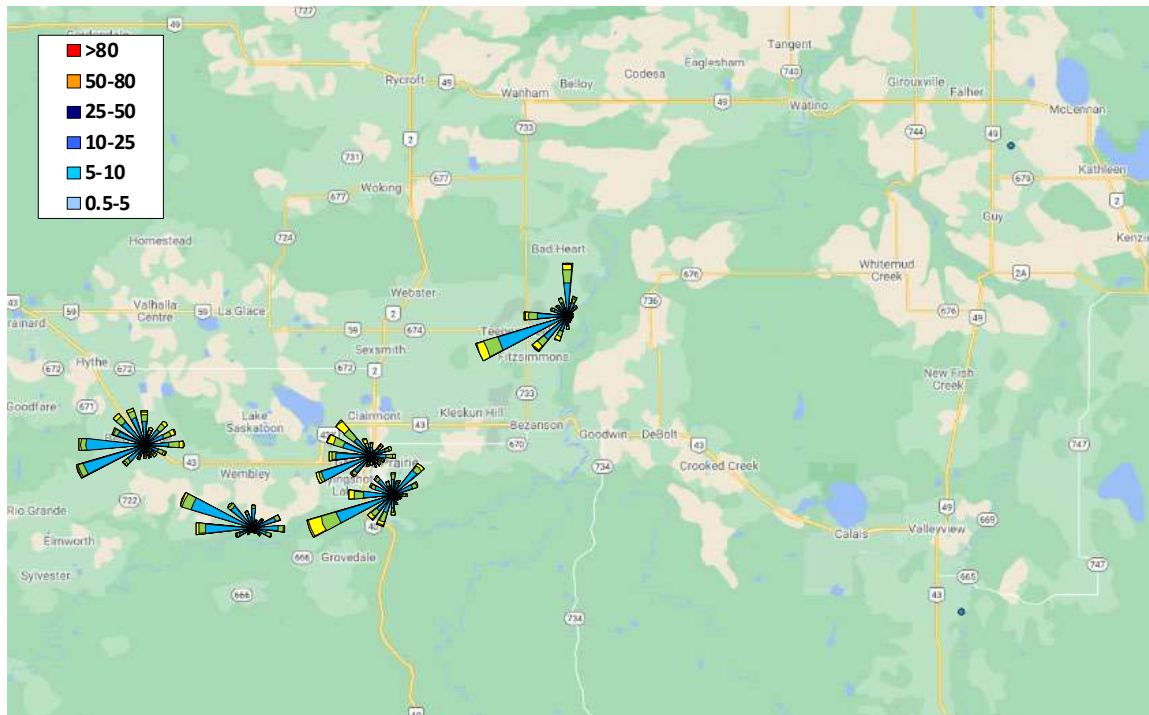
Annual 2020 PM Station Summary		
Station	Avg µg/m <sup>3</sup>	Max µg/m <sup>3</sup>
Evergreen Park PM <sub>2.5</sub>	3.6	50.4
Henry Pirker PM <sub>2.5</sub>	4.8	158.4
Smoky Heights PM <sub>2.5</sub>	4.1	142.5
Beaverlodge PM <sub>2.5</sub>	3.9	59.1
Valleyview PM <sub>2.5</sub>	-	-
Donnelly PM <sub>2.5</sub>	-	-
Wembley PM <sub>2.5</sub>	2.2	77.1



Fine Particulate Matter in µg/m<sup>3</sup>



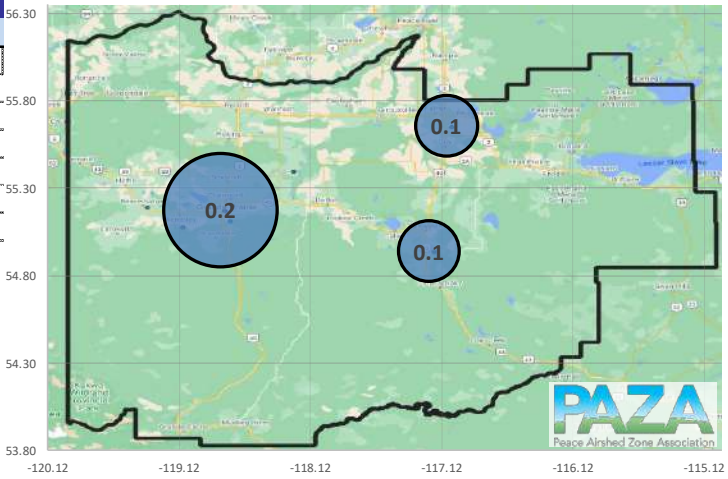
PM Roses in µg/m<sup>3</sup>



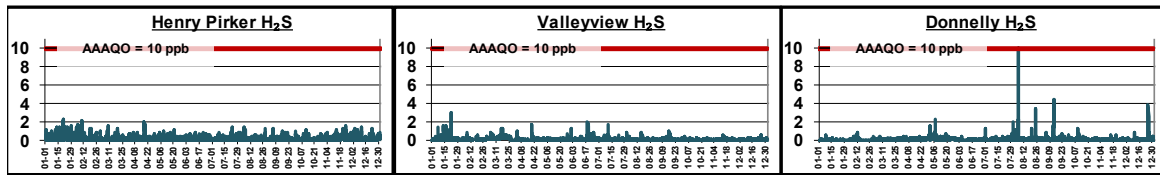


## 15.7 2020 Hydrogen Sulphide (H<sub>2</sub>S)

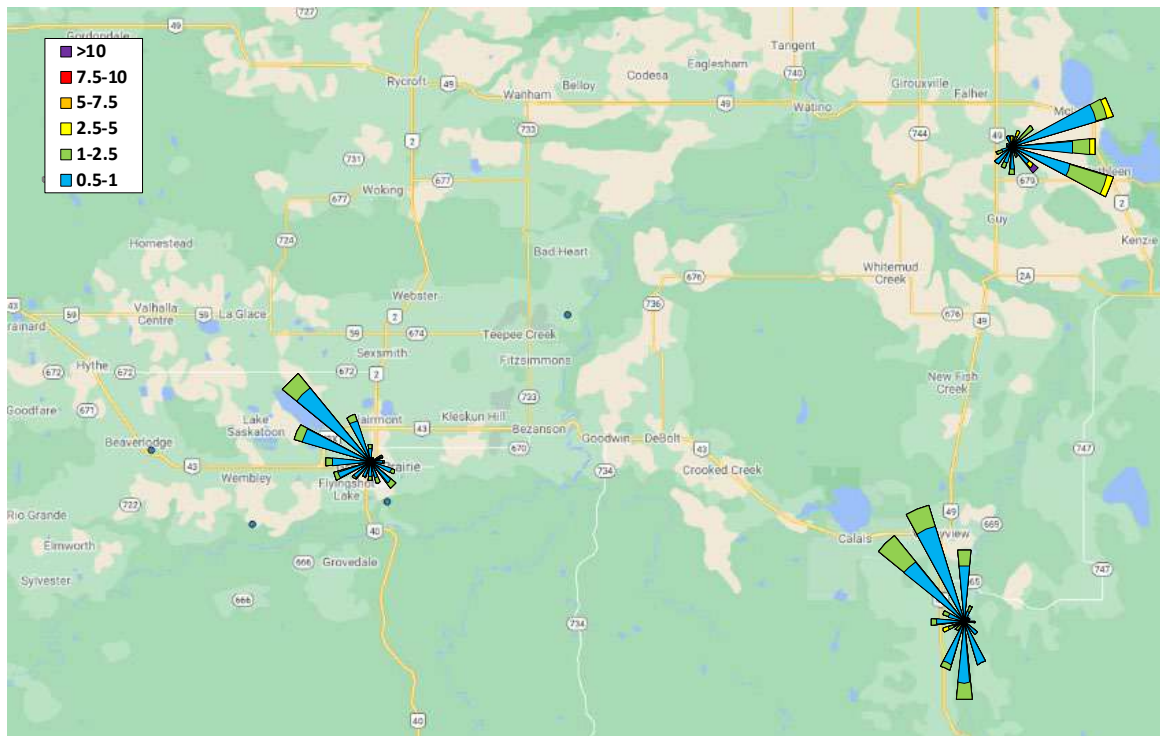
Annual 2020 H <sub>2</sub> S Station Summary		
Station	Avg (ppb)	Max (ppb)
Evergreen Park H <sub>2</sub> S	-	-
Henry Pirker H <sub>2</sub> S	0.2	2.3
Smoky Heights H <sub>2</sub> S	-	-
Beaverlodge H <sub>2</sub> S	-	-
Valleyview H <sub>2</sub> S	0.1	3.0
Donnelly H <sub>2</sub> S	0.1	10.1
Wembley H <sub>2</sub> S	-	-



Hydrogen Sulphide in ppb

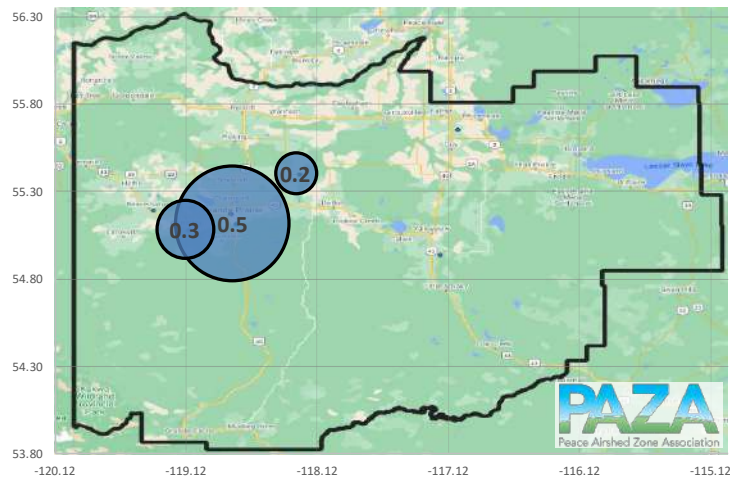


H<sub>2</sub>S Roses in ppb

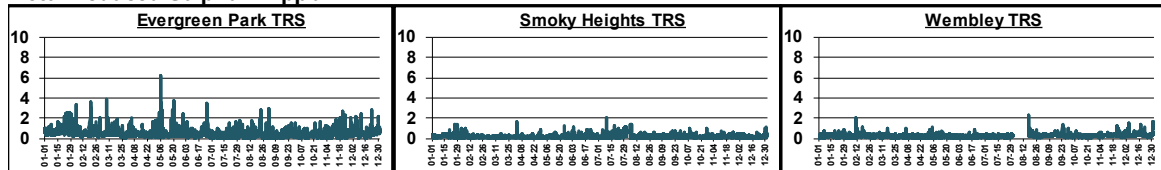


## 15.8 2020 Total Reduced Sulphur (TRS)

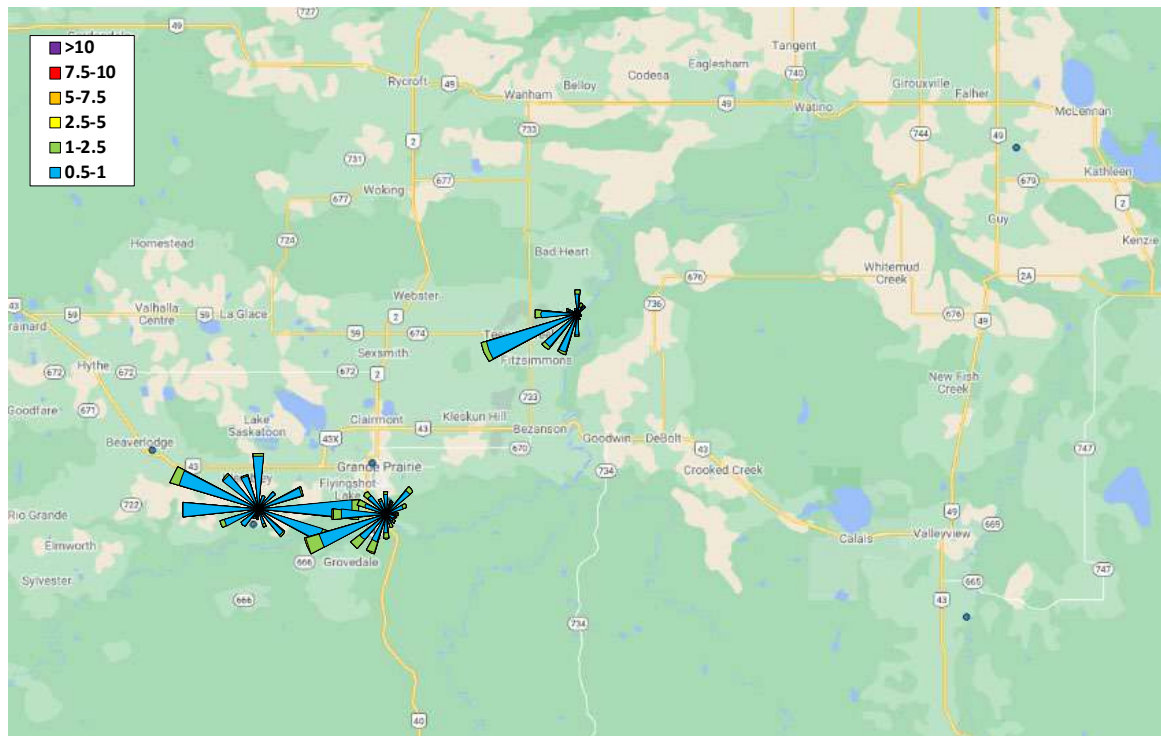
Annual 2020 TRS Station Summary		
Station	Avg (ppb)	Max (ppb)
Evergreen Park TRS	0.5	6.2
Henry Pirker TRS	-	-
Smoky Heights TRS	0.2	2.1
Beaverlodge TRS	-	-
Valleyview TRS	-	-
Donnelly TRS	-	-
Wembley TRS	0.3	2.3



Total Reduced Sulphur in ppb



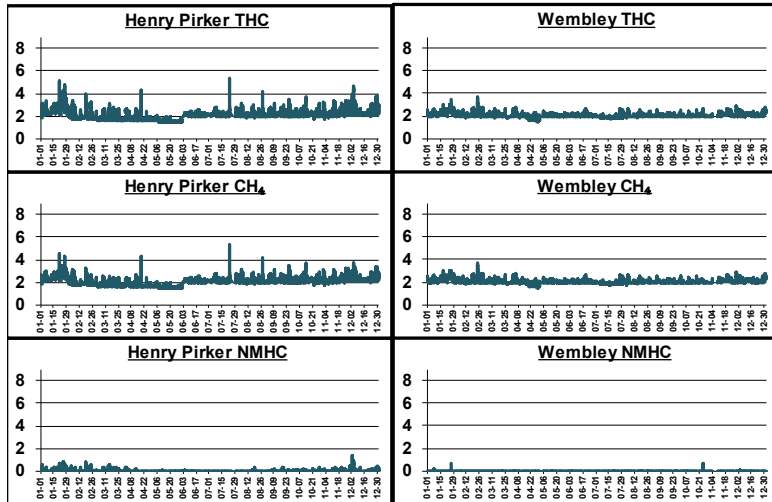
TRS Roses in ppb



## 15.9 2020 Total Hydrocarbon Summary (THC, CH<sub>4</sub>, NMHC)

Annual 2020 THC Station Summary						
Station	Total Hydrocarbons		Methane		Non-Methane HCs	
	Avg (ppm)	Max (ppm)	Avg (ppm)	Max (ppm)	Avg (ppm)	Max (ppm)
Evergreen Park THC	-	-	-	-	-	-
Henry Pirker THC	2.1	5.4	5.4	5.4	1.4	1.4
Smoky Heights THC	-	-	-	-	-	-
Beaverlodge THC	-	-	-	-	-	-
Valleyview THC	-	-	-	-	-	-
Donnelly THC	-	-	-	-	-	-
Wembley THC	2.1	3.7	3.7	3.7	0.6	0.6

Total Hydrocarbons in ppm

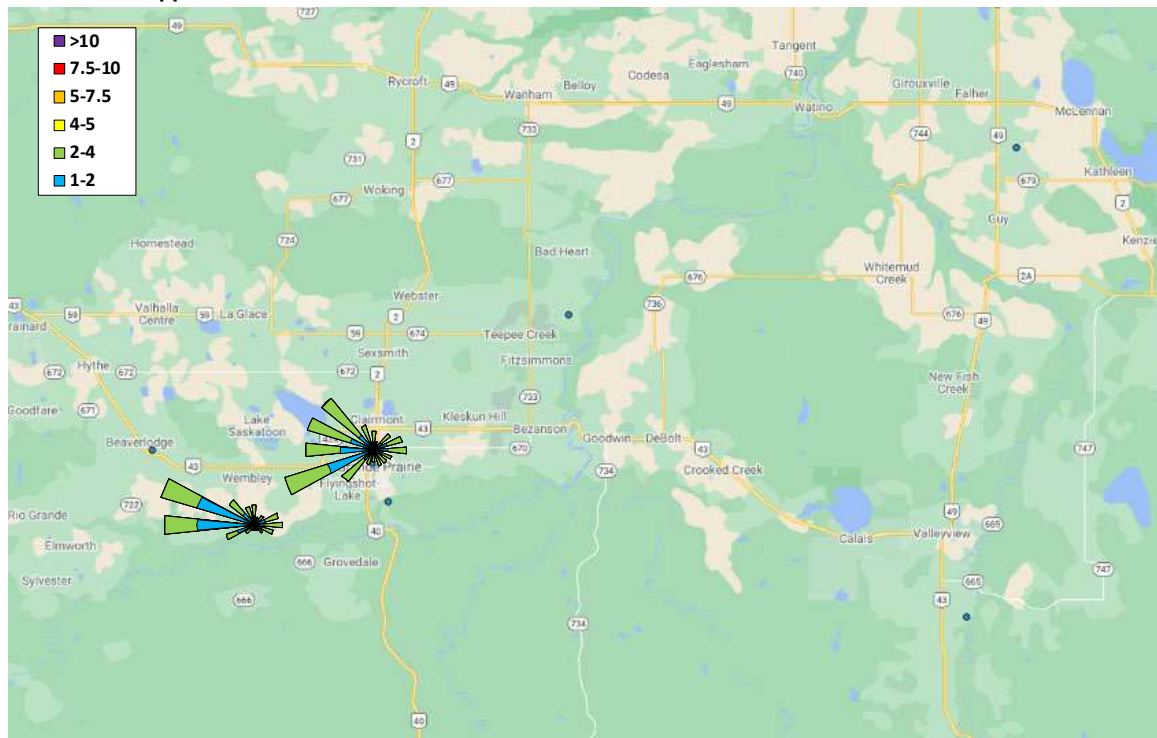


Total Hydrocarbons (THC)

Methane (CH<sub>4</sub>)

Non-Methane Hydrocarbons (NMHC)

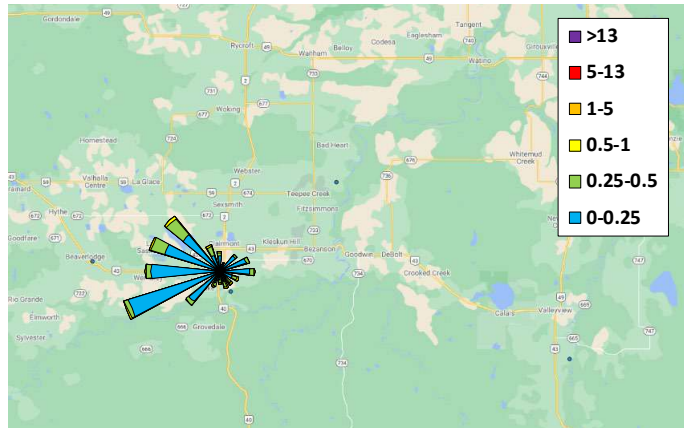
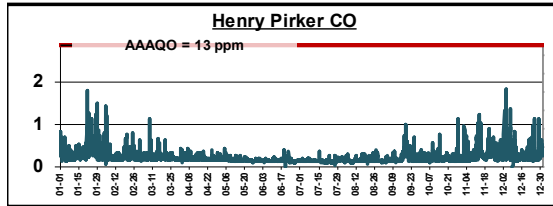
THC Roses in ppm



## 15.10 2020 Carbon Monoxide (CO)

Annual 2020 CO Station Summary		
Station	Avg (ppm)	Max (ppm)
Henry Pirker CO	0.20	1.81

### Carbon Monoxide in ppm



## 16 Passive Monitoring Data

### 16.1 Sulphur Dioxide Data

SO <sub>2</sub> in ppb	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Silver Valley	0.1	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Bay Tree	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.3	0.1	0.2	0.2
Boone Creek	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.4	0.4	0.2	0.3	0.4
Steeprock Creek	0.5	0.3	0.3	0.1	0.2	0.1	0.2	0.1	0.4	0.2	0.2	0.3
Spirit River	0.2	0.4	0.3	0.5	0.1	0.2	0.2	0.2	0.4	0.3	0.2	0.2
Woking	1.0	0.6	0.5	0.4	0.2	0.1	0.3	0.3	0.3	0.2	0.9	0.4
Webber Creek	0.7	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4
Hythe	0.6	0.4	0.4	0.1	0.2	0.1	0.2	0.1	0.4	0.2	0.5	0.3
Sylvester	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1
Beaverlodge	1.0	0.6	0.5	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.5	0.4
Poplar	1.4	0.7	0.6	0.4	0.4	0.4	0.3	0.2	1.3	0.5	0.7	0.7
Saddle Hills	0.3	0.3	0.4	0.4	0.3	0.3	0.5	0.4	0.4	0.3	0.5	0.3
Wanham	0.5	0.5	0.4	0.3	0.1	0.2	0.3	0.2	0.3	0.3	0.4	0.3
Eaglesham	0.1	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1
Wembley	0.5	0.6	0.4	0.3	0.4	0.7	0.3	0.3	0.9	0.4	0.3	0.5
Pinto Creek	0.4	0.2	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Grande Prairie I	1.0	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3
Smoky Heights	1.1	0.6	0.6	0.5	0.1	0.2	0.4	0.3	0.3	0.3	0.3	0.4
Gold Creek	0.4	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.1
Jean Cote	0.1	0.3	0.3	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2
Guy	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1
Crooked Creek	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.1
Clouston Creek		0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2
McLennan	0.3	0.6	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.3
Valleyview	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2
Peavine	0.0	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Gift Lake	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Little Smoky	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.1
Kinuso	0.0	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Henry Pirker	0.9	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.3
East Prairie	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1

#### 371 passive sulphur dioxide samples collected over 12 months at 31 sites in PAZA

- Minimum monthly value was 0.1ppb collected at East Prairie
- Maximum monthly value was 0.6ppb collected at Poplar
- Maximum monthly average was 0.4ppb in January

### 16.2 Ozone Data

O <sub>3</sub> in ppb	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bay Tree	35.6	42.8	49.1	36.2	37.5	23.9	21.8	17.4	19.3	33.3	31.0	29.2
Crooked Creek	32.5	42.2	54.1	40.4	43.9	32.6	24.5	21.0	27.1	36.3	29.6	28.8
Kinuso	35.1	46.9	46.1	36.8	41.6	29.0	27.0	27.4	21.5	35.1	28.2	28.0

#### 36 passive ozone samples collected over 12 months at 3 sites in PAZA

- Minimum monthly value was 31.4ppb collected at Bay Tree
- Maximum monthly value was 34.4ppb collected at Crooked Creek
- Maximum monthly average was 49.8ppb in March

## 16.3 Nitrogen Dioxide Data

NO <sub>2</sub> in ppb	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Silver Valley	0.3	0.7	0.1	0.1	0.5	0.7	0.6	0.7	1.1	1.9	1.2	1.5
Bay Tree	0.4	0.3	0.0	0.0	0.5	0.1	0.3	1.4	0.6	0.6	0.9	1.2
Boone Creek	0.7	0.5	0.0	0.0	0.4	0.2	0.4	0.4	0.6	0.7	1.2	1.4
Steeprock Creek	0.4	0.1	0.0	0.0	0.4	0.0	0.1	0.2	0.4	0.4	0.7	1.2
Spirit River	0.2	0.6	0.0	0.1	1.1	1.8	1.0	1.1	1.4	1.1	1.3	1.5
Woking	0.5	0.5	0.0	0.0	0.4	0.5	0.6	0.5	0.8	0.9	0.7	0.8
Webber Creek	4.7	3.5	0.7	0.7	1.7	1.3	1.8	1.4	2.8	2.8	3.9	5.6
Hythe	2.0	1.1	0.1	0.0	1.0	0.8	0.6	0.6	0.9	0.9	2.2	2.2
Sylvester	0.6	0.2	0.0	0.0	0.5	0.3	0.7	0.5	0.9	0.6	0.9	1.7
Beaverlodge	4.3	1.9	0.5	0.1	0.8	0.7	1.1	0.9	1.5	1.5	2.9	3.5
Poplar	3.8	1.8	0.2	0.2	0.9	0.9	0.9	1.1	1.4	1.5	3.0	2.4
Saddle Hills	0.4	0.5	0.0	0.0	0.4	0.5	0.5	0.4	0.6	0.9	0.9	1.0
Wanham	0.0	0.2	0.0	0.0	0.4	0.5	0.4	0.3	0.6	0.6	0.9	0.7
Eaglesham	0.0	0.3	0.0	0.0	0.5	1.9	0.5	0.3	0.7	0.7	0.6	0.3
Wembley	5.2	2.6	0.6	0.2	1.1	1.9	1.2	1.0	1.7	1.8	3.9	4.5
Pinto Creek	1.4	0.4	0.0	0.0	0.5	0.3	0.5	0.5	0.6	0.6	1.1	1.6
Grande Prairie I	15.1	9.9	3.9	1.4	2.1	1.5	1.6	1.7	3.9	8.8	12.6	13.0
Smoky Heights	2.2	1.7	0.0	0.2	0.4	0.9	0.9	0.7	1.1	1.1	2.6	3.3
Gold Creek	6.1	3.3	1.0	0.4	1.1	0.9	1.2	1.3	2.0	2.8	4.7	5.3
Jean Cote	0.0	0.3	0.0	0.0	0.7	1.4	0.5	0.5	0.7	0.6	0.9	0.9
Guy		0.2	0.0	0.0	1.2	1.5	0.5	0.4	0.6	0.6	0.8	1.1
Crooked Creek	2.2	1.1	0.3	0.0	0.5	0.7	0.4	0.7	0.9	1.0	1.4	0.8
Clouston Creek	0.5	0.5	0.0	0.0	0.7	1.0	0.3	0.3	0.6	0.9	1.0	1.3
McLennan	0.0	0.2	0.0	0.0	0.5	1.3	1.0	0.7	0.9	0.9	0.9	1.0
Valleyview	1.2	0.7	0.0	0.0	0.3	0.5	0.4	0.5	0.7	0.9	1.9	1.7
Peavine	0.0	0.3	0.0	0.0	0.1	0.1	0.1	0.1	0.3	0.4	0.6	0.5
Gift Lake	0.2	0.3	0.0	0.0	0.1	0.2	0.1	0.3	0.4	0.6	0.6	0.7
Little Smoky	3.8	1.9	0.4	0.2	0.8	0.6	0.7	1.1	1.8	1.7	2.6	4.0
Kinuso	1.3	0.9	0.0	0.0	0.2	0.4	0.2	0.3	0.6	0.6	0.9	1.1
Henry Pirker	20.8	9.0	3.3	1.3	1.5	1.5	1.7	1.9	3.7	5.2	10.8	10.9
East Prairie	0.0	1.1	0.0	0.0	0.3	0.1	0.2	0.2	0.3	0.3	0.9	0.6

### 371 passive nitrogen dioxide samples collected over 12 months at 31 sites in PAZA

- Minimum monthly value was 0.2ppb collected at Peavine
- Maximum monthly value was 6.3ppb collected at Grande Prairie
- Maximum monthly average was 2.6ppb in January

## 16.4 Hydrogen Sulphide Data

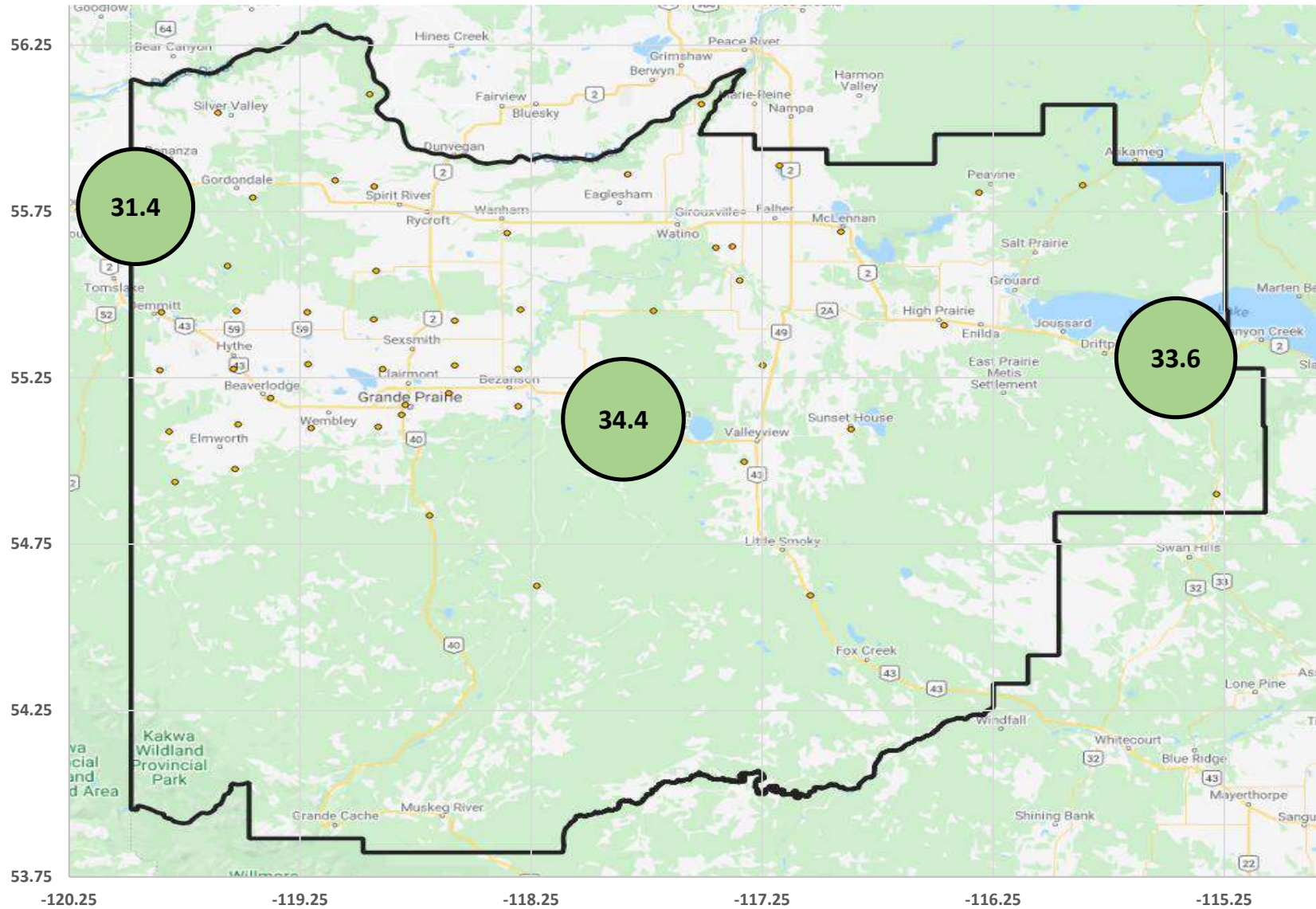
H <sub>2</sub> S in ppb	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Girouxville 3	0.6	0.6		0.3		0.9	0.2		0.0	0.4	0.4	0.4
Girouxville 4	0.2	0.4		0.2	0.3	0.7	0.5	0.7	0.0	0.5	0.3	0.3
Guy	0.2	0.1	0.1	0.1	0.1	0.3	0.6	0.2	0.1	0.1	0.2	0.2

### 32 passive hydrogen sulphide samples collected over 12 months at 3 sites in PAZA

- Minimum monthly value was 0.2ppb collected at Guy
- Maximum monthly value was 0.4ppb collected at Girouxville 3
- Maximum monthly average was 0.6ppb in June



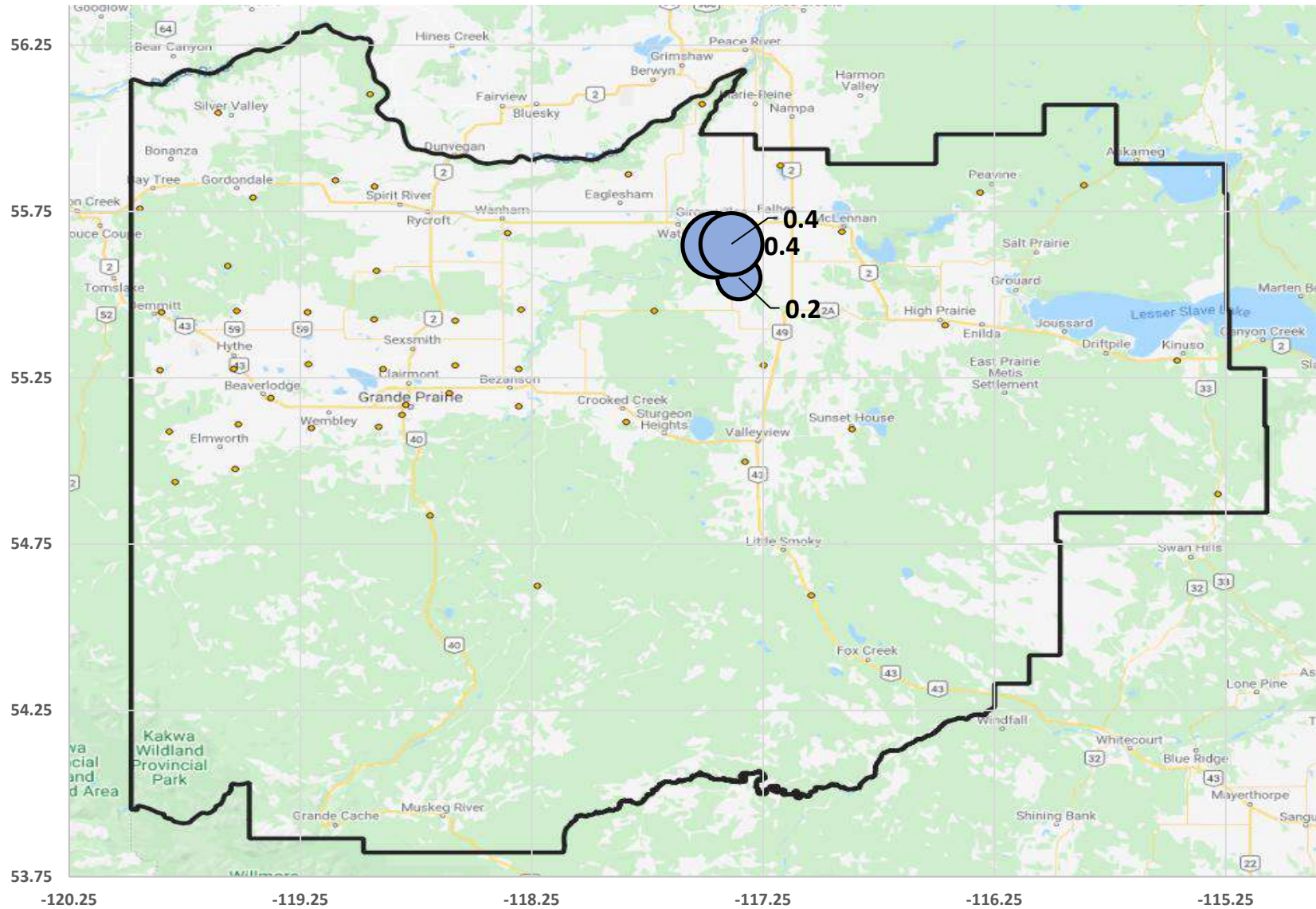
### O<sub>3</sub> 2020 Average (units in ppb)







### H<sub>2</sub>S 2020 Average (units in ppb)



## End of Report



# Peace Airshed Zone Association

## Ambient Air Monitoring Report

### 2020 Annual Data Summary Report