



Peace Airshed Zone Association

Ambient Air Monitoring Network Summary

**Ambient Air Quality Monitoring Program
Monthly Report
December 2019**

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January 31st, 2020

Alberta Environment and Parks

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

RE: Peace Airshed Zone Association (PAZA) – December 2019 Ambient Air Quality Monitoring Report

Enclosed is the PAZA Ambient Air Quality Monitoring Network Report for the month of December 2019.

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

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

Program Manager

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This report was prepared by Andersen Science Consulting and reviewed by Mandeep Dhaliwal.

PAZA has retained the services of WSP Canada Inc. to conduct continuous ambient monitoring and Andersen Science Consulting to provide data validation and reporting on its behalf.

This report is submitted by PAZA on behalf of the industrial member companies to satisfy the requirements of the following facility Operating Approvals:

Company	Facility	LSD	EPEA Approval Number
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	16-31-78-11-W6M	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

Company	Facility	LSD	EPEA Approval Number
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	138884-01-00
Penn West Petroleum Ltd.	Tangent	13-29-080-23-W5	00001746-02-00

Company	Facility	LSD	EPEA Approval Number
	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
Spectra Energy Midstream Corporation	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

Included in this report is a summary of the monthly passive monitoring and continuous monitoring programs and detailed hourly average reports. Operational summaries can be found on the “Continuous Ambient Network Equipment and Results Summary” pages of the report.

Continuous Monitoring: **Seven (7) Stations including Henry Pirker (Grande Prairie), Evergreen Park, Smoky Heights, Beaverlodge, Valleyview, Donnelly and Wembley-Portable.**

Calibration and Data Submission

This report, hourly data and calibration reports for December 2019 were submitted to the ETS data system.

Concentrations in excess of the Clean Air (Maximum Levels) Regulation:

There were no exceedances of the AAAQO in December.

Operational times less than 90 percent:

There were no operational times less than 90 percent in December.

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.

Passive Monitoring - 32 Stations throughout the PAZA zone:

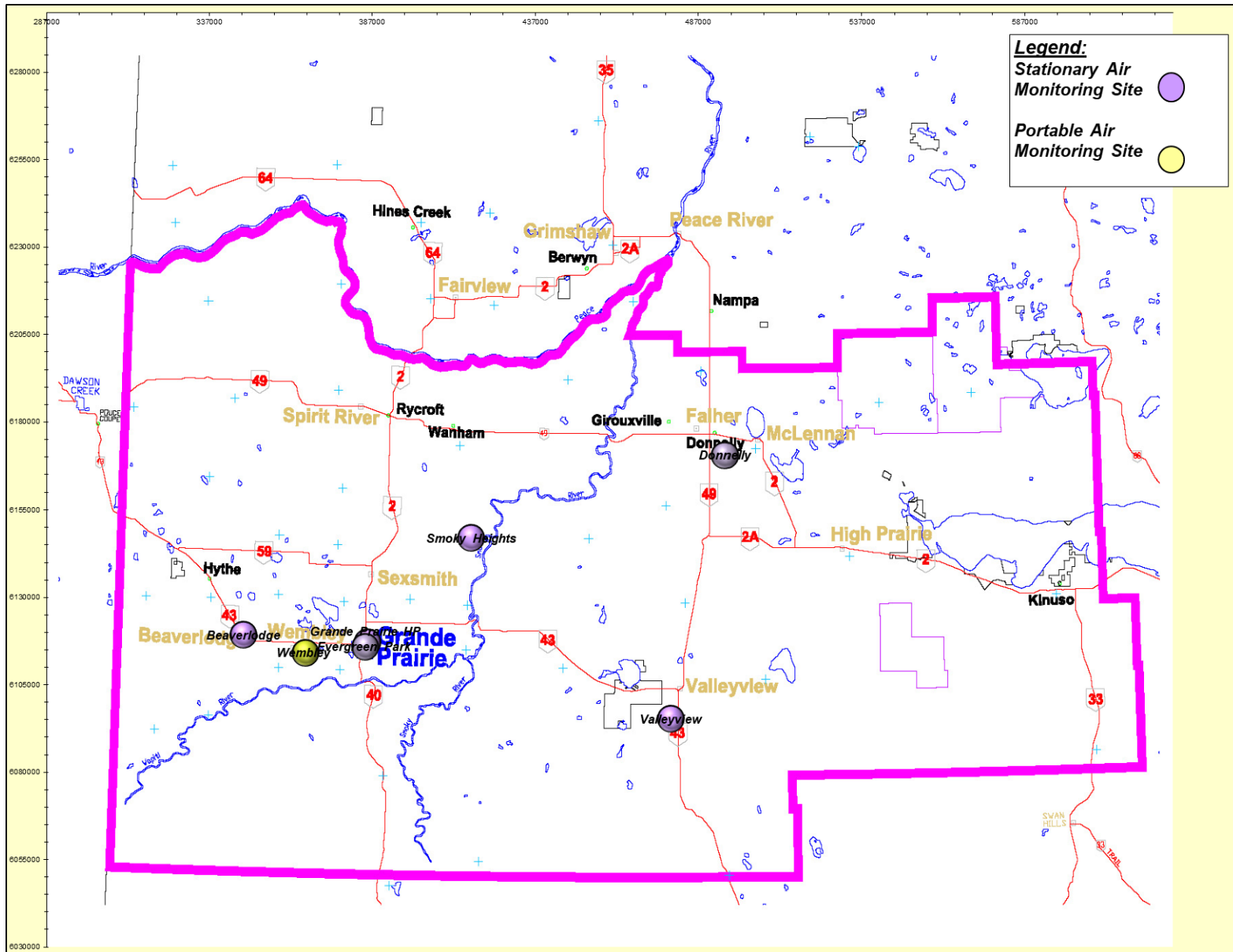
There were seven duplicate sites sampled in the month of December: Wembley, Wapiti, Kinuso (SO₂), Kinuso (O₃), Steeprock Creek, Smoky Heights, Deer Mountain 2 (NO₂), and Girouxville 4 (H₂S). The passive sample analyses were performed by MAXXAM Analytics Inc. There were no exceedances of the AAAQOs for all monitored parameters at any of the passive monitoring stations during this month.

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.

X 

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

Location of PAZA Continuous Monitoring Stations



Continuous Ambient Network Equipment and Results Summary

Beaverlodge Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			Conc	1-hr		24-hr / 8-hr		
	1-hr	24-hr	30-day				1-hr	24-hr	30-day		Day		Conc	Day	Operational Time (%)
SO ₂ (ppb)	172	48	8	Beaverlodge	0.7	0.0	0	0	0	19.6	Dec-13 06:00	2.8	Dec-18	100.0	Dec-03
NO (ppb)					1.9	0.0	-	-	-	39.3	Dec-21 12:00	9.7	Dec-19	100.0	Dec-03
NO ₂ (ppb)	159	106			8.3	0.5	0	0	-	29.5	Dec-09 19:00	19.8	Dec-20	100.0	Dec-03
NO _x (ppb)					10.2	0.5	-	-	-	57.9	Dec-21 12:00	29.1	Dec-21	100.0	Dec-03
O ₃ (ppb)	76				24.3	0.3	0	-	-	42.3	Dec-01 12:00	37.3	Dec-26	100.0	Dec-03
O ₃ (ppb) - 8-hr							-	-	-			39.8	Dec-02		-
PM _{2.5} (µg/m3)	80	29			4.9	0.0	0	0	-	36.6	Dec-06 23:00	15.5	Dec-20	100.0	Dec-03
RH (%)					76.0	36.9	-	-	-	99.0	Dec-04 09:00	91.7	Dec-20	100.0	-
Temp (°C)					-6.1	-17.2	-	-	-	4.6	Dec-31 04:00	3.0	Dec-31	100.0	-
WSPD v (km/hr)					1.5	0.0	-	-	-	44.6	Dec-02 17:00	17.3	Dec-02	100.0	13/08/2019
WDIR					WSW		-	-	-	-	-	-	-	100.0	13/08/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
NO/NO ₂ /NO _x	TECO	42I	
O ₃	TECO	49I	
PM _{2.5}	SHARP	5030	
ET/RH			
WS/WD	MetOne	50.5	

Evergreen Park Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			1-hr		24-hr / 8-hr		Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day	Conc	Day	Conc	Day		
SO ₂ (ppb)	172	48	8	Evergreen Park	0.3	0.0	0	0	0	2.1	Dec-08 22:00	0.6	Dec-01	100.0	Dec-20
TRS (ppb)					0.8	0.2	-	-	-	6.1	Dec-06 22:00	1.7	Dec-22	100.0	Dec-20
PM _{2.5} (µg/m3)	80	29			4.2	0.0	0	0	-	32.5	Dec-23 12:00	12.4	Dec-06	91.3	Dec-20
RH (%)					79.2	47.9	-	-	-	93.1	Dec-31 22:00	87.1	Dec-10	100.0	-
Temp (°C)					-9.5	-20.8	-	-	-	5.6	Dec-31 14:00	1.5	Dec-03	100.0	-
WSPD v (km/hr)					0.7	0.0	-	-	-	18.1	Dec-02 18:00	4.9	Dec-03	100.0	18/09/2019
WDIR					WSW		-	-	-	-	-	-	-	100.0	18/09/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
TRS	TECO	43C/43I	
PM _{2.5}	SHARP	5030	Analyzer returned invalid readings Dec 20-23. Sample filter reset.
ET/RH			
WS/WD	Gil/RMYoung	MetPak/RMY86004	

Henry Pirker Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
										1-hr		24-hr / 8-hr			
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			Conc	Day	Conc	Day	Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day						
SO ₂ (ppb)	172	48	8	Henry Pirker	0.5	0.0	0	0	0	8.5	Dec-15 21:00	1.1	Dec-15	100.0	Dec-06
H ₂ S (ppb)					0.5	0.0	0	0	-	2.9	Dec-22 07:00	1.3	Dec-22	100.0	Dec-06
NO (ppb)					17.4	0.0	-	-	-	127.6	Dec-05 09:00	60.0	Dec-01	100.0	Dec-06
NO ₂ (ppb)	159	106			20.0	2.8	0	0	-	50.9	Dec-05 08:00	31.2	Dec-28	100.0	Dec-06
NO _x (ppb)					37.7	3.0	-	-	-	175.3	Dec-05 09:00	89.5	Dec-01	100.0	Dec-06
O ₃ (ppb)	76				12.9	0.3	0	-	-	39.8	Dec-18 00:00	29.2	Dec-25	100.0	Dec-06
O ₃ (ppb) - 8-hr							-	-	-			38.3	Dec-18		-
CO (ppm)	13				0.32	0.1	0	0	-	1.7	Dec-05 08:00	0.6	Dec-01	100.0	Dec-02
CO (ppm) - 8-hr	5						0					0.8	Dec-05		-
THC (ppm)					2.3	1.7	-	-	-	4.7	Dec-23 09:00	3.7	Dec-01	99.6	Dec-02
CH ₄ (ppm)					2.2	1.7	-	-	-	4.3	Dec-23 09:00	3.2	Dec-01	99.6	Dec-02
NMHC (ppm)					0.1	0.0	-	-	-	0.8	Dec-01 21:00	0.5	Dec-22	99.6	Dec-02
PM _{2.5} (µg/m3)	80	29			7.9	0.0	0	0	-	50.5	Dec-08 10:00	23.9	Dec-01	100.0	Dec-02
RH (%)					70.6	47.5	-	-	-	83.4	Dec-04 07:00	77.9	Dec-10	100.0	-
SR (W/m ²)					16.0	0.0	-	-	-	170.8	Dec-06 13:00	29.3	Dec-01	100.0	-
Temp (°C)					-9.0	-20.5	-	-	-	5.5	Dec-31 13:00	1.0	Dec-03	100.0	-
WSPD v (km/hr)					1.1	0.1	-	-	-	25.0	Dec-17 20:00	7.3	Dec-02	99.7	12/08/2019
WDIR					WNW		-	-	-	-	-	-	-	99.7	12/08/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
H ₂ S	TECO	450I	
NO/NO ₂ /NO _x	TECO	42I	
O ₃	TECO	49I	
CO	TECO	48I-TLE	
THC/CH ₄ /NMHC	TECO	55I	Hydrogen bottle replaced Dec 19
PM _{2.5}	SHARP	5030	
ET/RH			
SR			
WS/WD	MetOne	50.5	Wind system returned invalid readings Dec 1 due to icing conditions

Smoky Heights Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			1-hr		24-hr / 8-hr		Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day	Conc	Day	Conc	Day		
SO ₂ (ppb)	172	48	8	Smoky Heights	0.5	0.0	0	0	0	7.7	Dec-03 06:00	2.1	Dec-15	100.0	Dec-05
TRS (ppb)					0.3	0.0	-	-	-	1.5	Dec-25 04:00	0.8	Dec-30	100.0	Dec-05
PM _{2.5} (µg/m3)	80	29			5.6	0.0	0	0	-	63.1	Dec-07 00:00	15.8	Dec-01	100.0	Dec-05
Temp (°C)					-9.8	-19.0	-	-	-	3.8	Dec-03 03:00	-0.3	Dec-03	100.0	-
WSPD v (km/hr)					5.2	0.2	-	-	-	50.0	Dec-02 17:00	26.1	Dec-02	100.0	04/06/2019
WDIR					WSW		-	-	-	-	-	-	-	100.0	04/06/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
TRS	TECO	43I	
PM _{2.5}	SHARP	5030	
ET			
WS/WD	MetOne	50.5	

Valleyview Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			1-hr		24-hr / 8-hr		Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day	Conc	Day	Conc	Day		
SO ₂ (ppb)	172	48	8	Valleyview	0.1	0.0	0	0	0	1.1	Dec-19 03:00	0.5	Dec-19	100.0	Dec-04
H ₂ S (ppb)	10	3			0.1	0.0	0	0	-	0.6	Dec-20 06:00	0.3	Dec-20	100.0	Dec-04
RH (%)					85.5	52.3	-	-	-	100.0	Dec-04 06:00	93.1	Dec-31	100.0	-
Temp (°C)					-9.5	-21.4	-	-	-	7.4	Dec-03 14:00	4.7	Dec-03	100.0	-
WSPD v (km/hr)					0.5	0.0	-	-	-	13.4	Dec-02 20:00	5.5	Dec-12	100.0	23/09/2019
WDIR					WSW		-	-	-	-	-	-	-	100.0	23/09/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
H ₂ S	TECO	450I	
ET/RH			
WS/WD	RMYoung	RMY86004	

Donnelly Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			1-hr		24-hr / 8-hr		Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day	Conc	Day	Conc	Day		
SO ₂ (ppb)	172	48	8	Donnelly	0.2	0.0	0	0	0	4.4	Dec-08 14:00	0.8	Dec-15	100.0	Dec-17
H ₂ S (ppb)	10	3			0.0	0.0	0	0	-	0.7	Dec-05 00:00	0.3	Dec-22	100.0	Dec-17
Temp (°C)					-8.0	-18.8	-	-	-	4.7	Dec-17 20:00	0.5	Dec-03	100.0	-
WSPD v (km/hr)					6.5	0.1	-	-	-	41.9	Dec-17 21:00	20.8	Dec-28	100.0	26/06/2019
WDIR					SSW		-	-	-	-	-	-	-	100.0	26/06/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
H ₂ S	TECO	450I	
ET/RH			
WS/WD	RMYoung	5103	

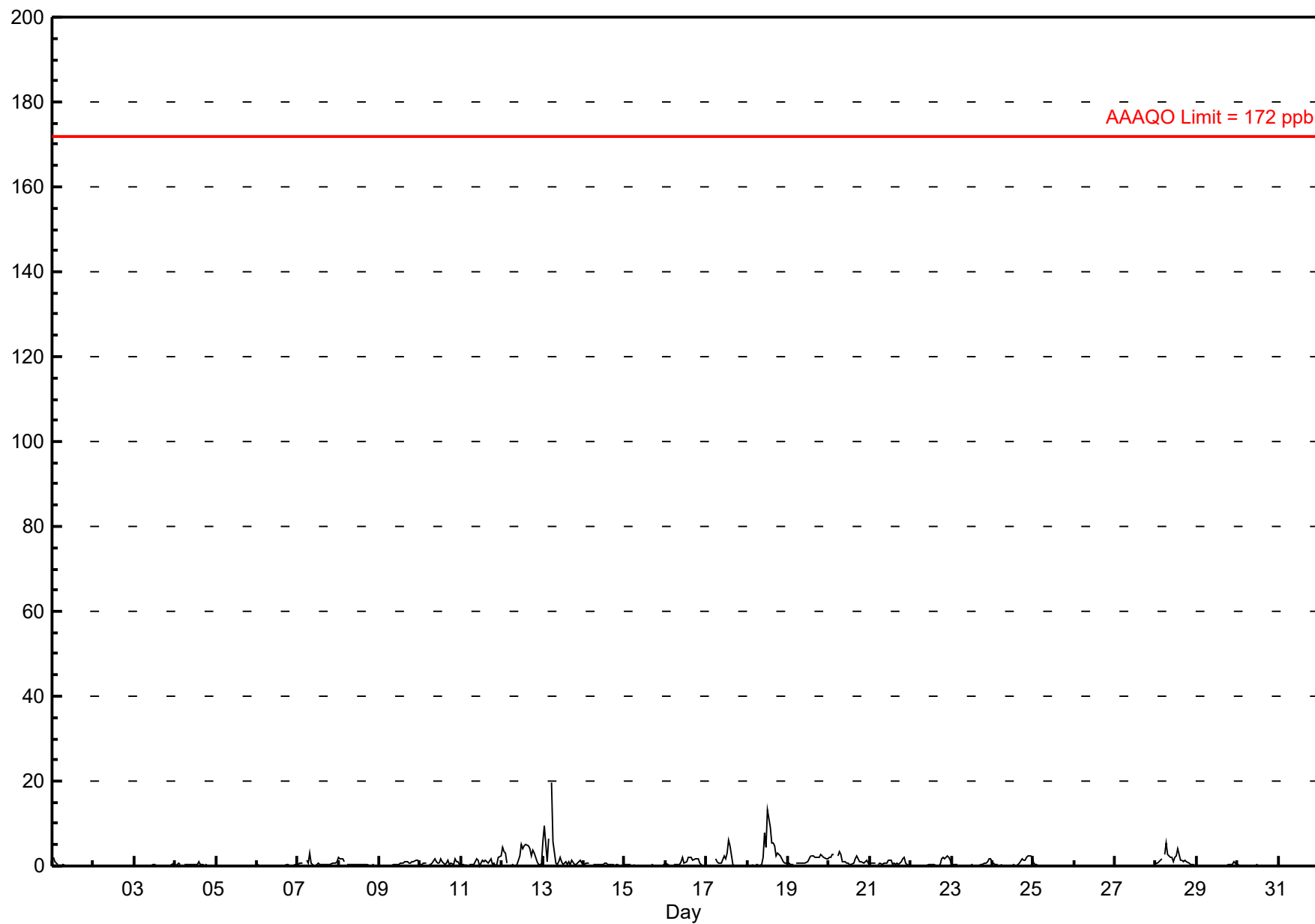
Wembley-Portable Air Monitoring Station

Dec-2019 Peace Airshed Zone Association										Maximum Recorded Values					
Parameter (units)	Objectives			Station	Monthly Average	Min	Exceedence			1-hr		24-hr / 8-hr		Operational Time (%)	Calibration Date
	1-hr	24-hr	30-day				1-hr	24-hr	30-day	Conc	Day	Conc	Day		
SO ₂ (ppb)	172	48	8	Wembley-Portable	0.3	0.0	0	0	0	8.7	Dec-18 03:00	1.3	Dec-21	100.0	Dec-11
TRS (ppb)					0.2	0.0	-	-	-	1.4	Dec-17 10:00	0.6	Dec-17	100.0	Dec-12
NO (ppb)					1.9	0.0	-	-	-	34.8	Dec-17 11:00	12.6	Dec-17	100.0	Dec-11
NO ₂ (ppb)	159	106			8.0	0.4	0	0	-	31.4	Dec-17 05:00	17.5	Dec-22	100.0	Dec-11
NO _x (ppb)					10.0	0.5	-	-	-	60.7	Dec-17 11:00	29.5	Dec-17	100.0	Dec-11
O ₃ (ppb)	76				20.0	0.0	0	-	-	41.6	Dec-02 17:00	34.7	Dec-02	100.0	Dec-11
O ₃ (ppb) - 8-hr							-	-	-			41.2	Dec-02		-
THC (ppm)					2.2	1.9	-	-	-	2.9	Dec-24 04:00	2.7	Dec-22	97.7	Dec-07
CH ₄ (ppm)					2.2	1.9	-	-	-	2.9	Dec-24 04:00	2.7	Dec-22	97.7	Dec-07
NMHC (ppm)					0.0	0.0	-	-	-	0.0	Dec-30 05:00	0.0	Dec-30	97.7	Dec-07
PM _{2.5} (µg/m3)	80	29			3.5	0.0	0	0	-	40.9	Dec-01 02:00	12.2	Dec-01	100.0	Dec-11
Temp (°C)					-8.3	-19.2	-	-	-	5.6	Dec-31 14:00	2.3	Dec-31	100.0	-
WSPD v (km/hr)					1.9	0.2	-	-	-	22.8	Dec-27 14:00	10.3	Dec-27	100.0	07/08/2019
WDIR					WNW		-	-	-	-	-	-	-	100.0	07/08/2019

Parameter	Analyzer		Notes
	Make	Model	
SO ₂	TECO	43I	
TRS	TECO	43I	
NO/NO ₂ /NO _x	TECO	42I	
O ₃	TECO	49I	ZS sequence failed correctly complete Nov 7, requiring analyzer reset
THC/CH ₄ /NMHC	TECO	55I	Hydrogen cylinder expired Dec 6, swapped and analyzer calibrated Dec 7. Span gas ran out during Dec 11 span, replaced Dec 12.
PM _{2.5}	TEOM		
ET/RH			
WS/WD	MetOne	50.5	

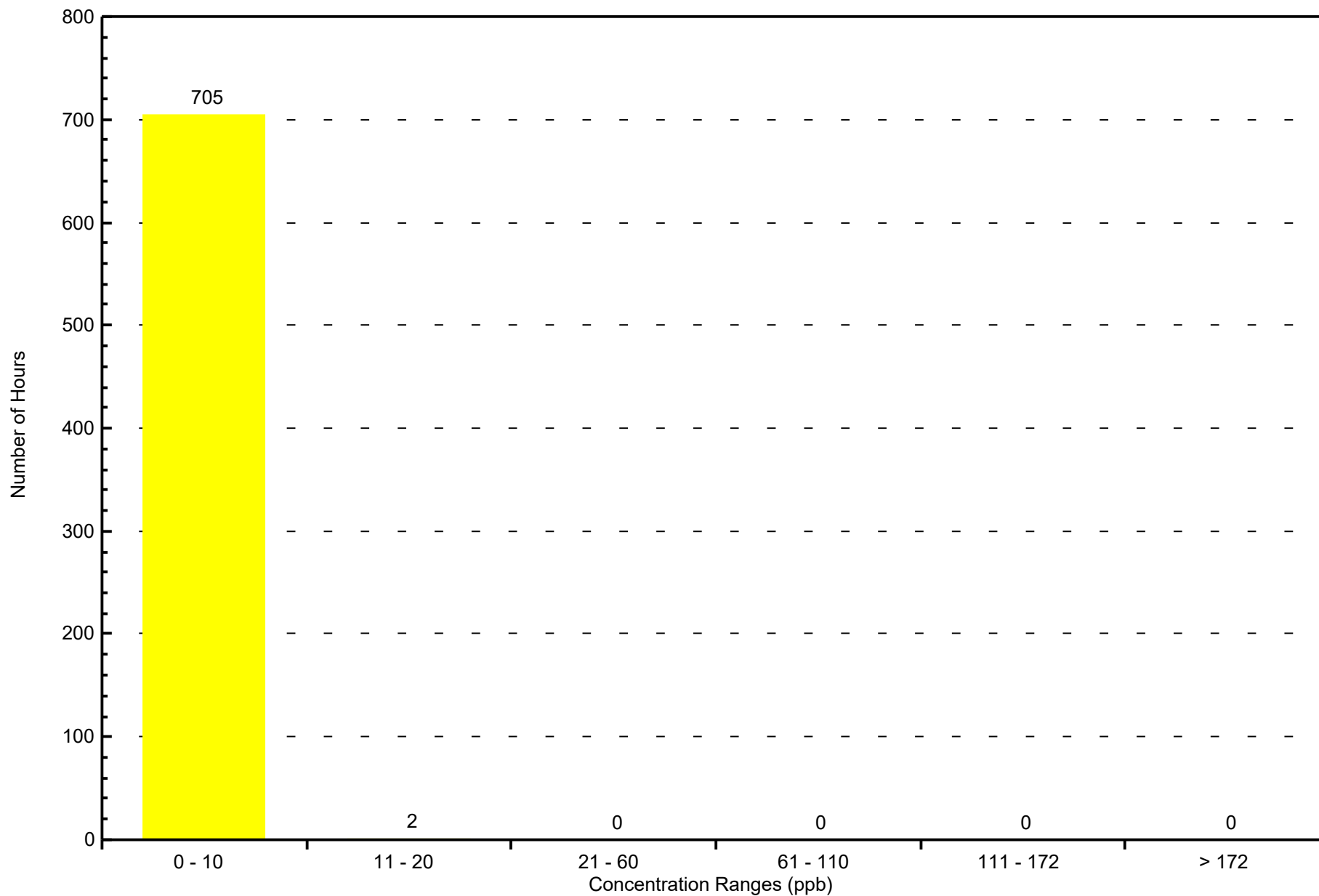
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Beaverlodge - December 2019



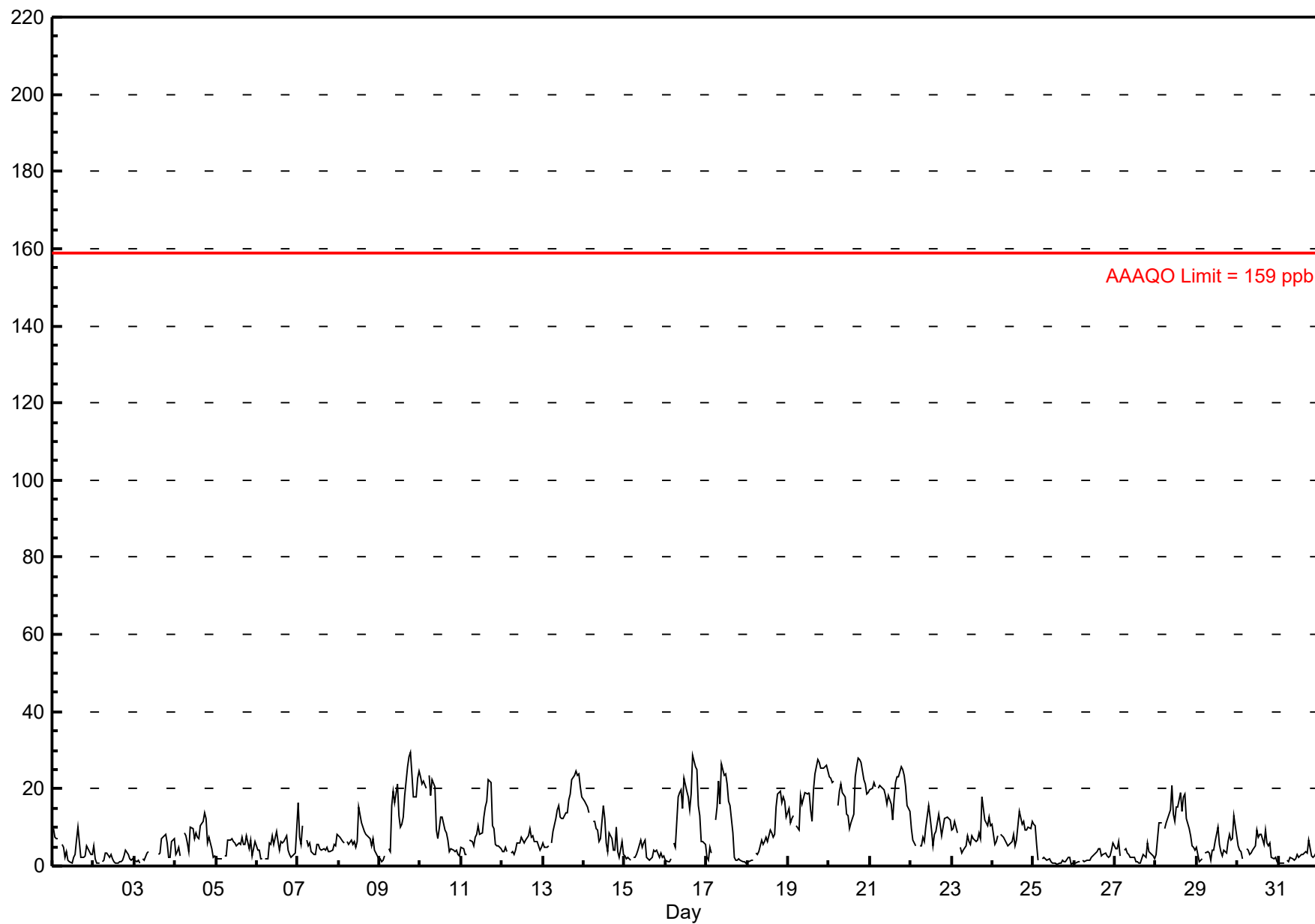
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Beaverlodge - December 2019



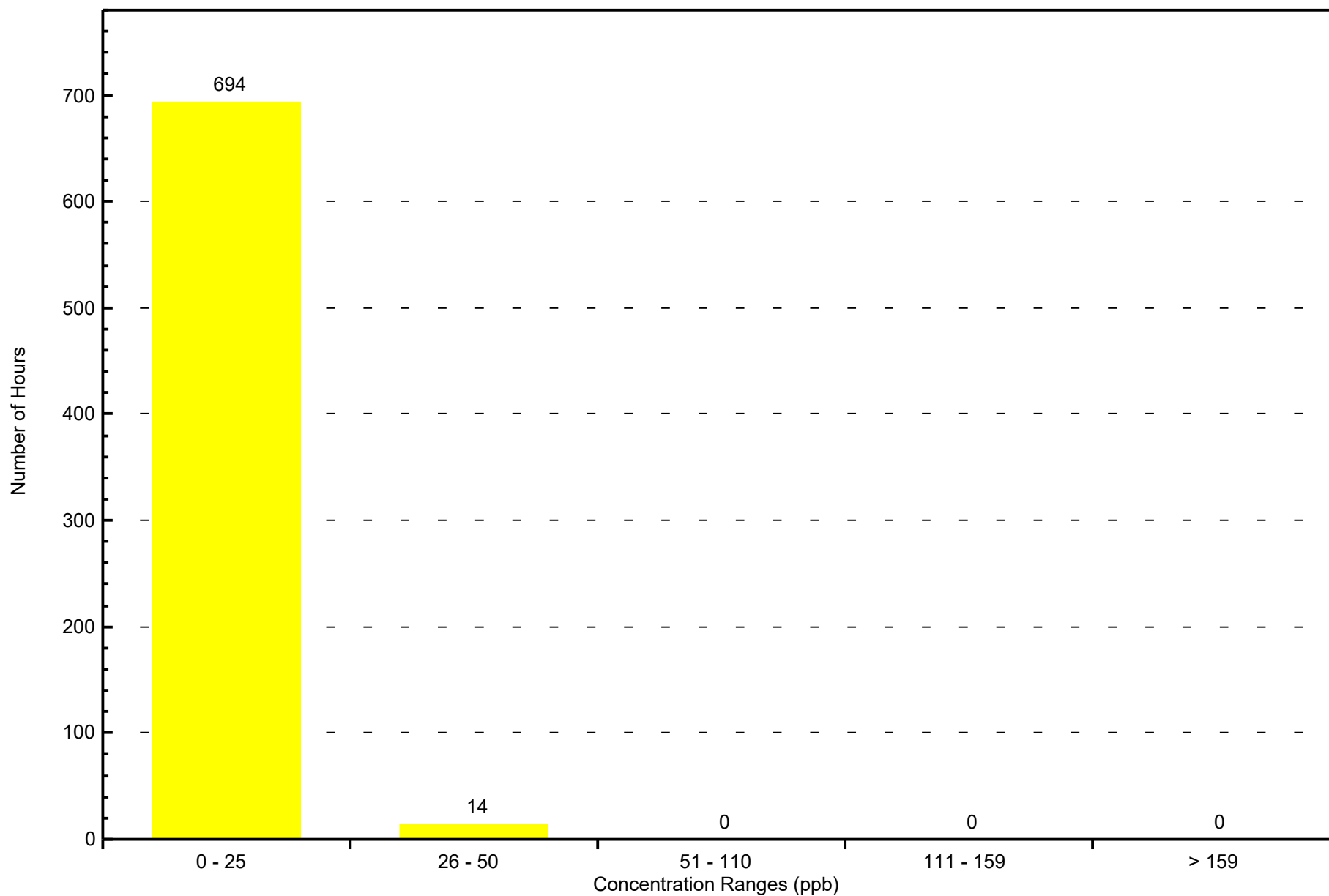
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Beaverlodge - December 2019



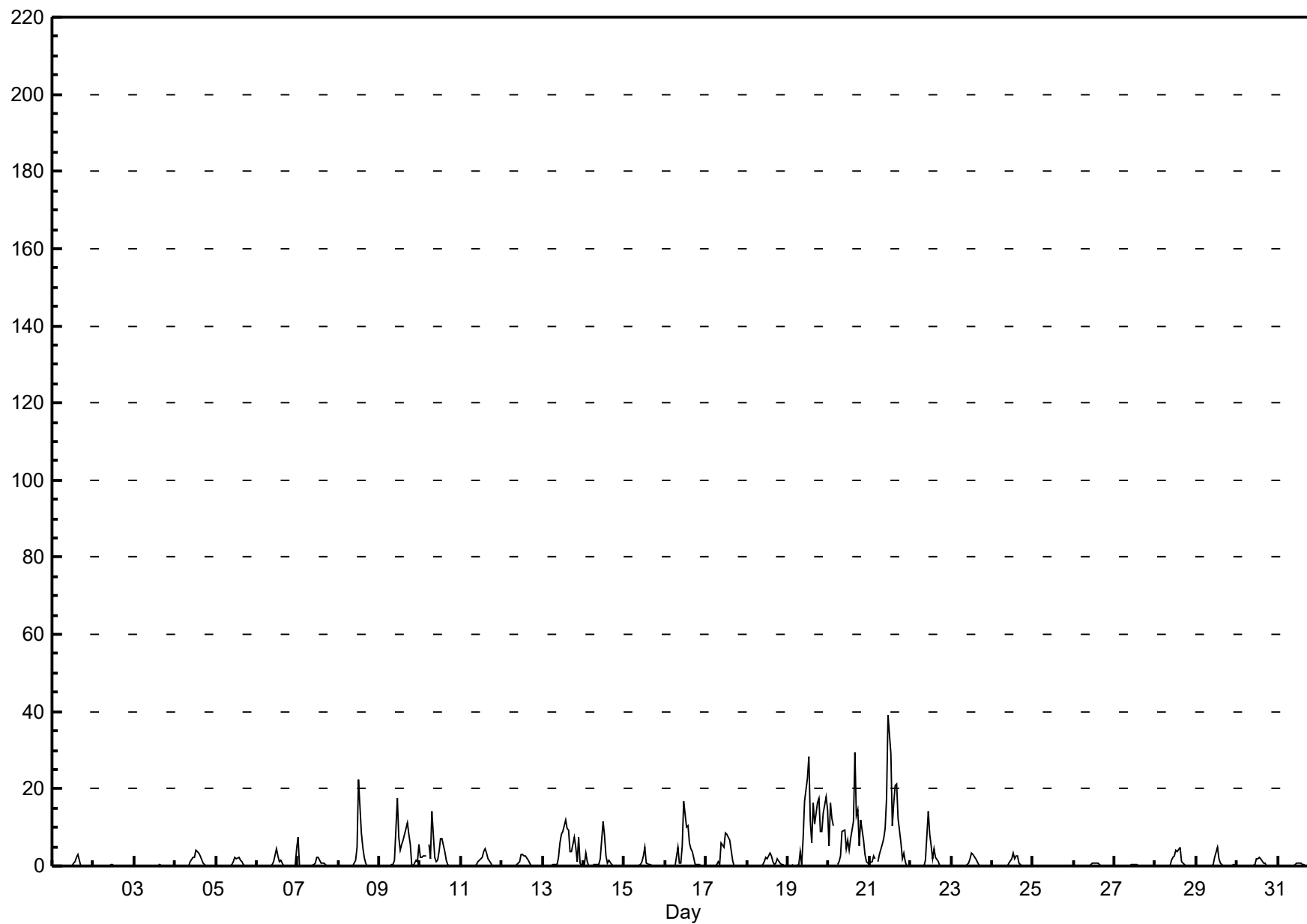
Histogram of Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Beaverlodge - December 2019



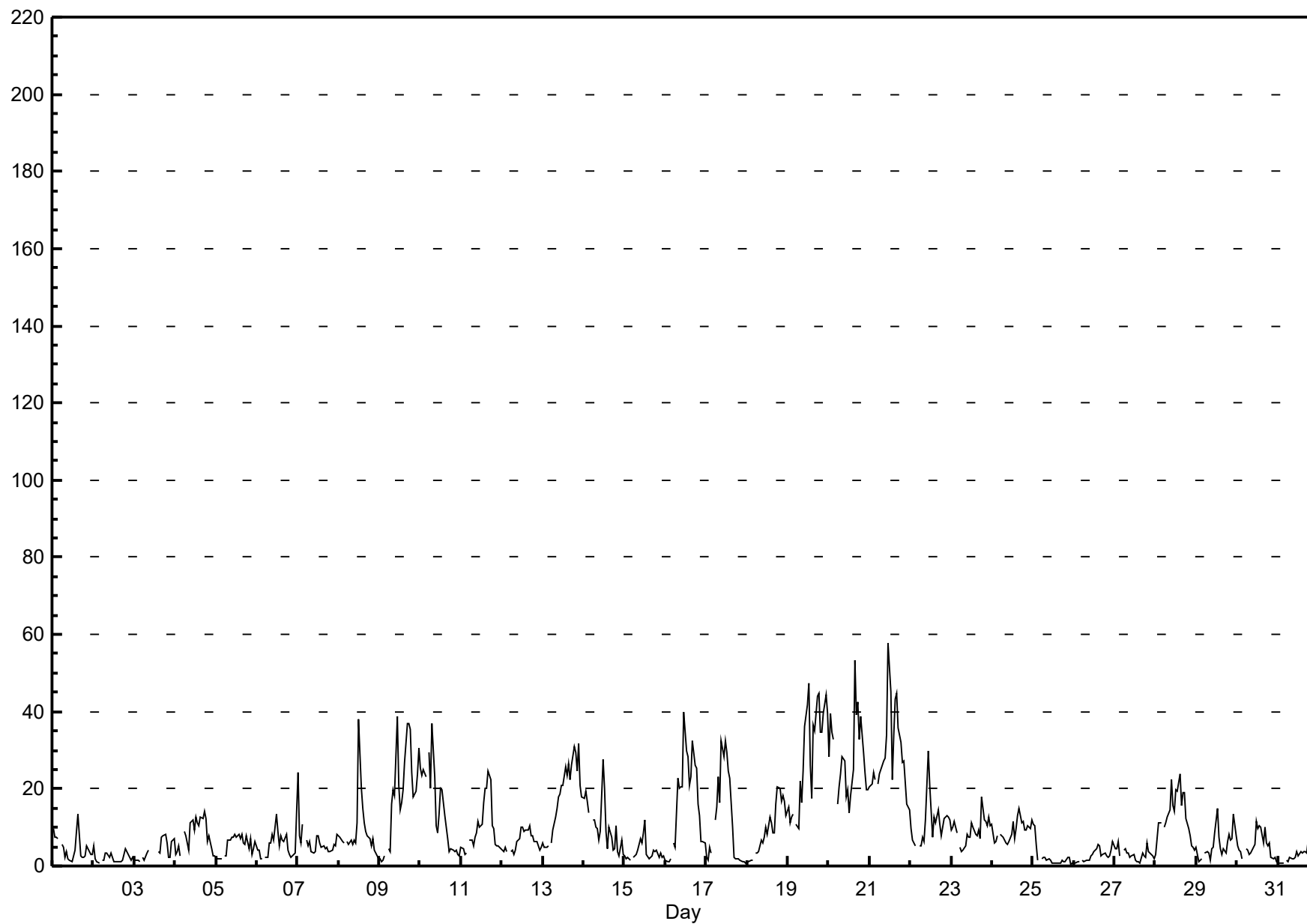
Hourly Averages

Nitrogen Oxide (NO) - ppb
Beaverlodge - December 2019



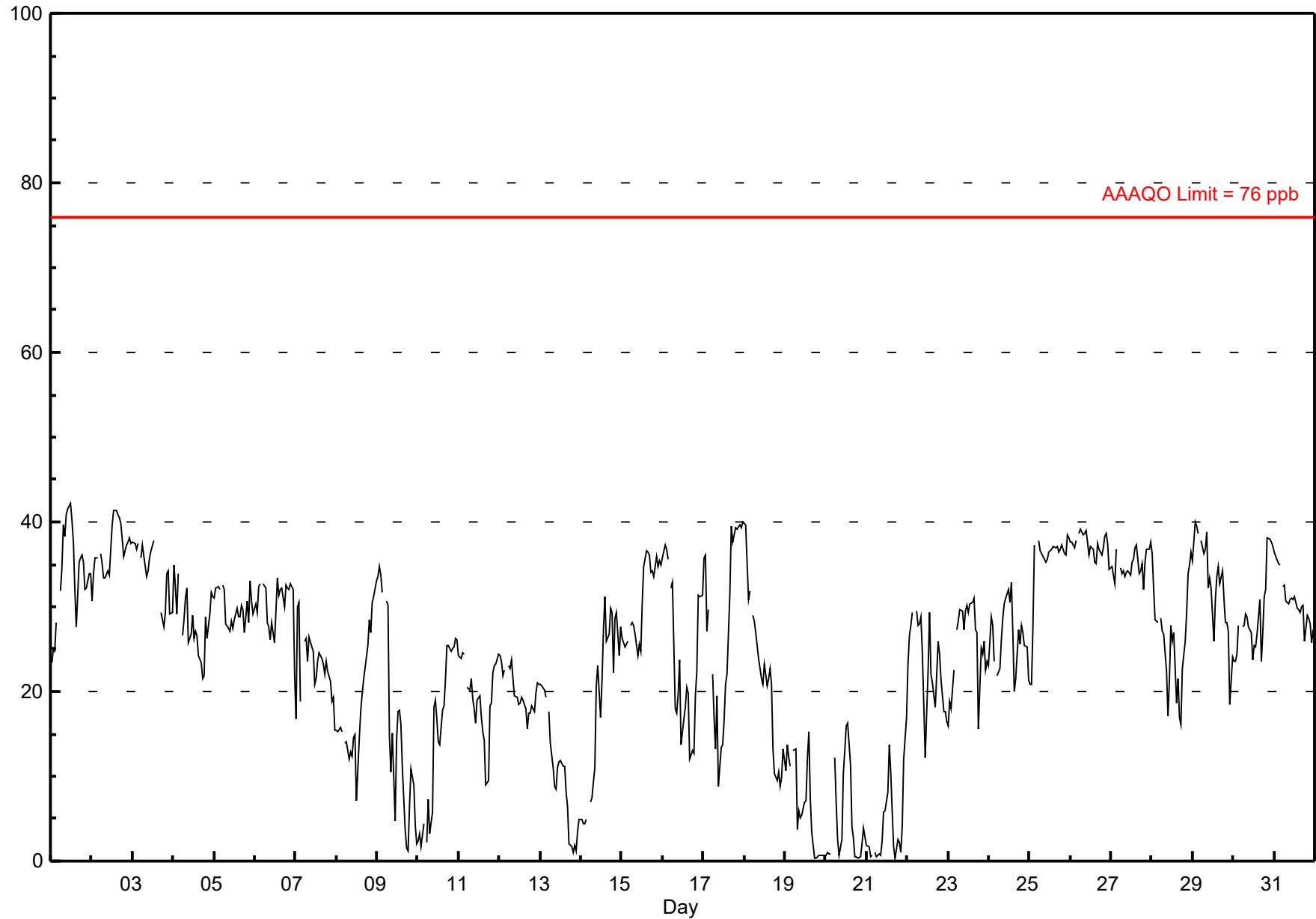
Hourly Averages

Oxides of Nitrogen (NO_x) - ppb
Beaverlodge - December 2019



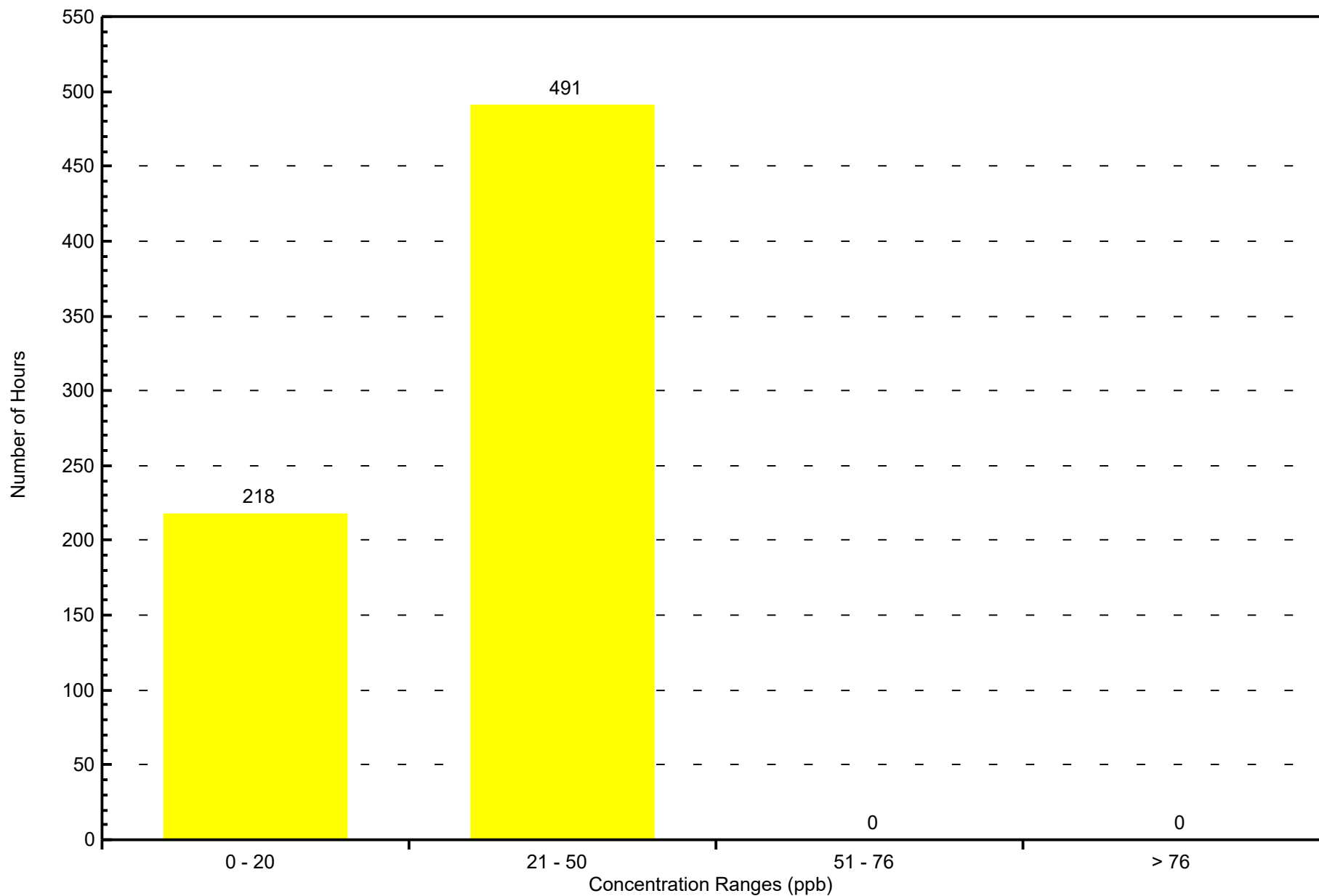
Hourly Averages

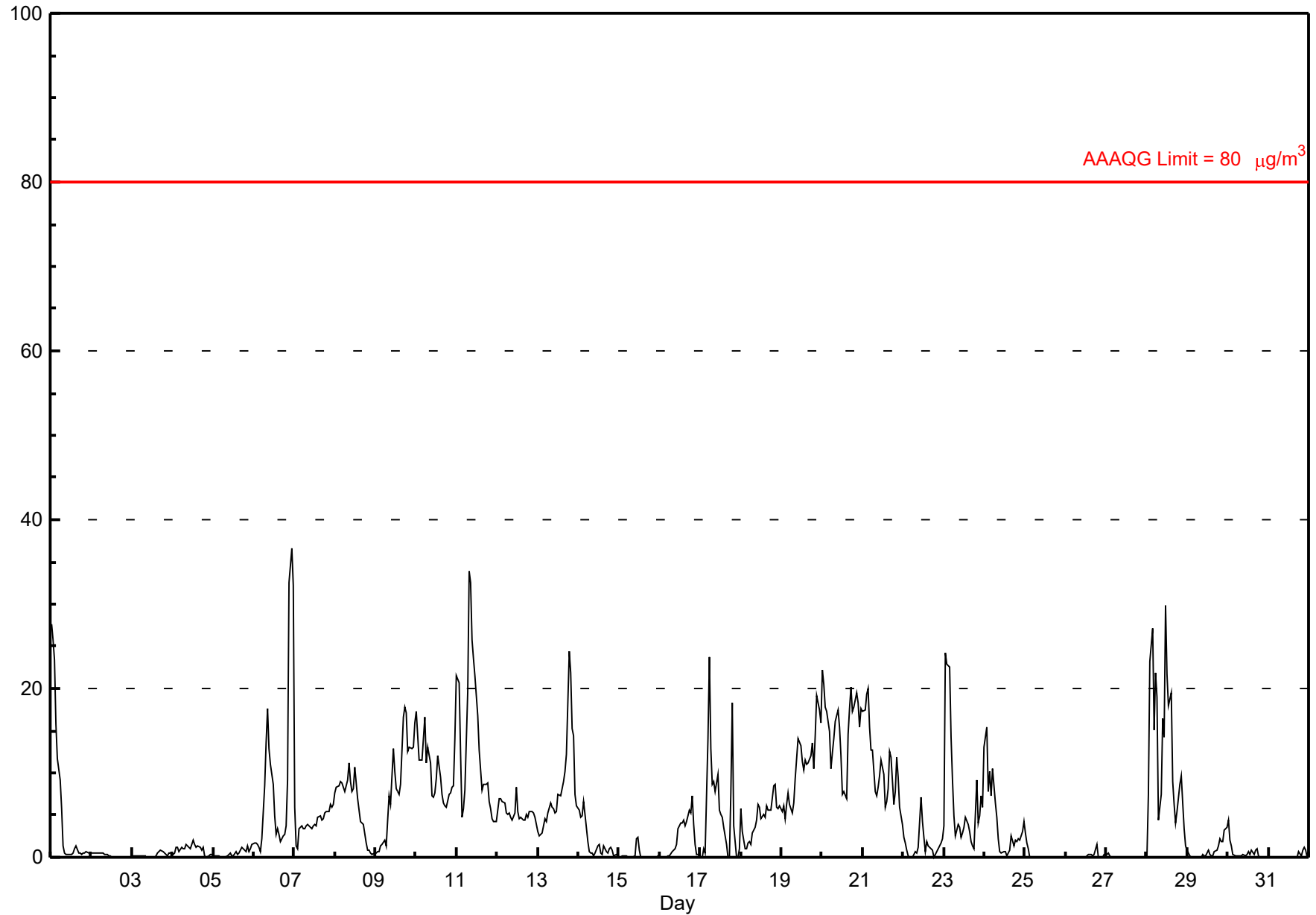
Ozone (O₃) - ppb
Beaverlodge - December 2019

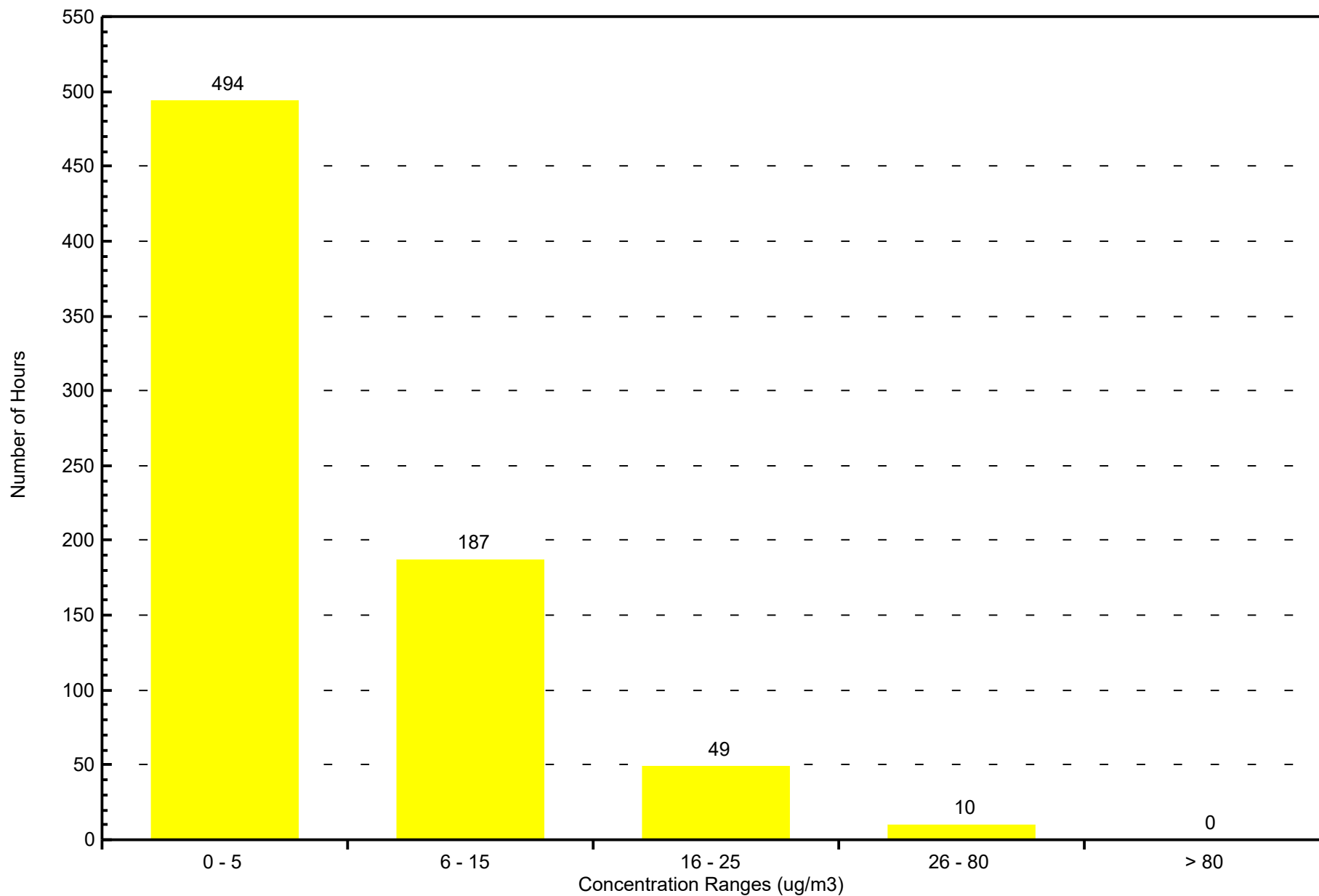


Histogram of Hourly Averages

Ozone (O₃) - ppb
Beaverlodge - December 2019

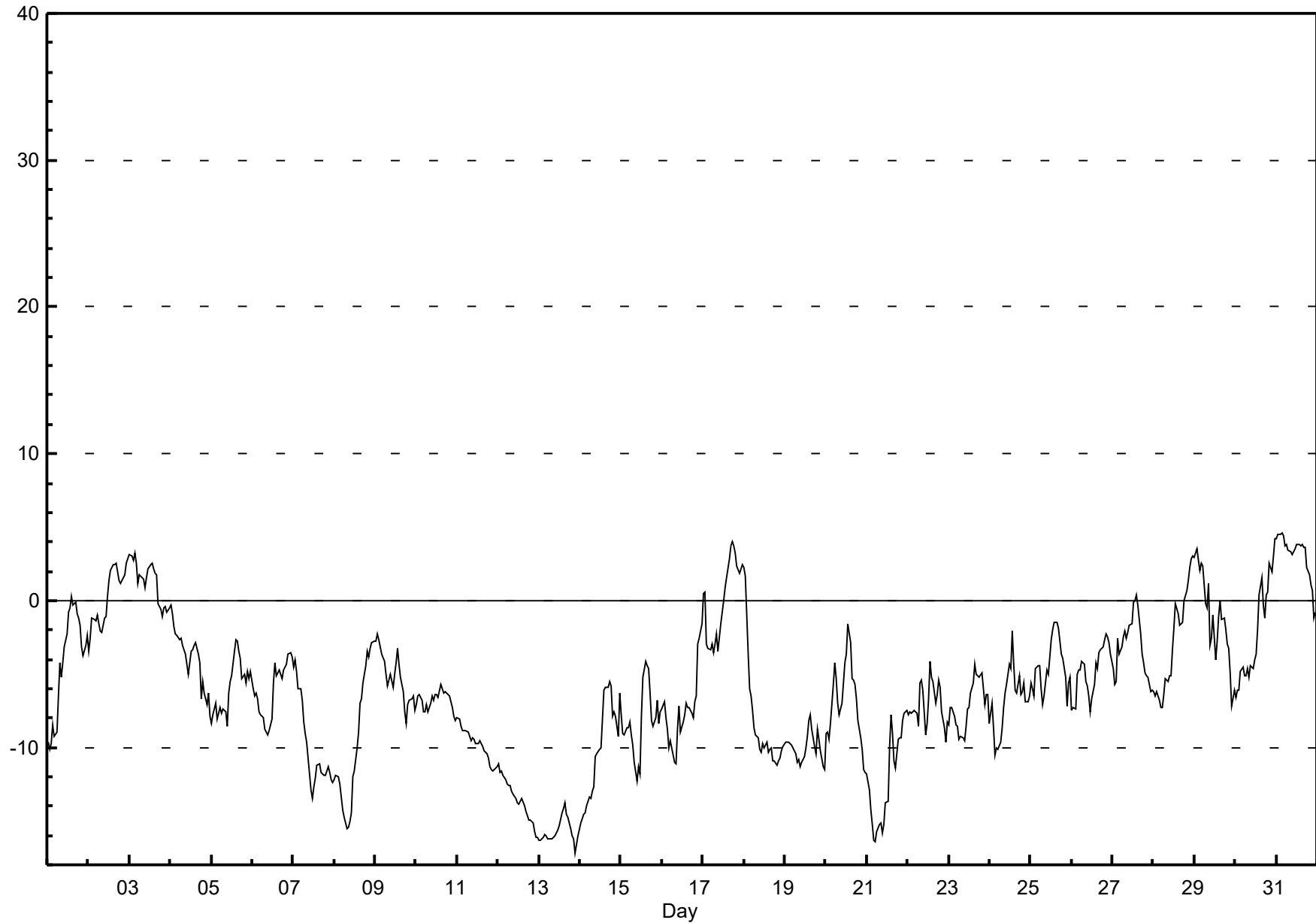






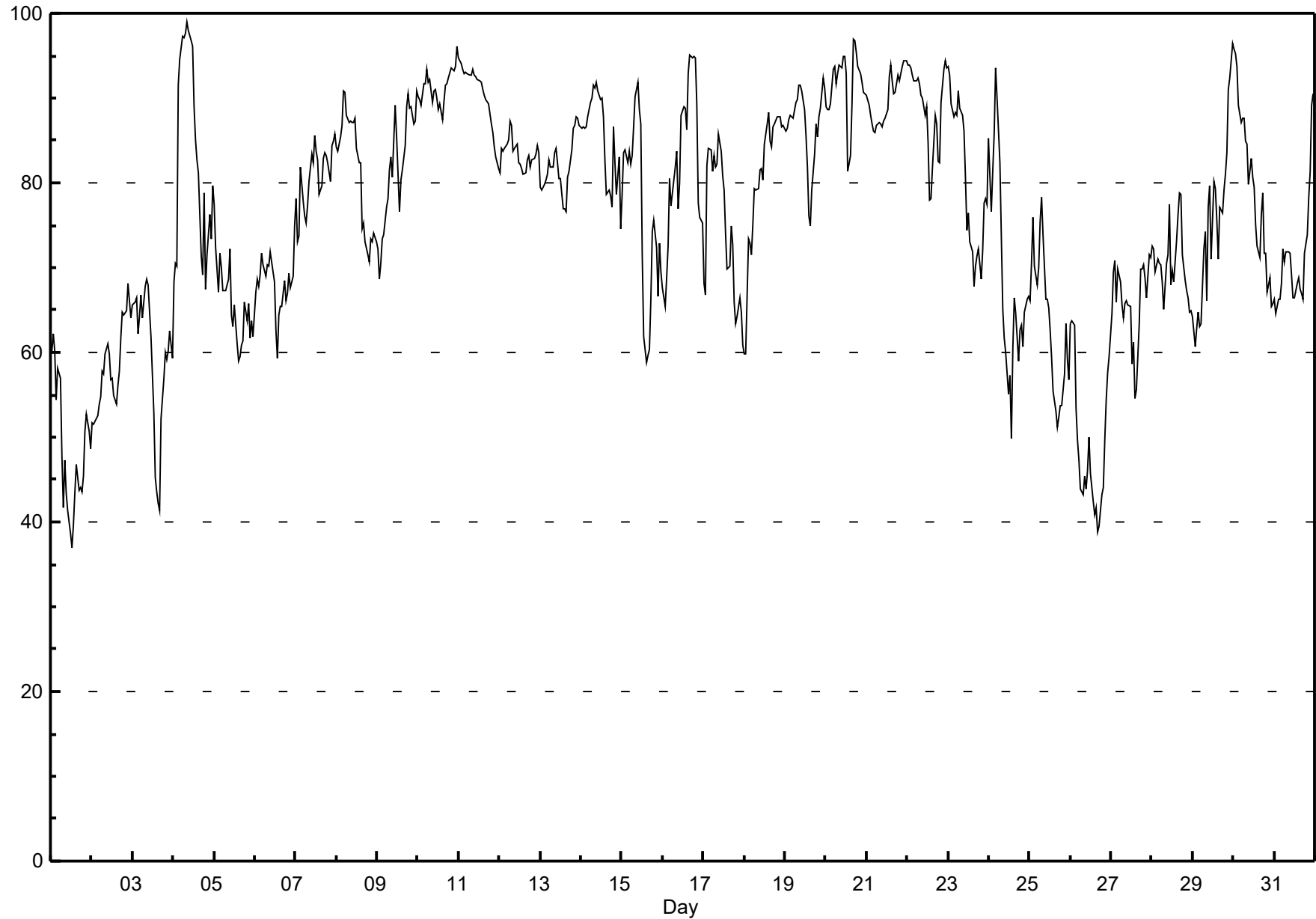
Hourly Averages

External Temperature (ET) - °C
Beaverlodge - December 2019



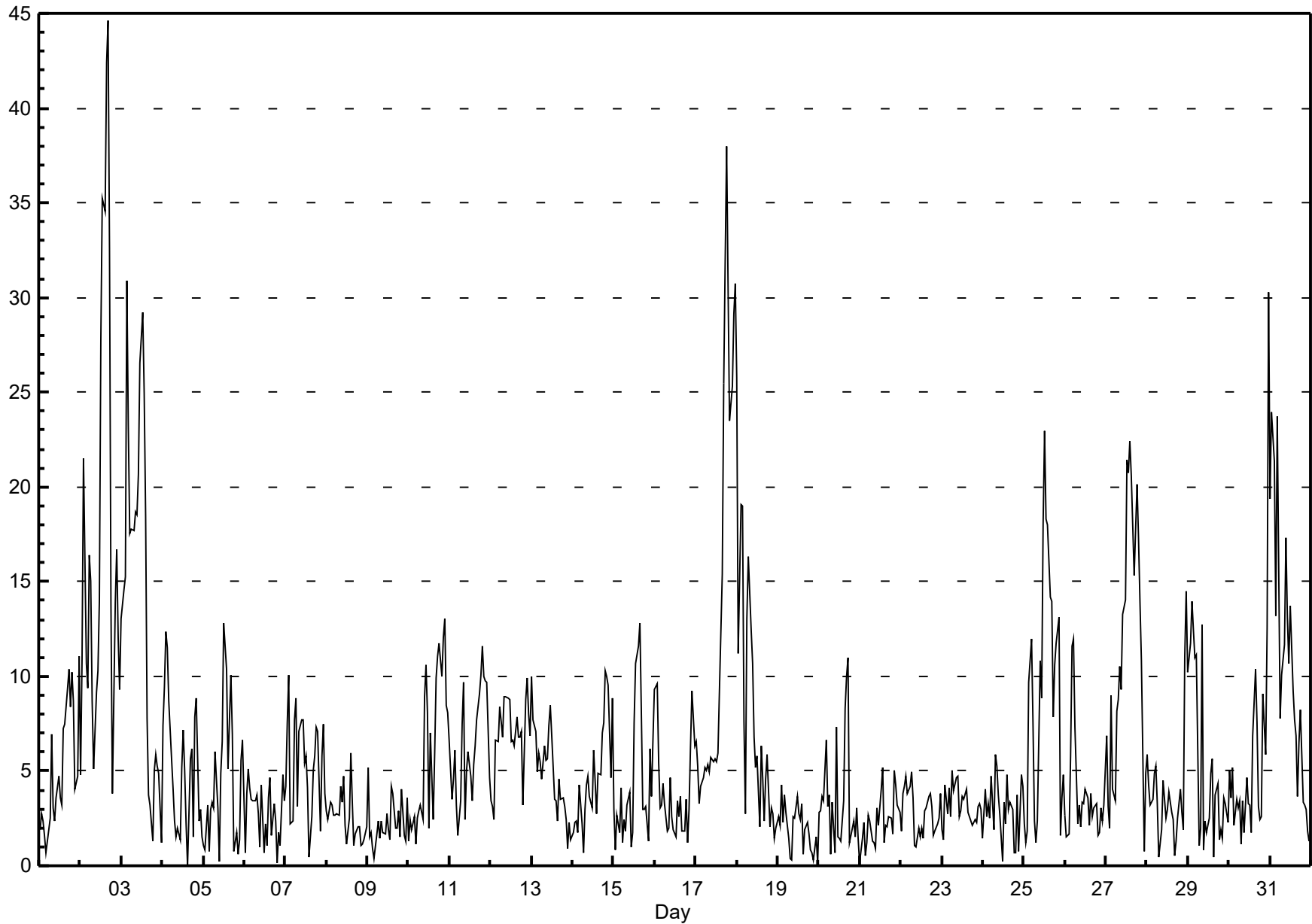
Hourly Averages

Relative Humidity (RH) - %
Beaverlodge - December 2019



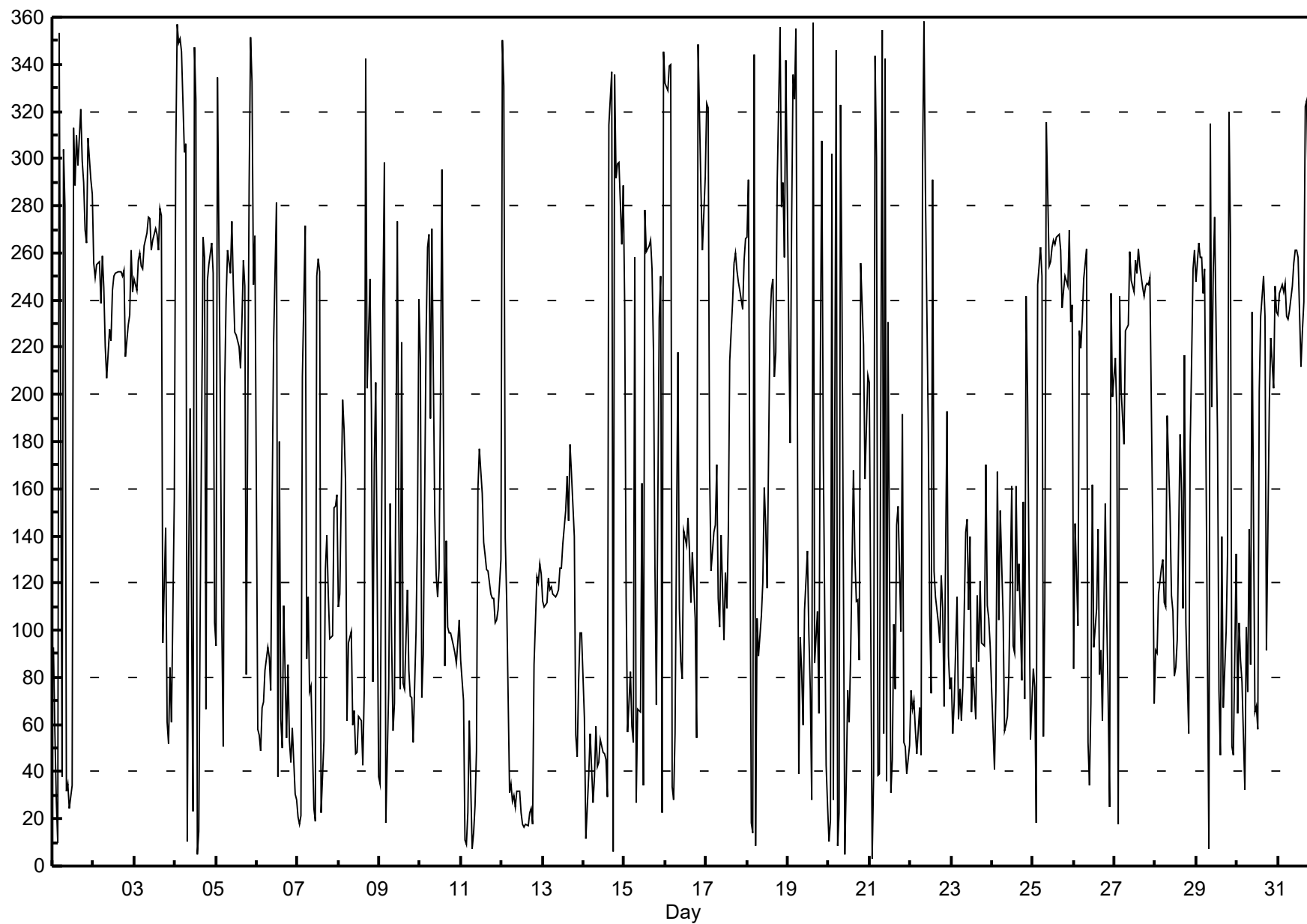
Hourly Averages

Wind Speed (WS) - km/h
Beaverlodge - December 2019



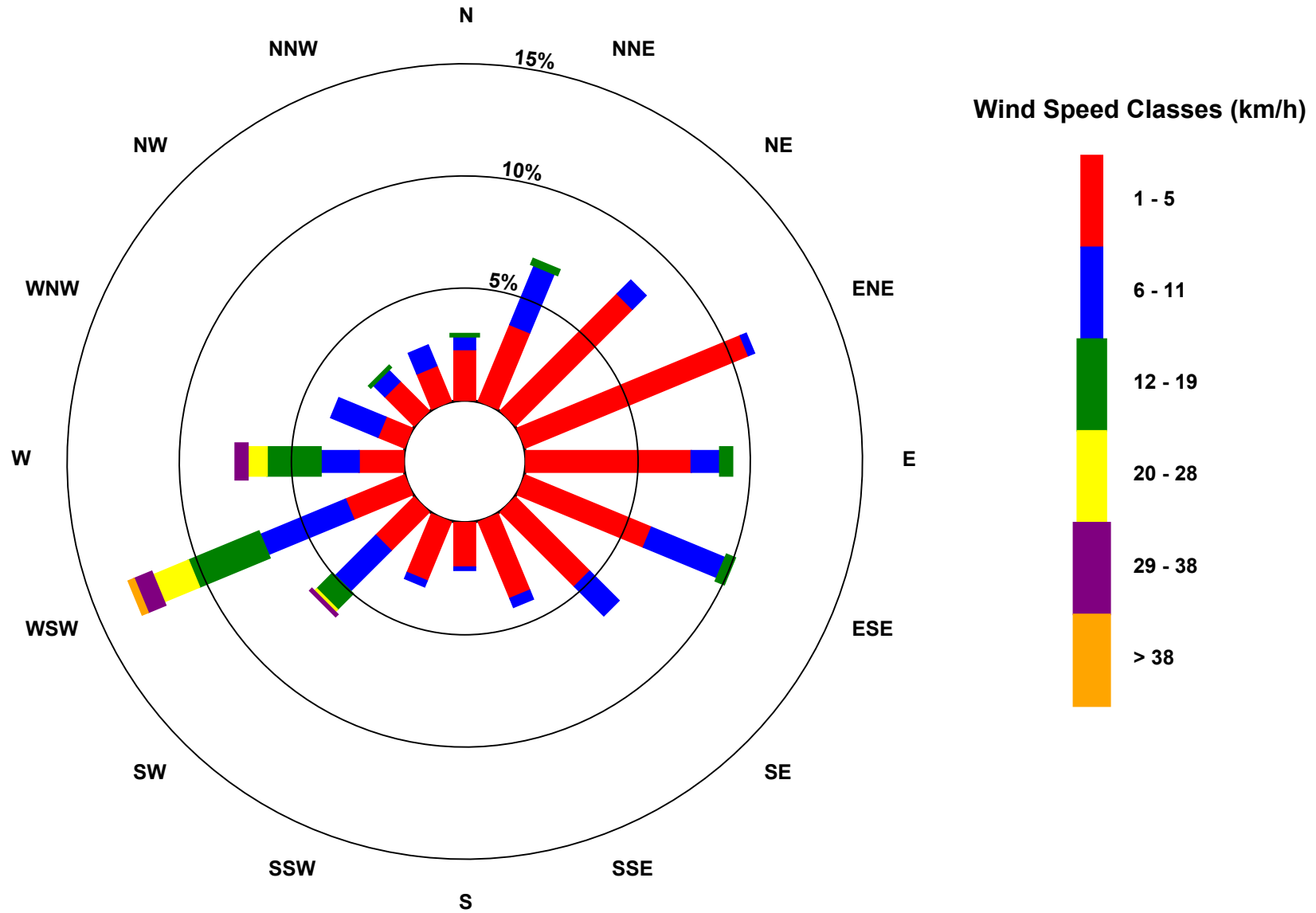
Hourly Averages

Wind Direction (WD) - deg
Beaverlodge - December 2019



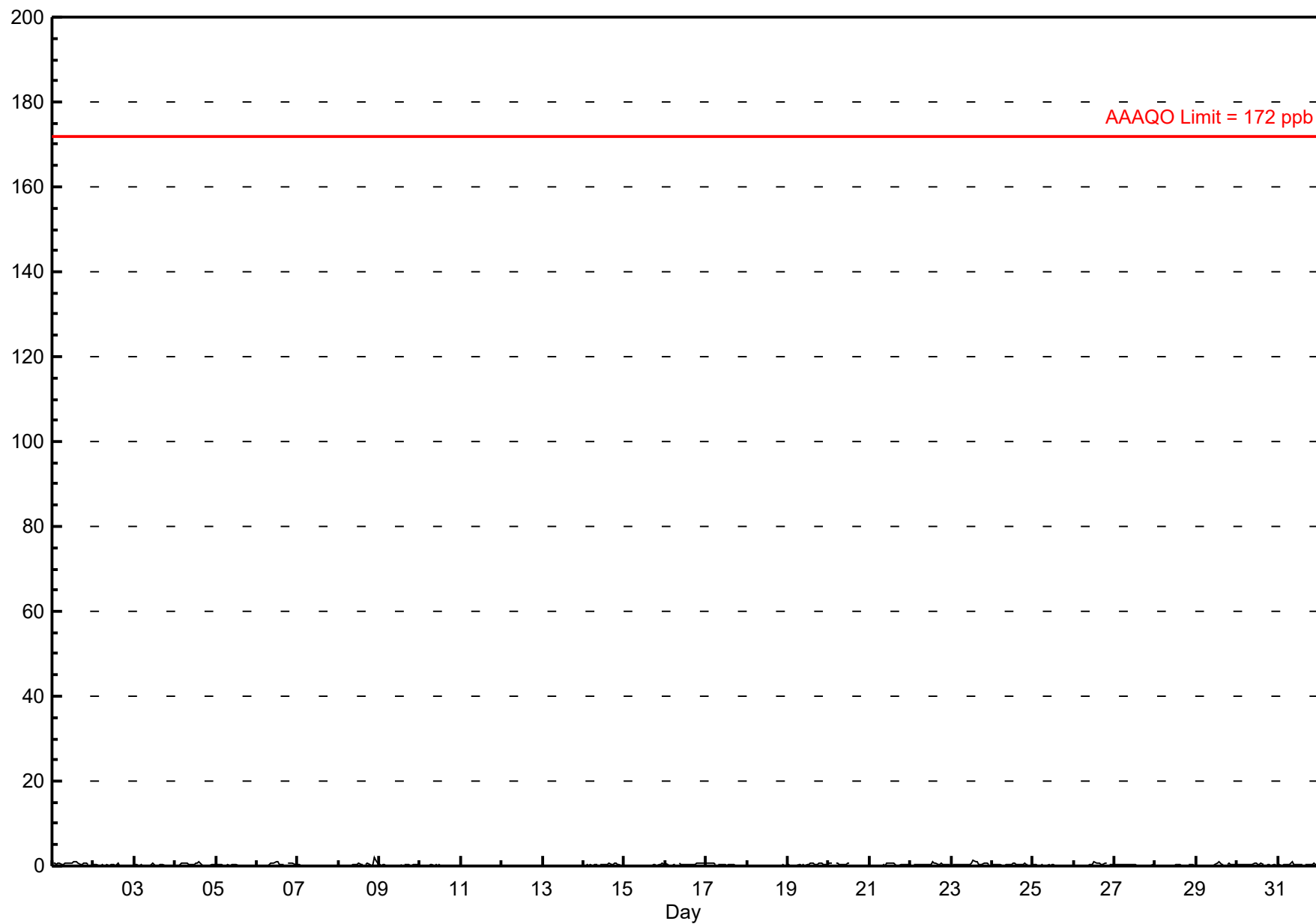
Wind Rose

Wind Speed (WS) (km/h)
Beaverlodge - December 2019



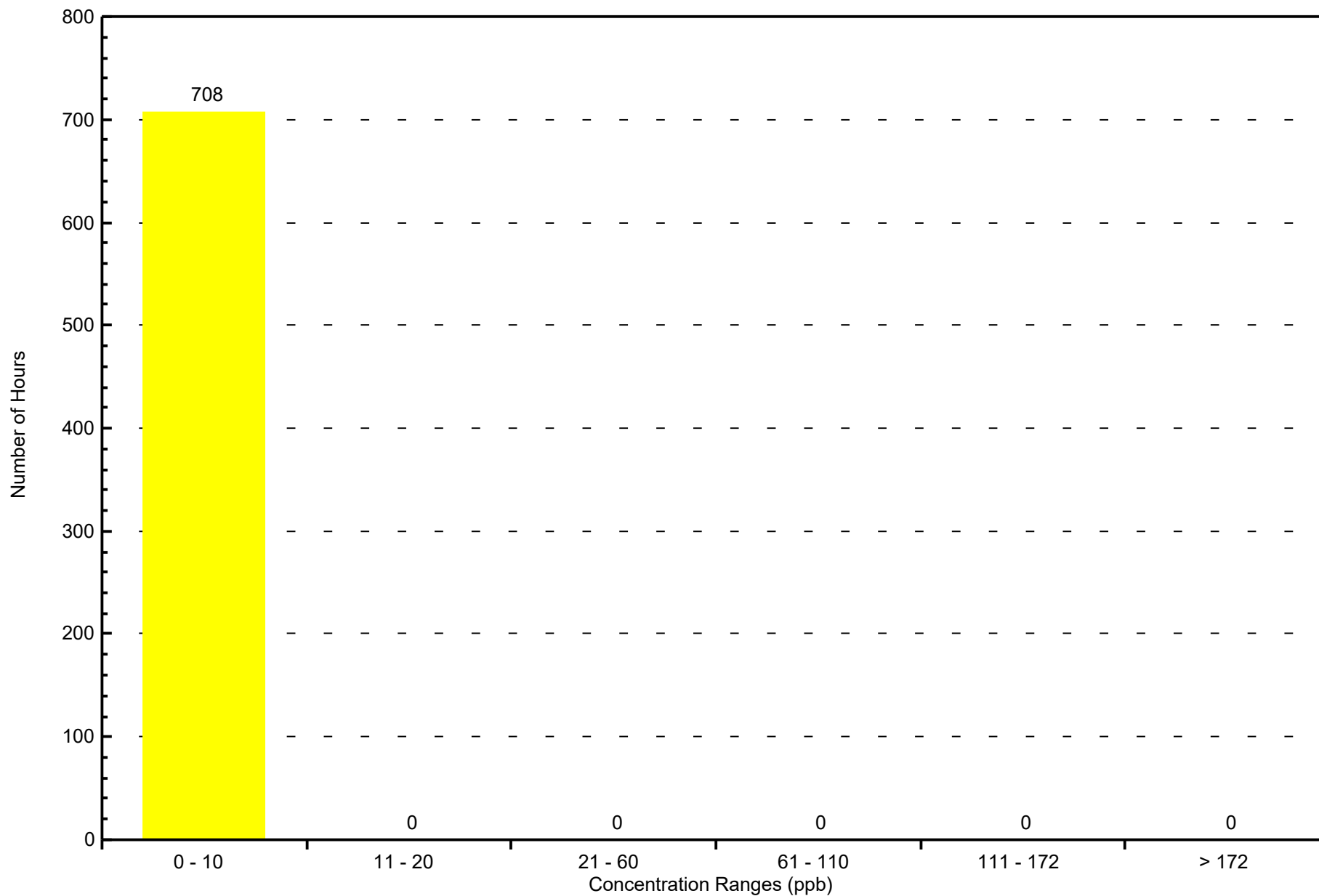
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Evergreen Park - December 2019



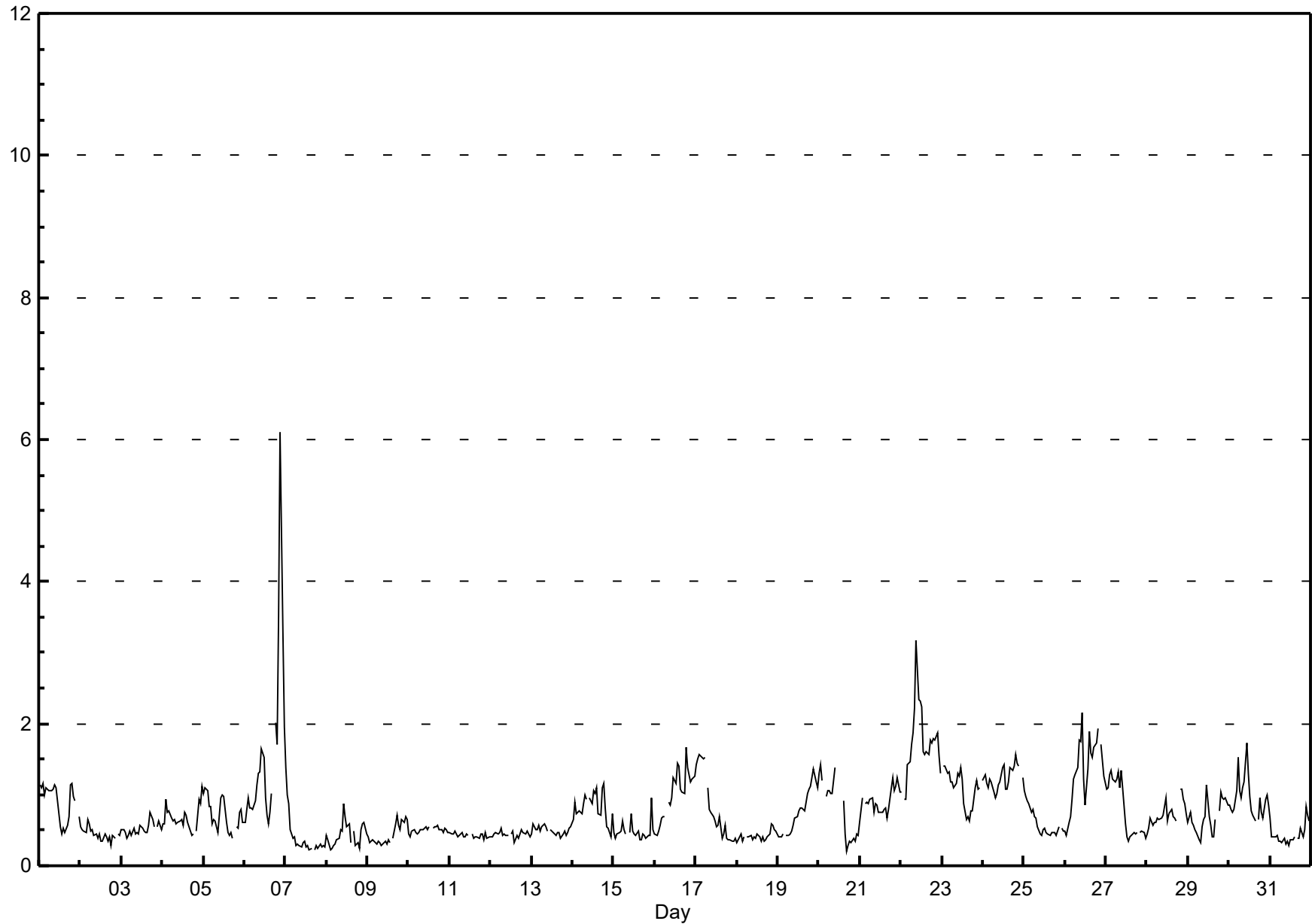
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Evergreen Park - December 2019



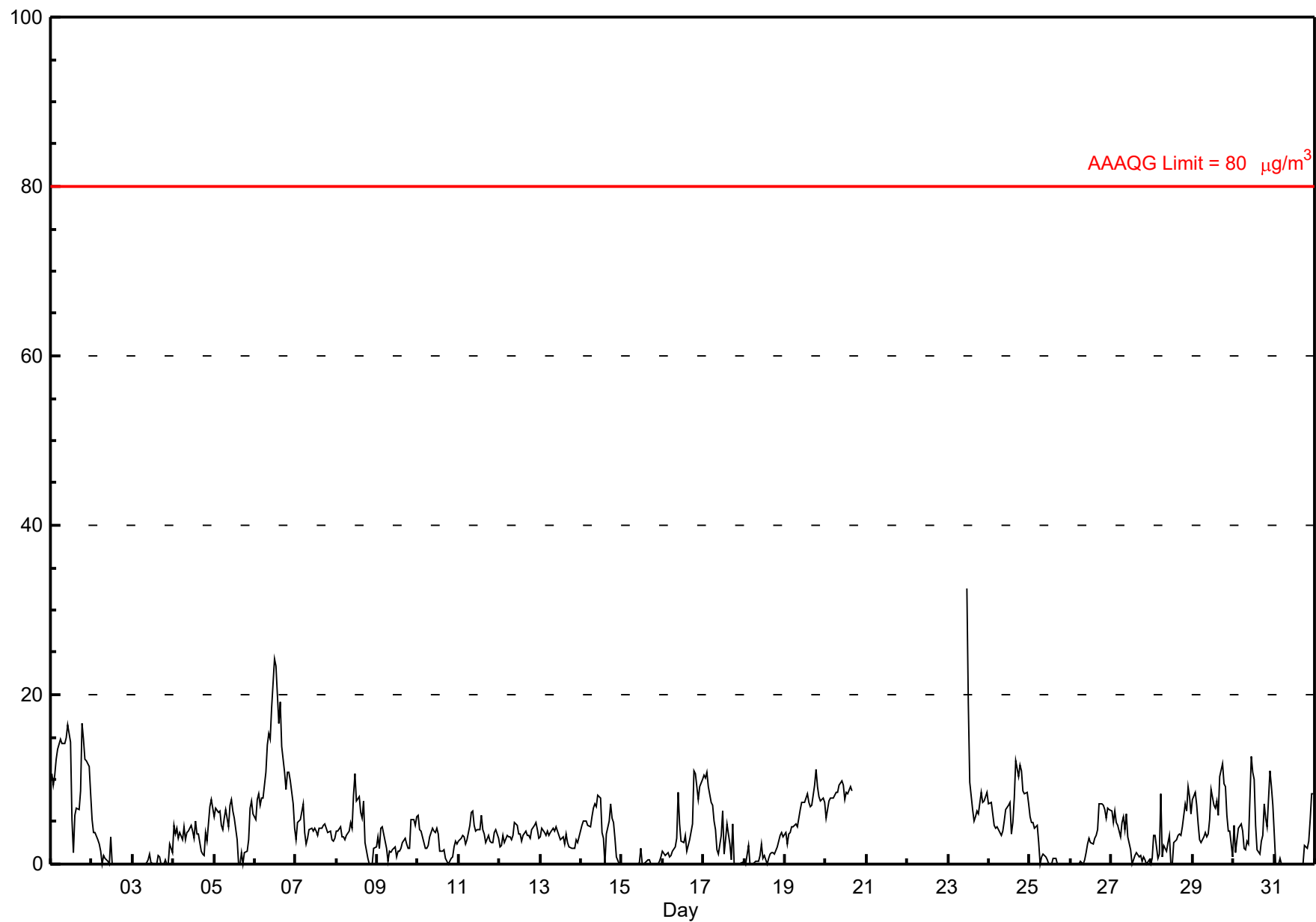
Hourly Averages

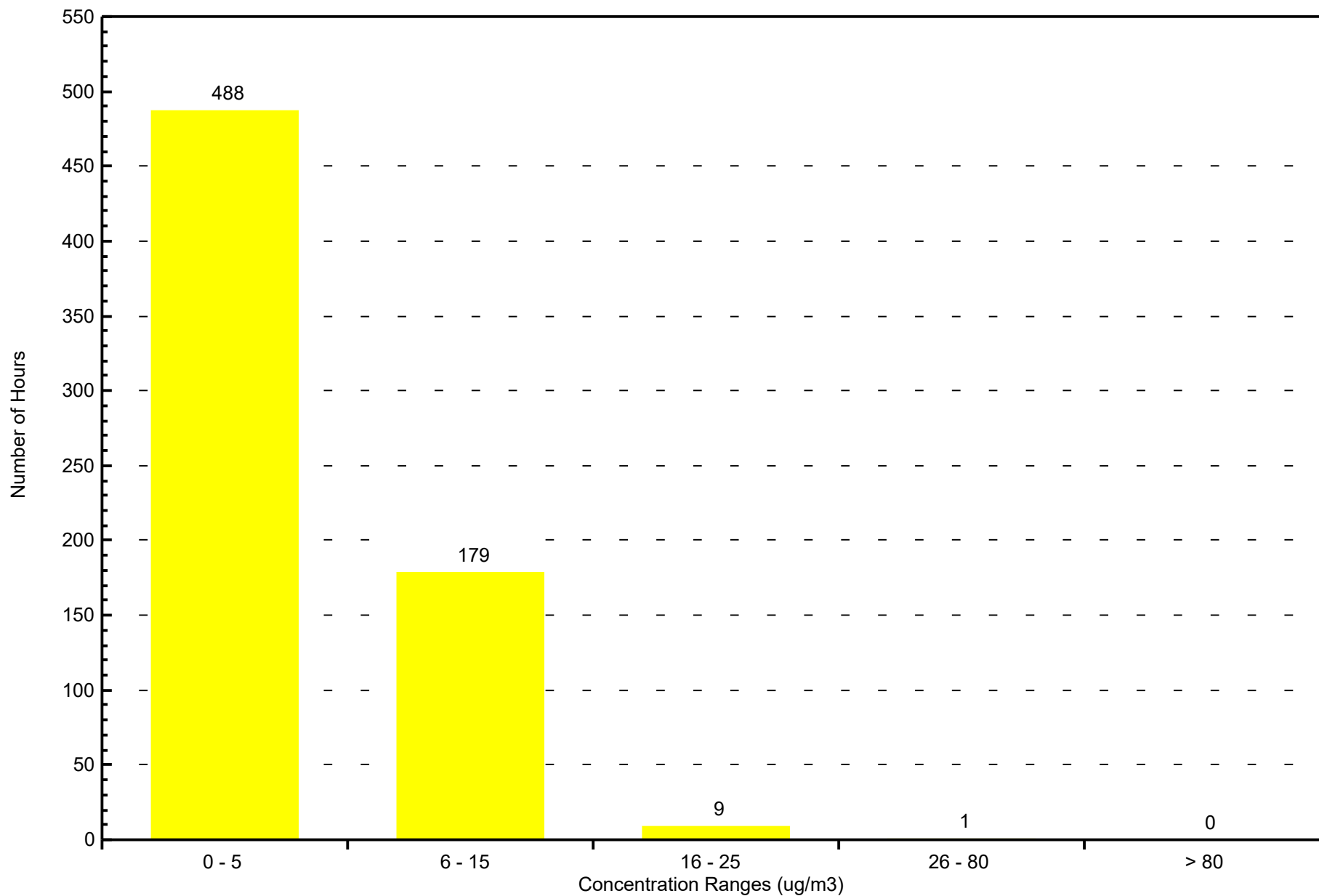
Total Reduced Sulphur (TRS) - ppb
Evergreen Park - December 2019



Hourly Averages

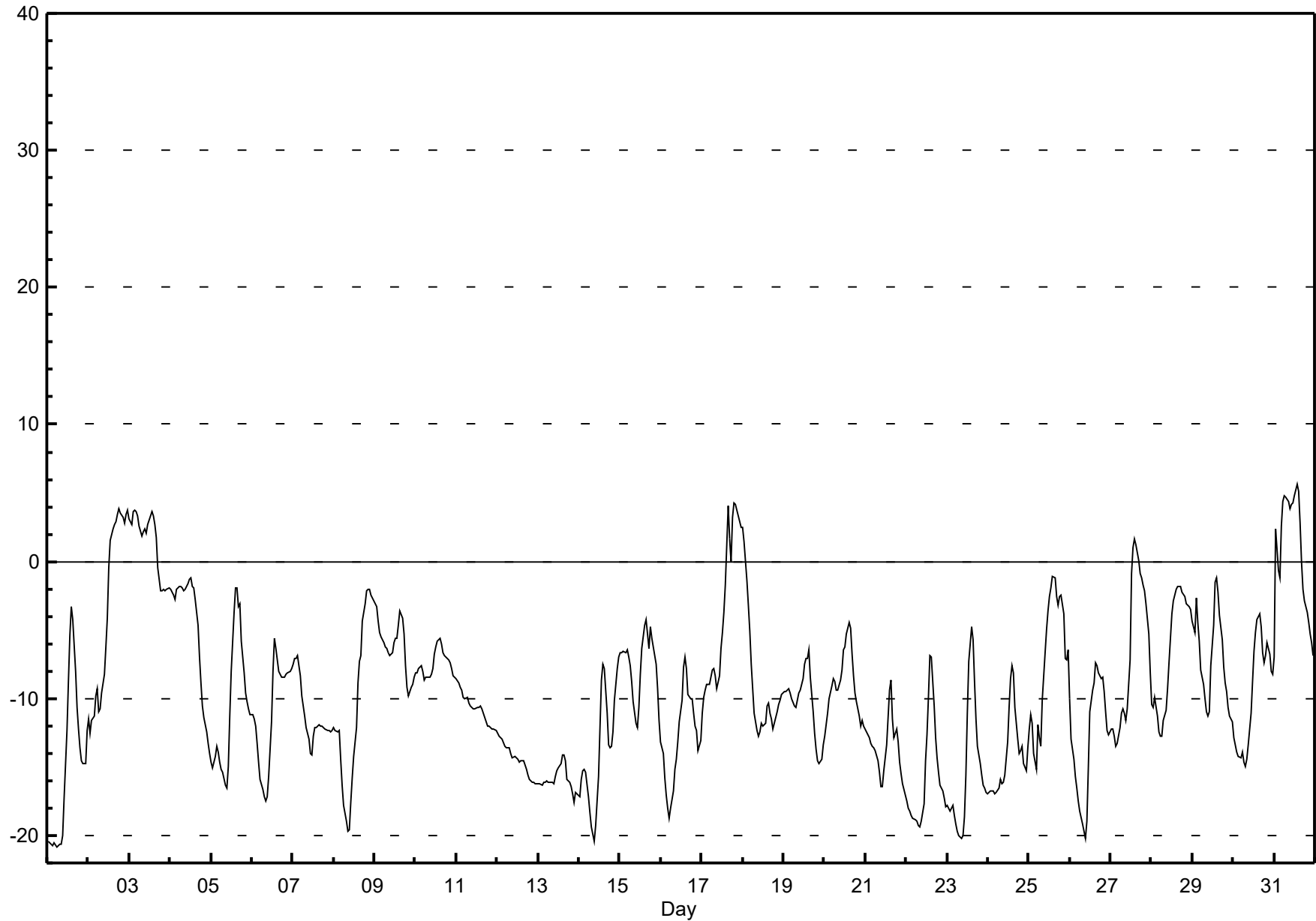
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Evergreen Park - December 2019





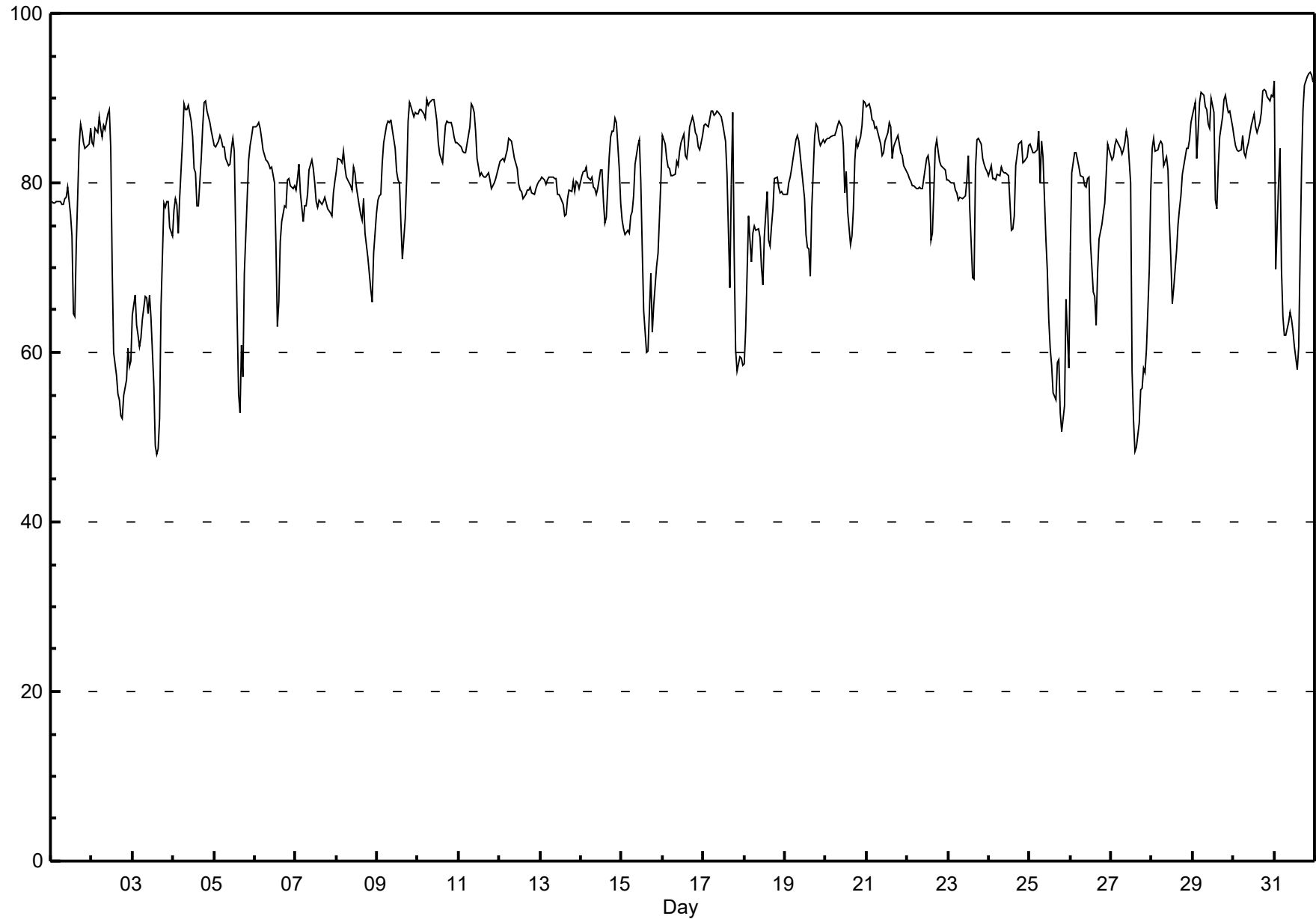
Hourly Averages

External Temperature (ET) - °C
Evergreen Park - December 2019



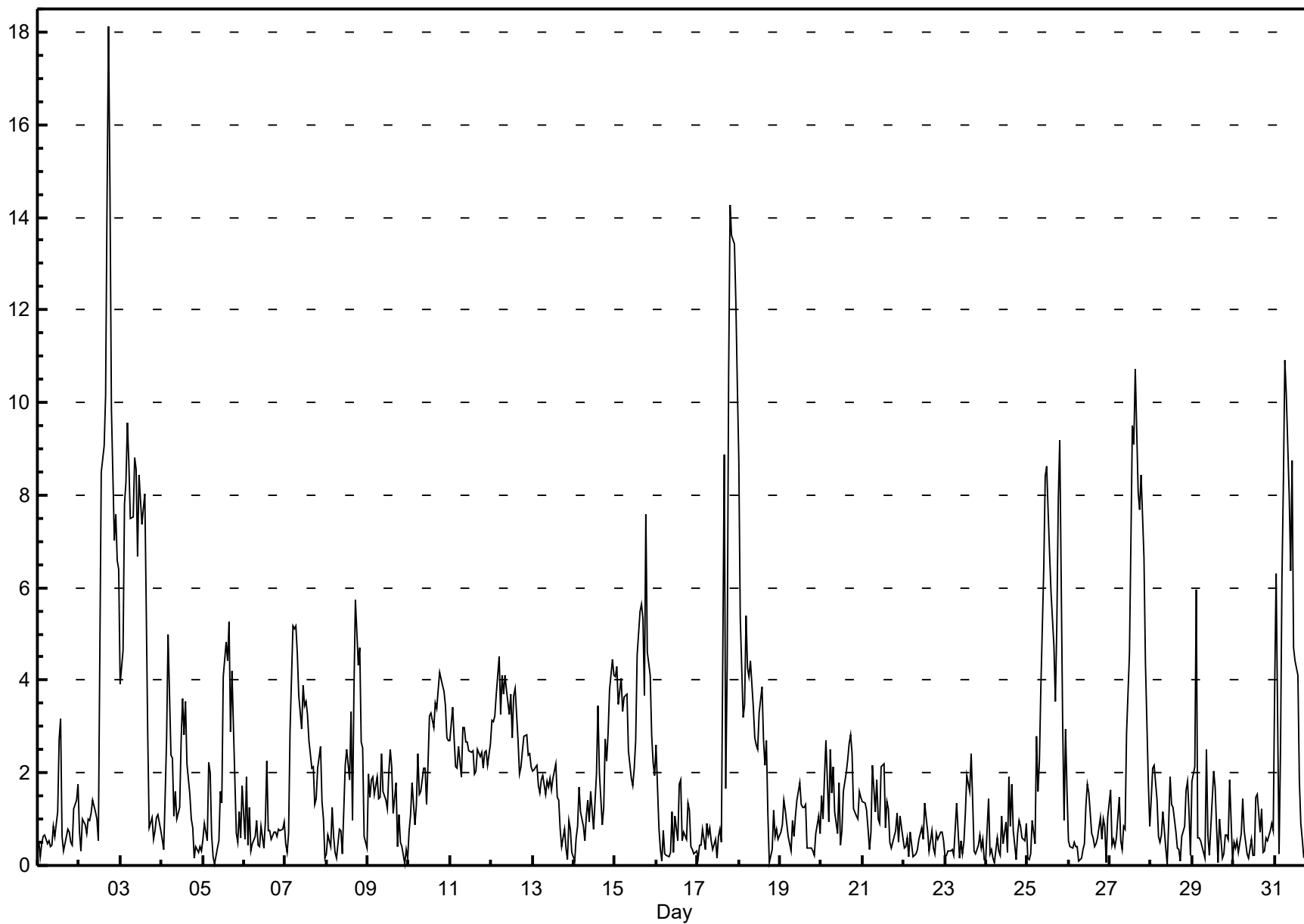
Hourly Averages

Relative Humidity (RH) - %
Evergreen Park - December 2019



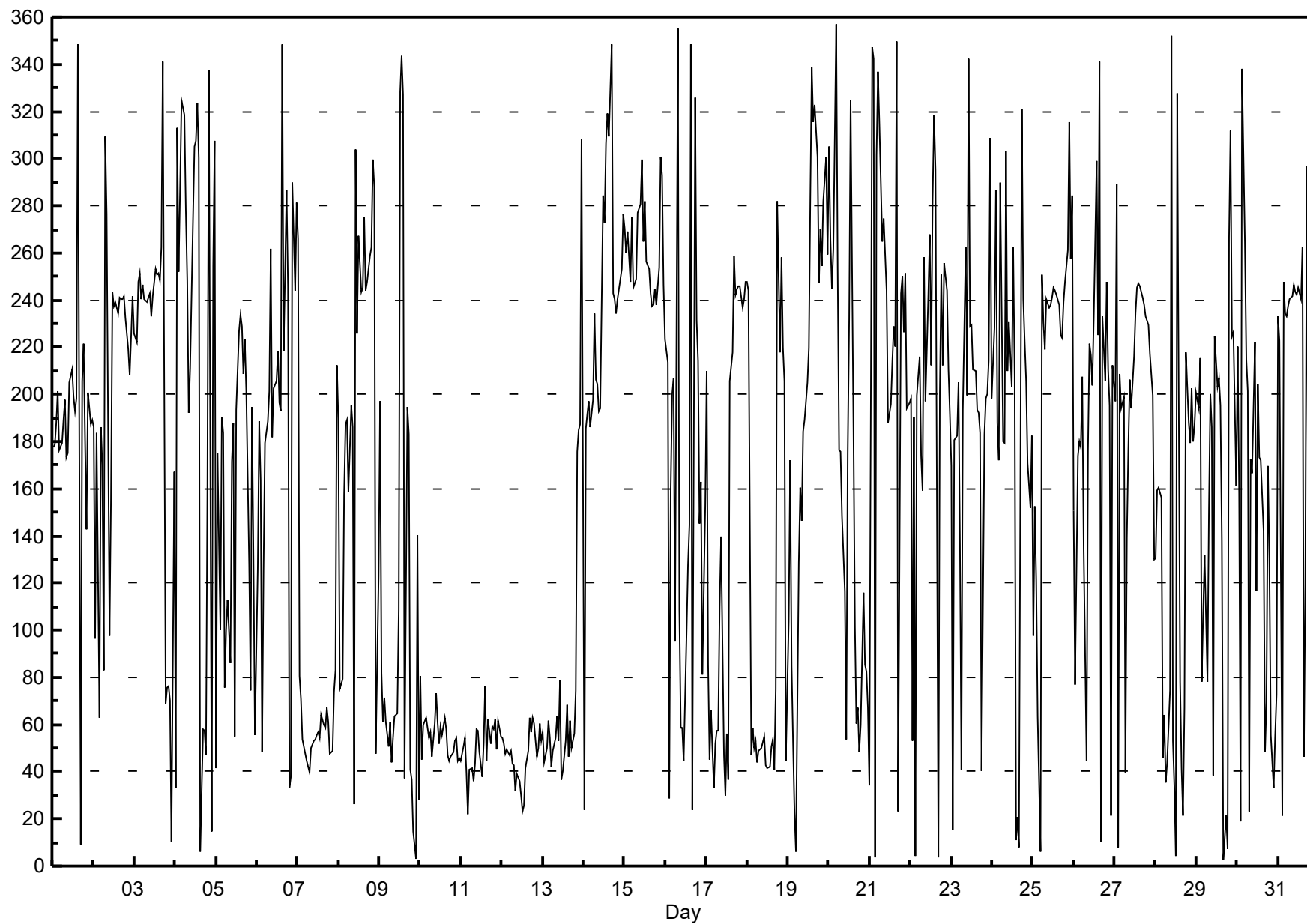
Hourly Averages

Wind Speed (WS) - km/h
Evergreen Park - December 2019



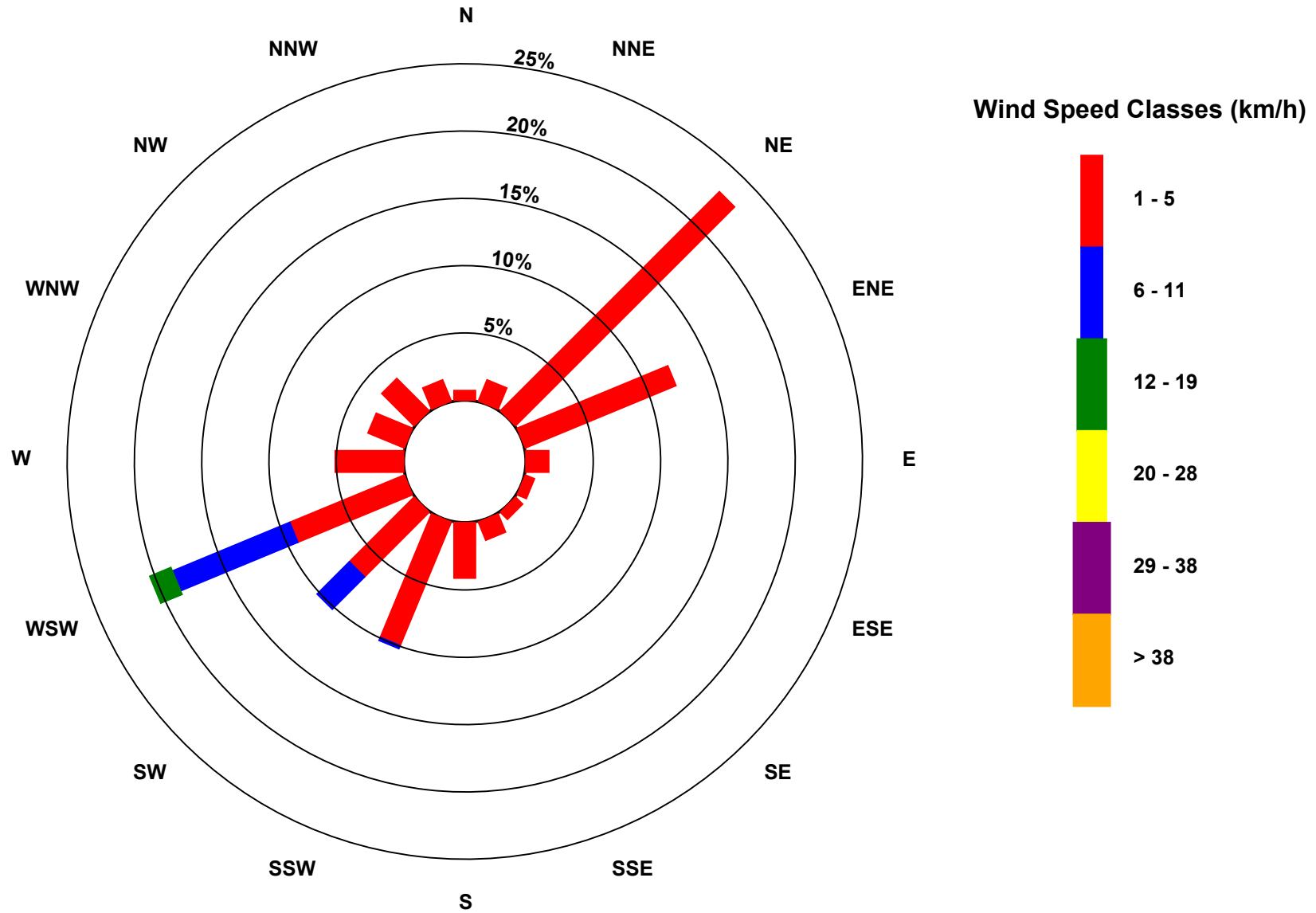
Hourly Averages

Wind Direction (WD) - deg
Evergreen Park - December 2019



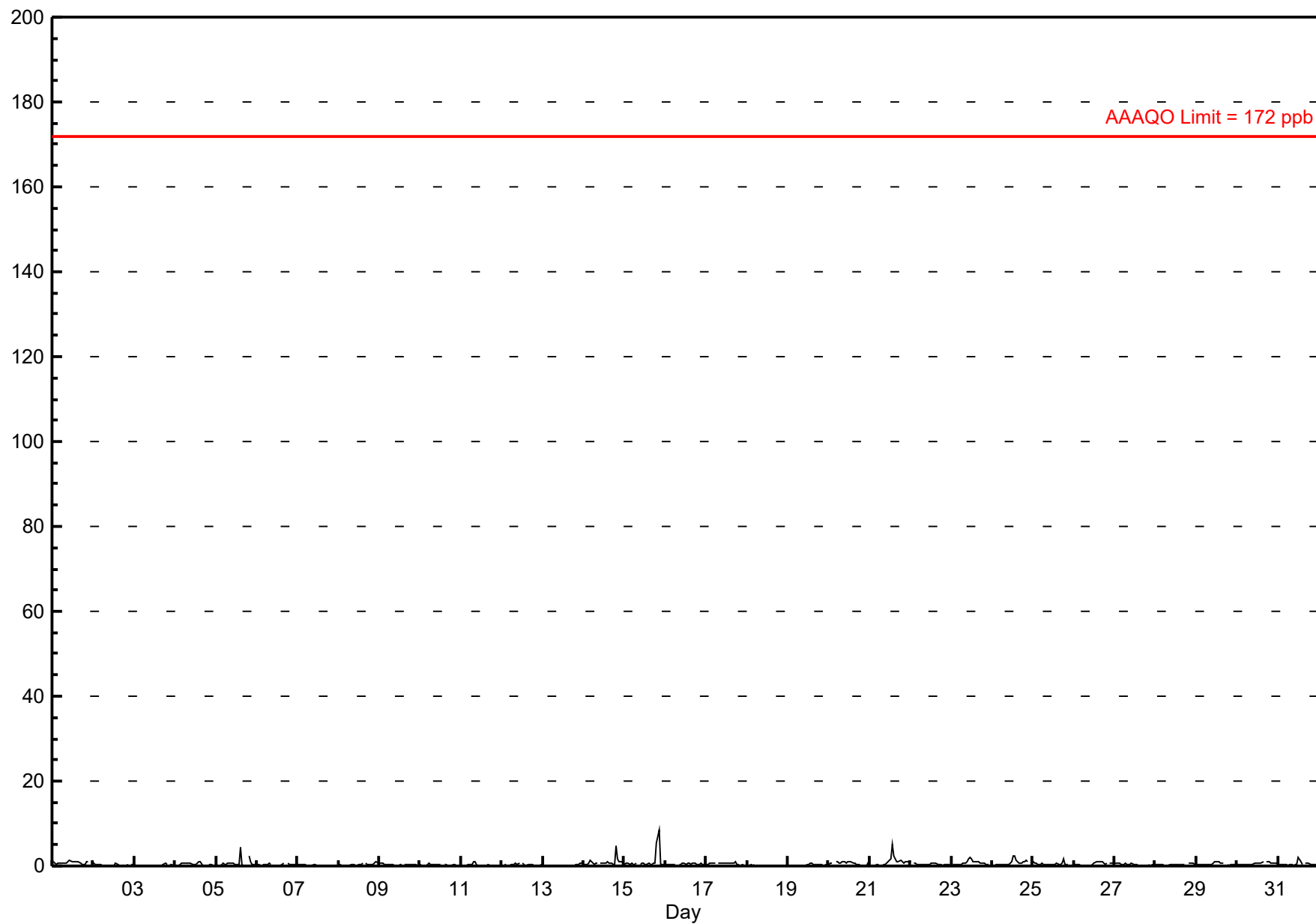
Wind Rose

Wind Speed (WS) (km/h)
Evergreen Park - December 2019



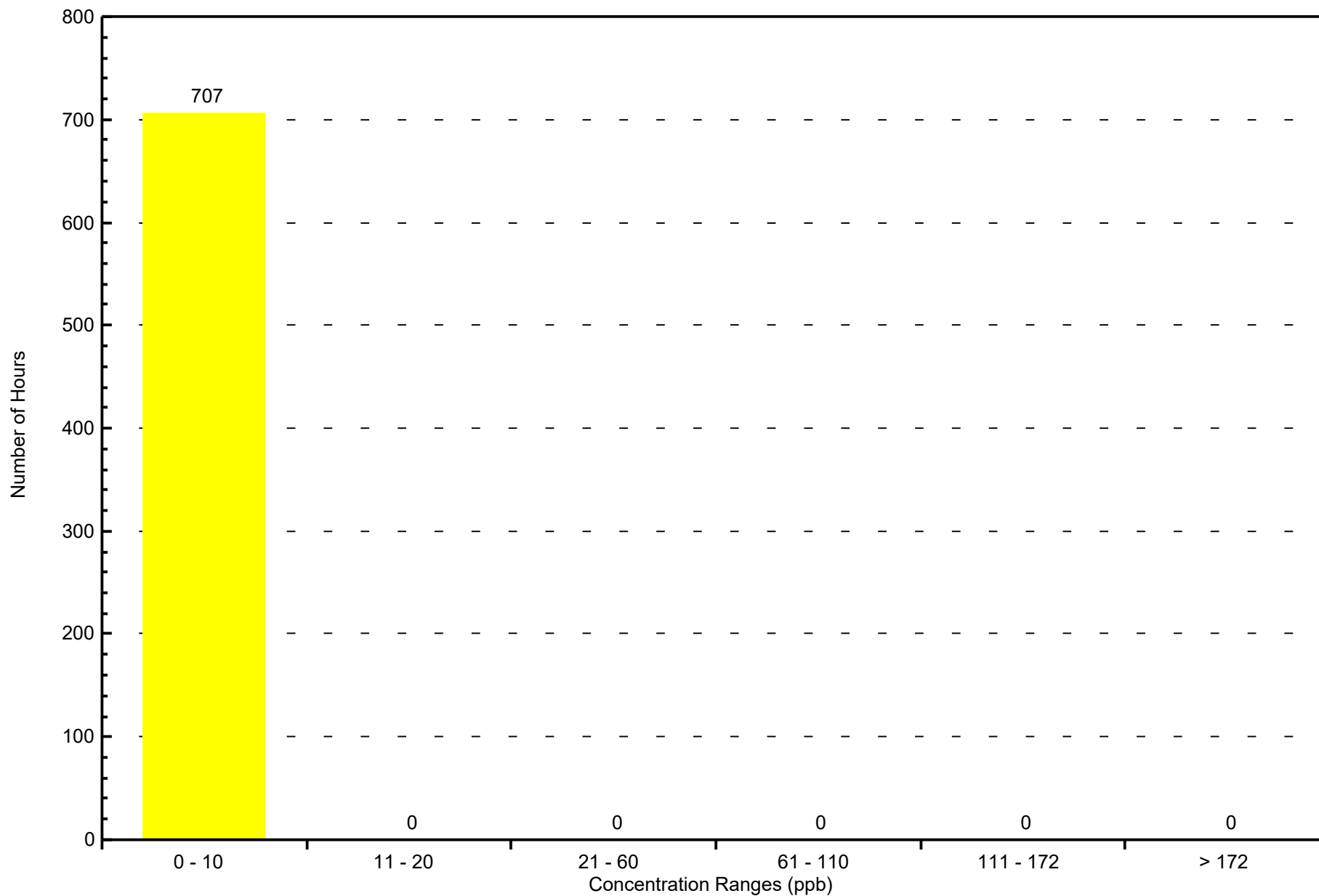
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Henry Pirker - December 2019



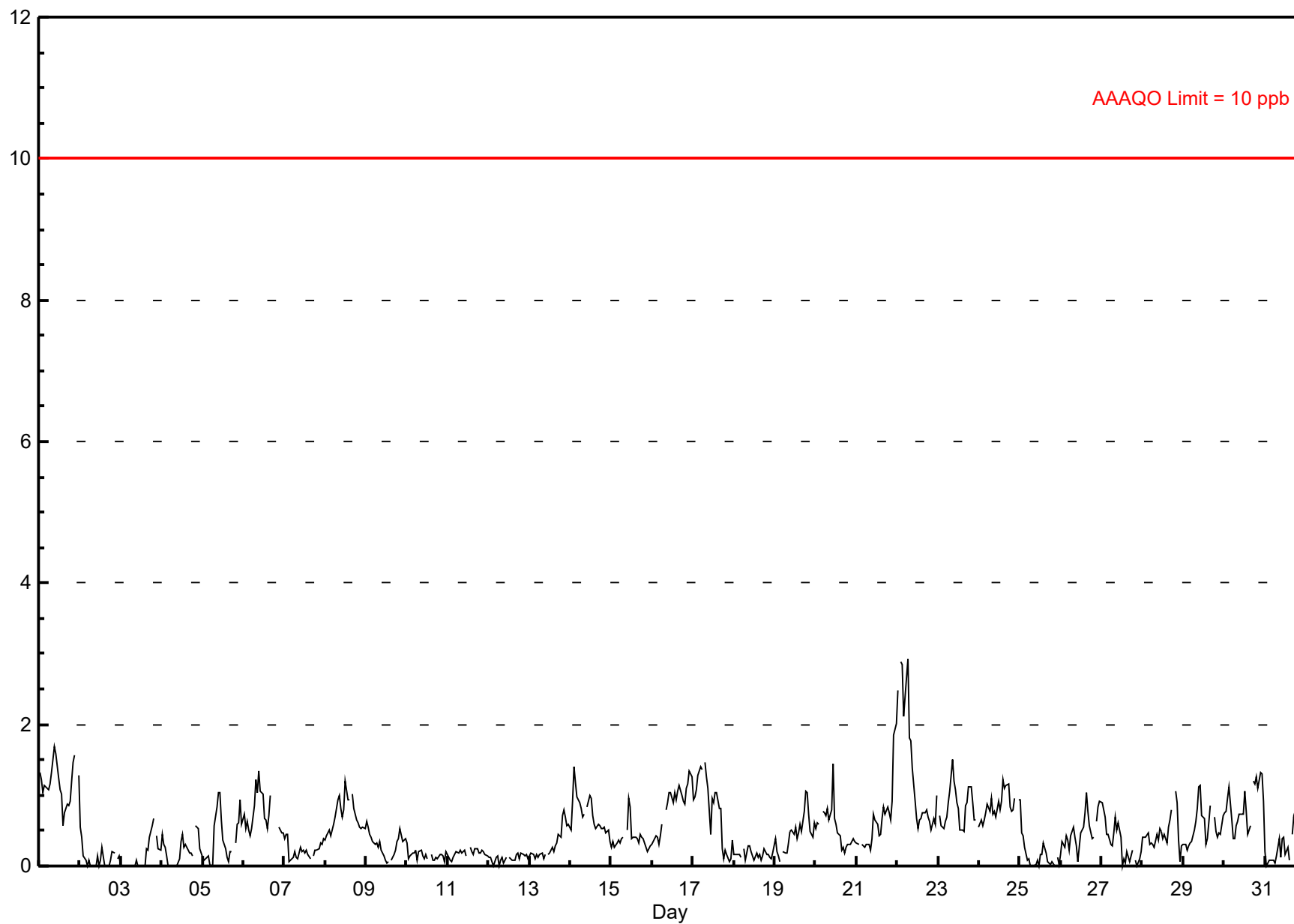
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Henry Pirker - December 2019



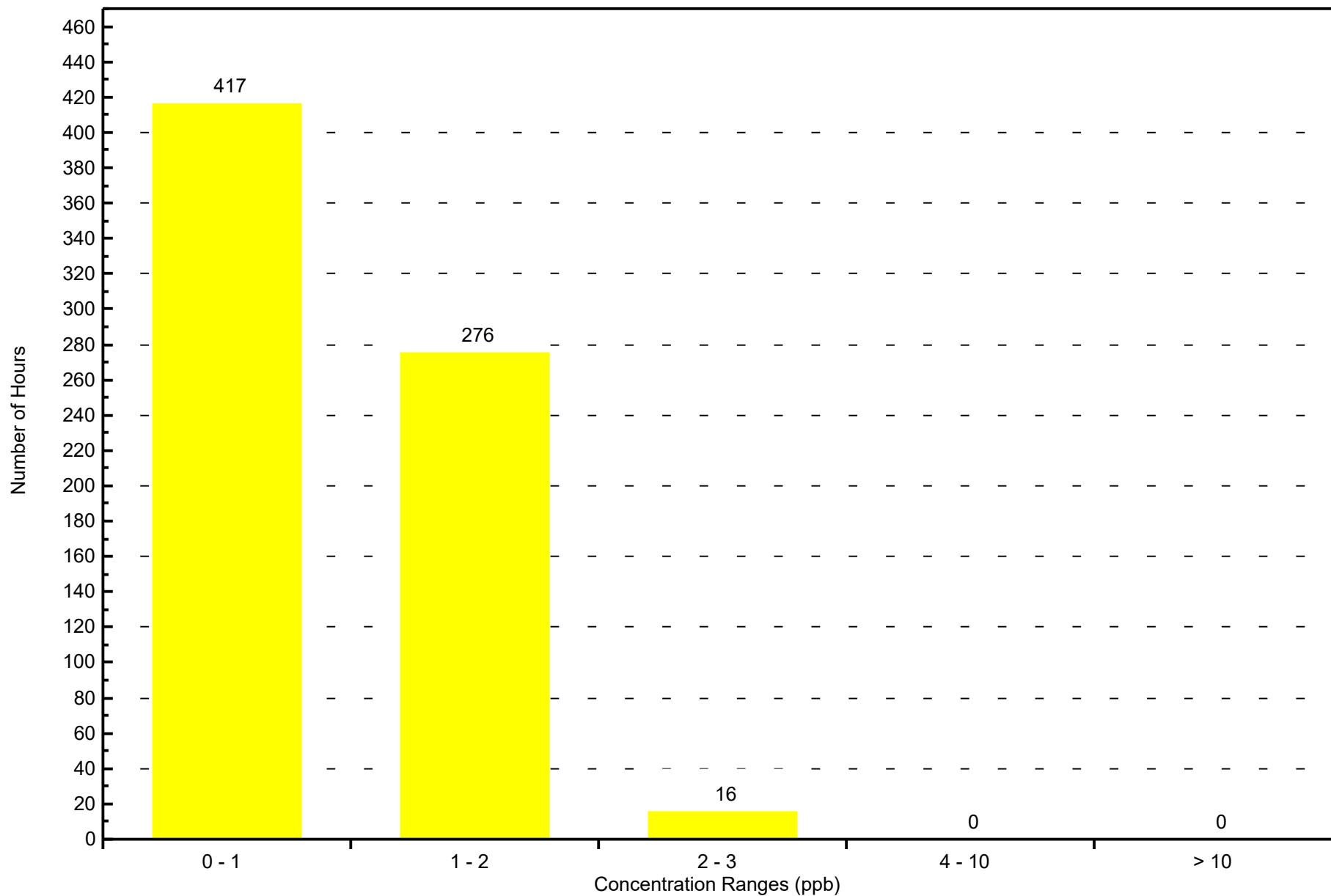
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Henry Pirker - December 2019



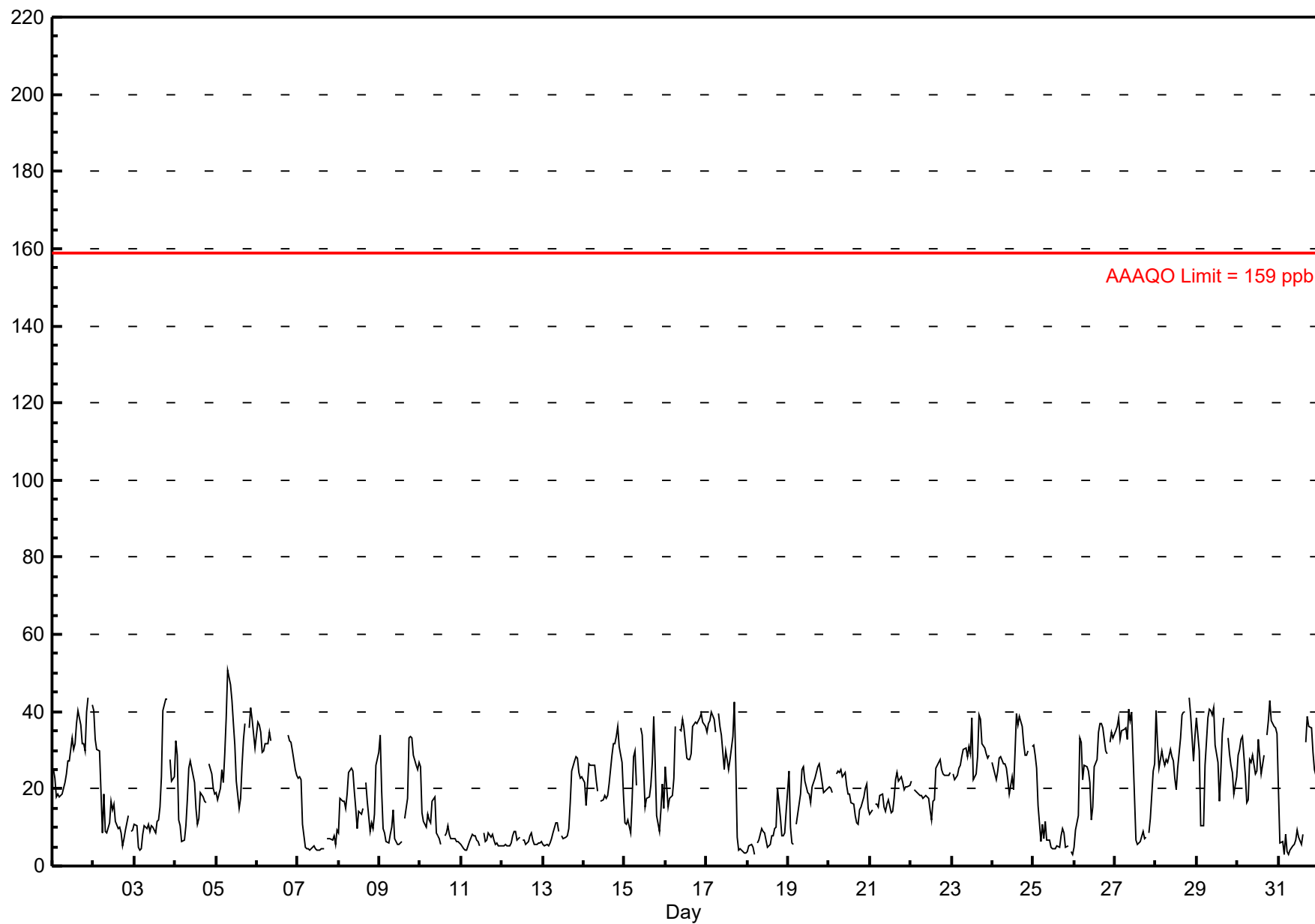
Histogram of Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Henry Pirker - December 2019



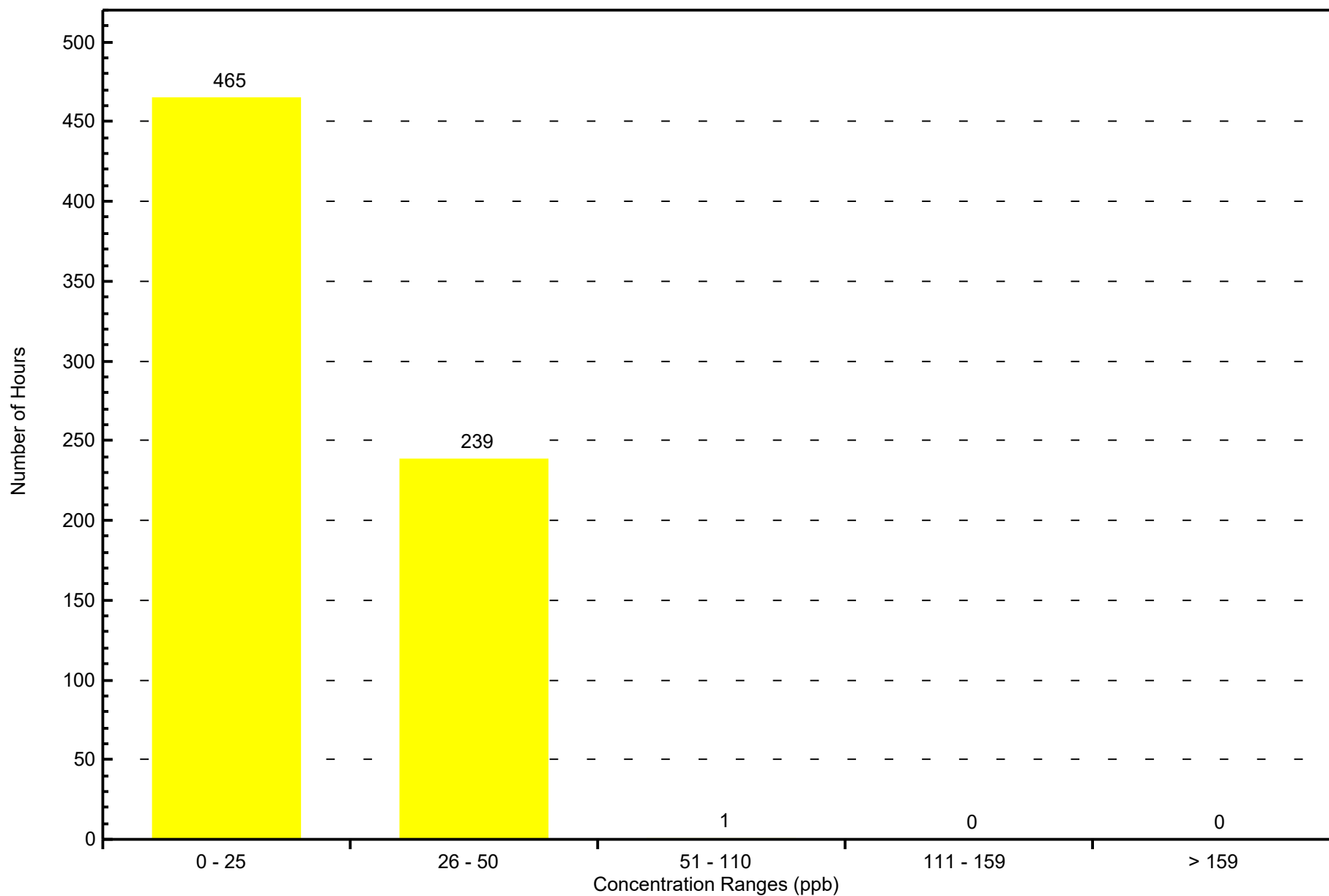
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Henry Pirker - December 2019



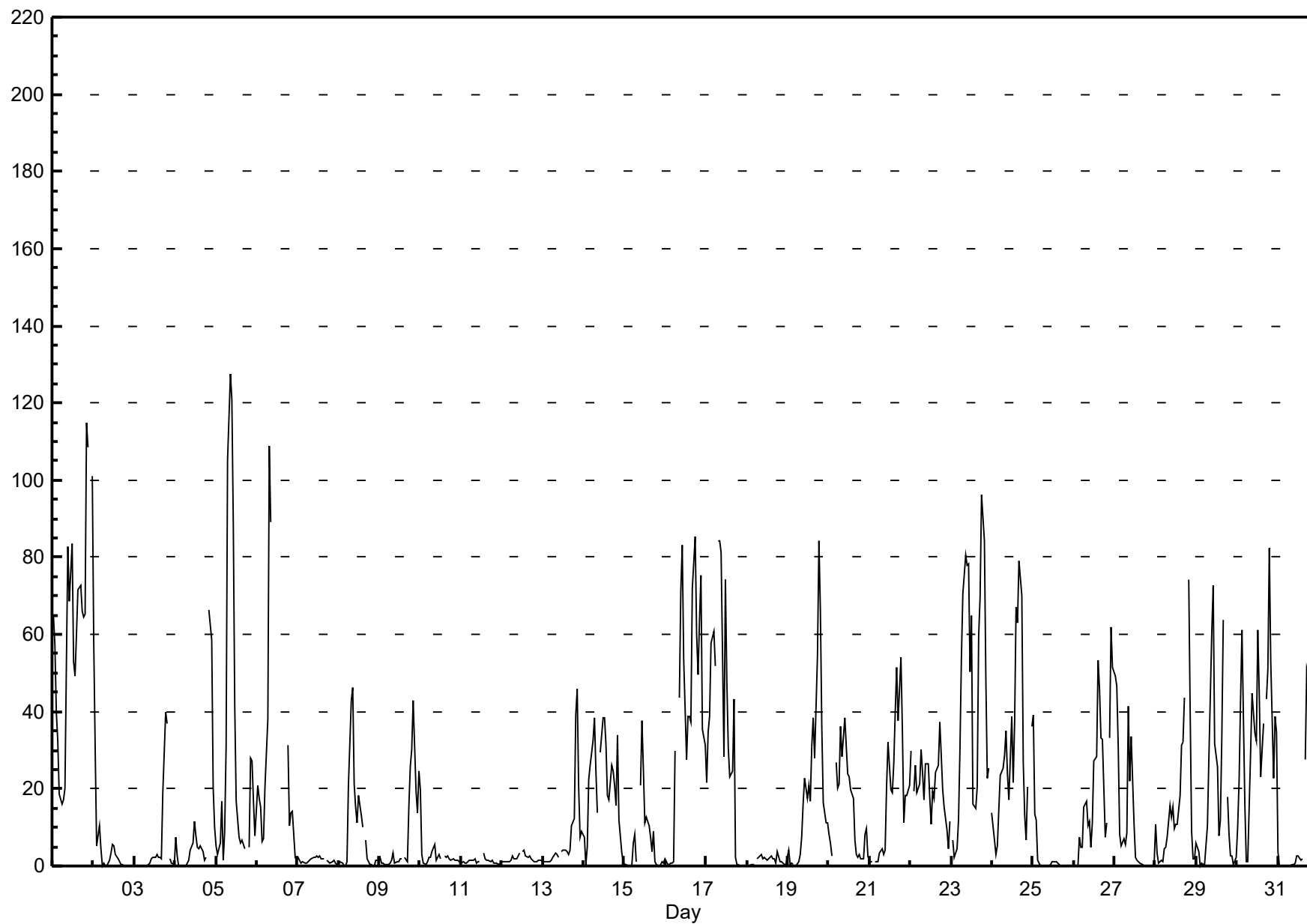
Histogram of Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Henry Pirker - December 2019



Hourly Averages

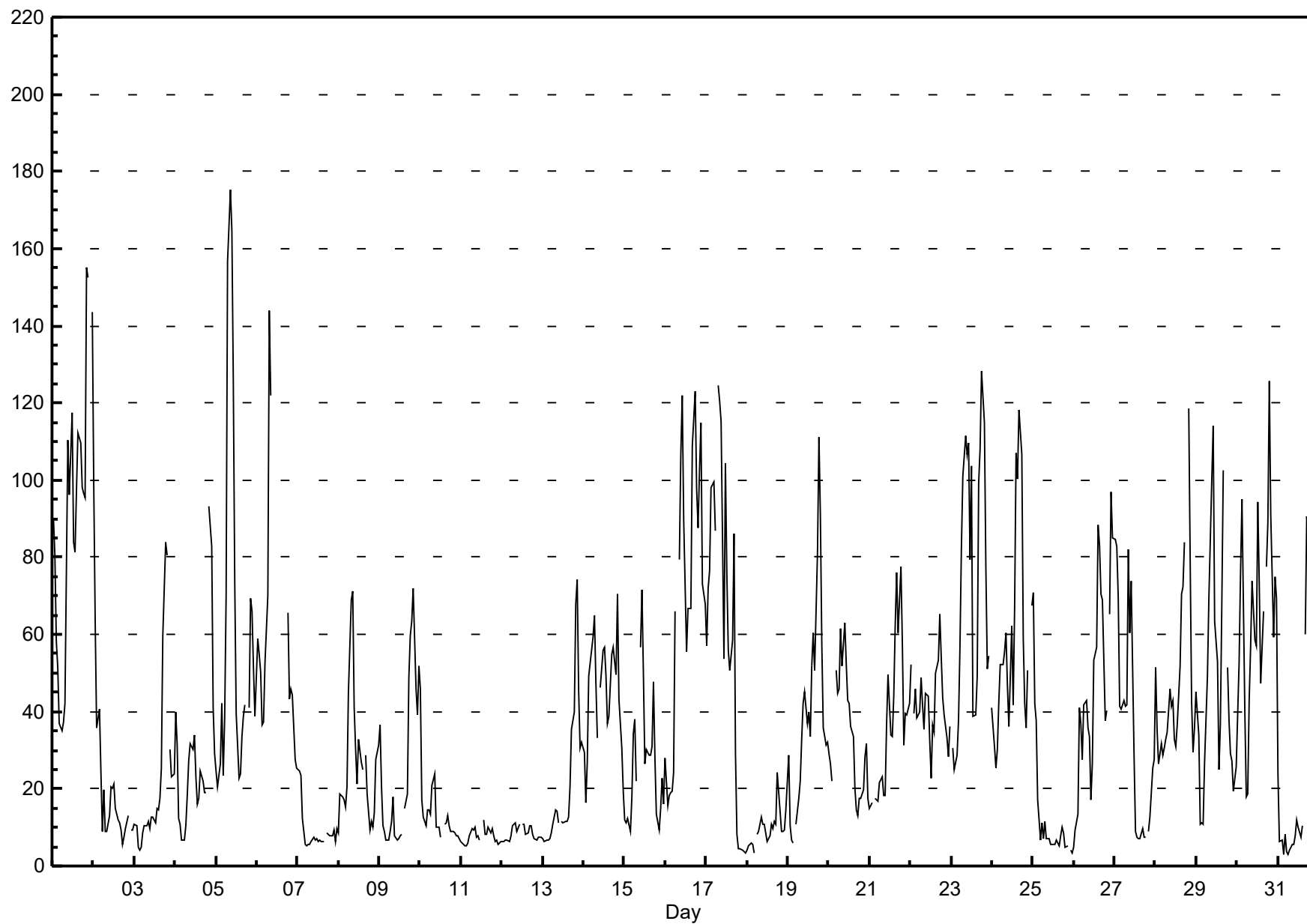
Nitrogen Oxide (NO) - ppb
Henry Pirker - December 2019



Hourly Averages

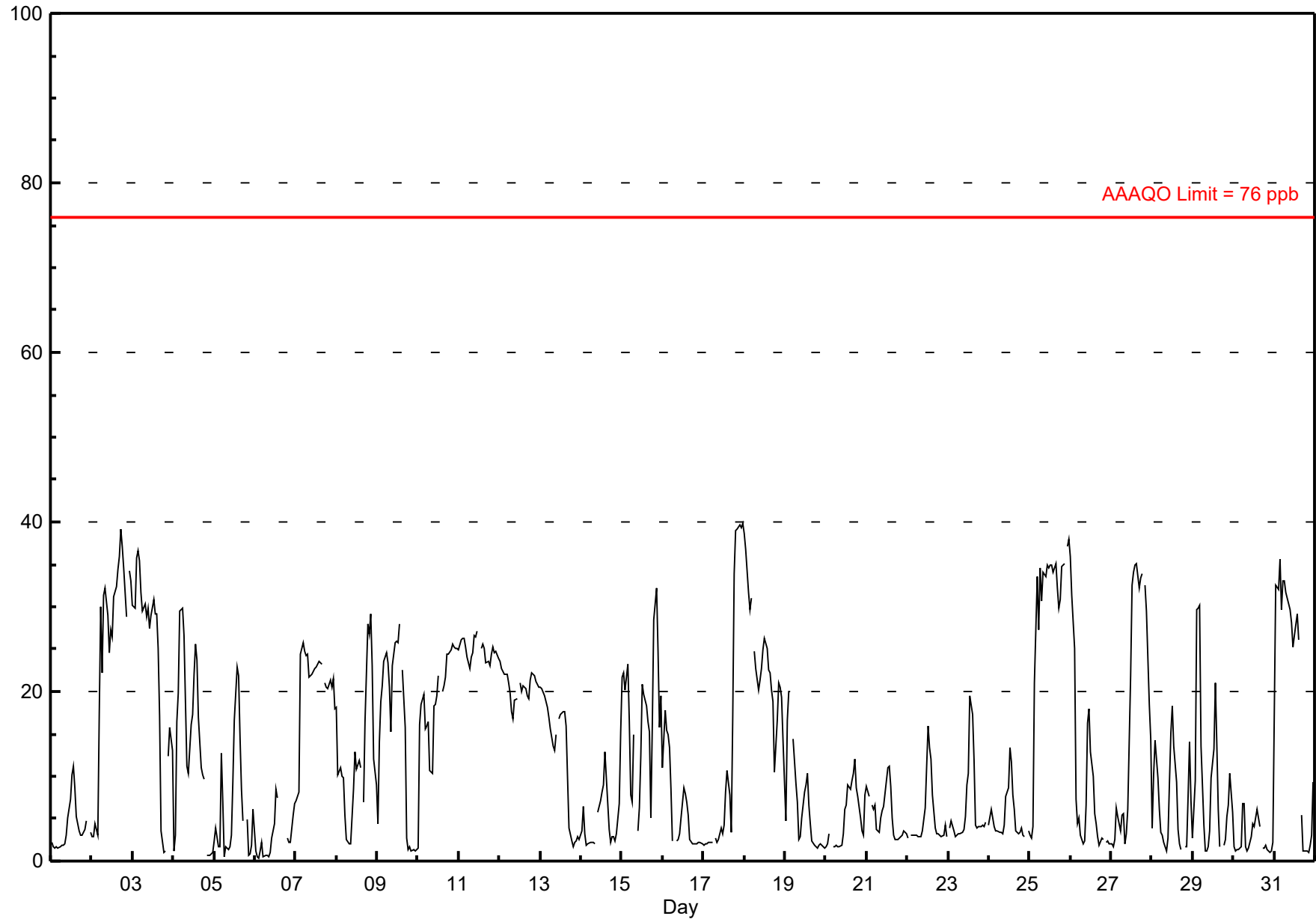
Oxides of Nitrogen (NO_x) - ppb

Henry Pirker - December 2019



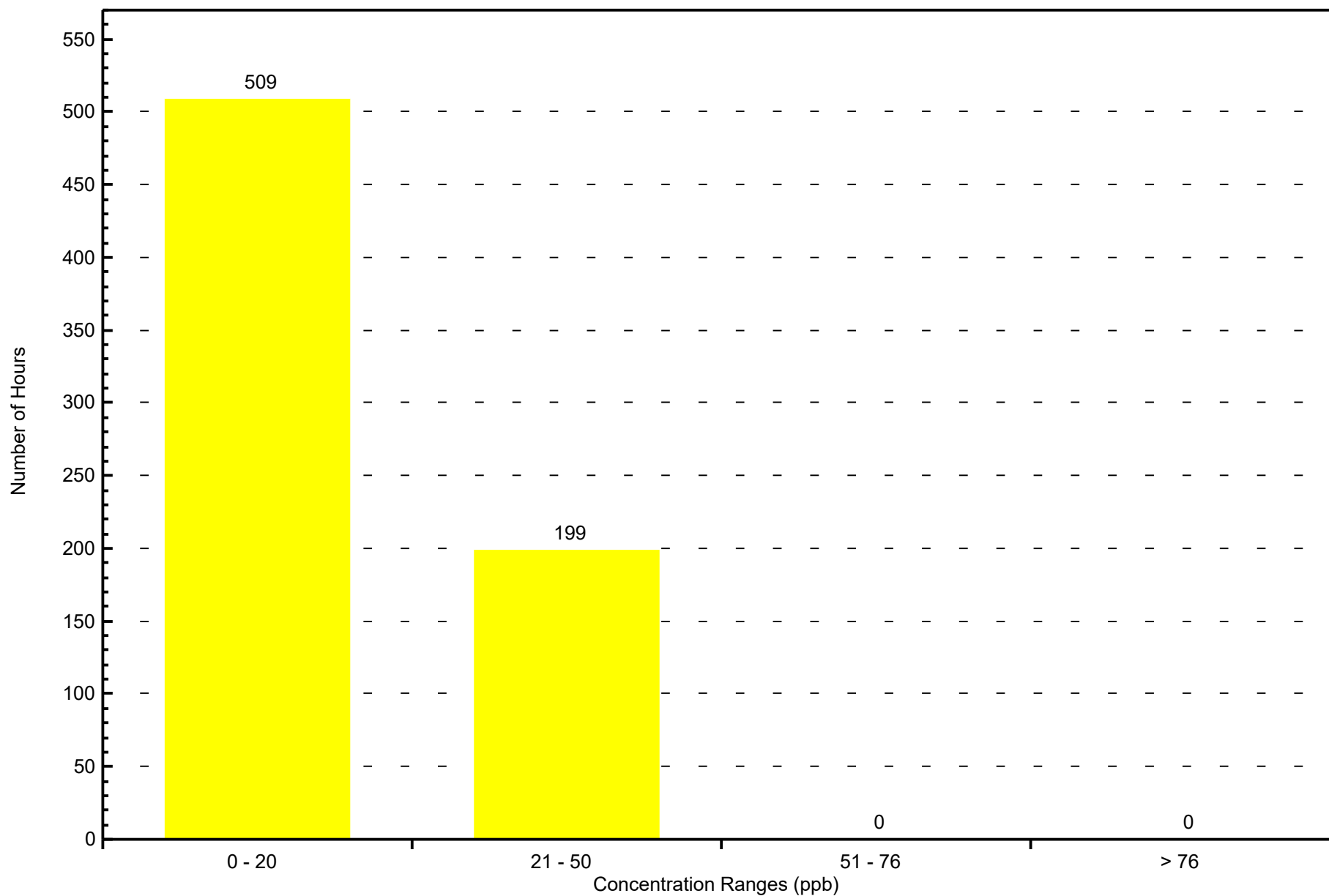
Hourly Averages

Ozone (O_3) - ppb
Henry Pirker - December 2019



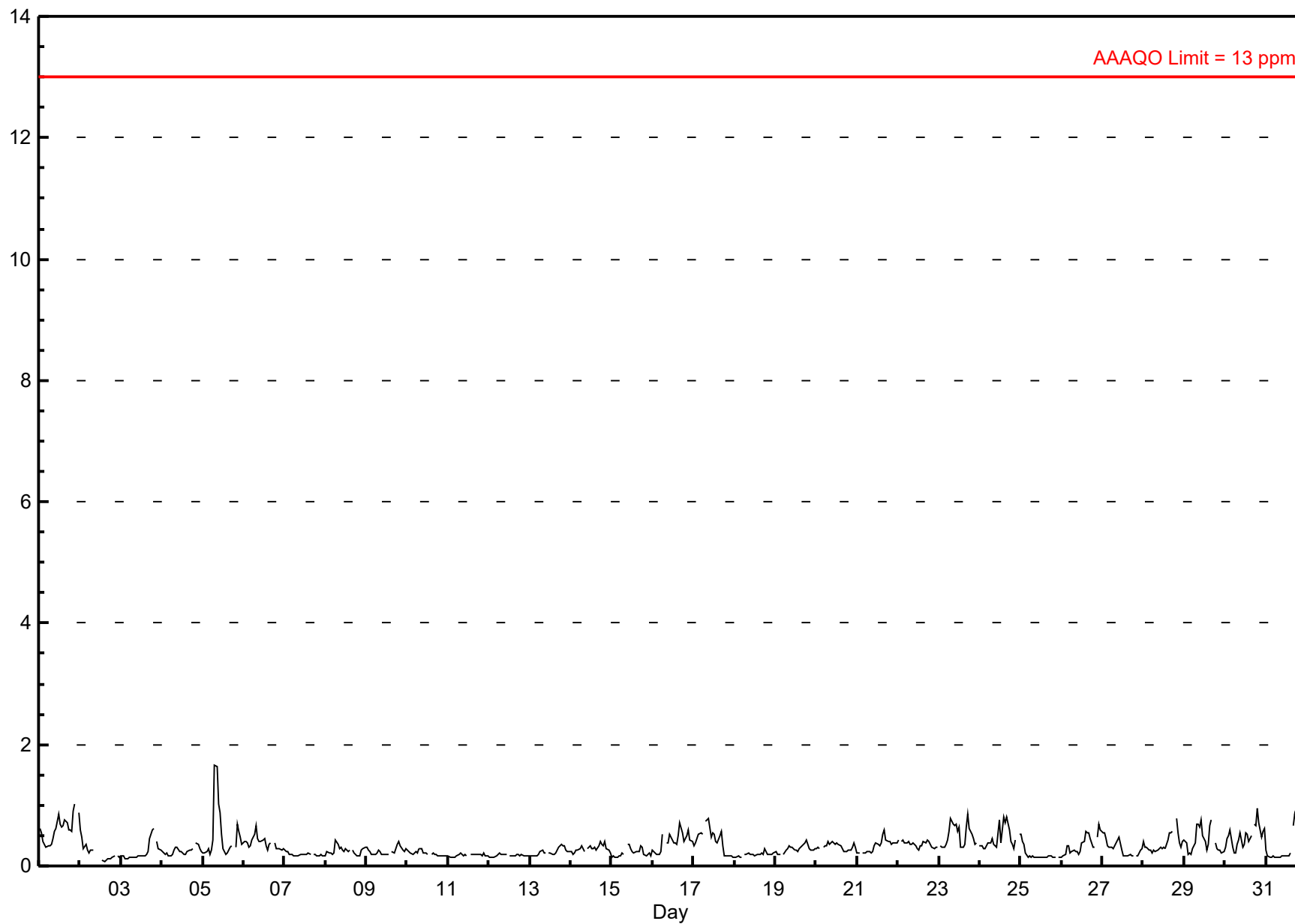
Histogram of Hourly Averages

Ozone (O₃) - ppb
Henry Pirker - December 2019



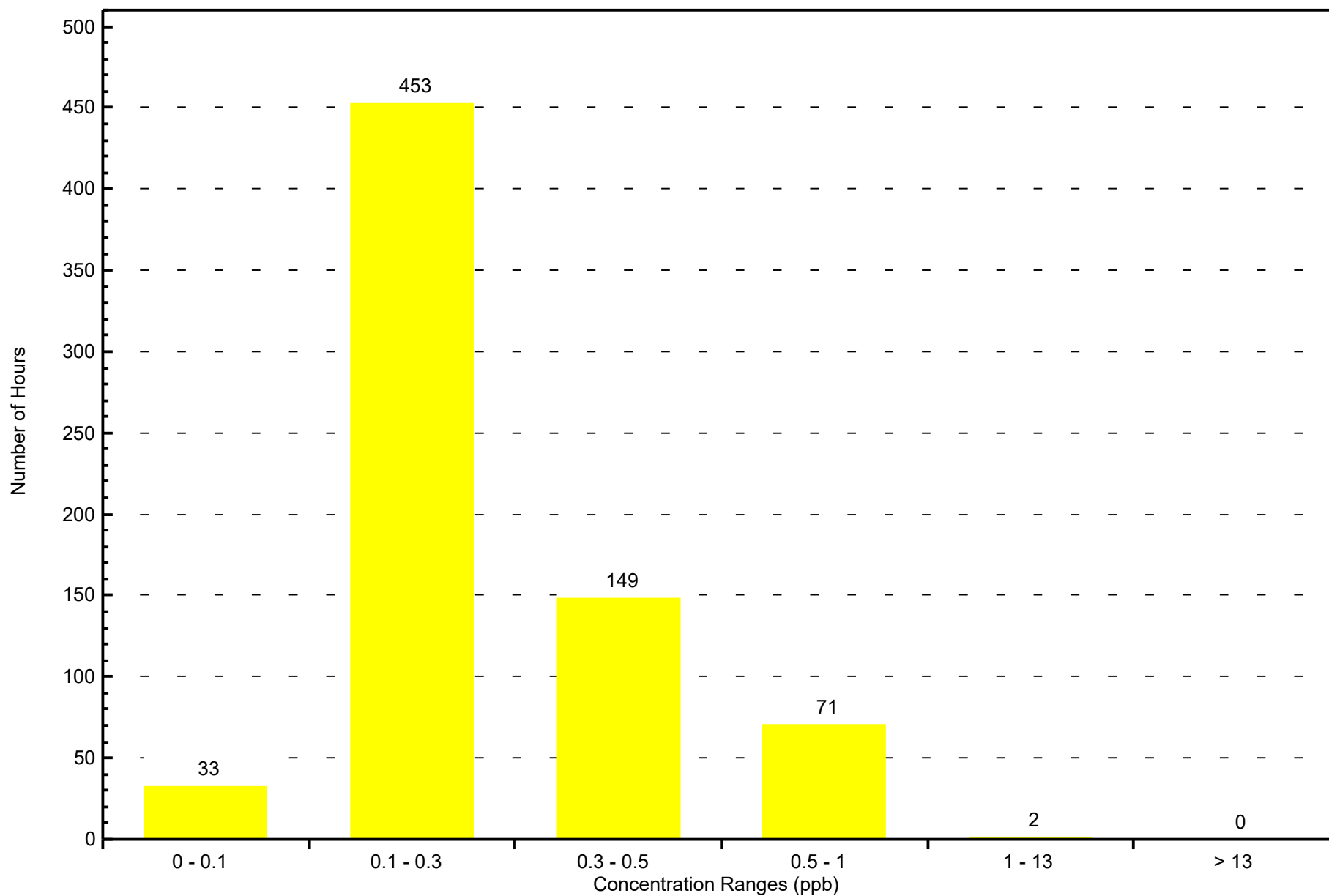
Hourly Averages

Carbon Monoxide (CO) - ppm
Henry Pirker - December 2019



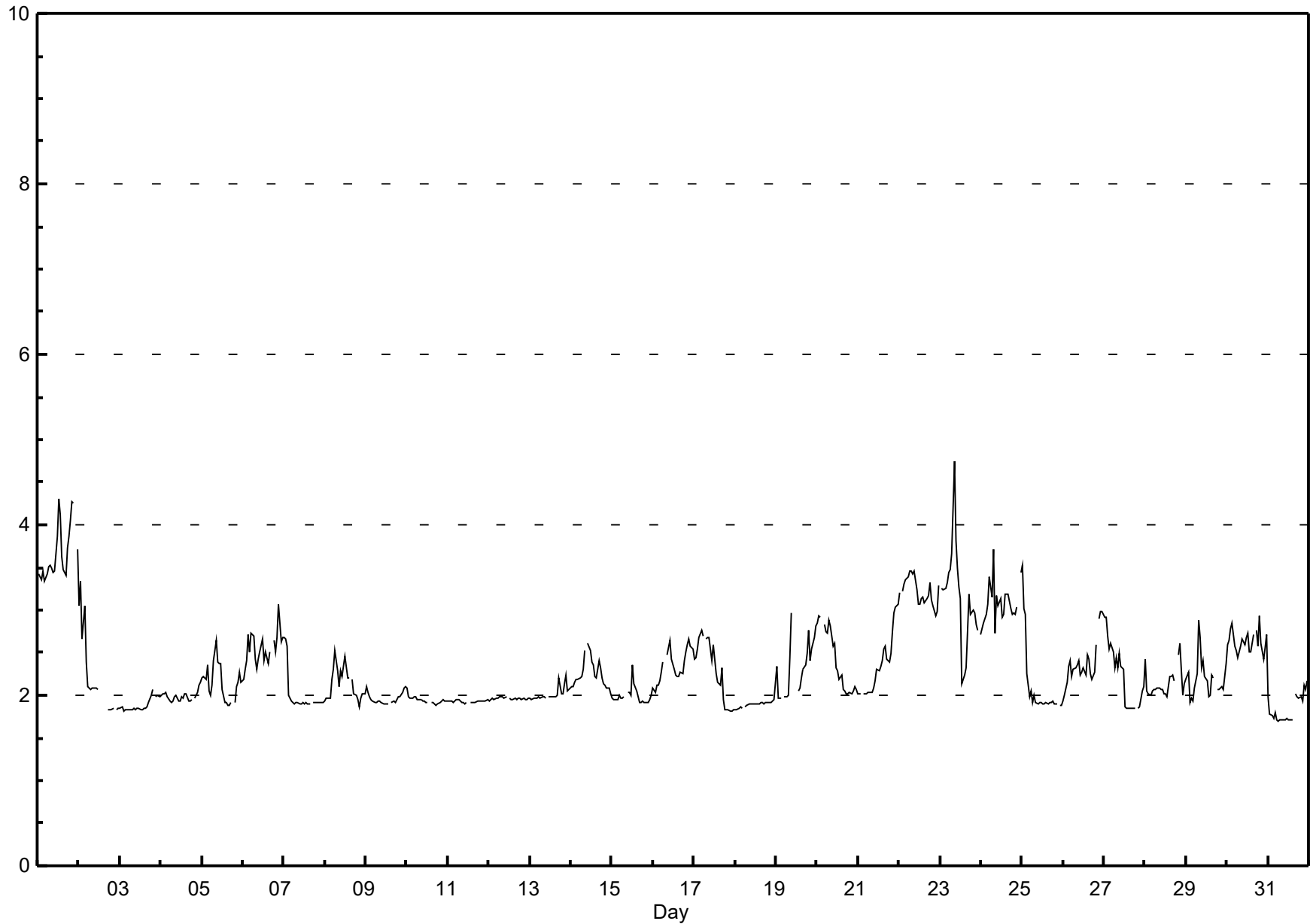
Histogram of Hourly Averages

Carbon Monoxide (CO) - ppm
Henry Pirker - December 2019



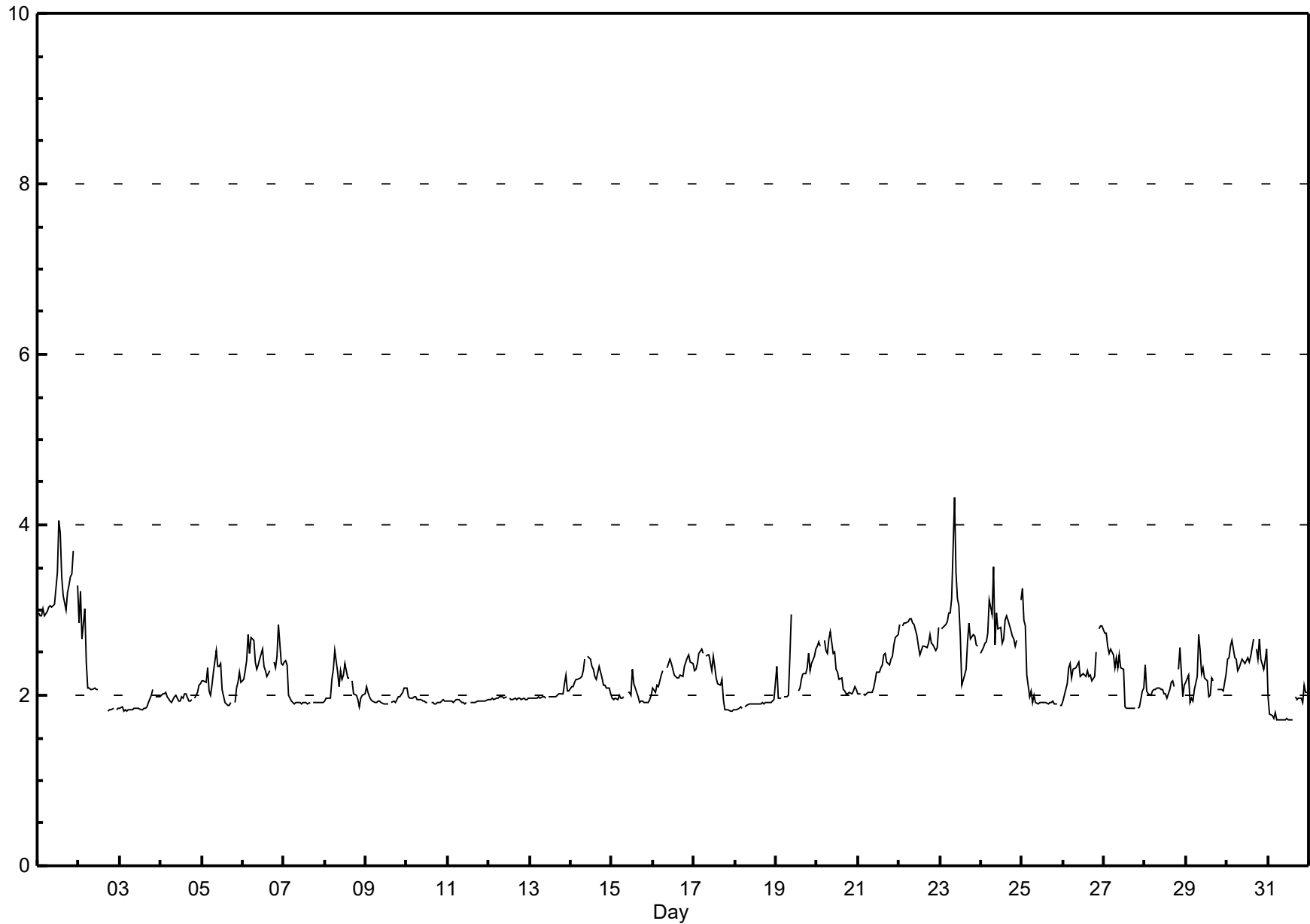
Hourly Averages

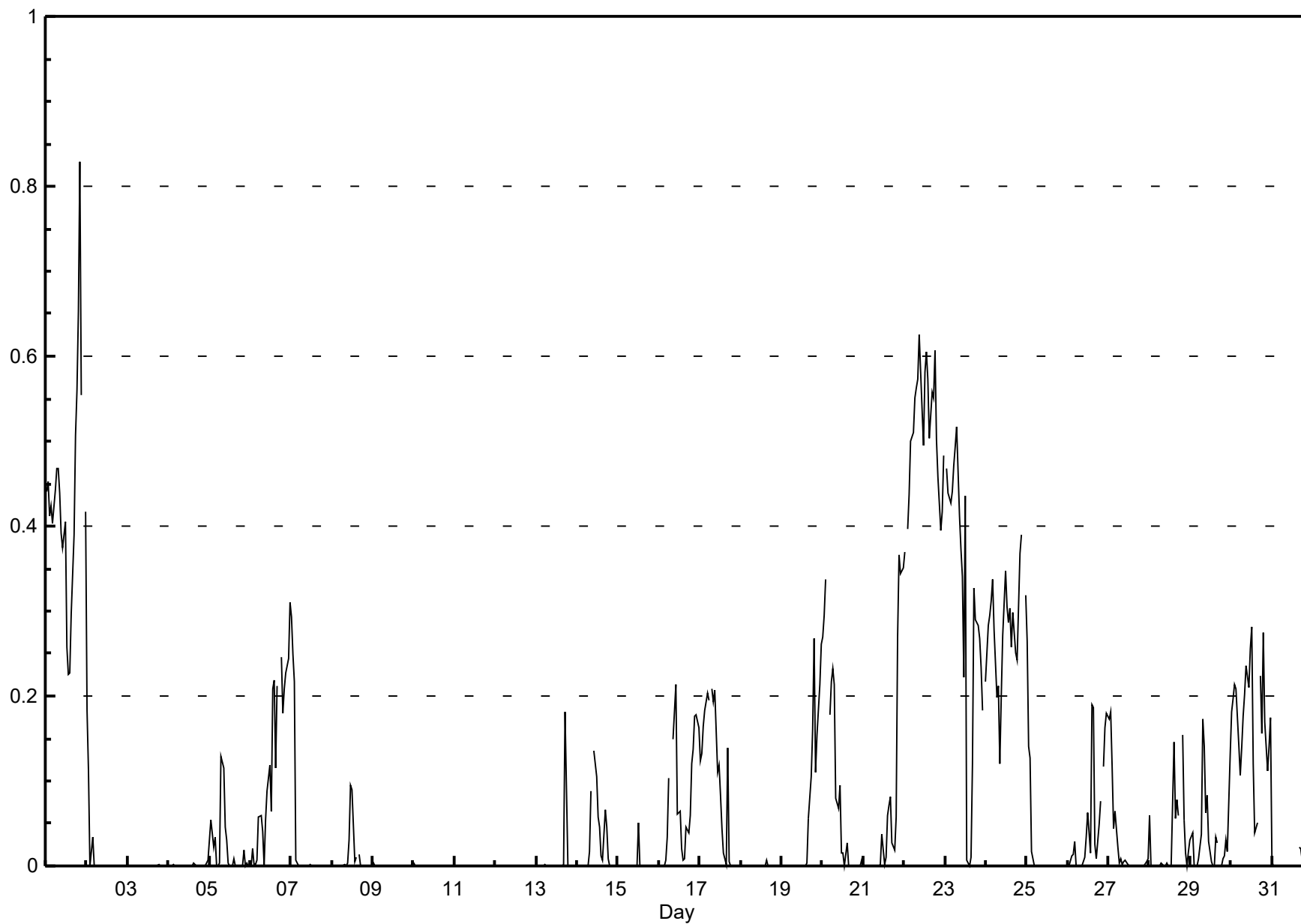
Total Hydrocarbons (THC) - ppm
Henry Pirker - December 2019

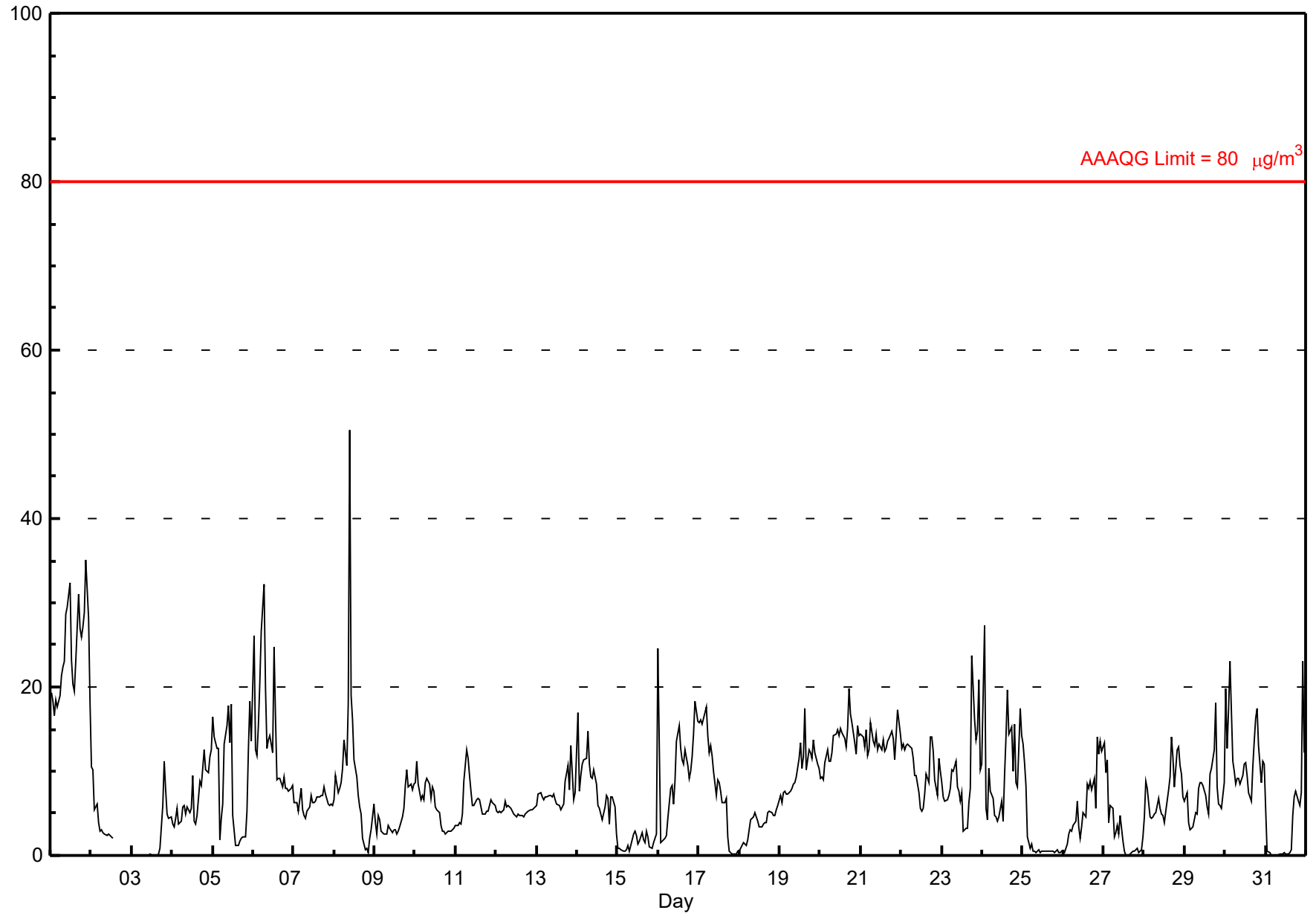


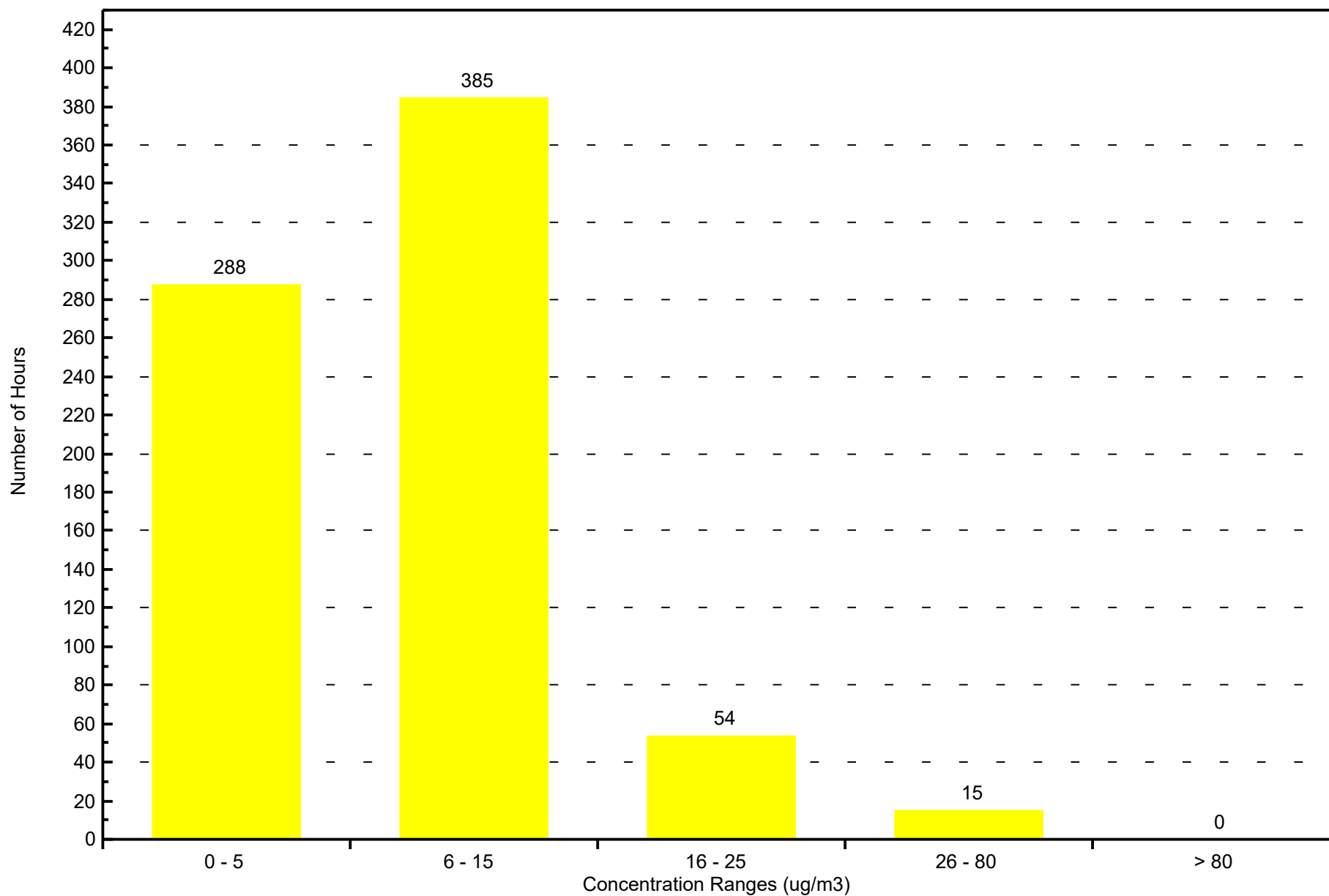
Hourly Averages

Methane (CH₄) - ppm
Henry Pirker - December 2019





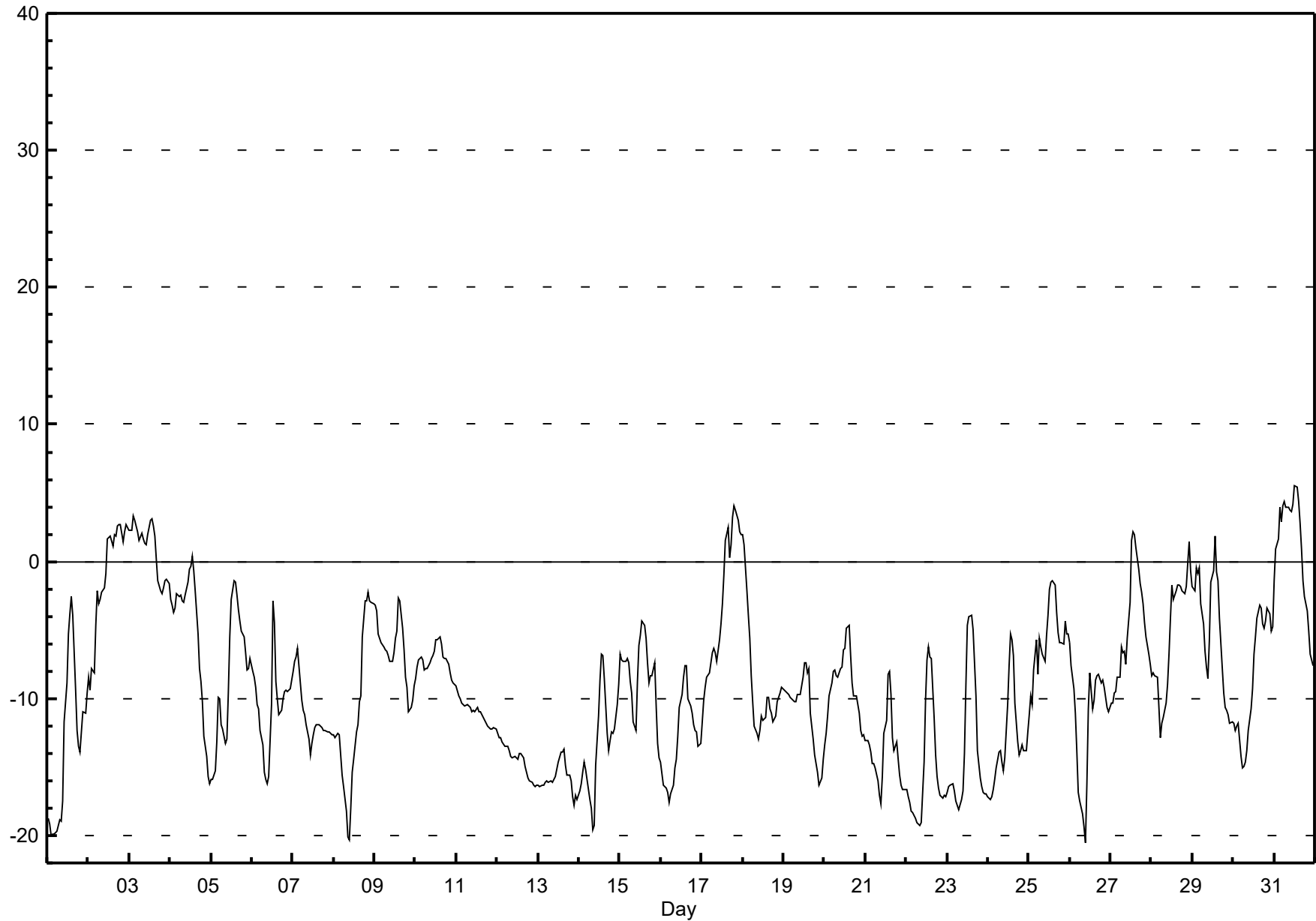




Hourly Averages

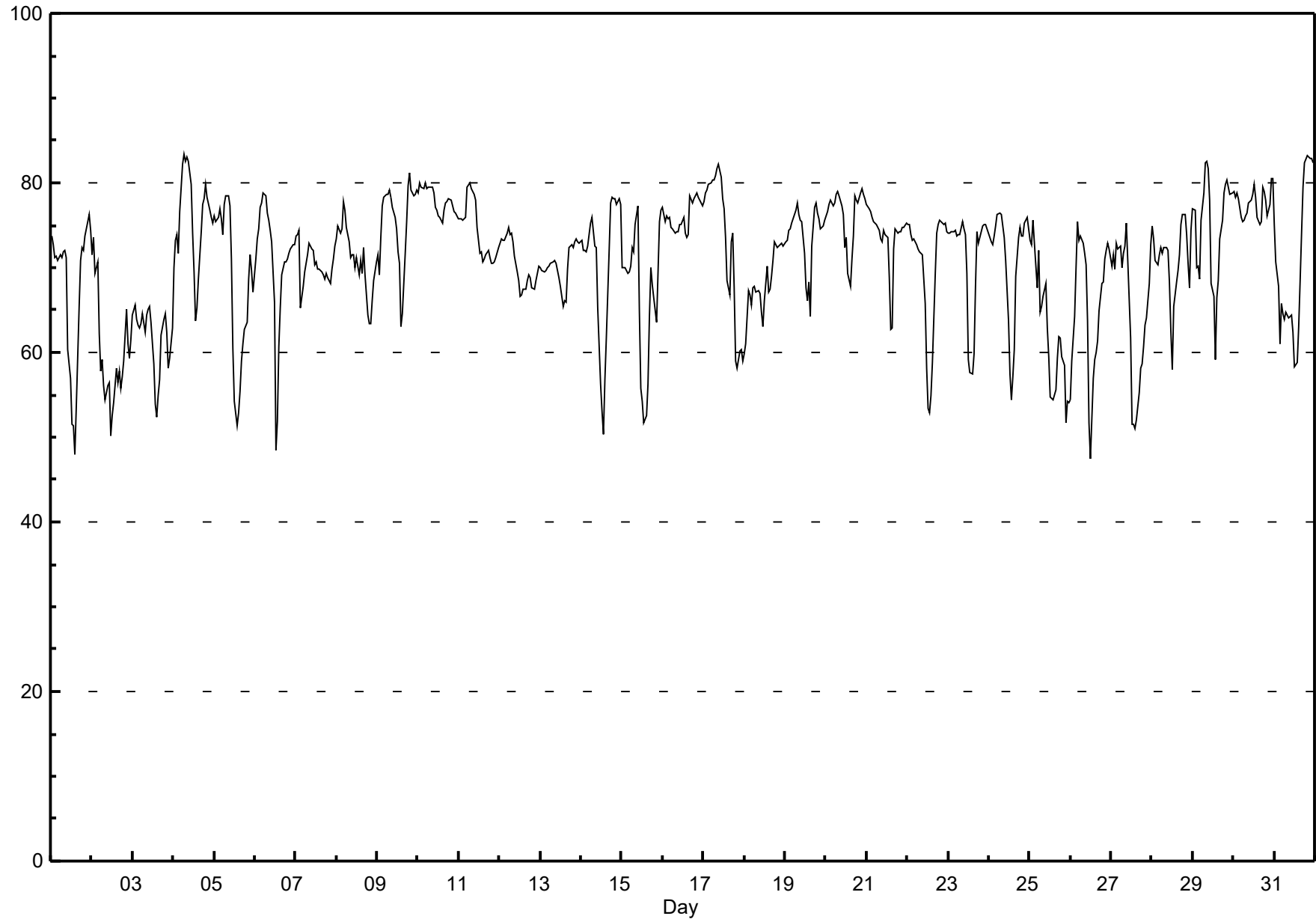
External Temperature (ET) - °C

Henry Pirker - December 2019



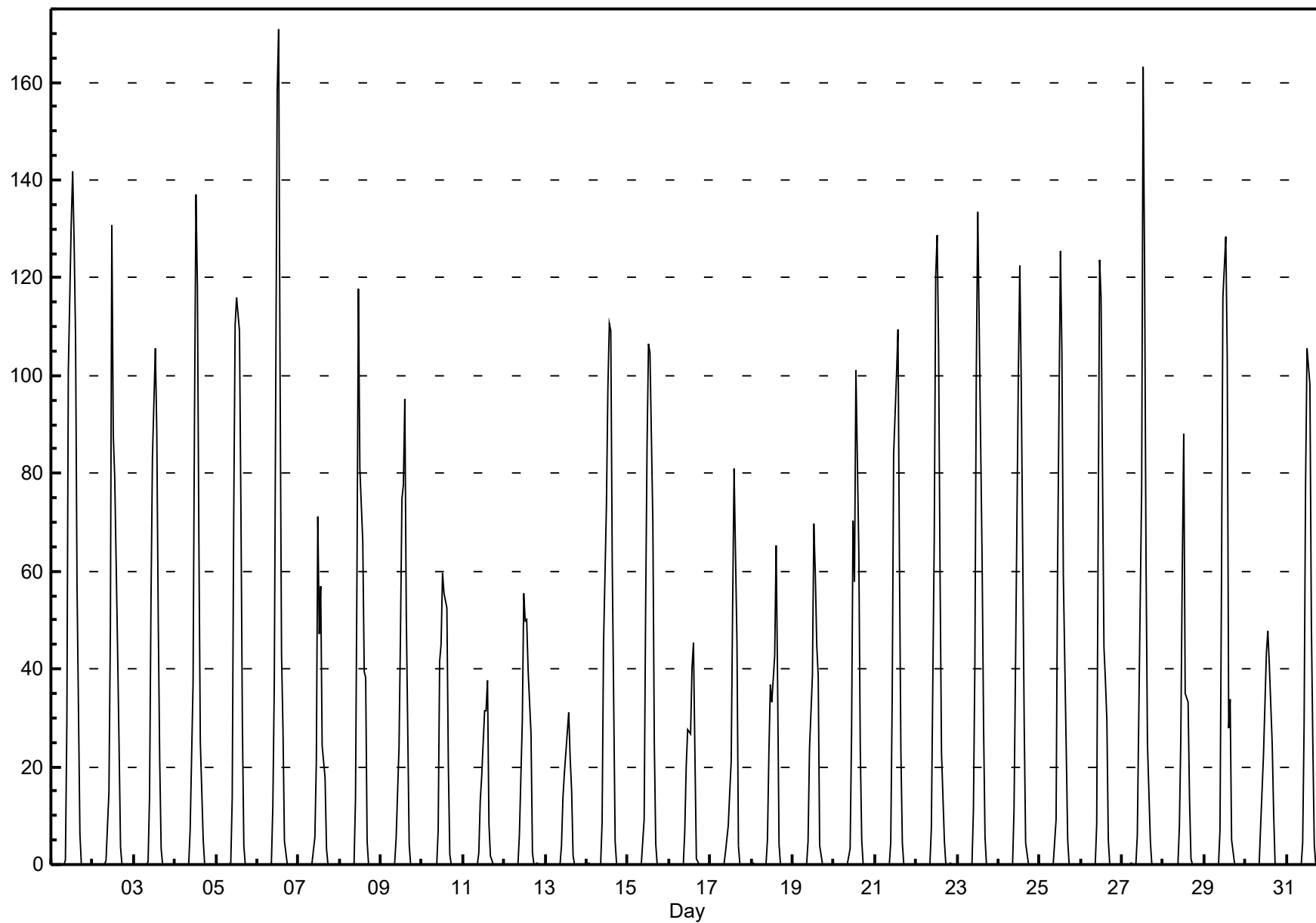
Hourly Averages

Relative Humidity (RH) - %
Henry Pirker - December 2019



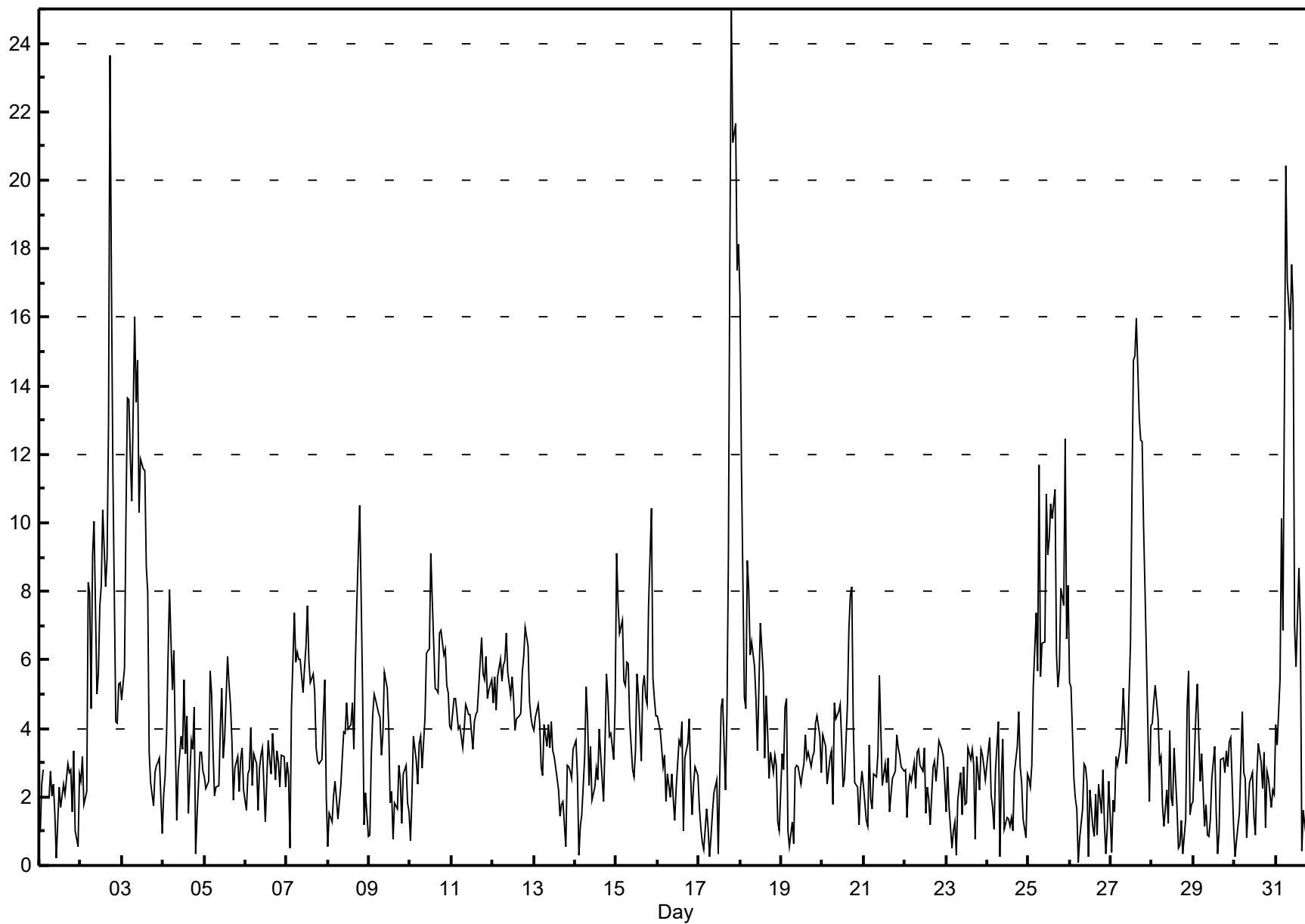
Hourly Averages

Solar Radiation (SR) - W/m²
Henry Pirker - December 2019



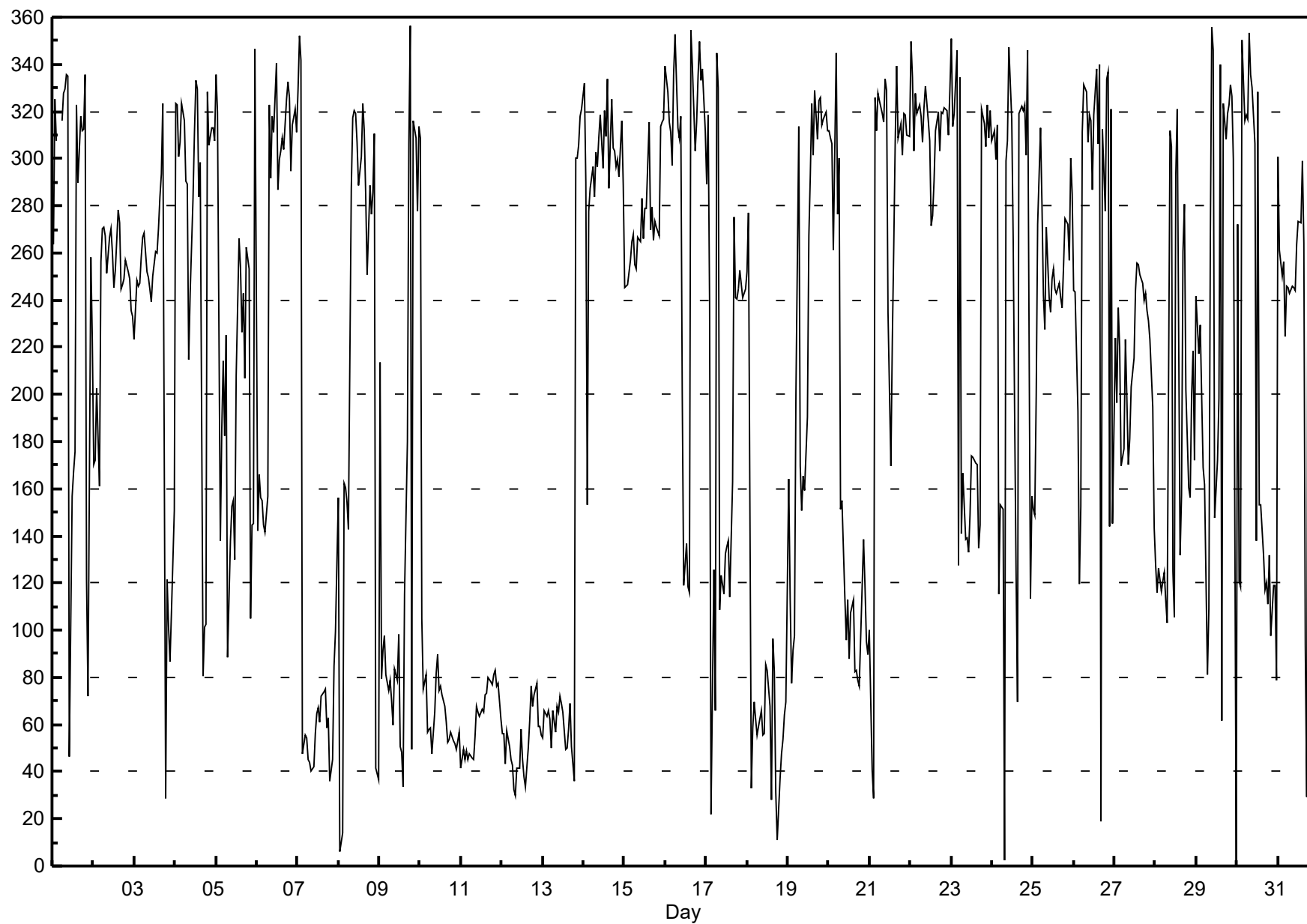
Hourly Averages

Wind Speed (WS) - km/h
Henry Pirker - December 2019



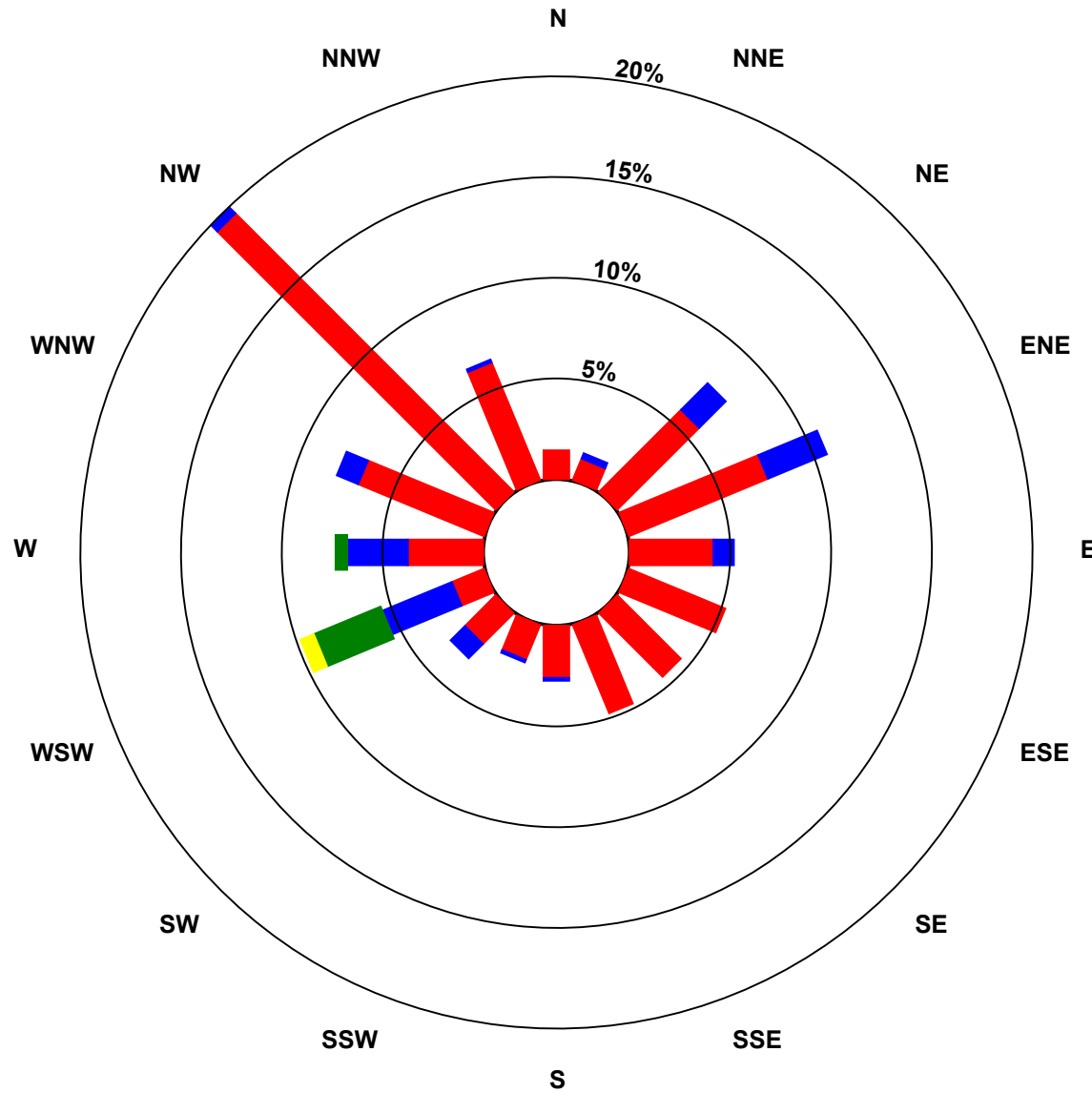
Hourly Averages

Wind Direction (WD) - deg
Henry Pirker - December 2019

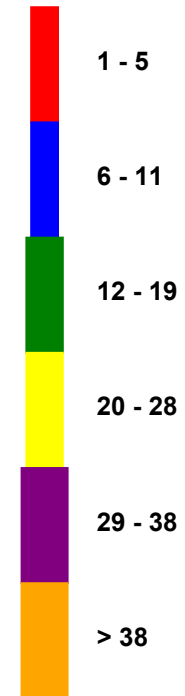


Wind Rose

Wind Speed (WS) (km/h)
Henry Pirker - December 2019

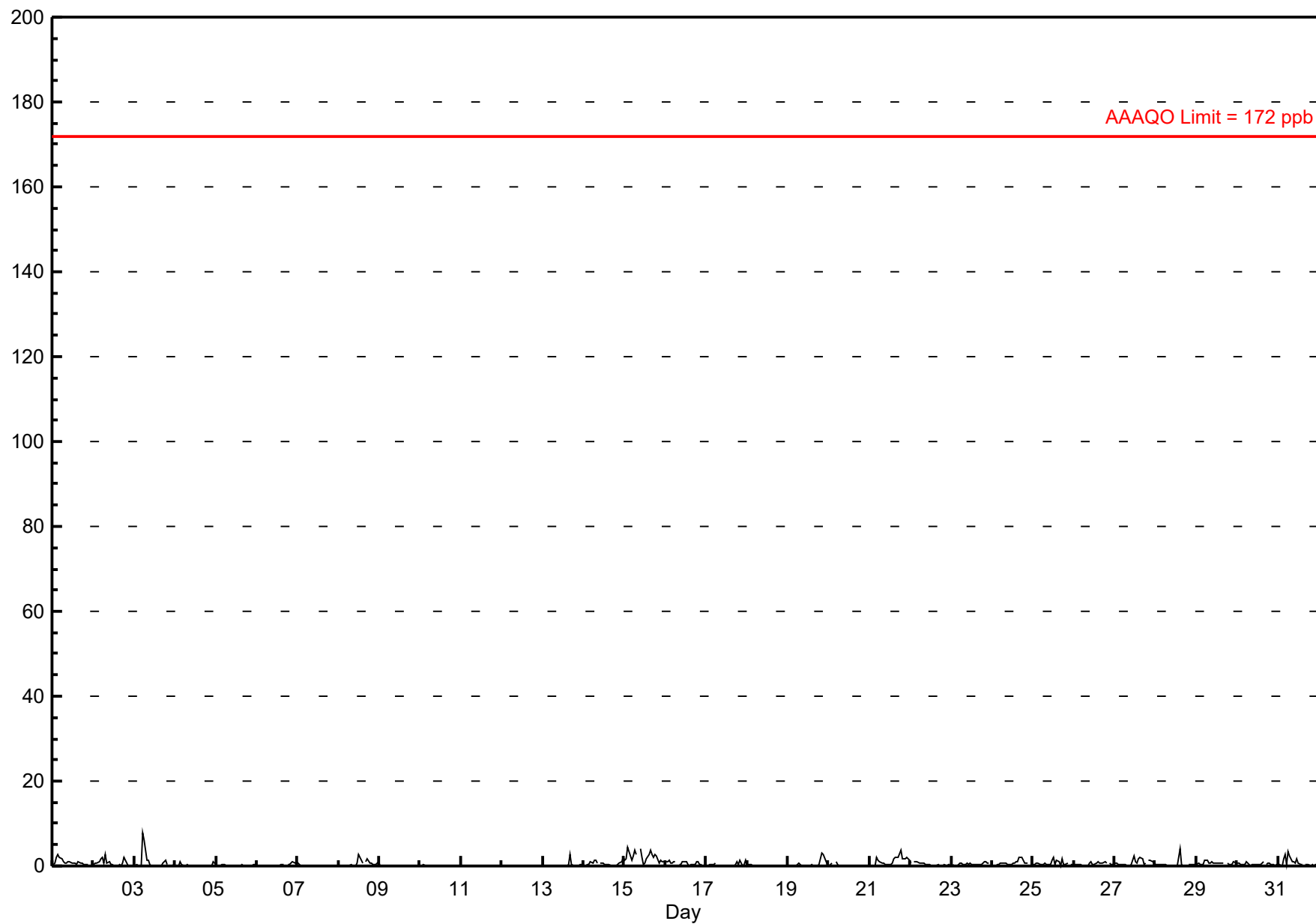


Wind Speed Classes (km/h)



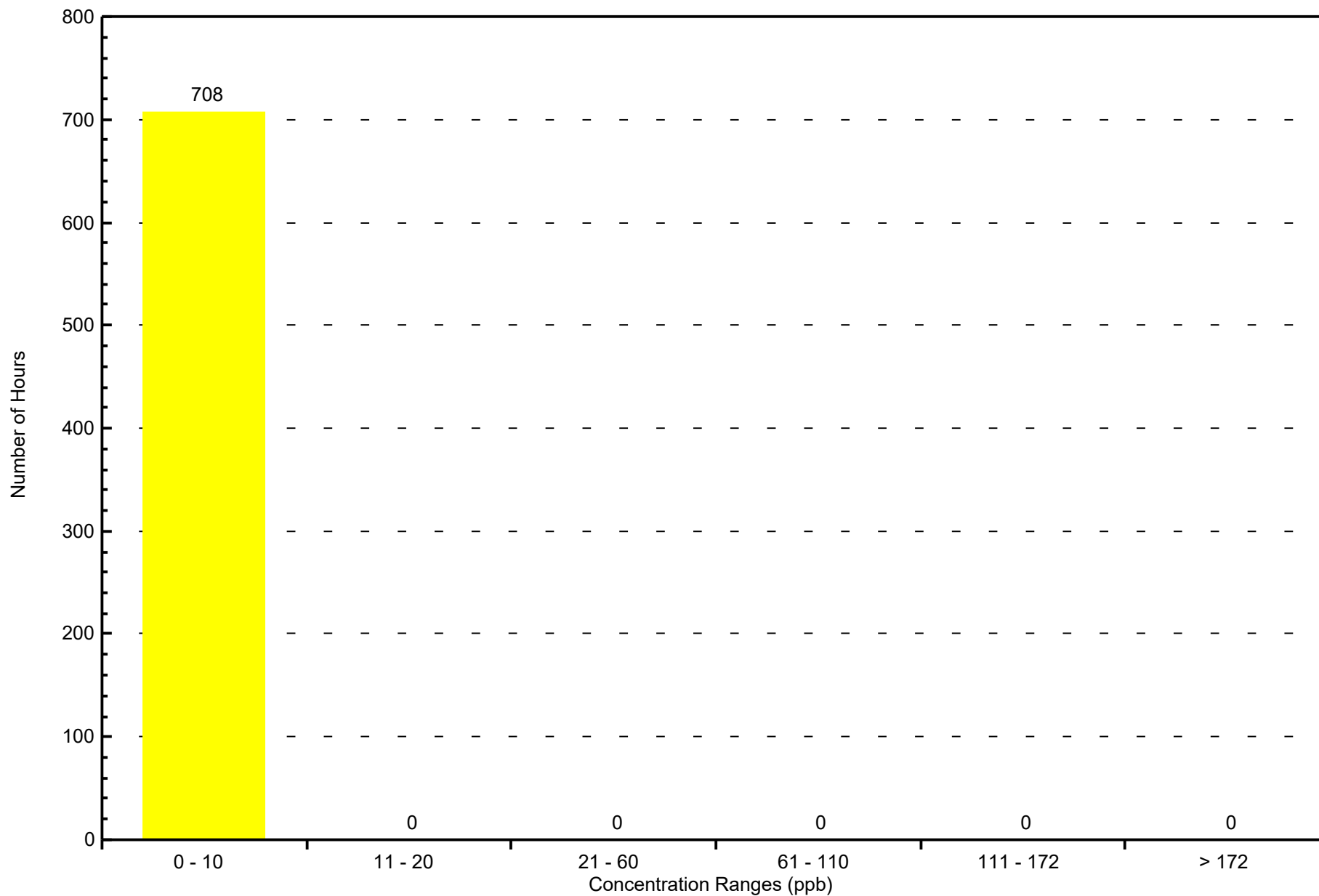
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Smoky Heights - December 2019



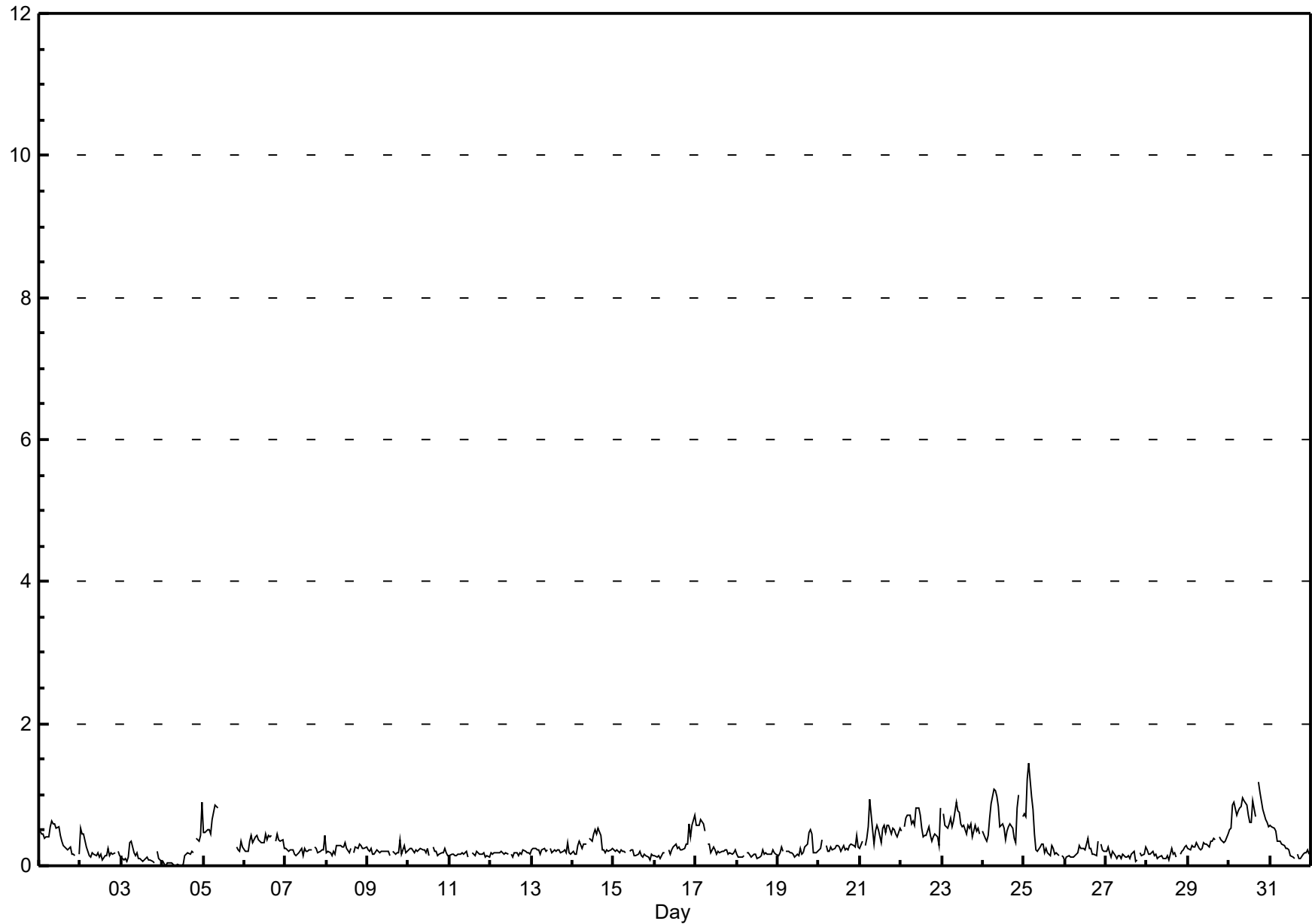
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Smoky Heights - December 2019



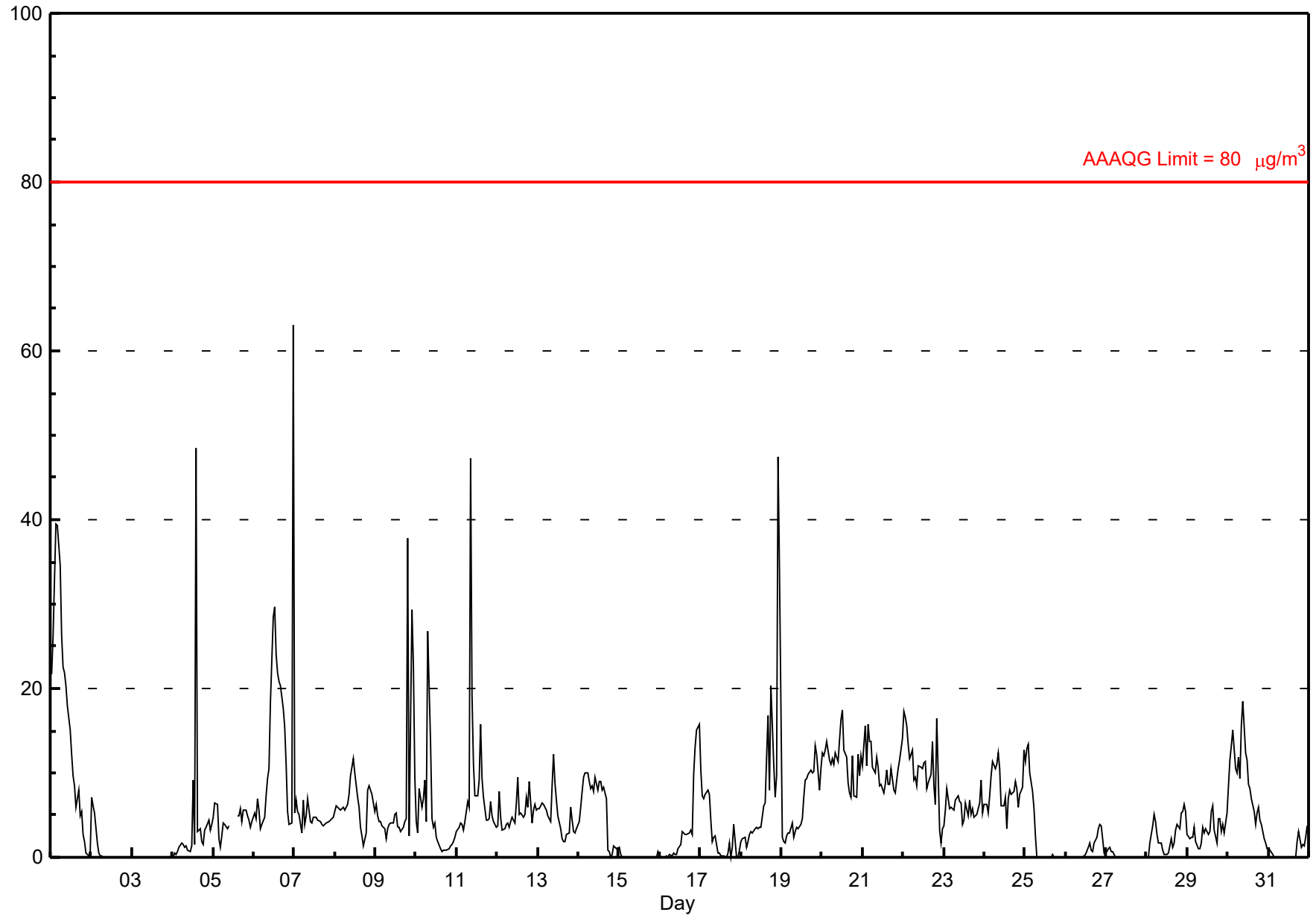
Hourly Averages

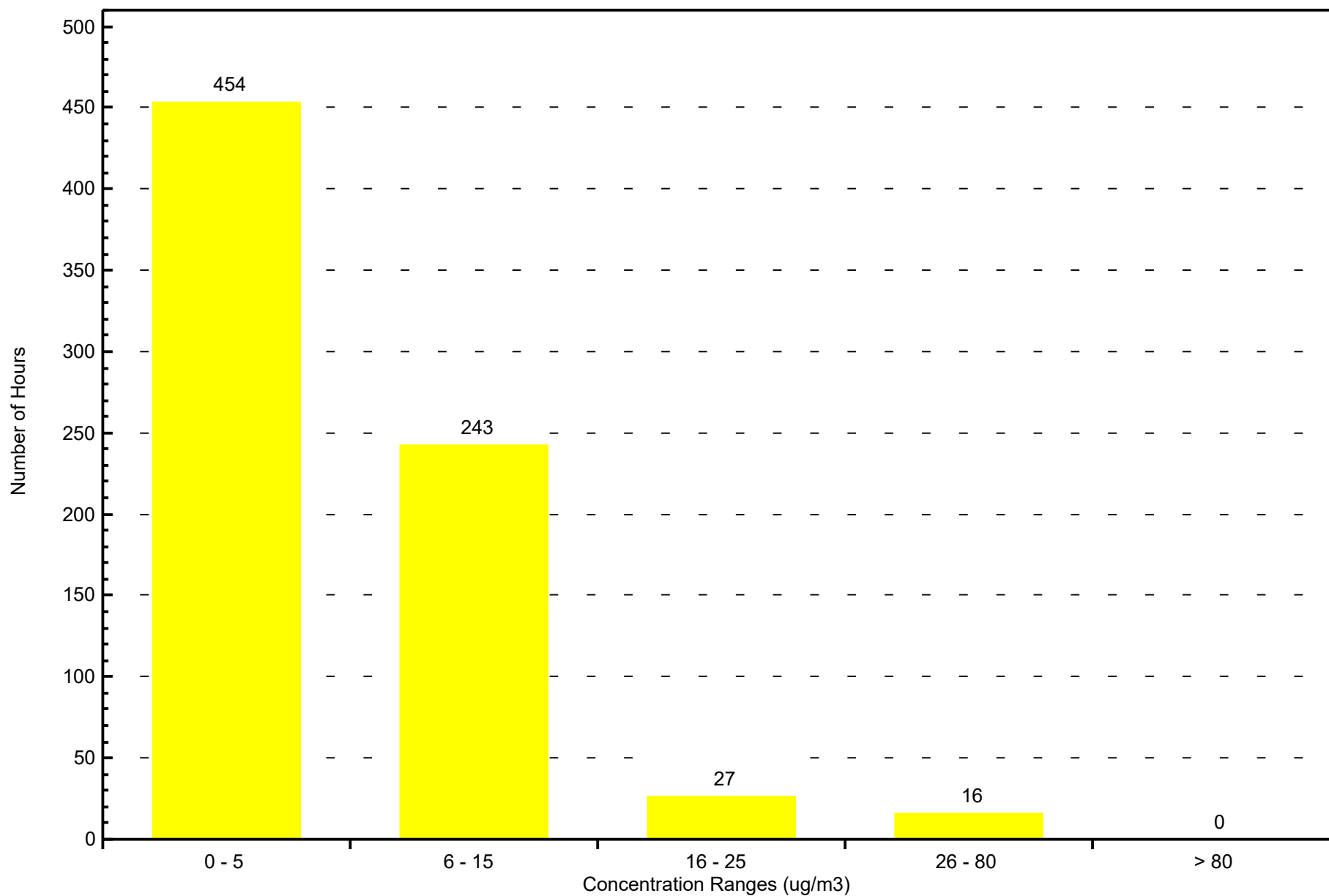
Total Reduced Sulphur (TRS) - ppb
Smoky Heights - December 2019



Hourly Averages

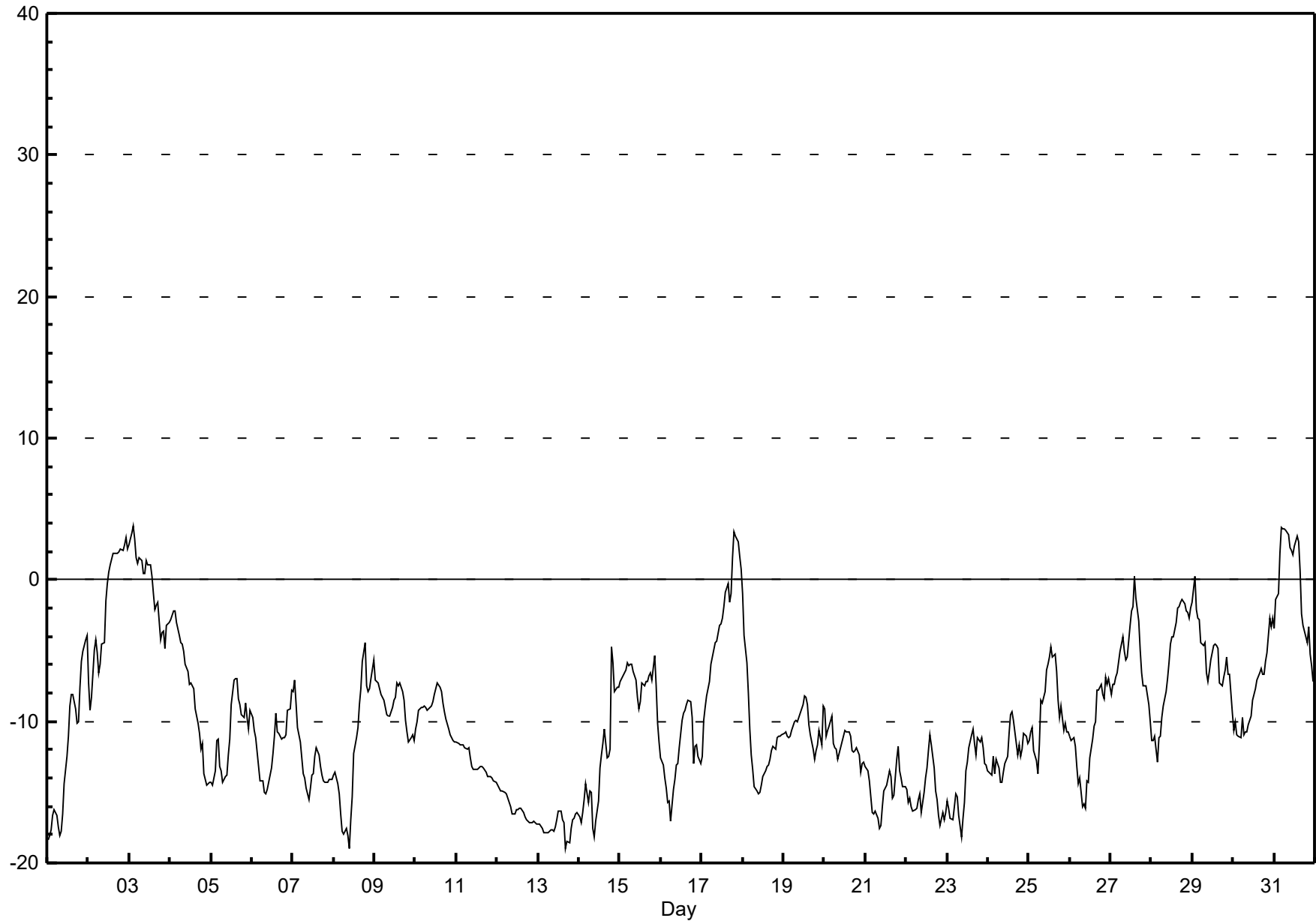
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Smoky Heights - December 2019





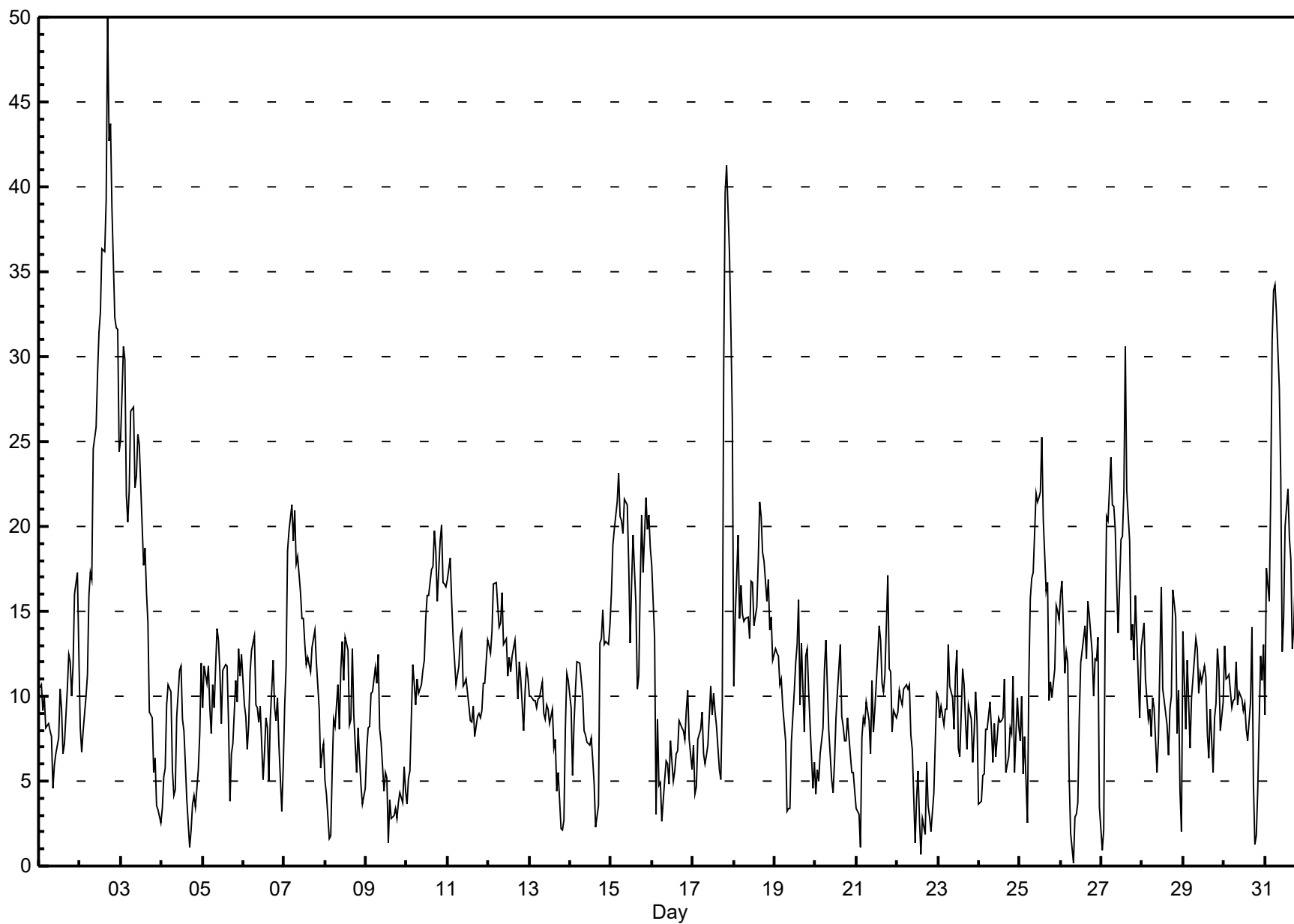
Hourly Averages

External Temperature (ET) - °C
Smoky Heights - December 2019



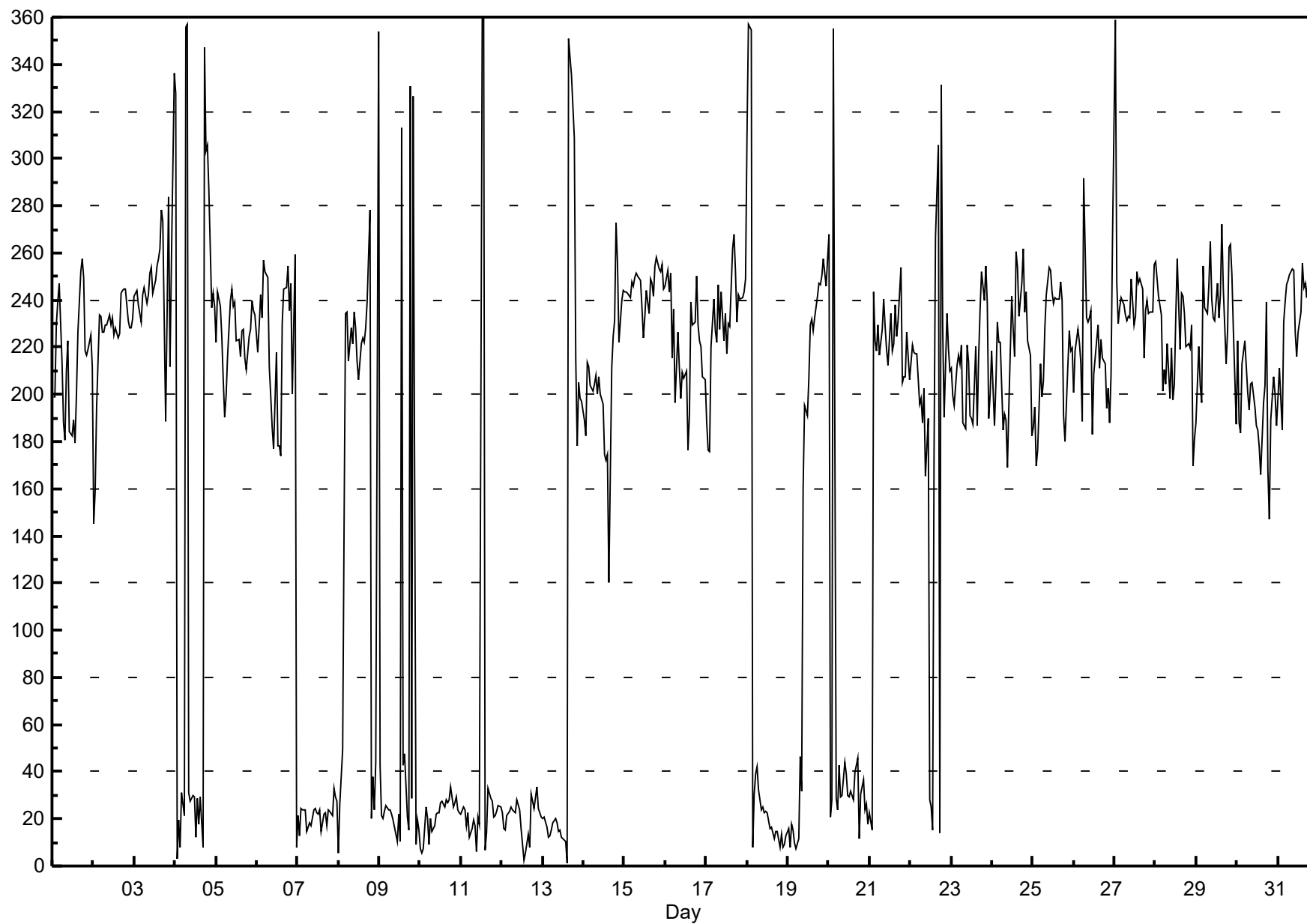
Hourly Averages

Wind Speed (WS) - km/h
Smoky Heights - December 2019



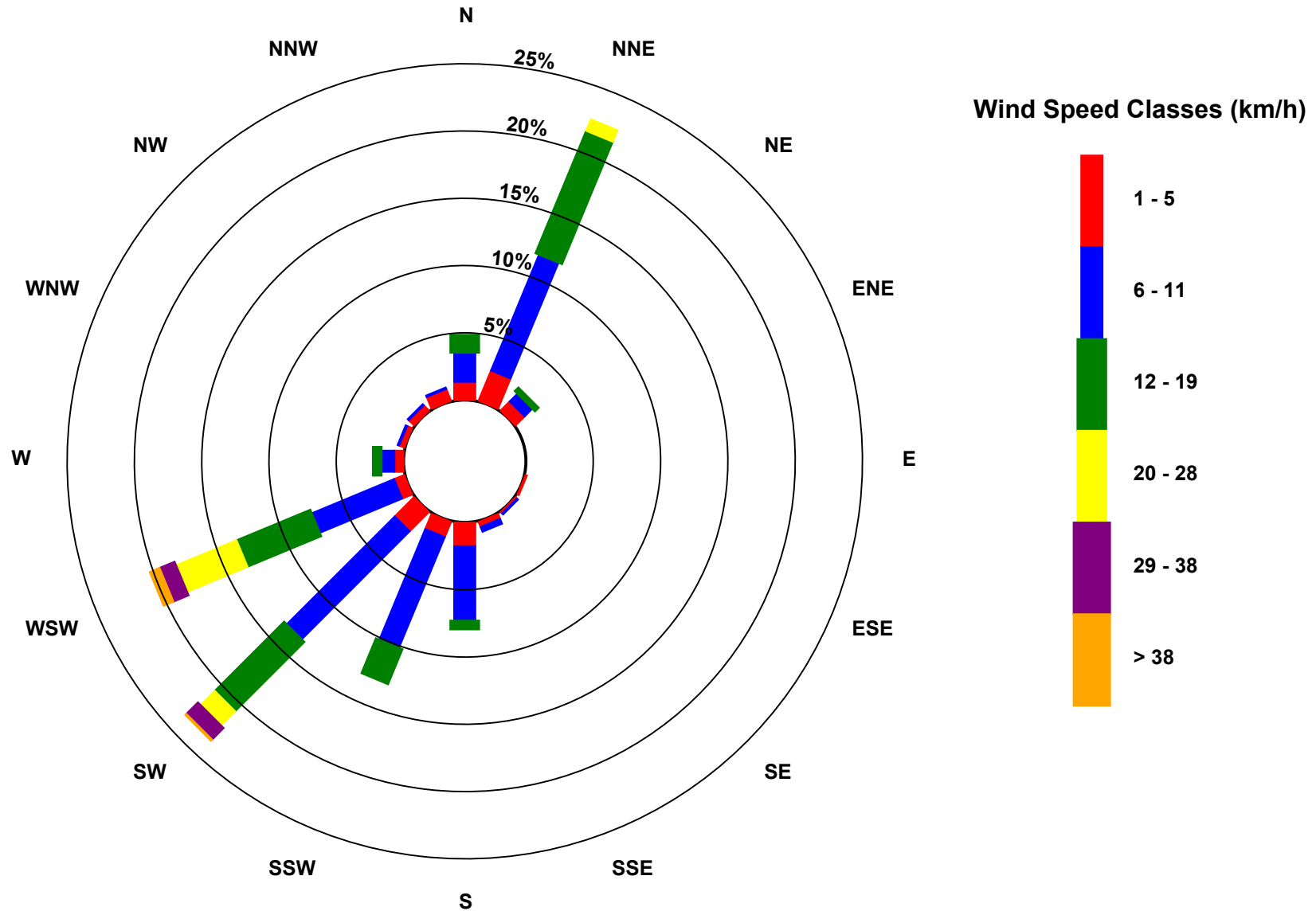
Hourly Averages

Wind Direction (WD) - deg
Smoky Heights - December 2019



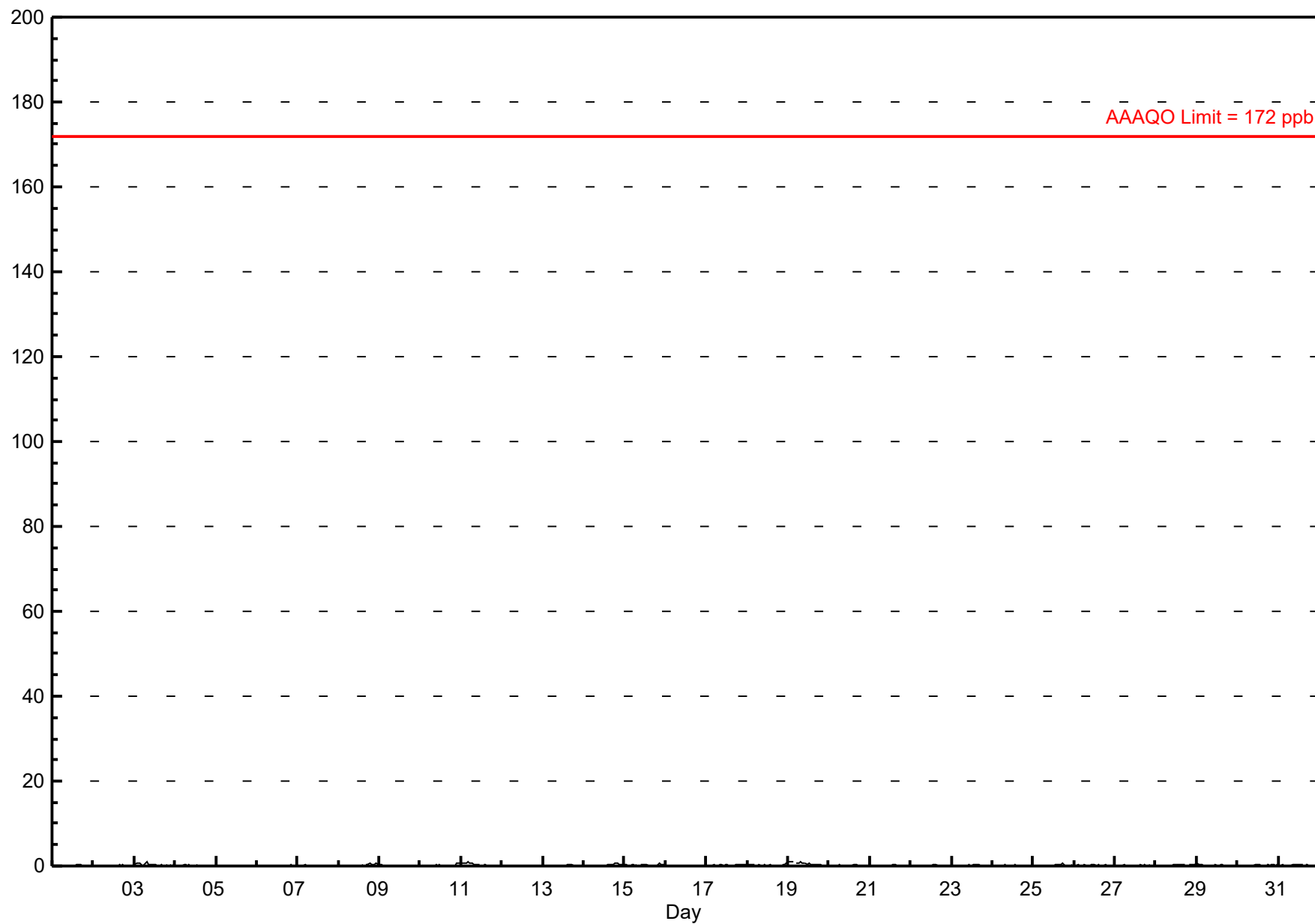
Wind Rose

Wind Speed (WS) (km/h)
Smoky Heights - December 2019



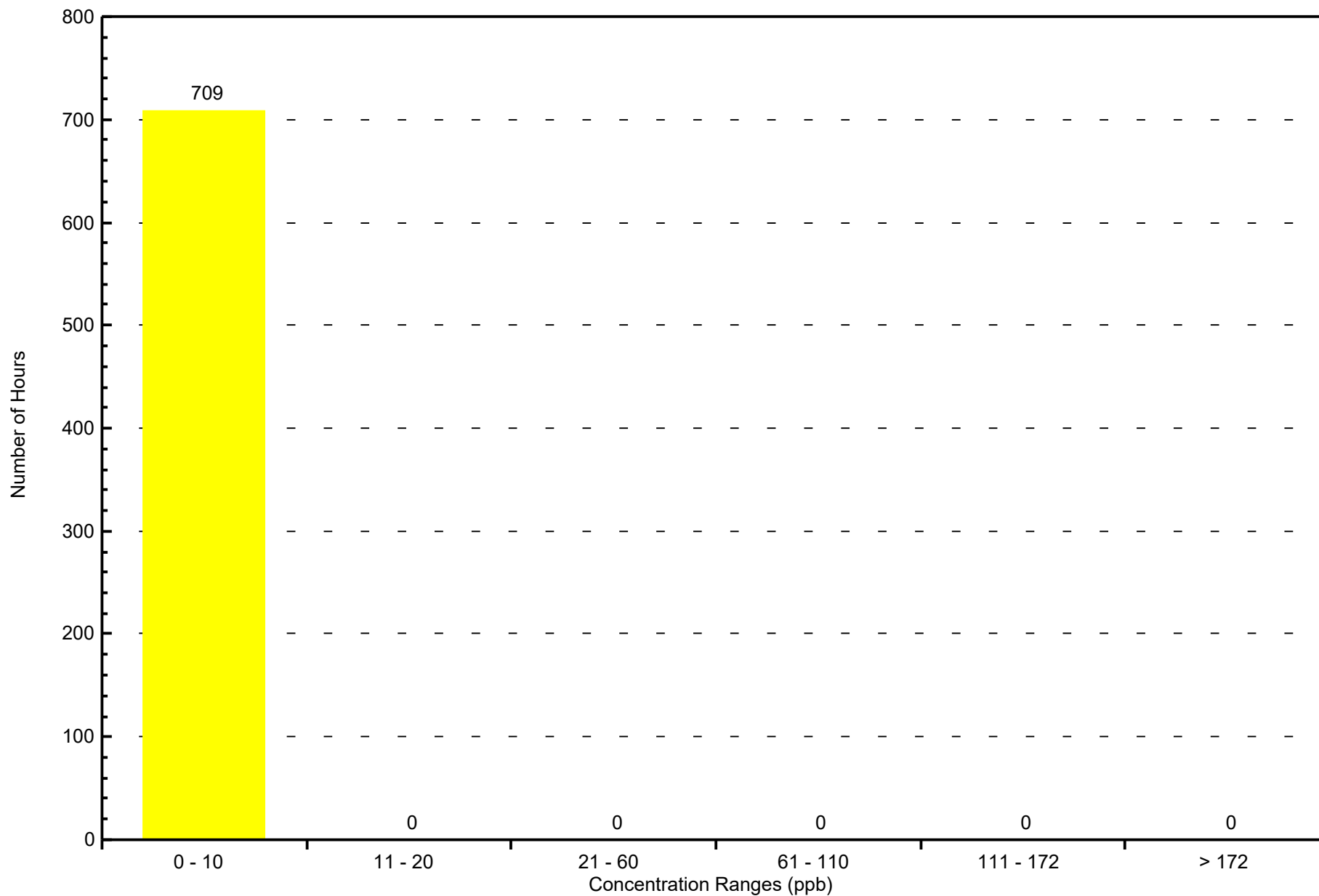
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Valleyview - December 2019



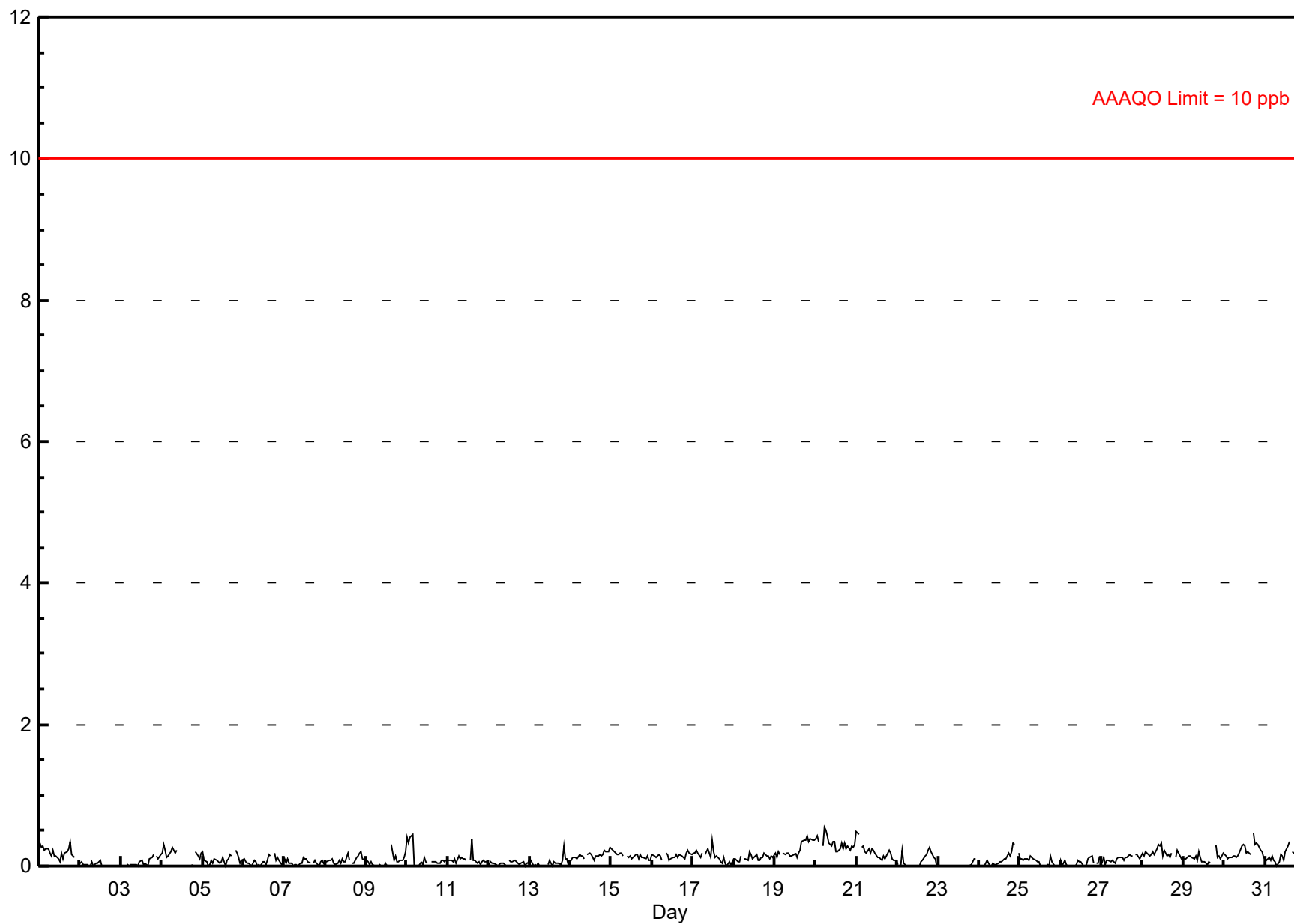
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Valleyview - December 2019



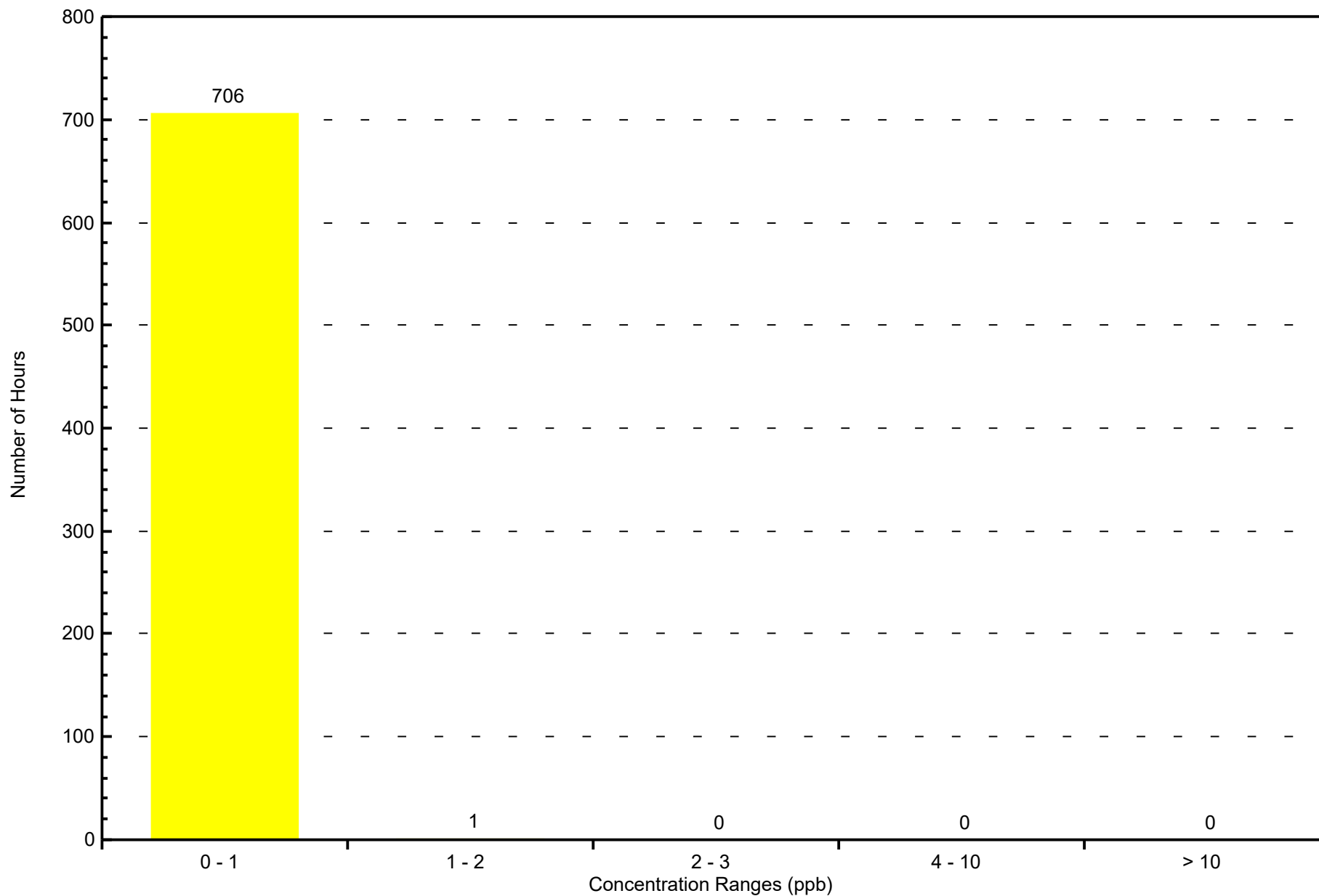
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Valleyview - December 2019



Histogram of Hourly Averages

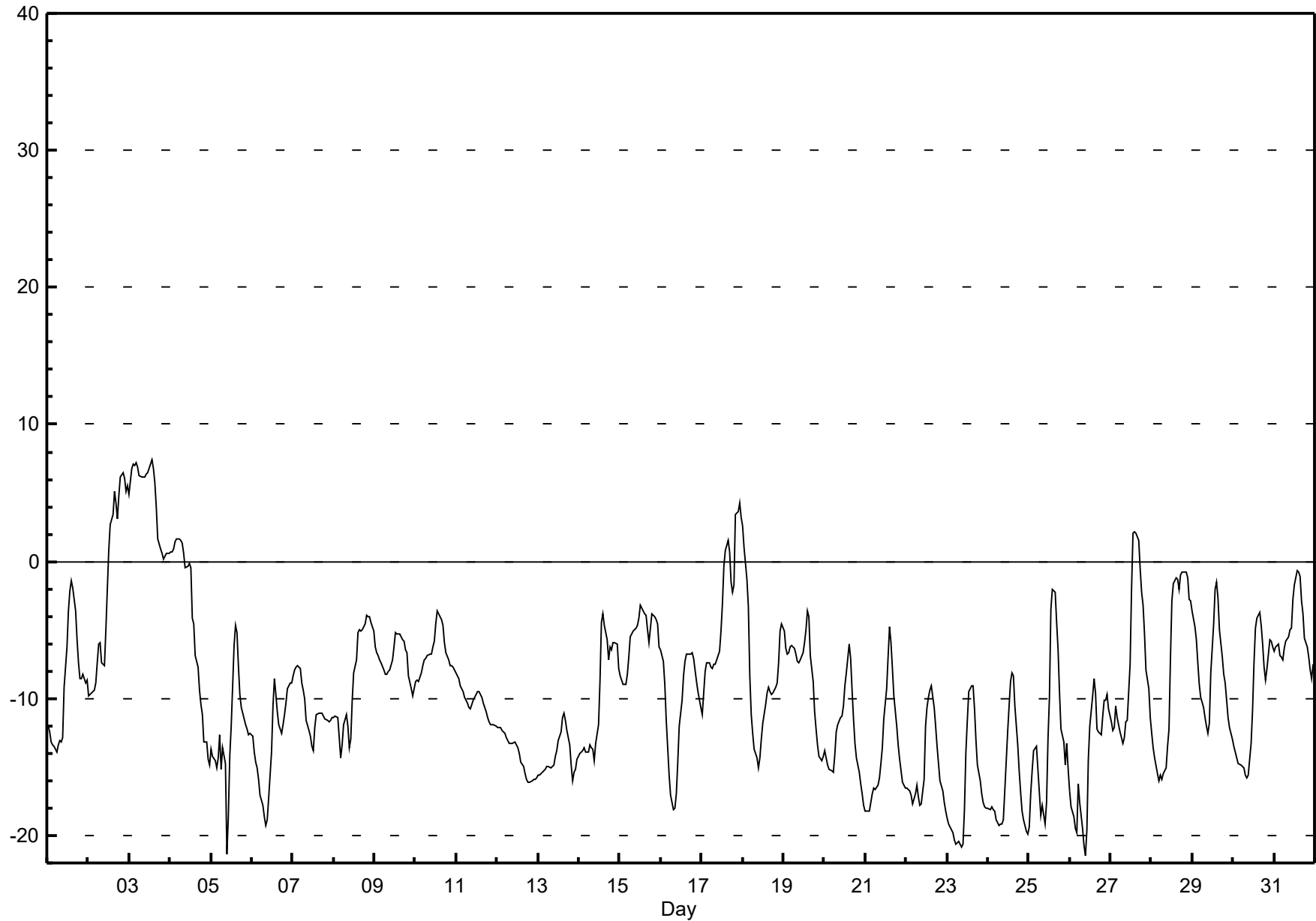
Hydrogen Sulphide (H₂S) - ppb
Valleyview - December 2019



Hourly Averages

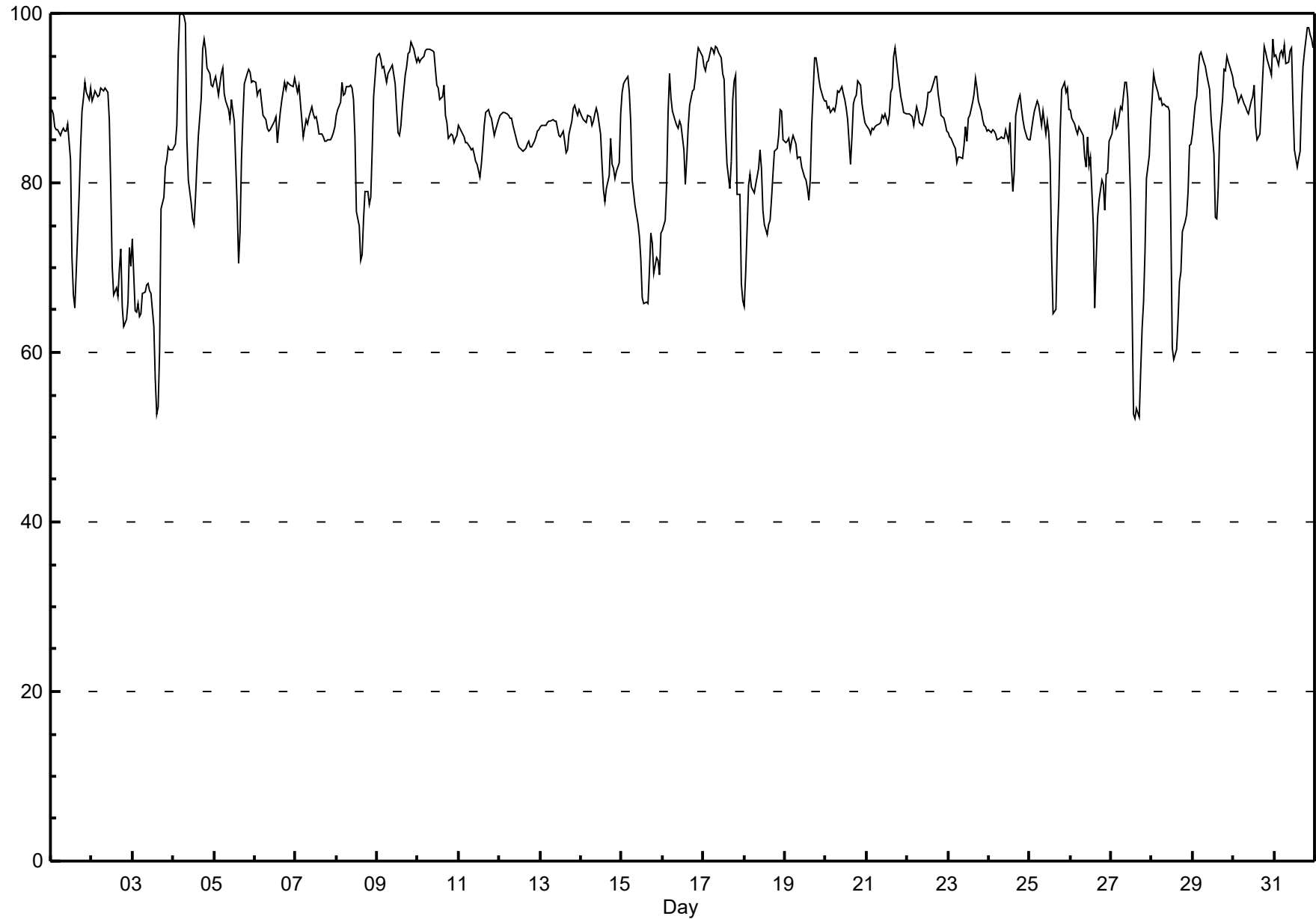
External Temperature (ET) - °C

Valleyview - December 2019



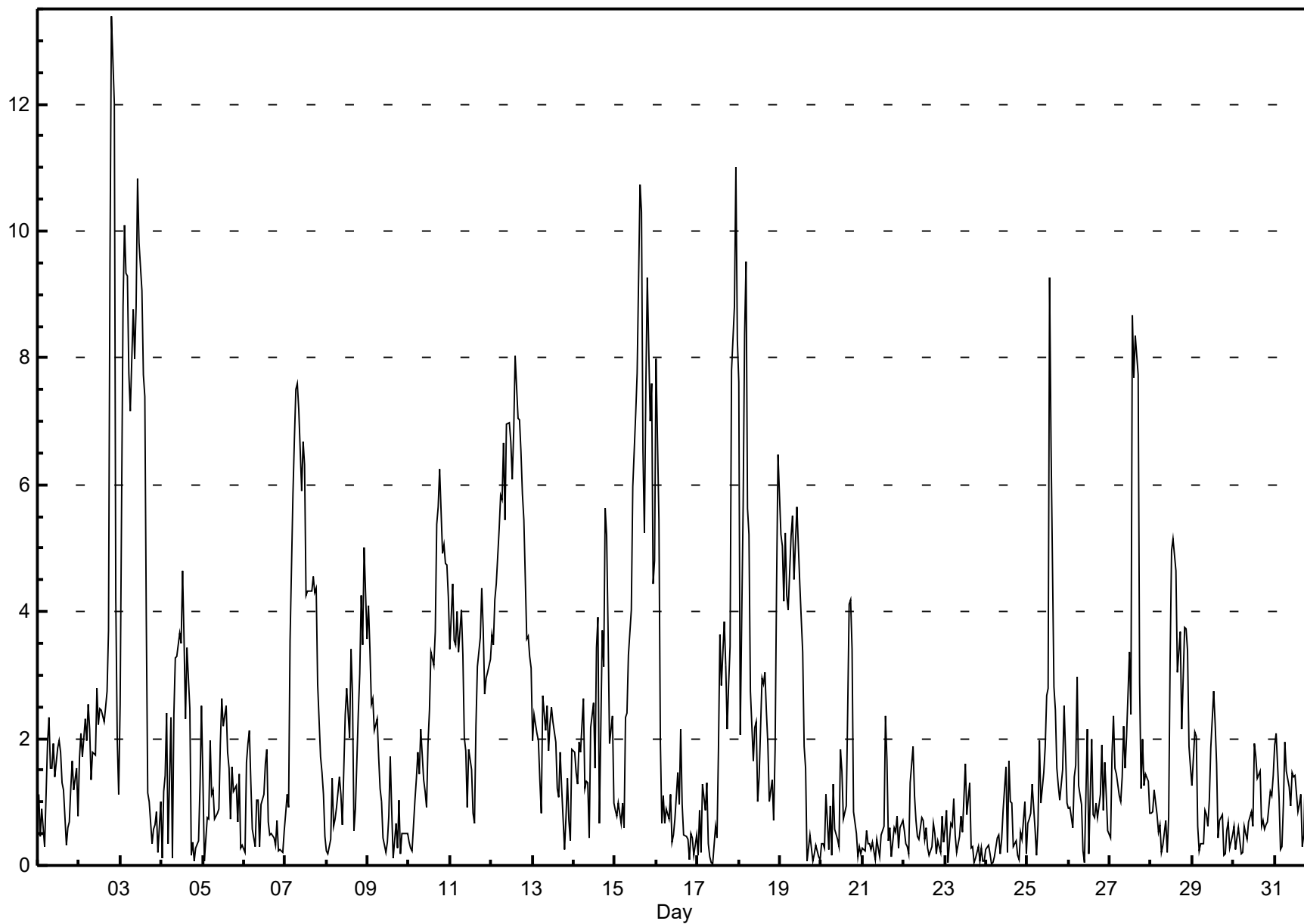
Hourly Averages

Relative Humidity (RH) - %
Valleyview - December 2019



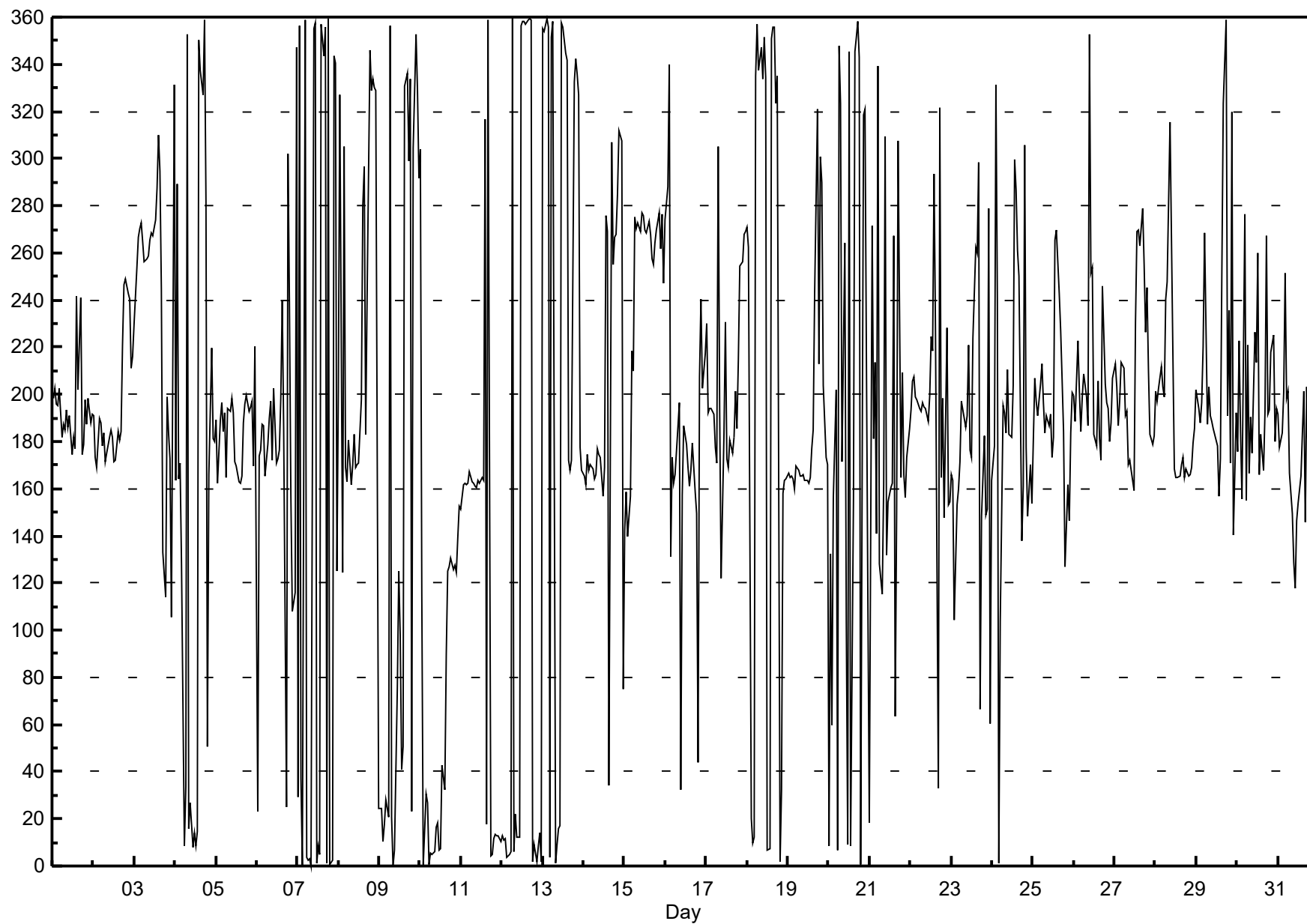
Hourly Averages

Wind Speed (WS) - km/h
Valleyview - December 2019



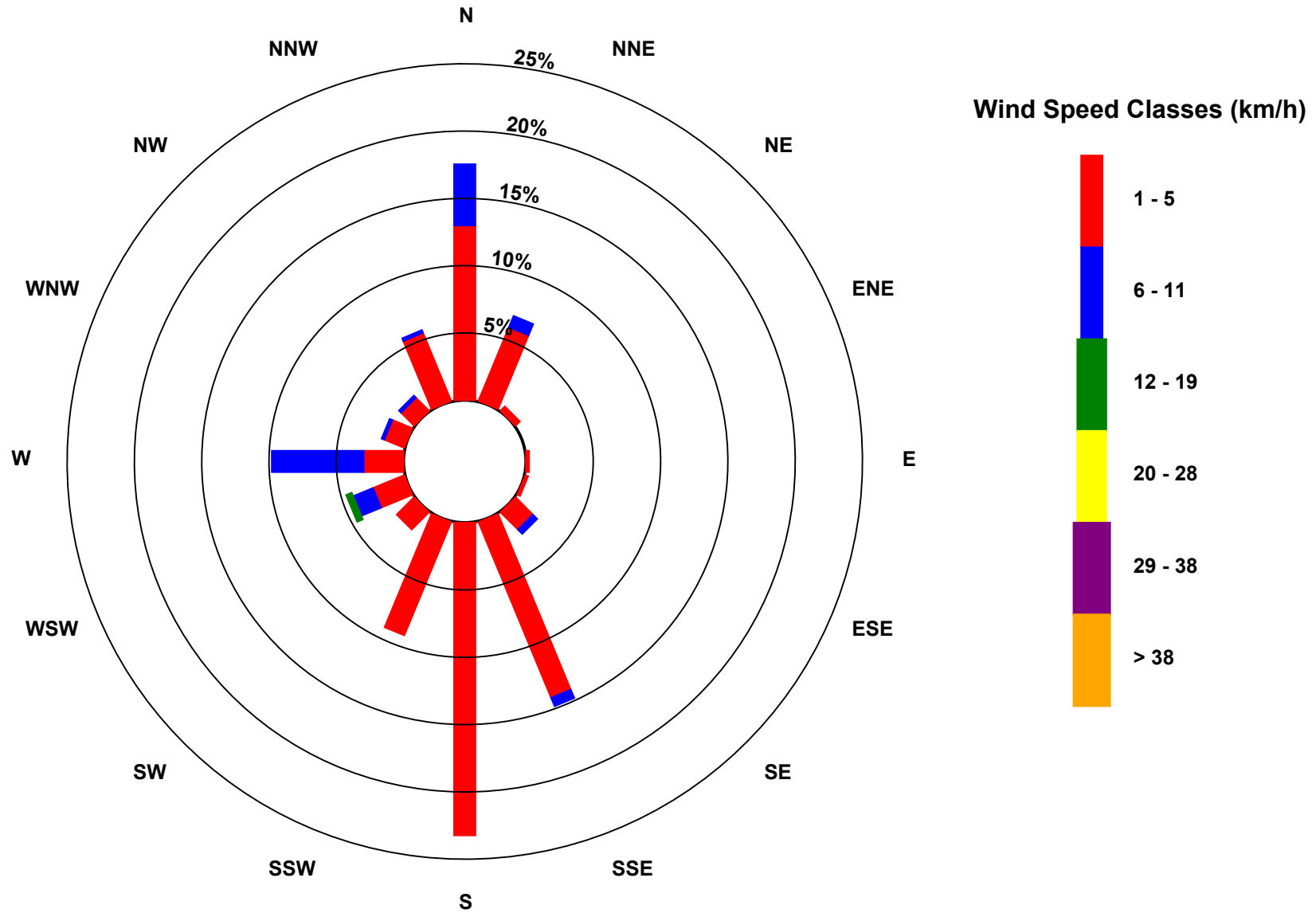
Hourly Averages

Wind Direction (WD) - deg
Valleyview - December 2019



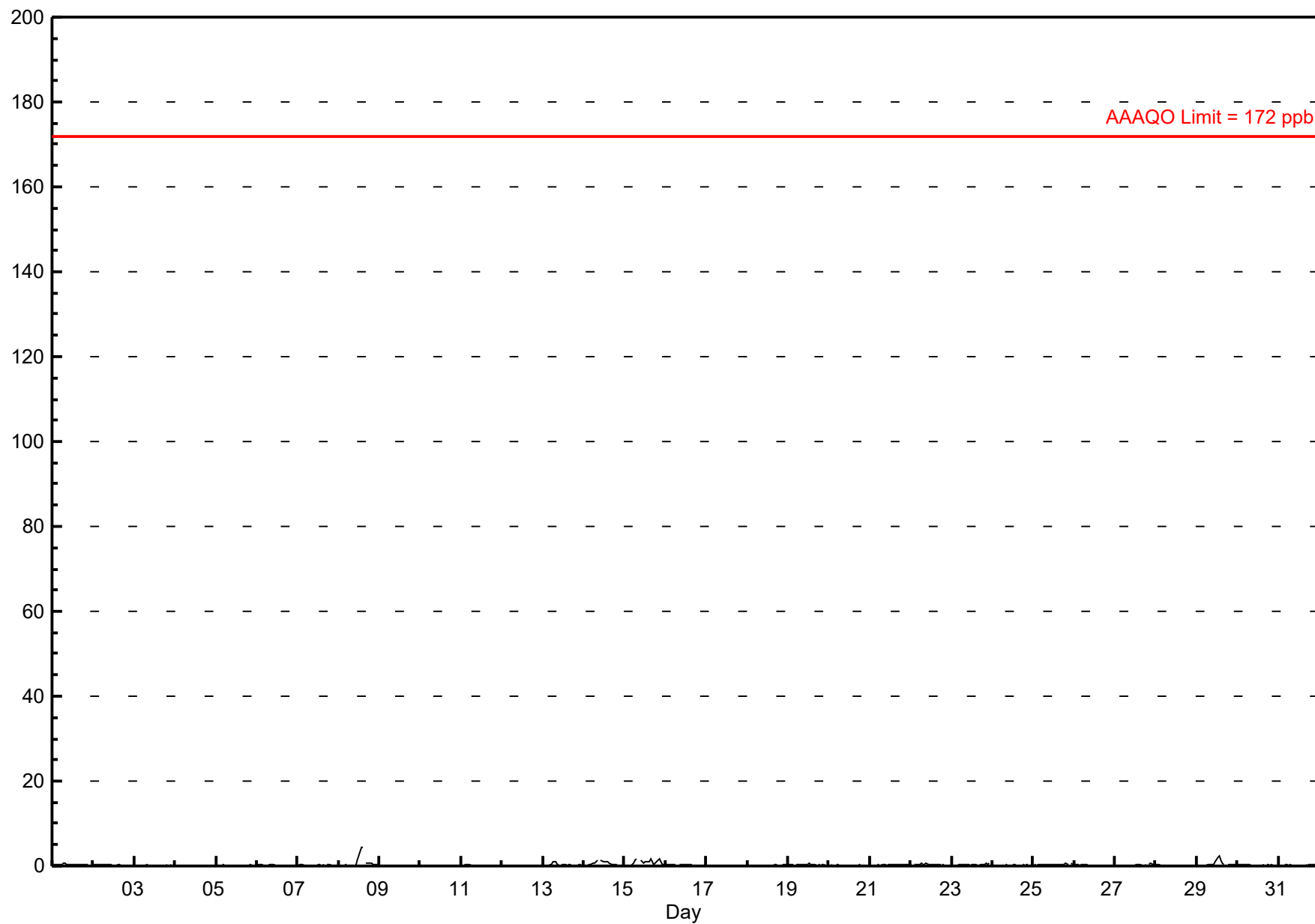
Wind Rose

Wind Speed (WS) (km/h)
Valleyview - December 2019



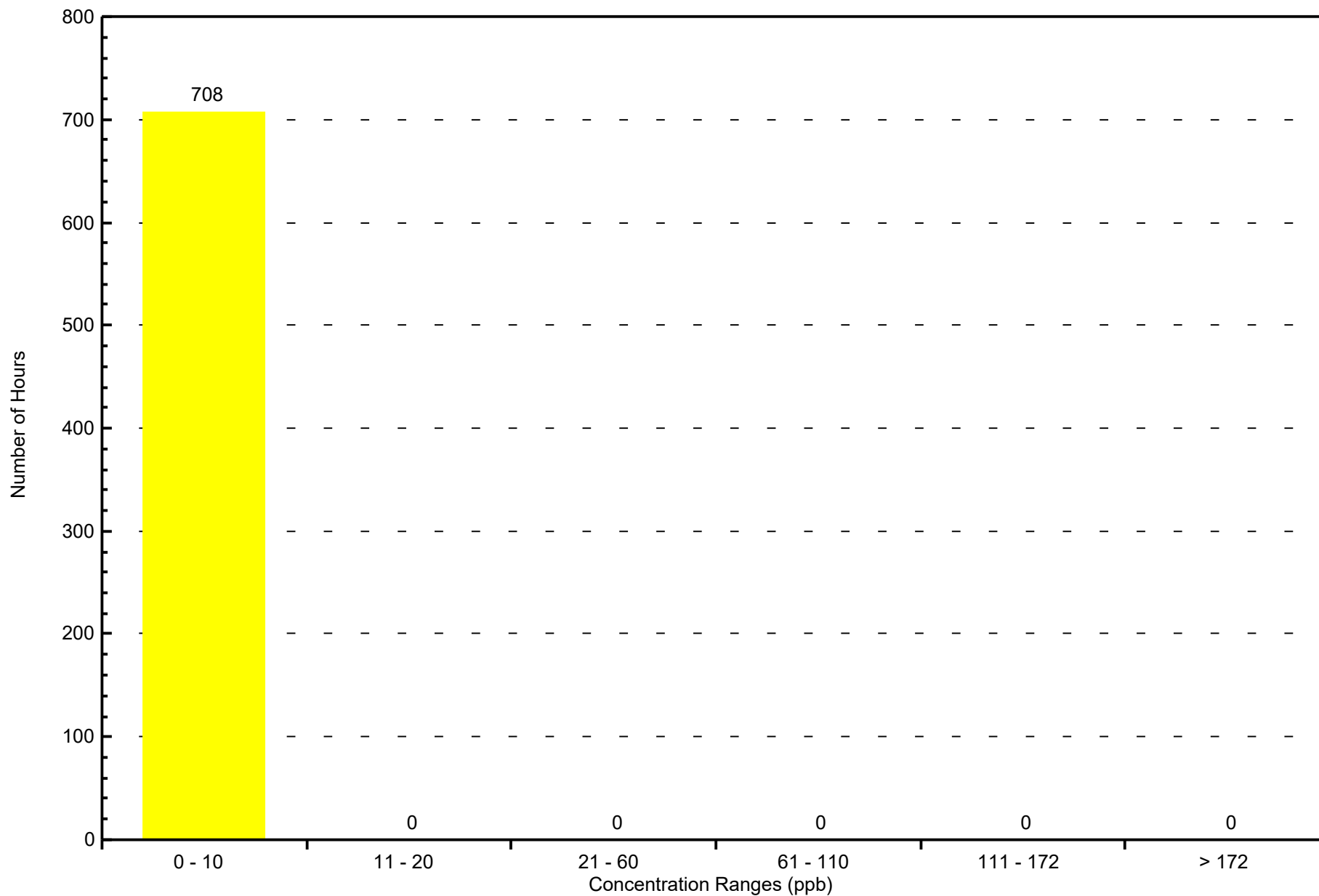
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Donnelly - December 2019



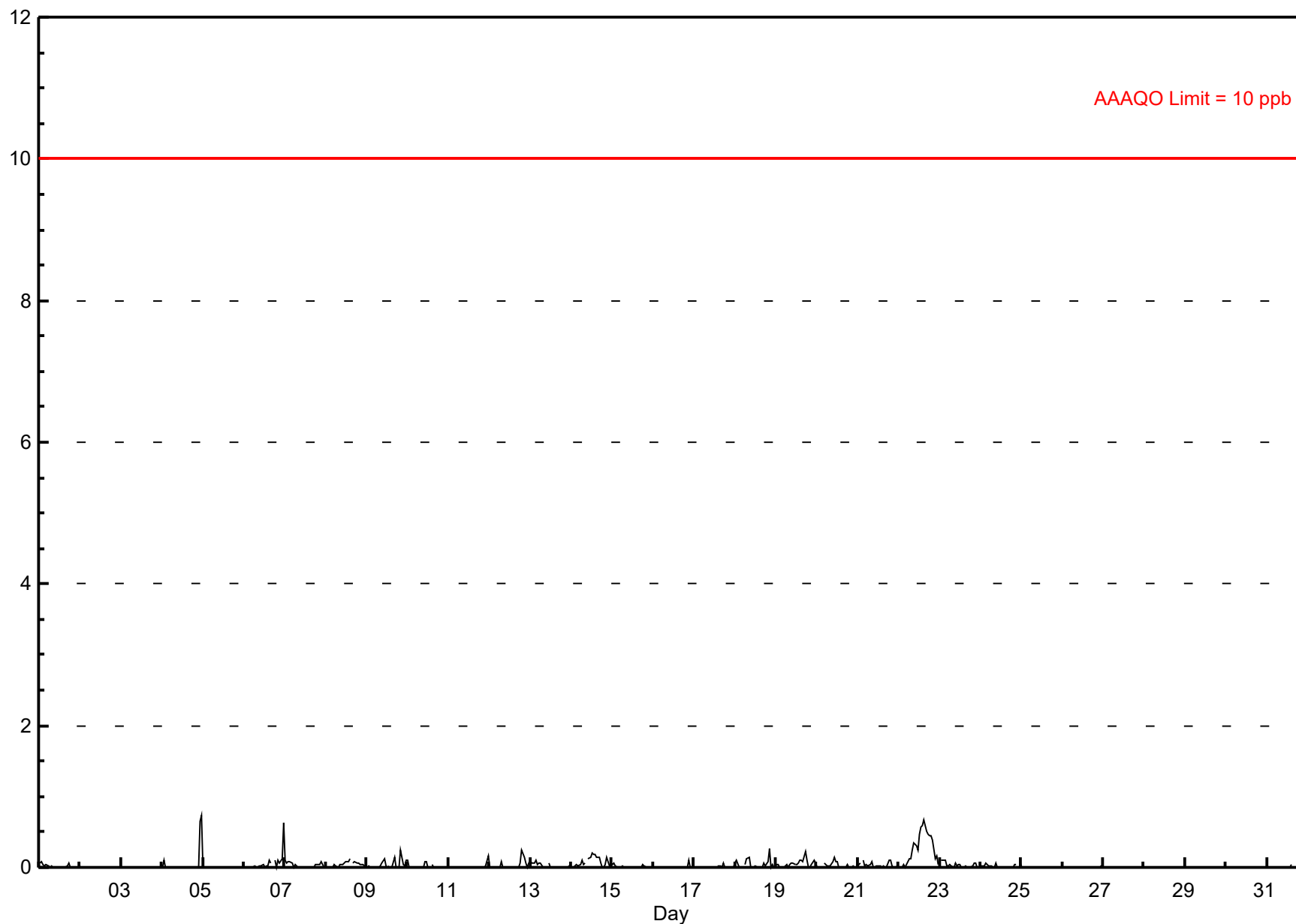
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Donnelly - December 2019



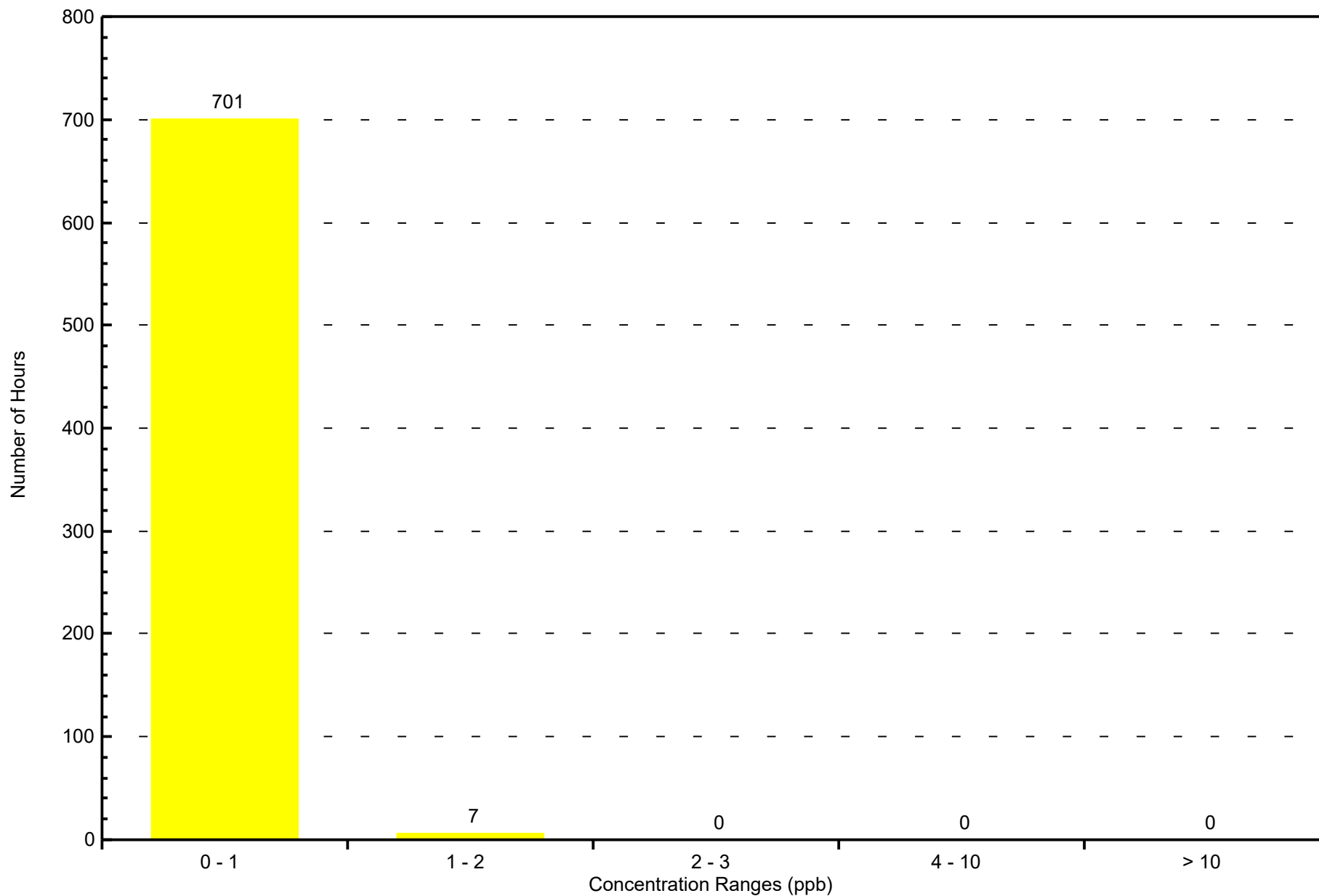
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Donnelly - December 2019



Histogram of Hourly Averages

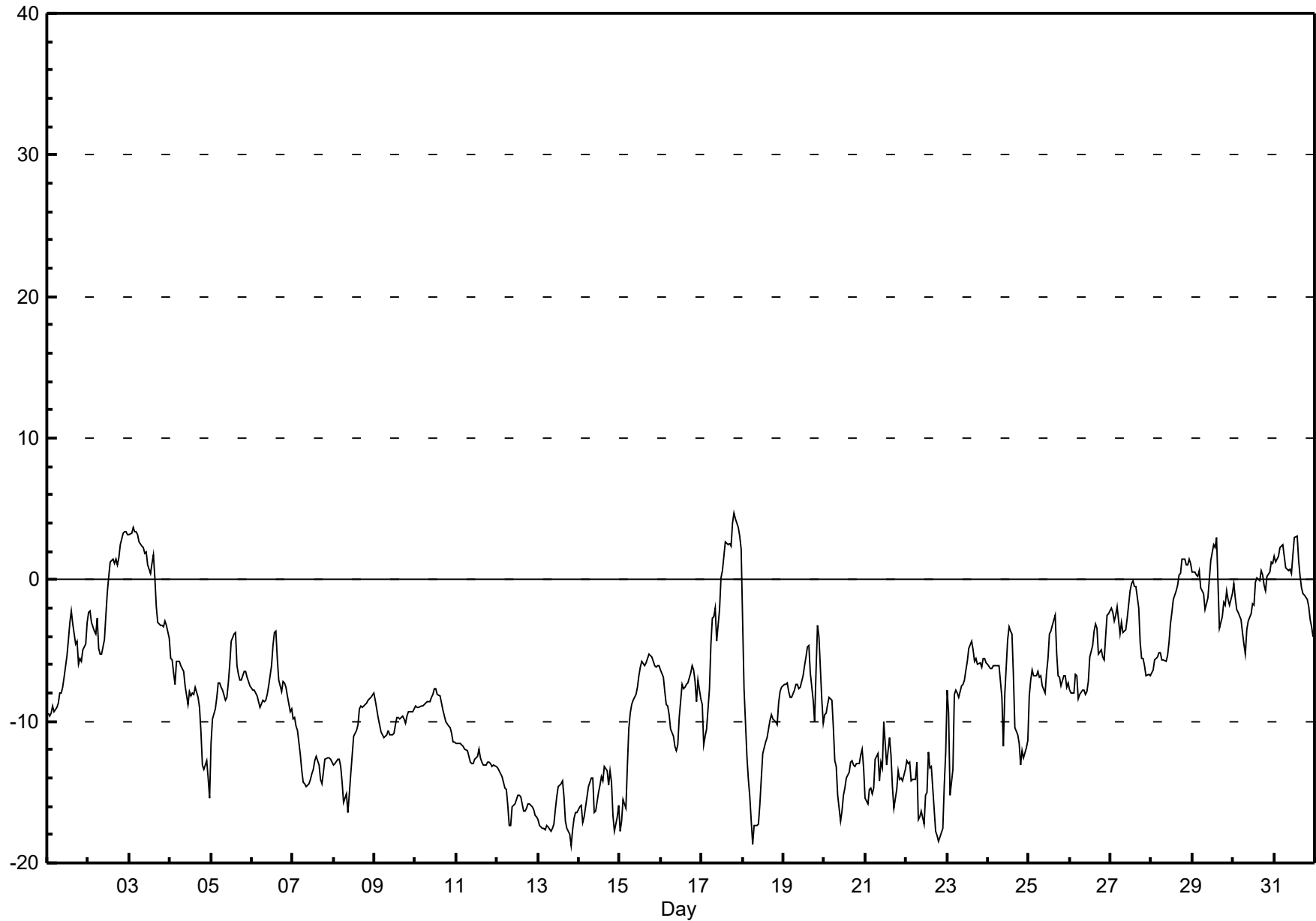
Hydrogen Sulphide (H₂S) - ppb
Donnelly - December 2019



Hourly Averages

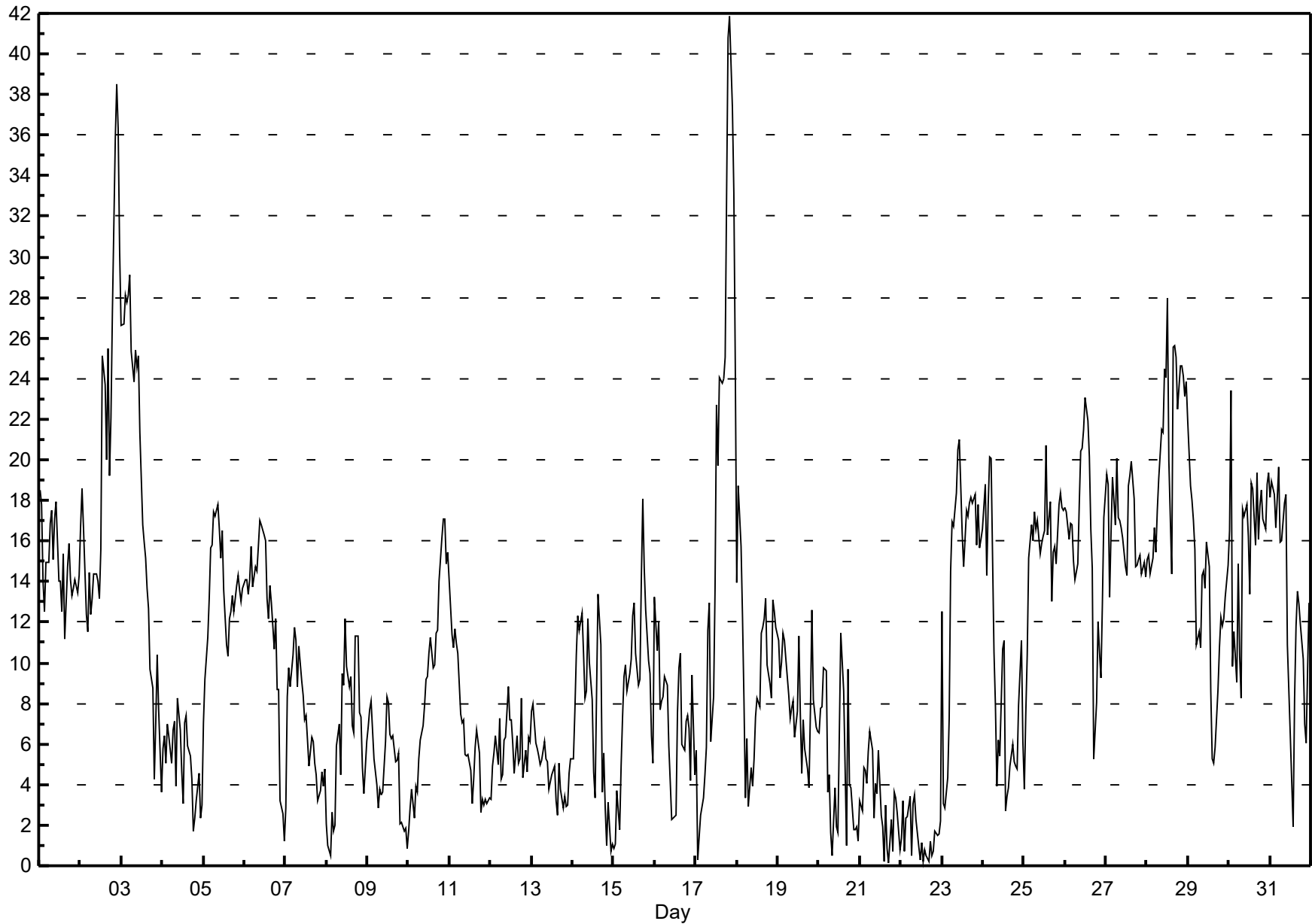
External Temperature (ET) - °C

Donnelly - December 2019



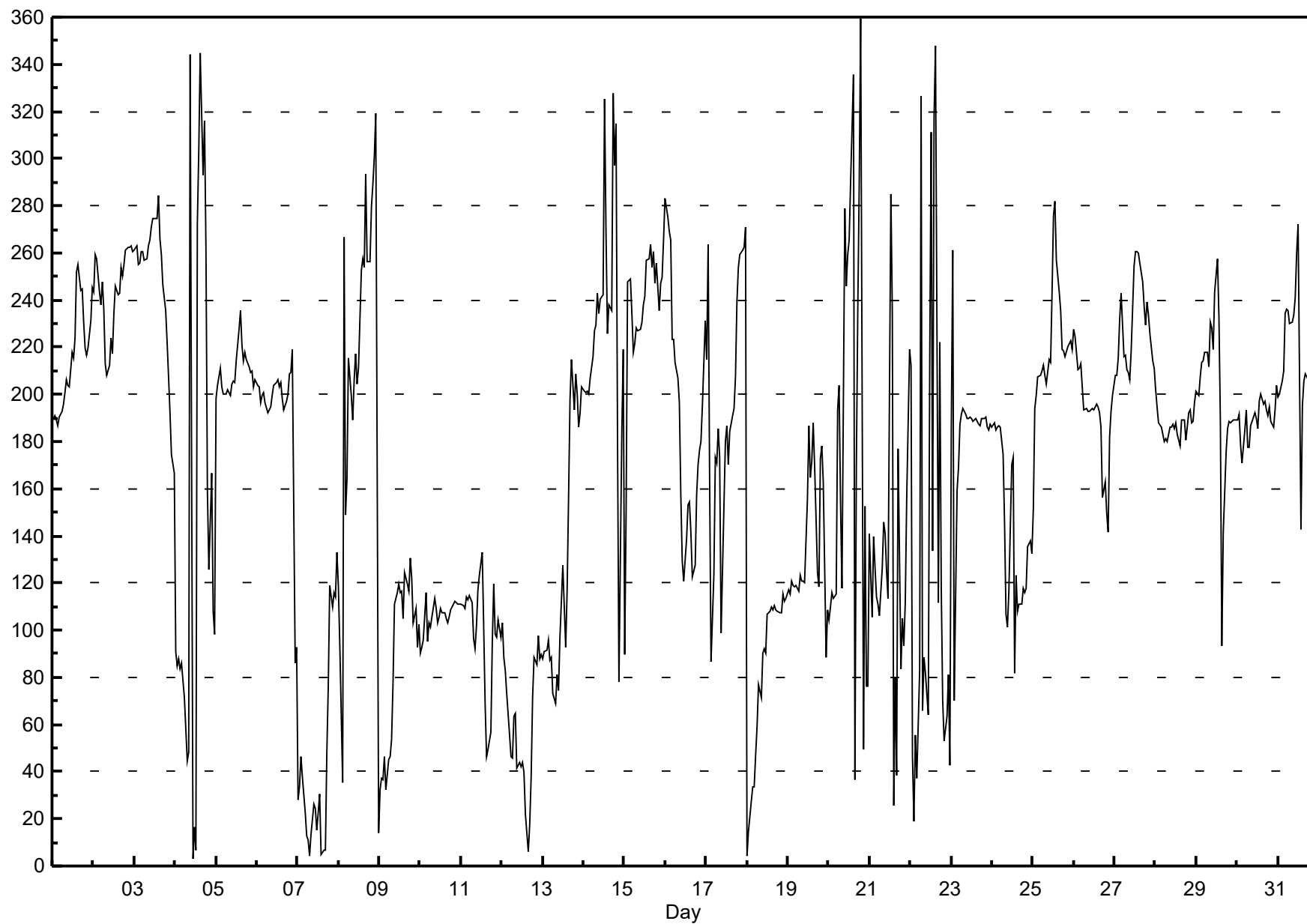
Hourly Averages

Wind Speed (WS) - km/h
Donnelly - December 2019



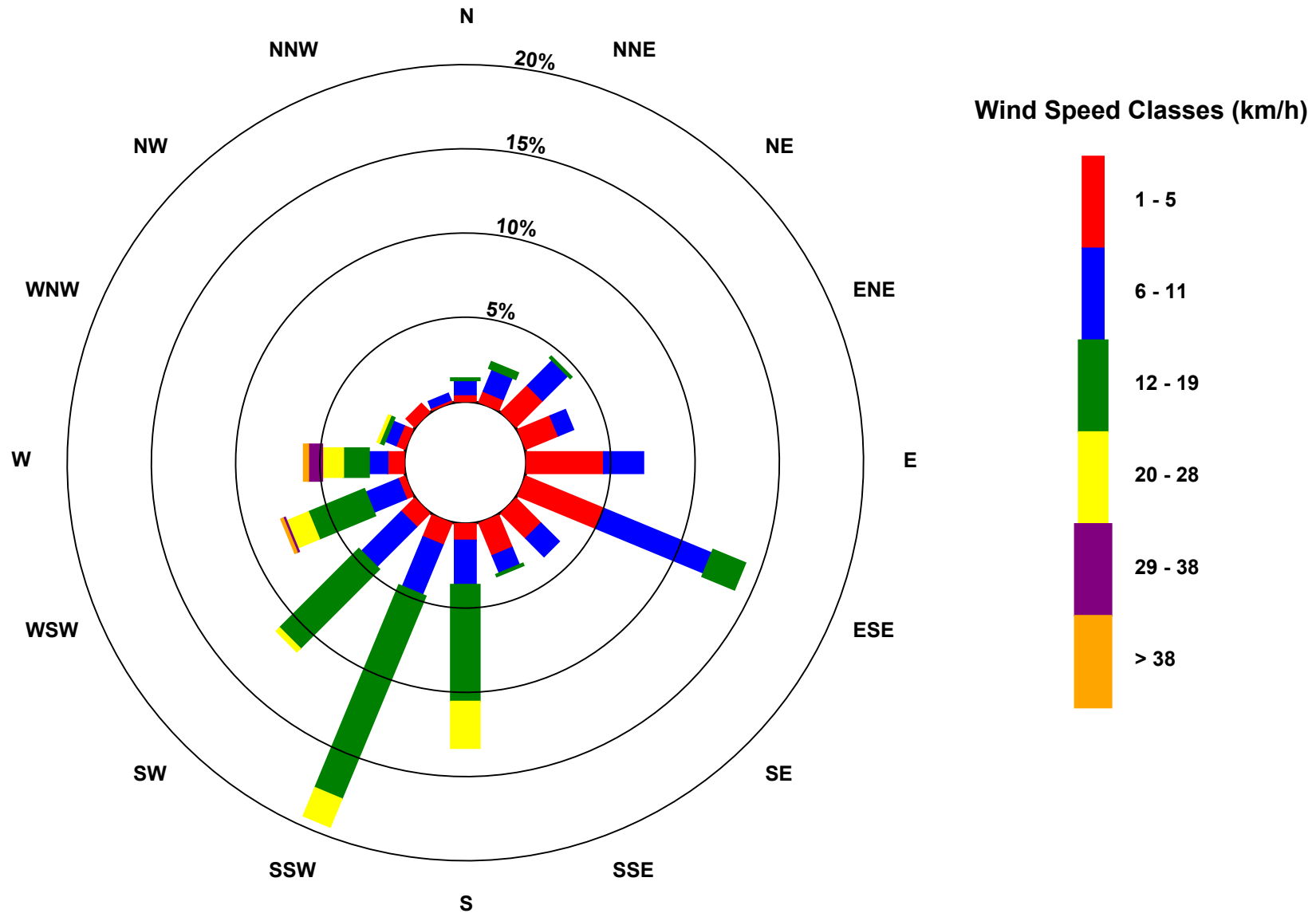
Hourly Averages

Wind Direction (WD) - deg
Donnelly - December 2019



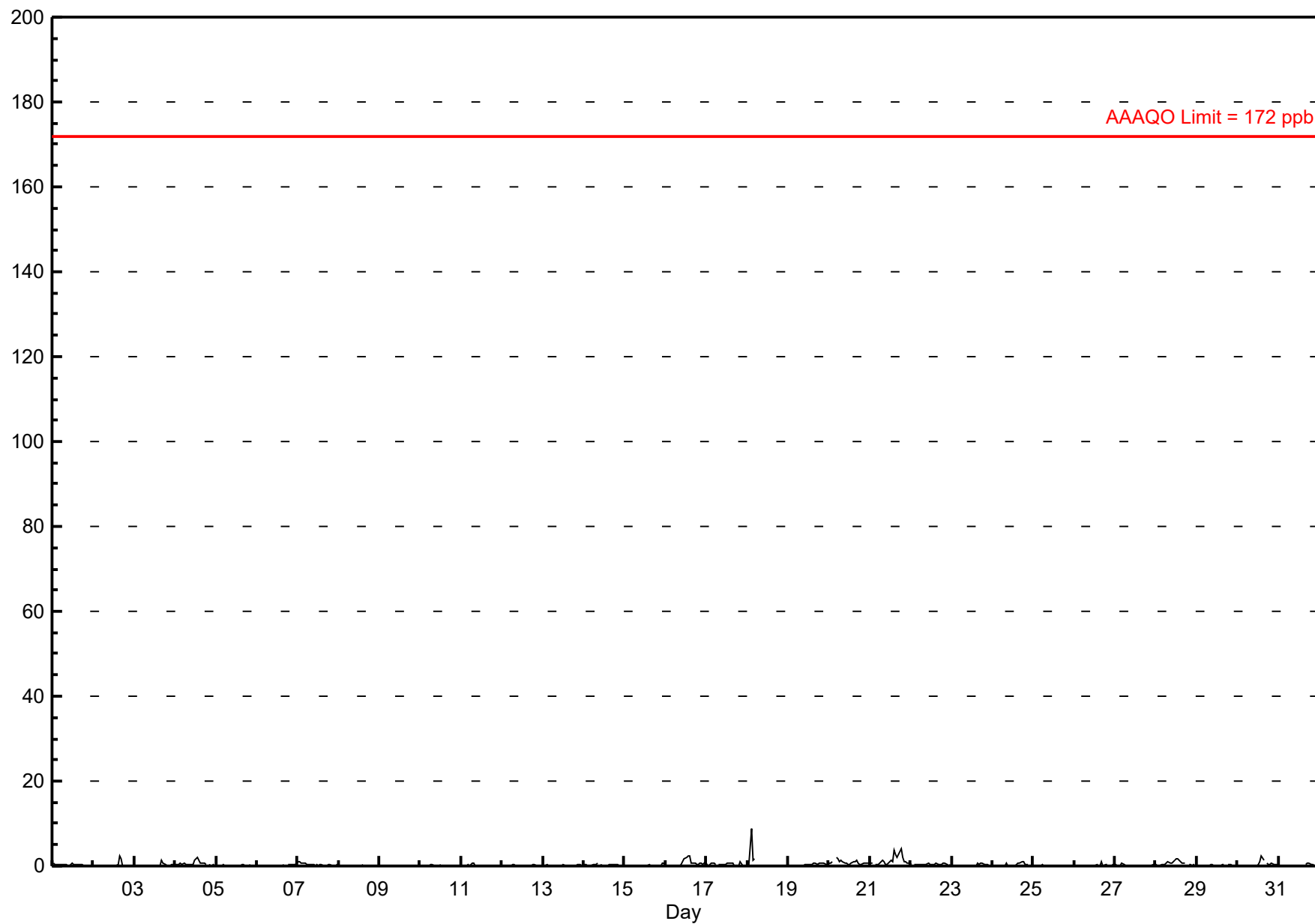
Wind Rose

Wind Speed (WS) (km/h)
Donnelly - December 2019



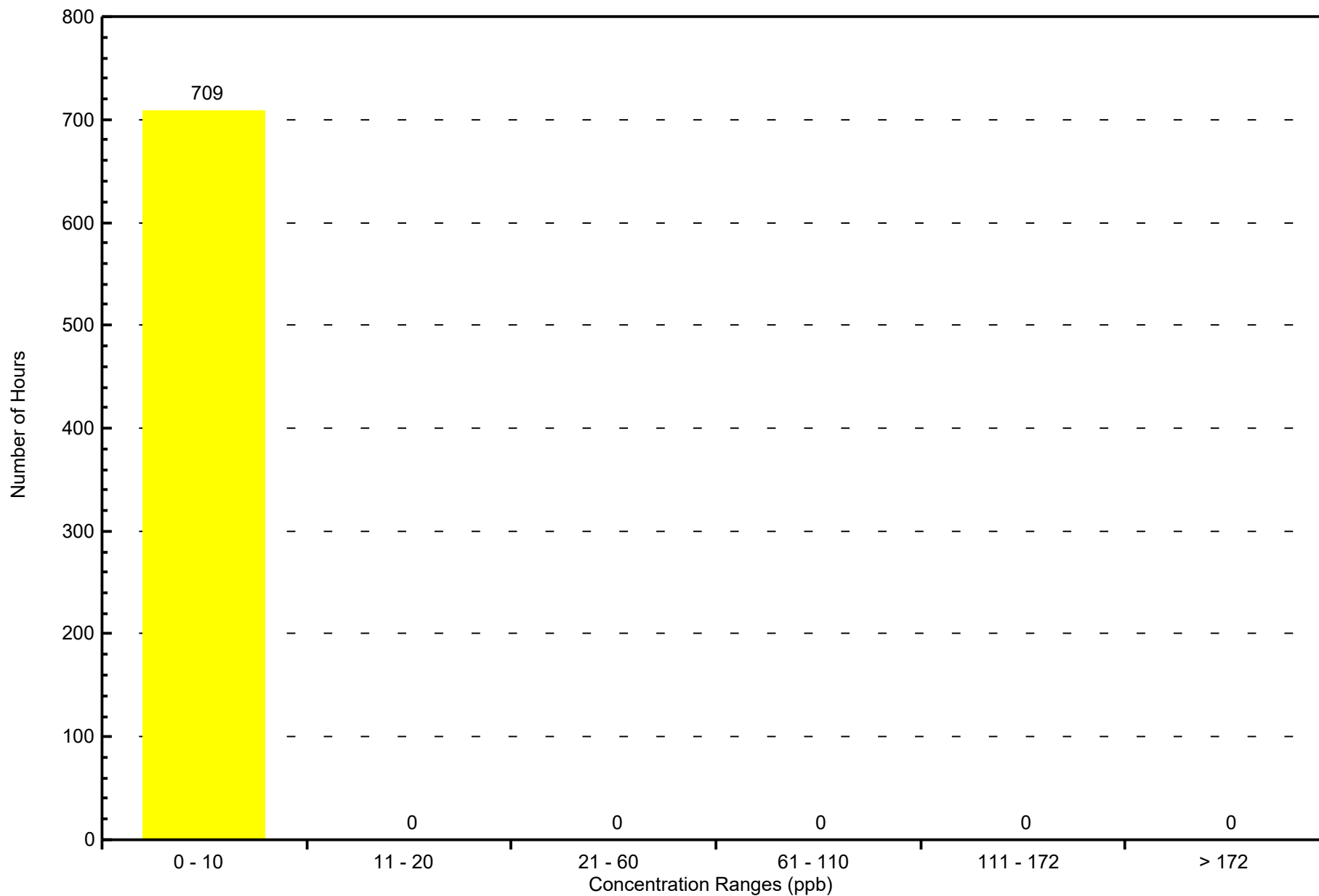
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wembley - December 2019



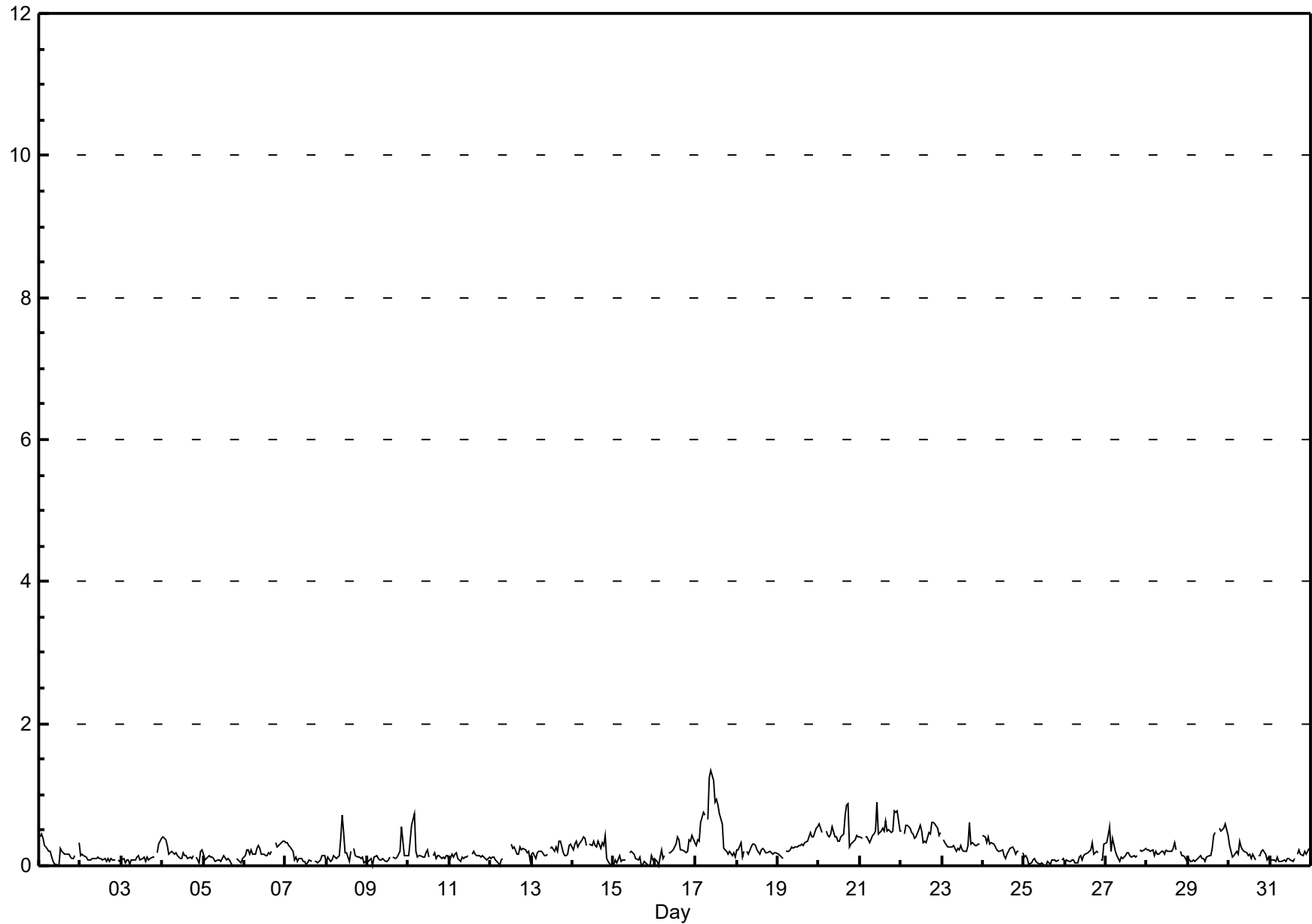
Histogram of Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wembley - December 2019



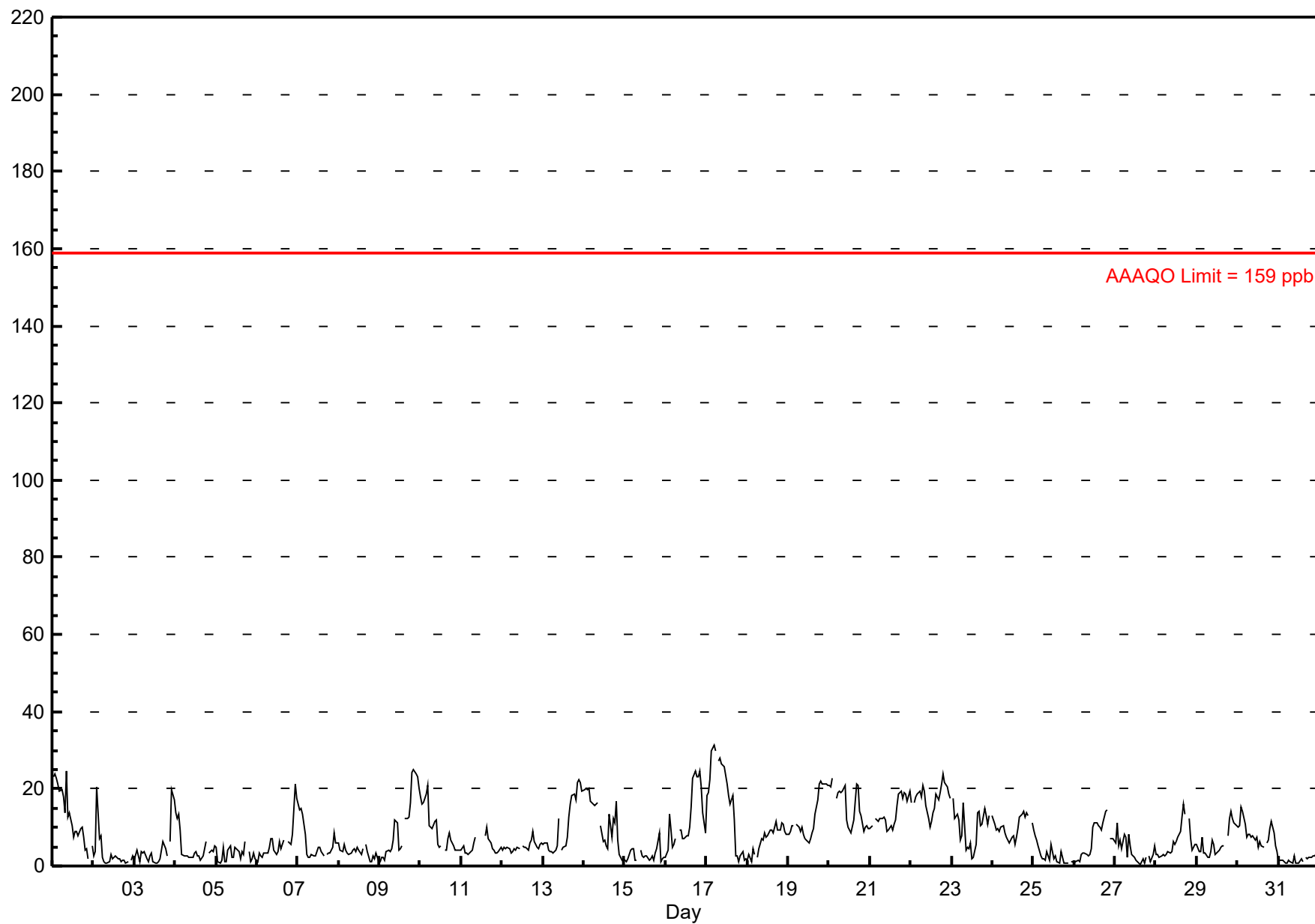
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Wembley - December 2019



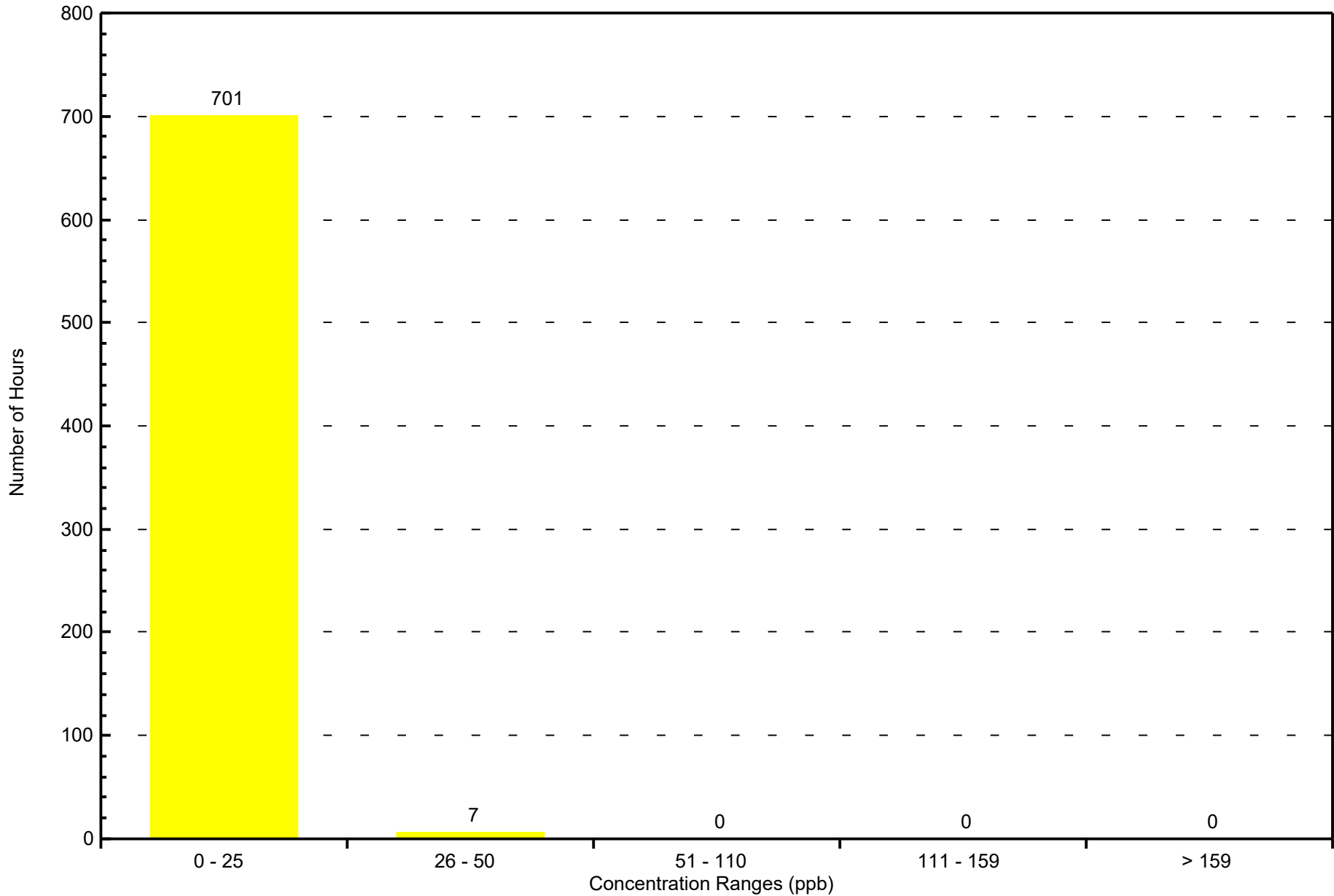
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wembley - December 2019



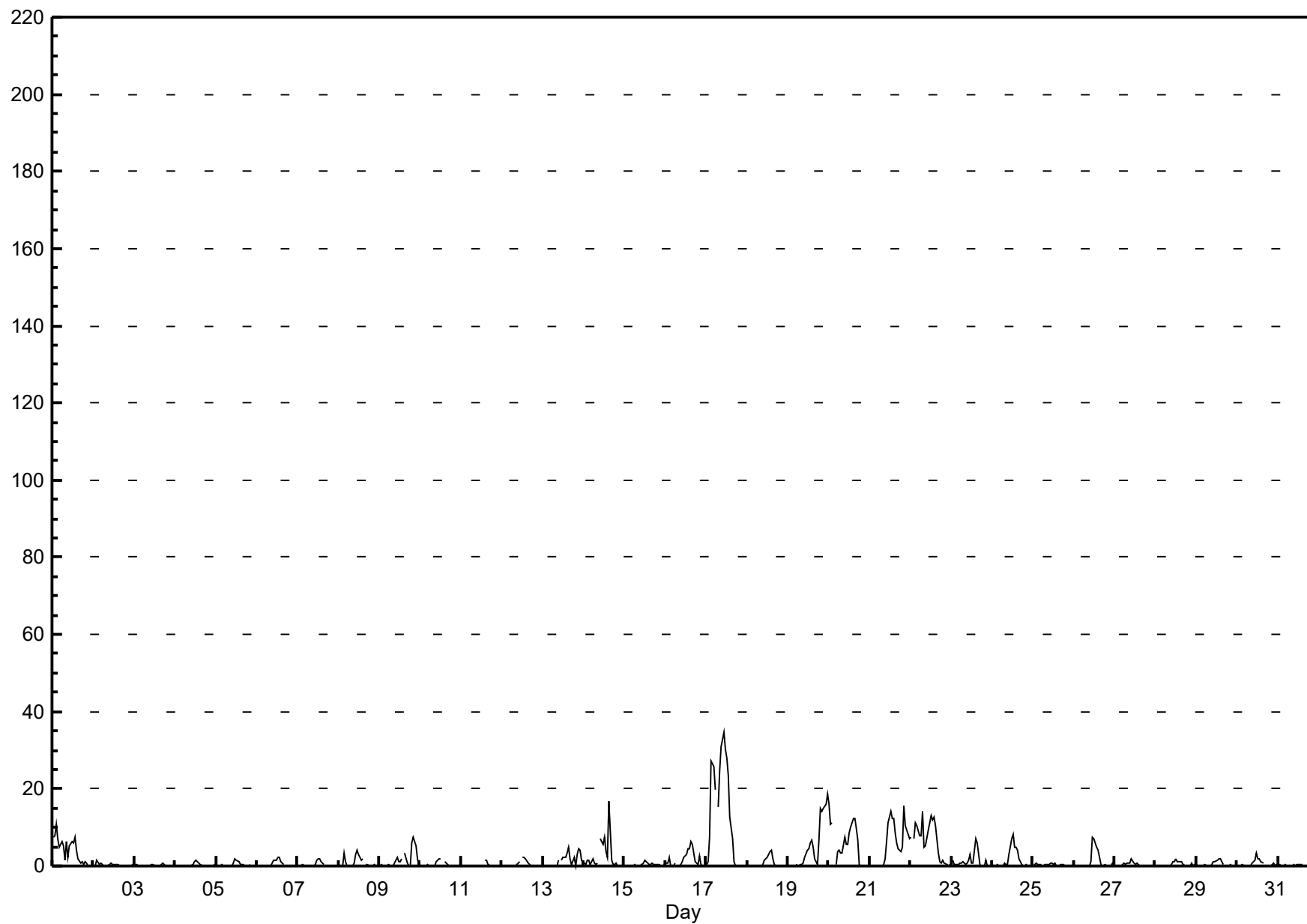
Histogram of Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wembley - December 2019



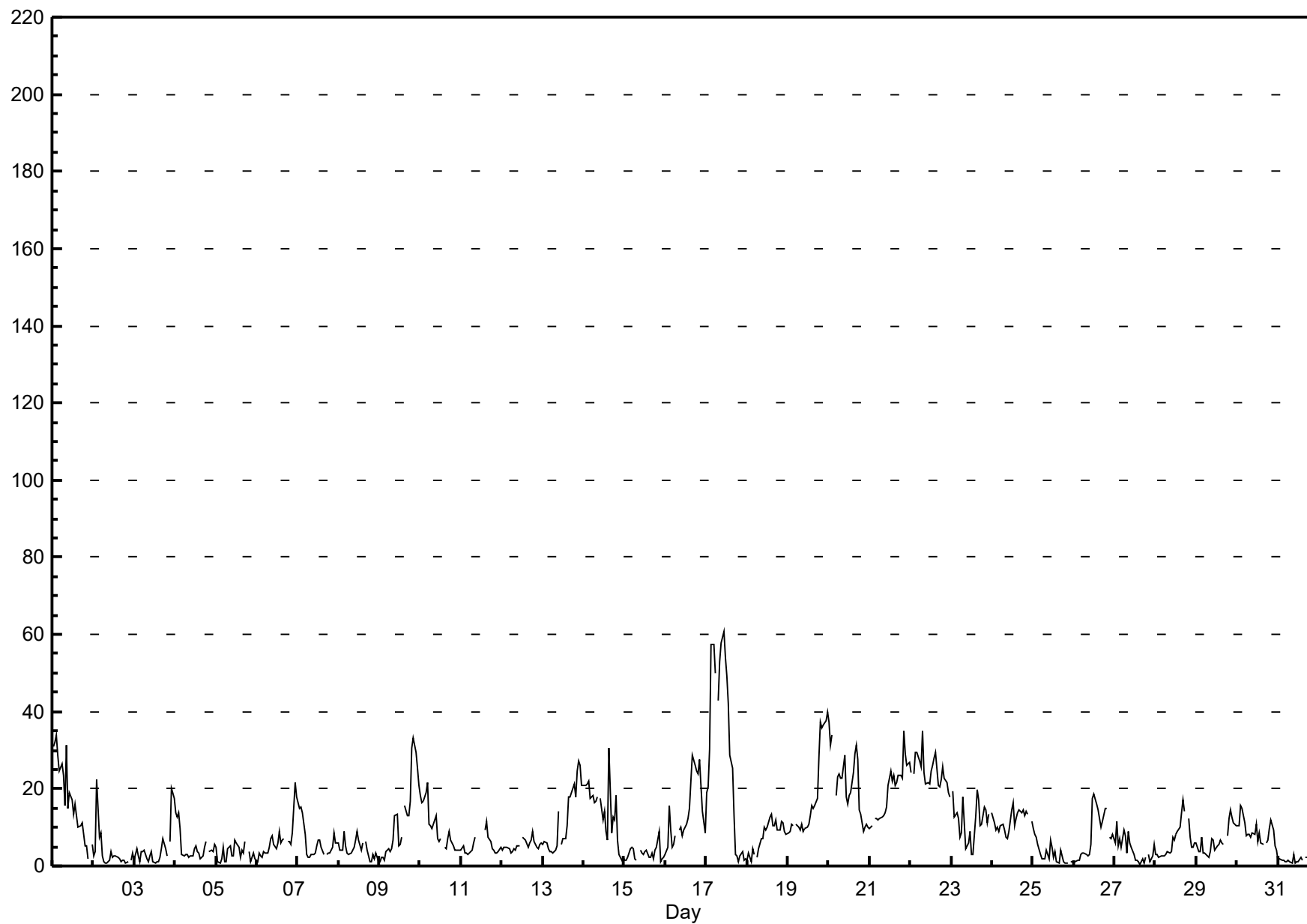
Hourly Averages

Nitrogen Oxide (NO) - ppb
Wembley - December 2019



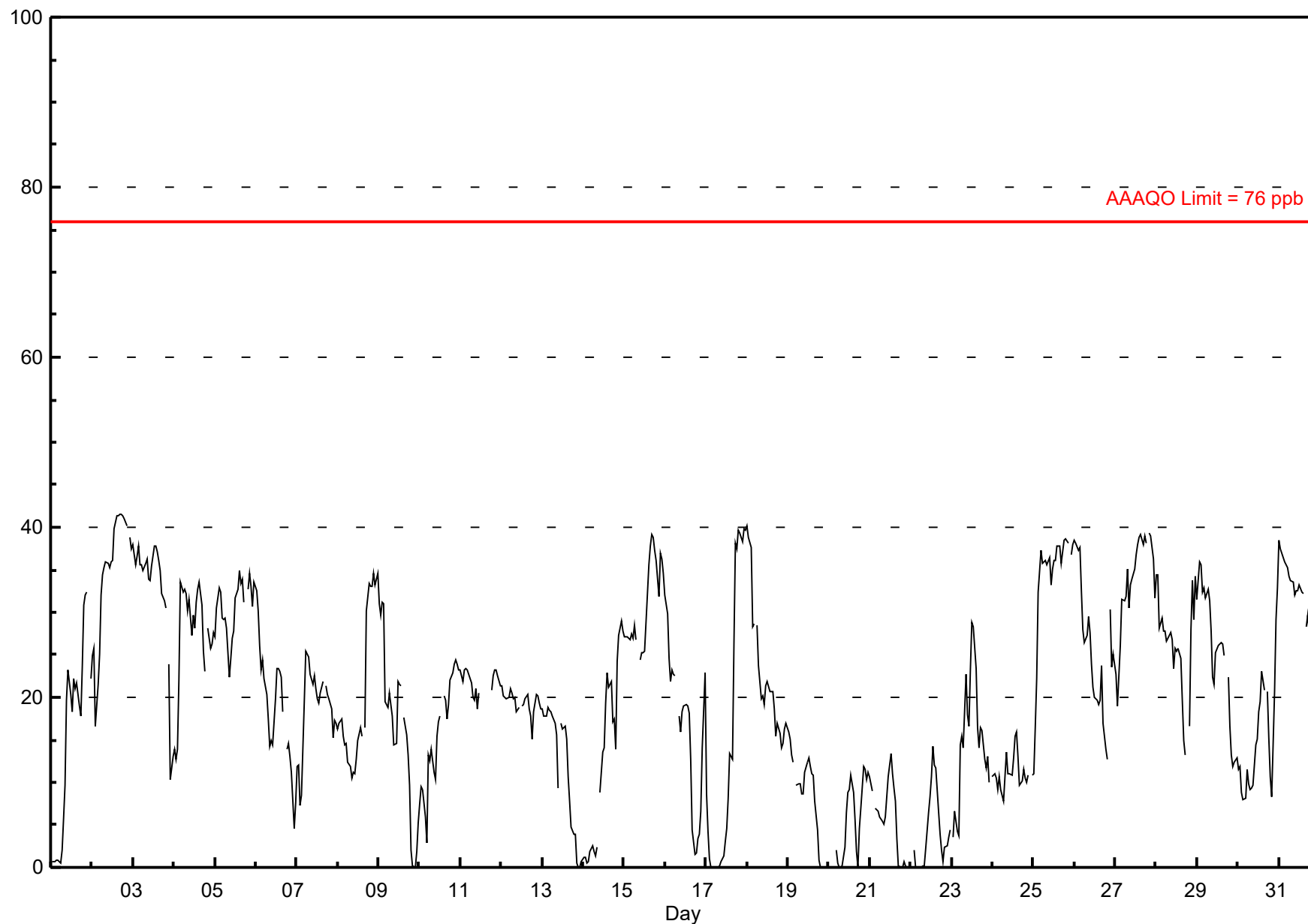
Hourly Averages

Oxides of Nitrogen (NO_x) - ppb
Wembley - December 2019



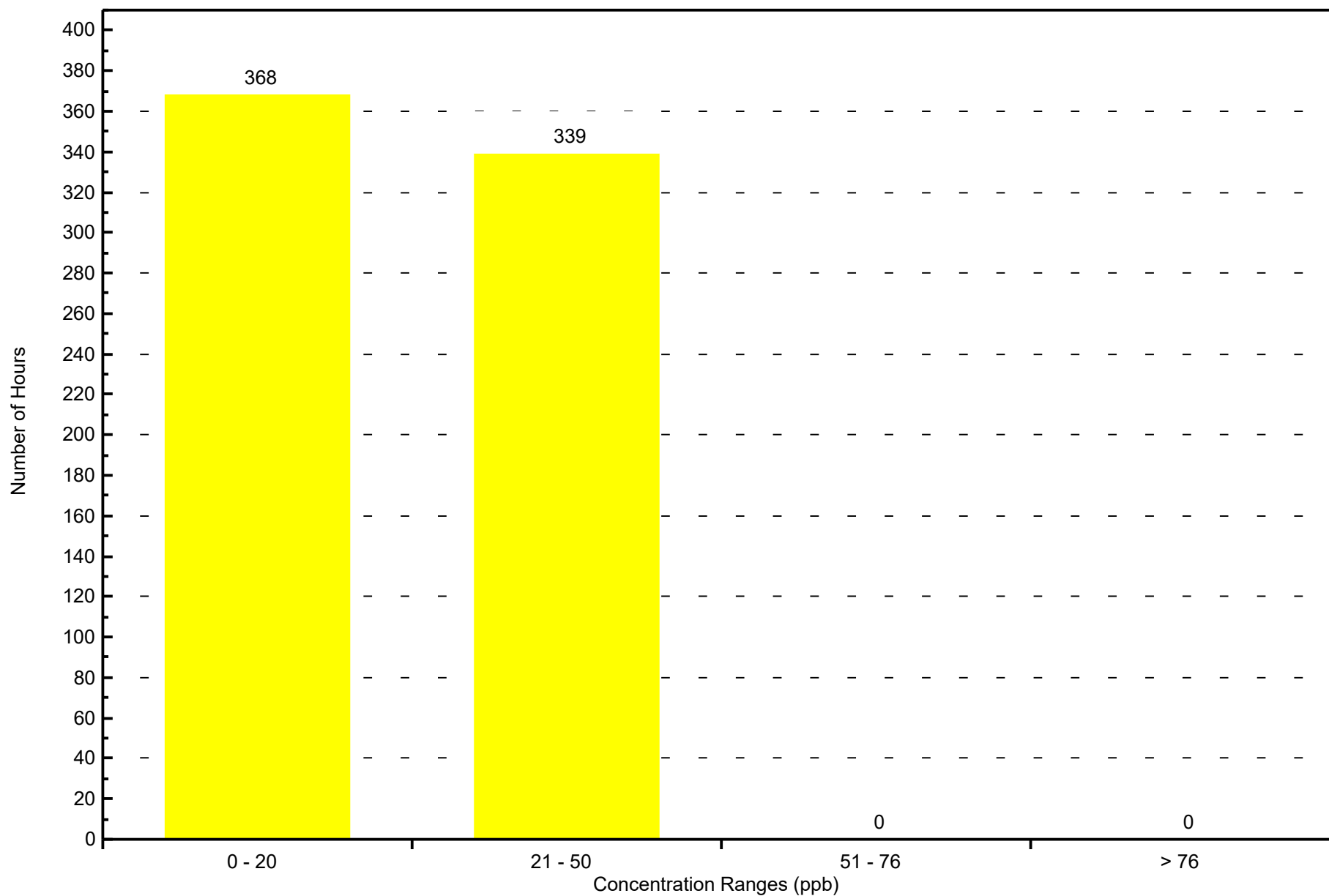
Hourly Averages

Ozone (O₃) - ppb
Wembley - December 2019



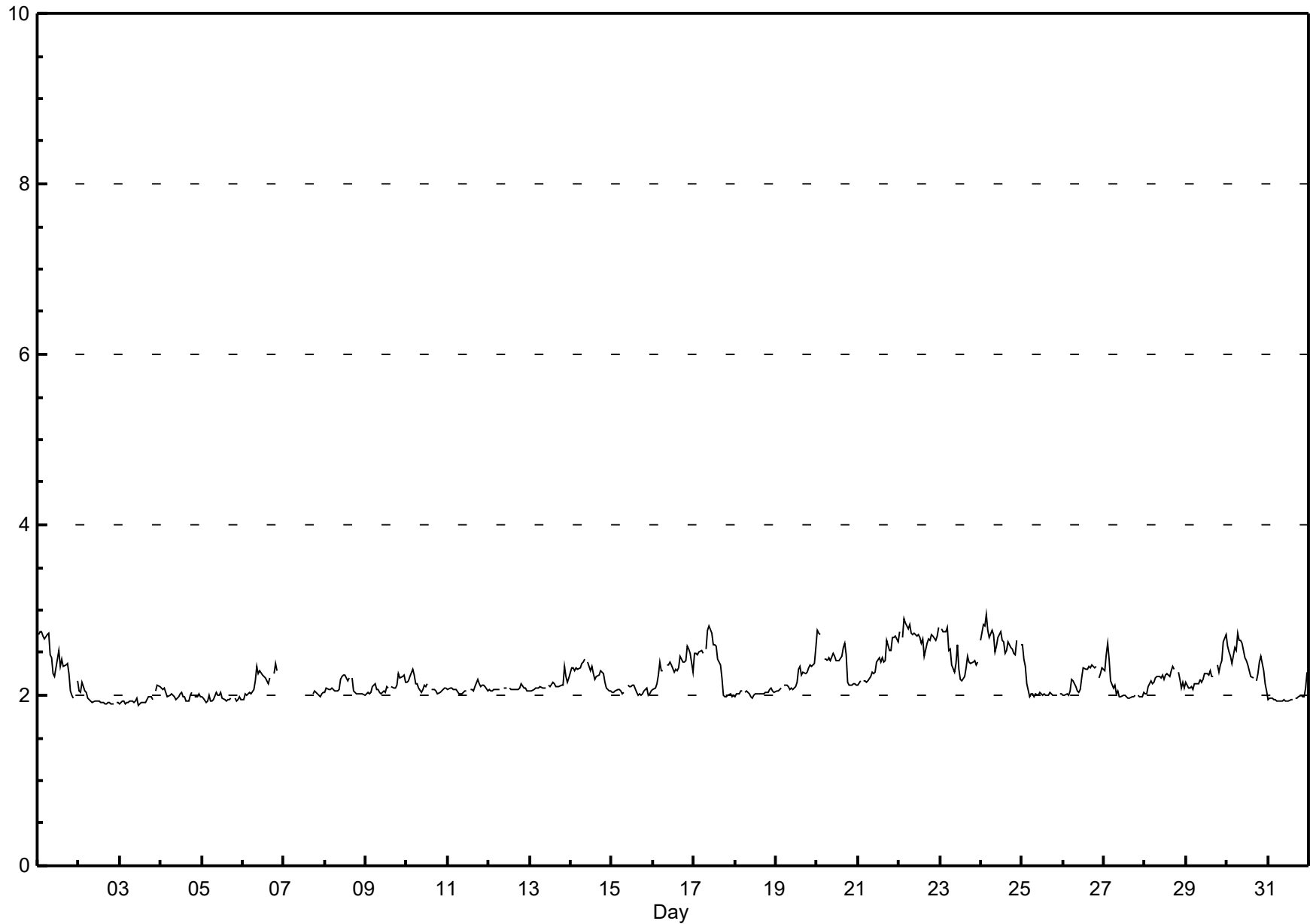
Histogram of Hourly Averages

Ozone (O₃) - ppb
Wembley - December 2019



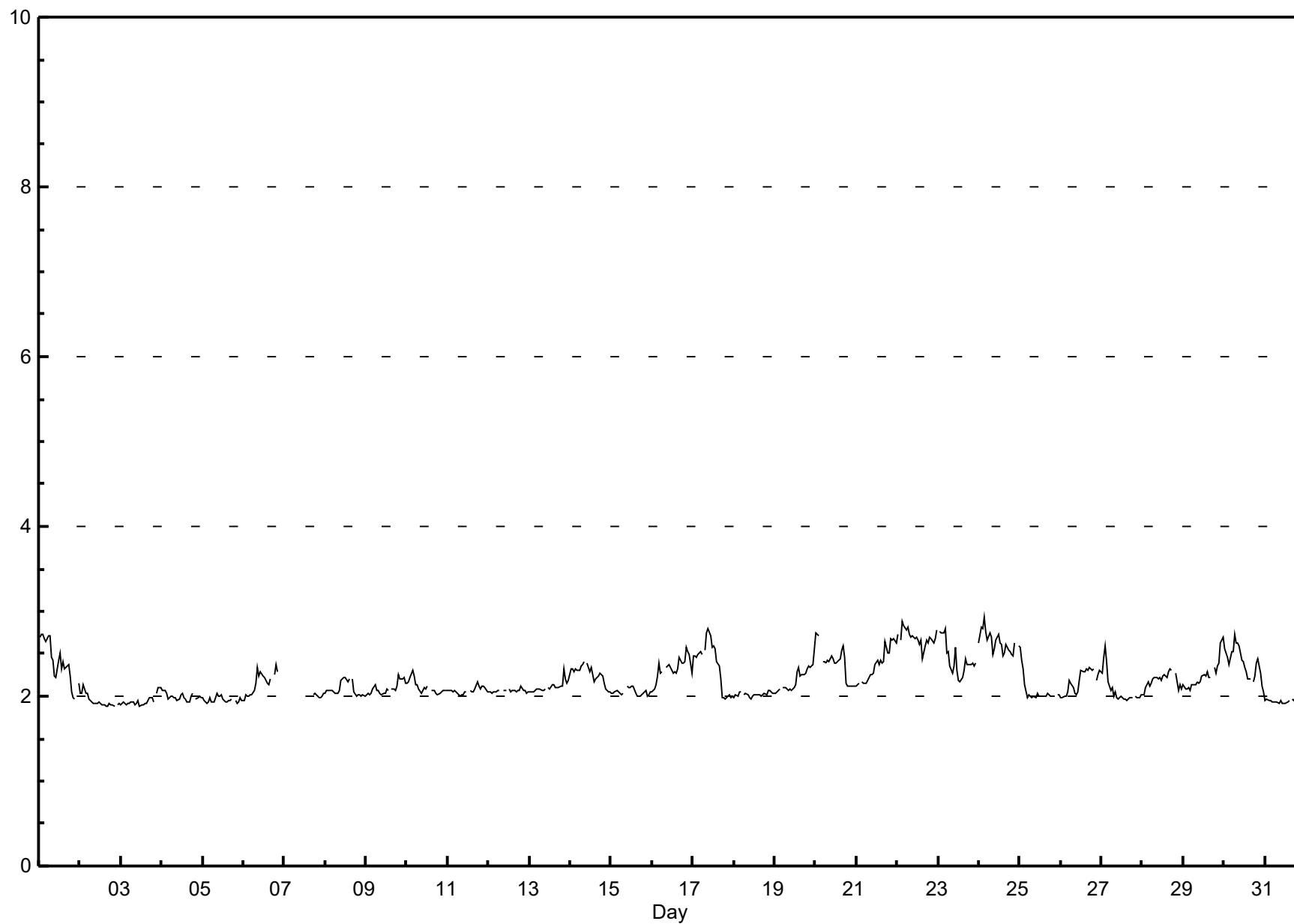
Hourly Averages

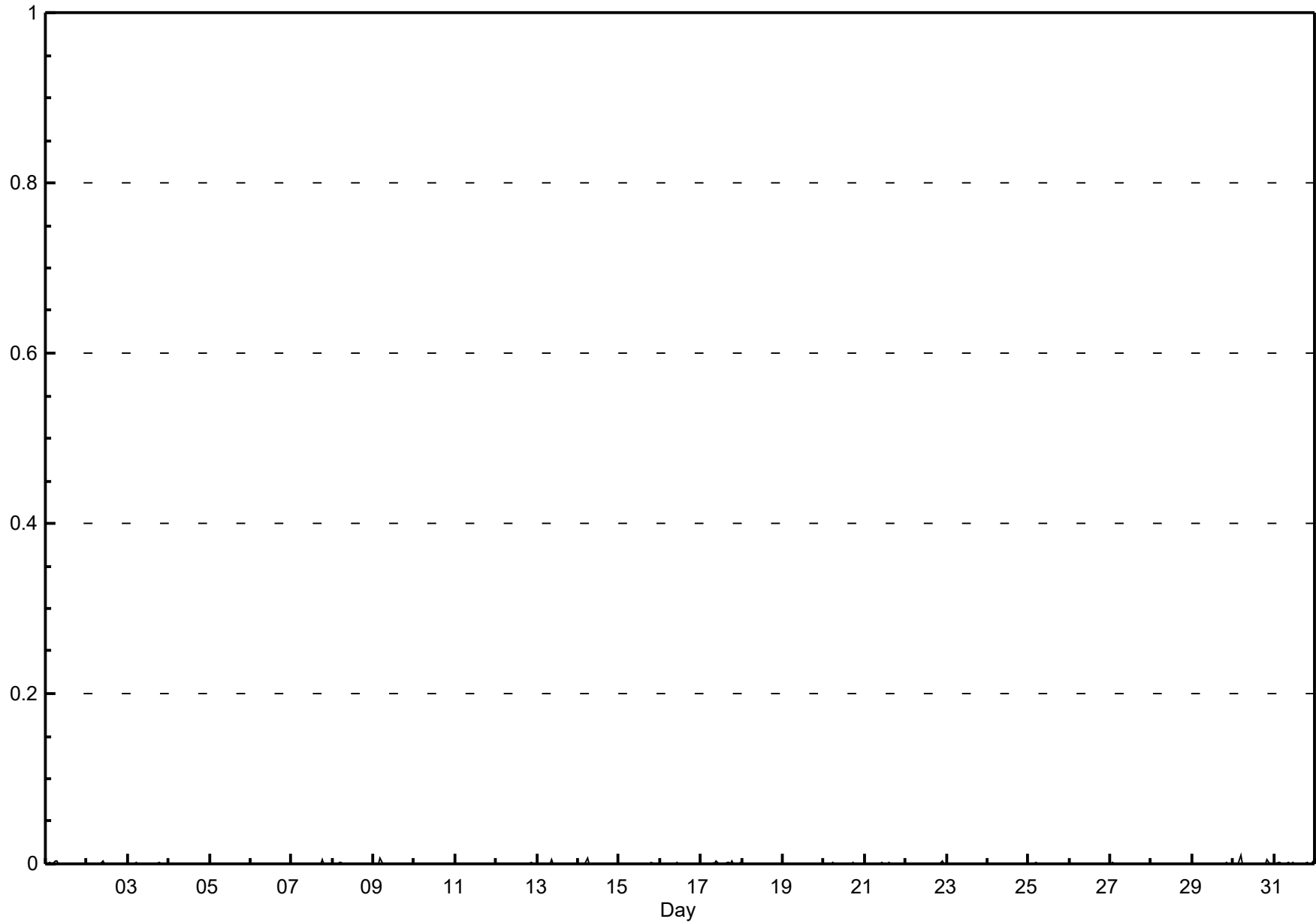
Total Hydrocarbons (THC) - ppm
Wembley - December 2019



Hourly Averages

Methane (CH₄) - ppm
Wembley - December 2019





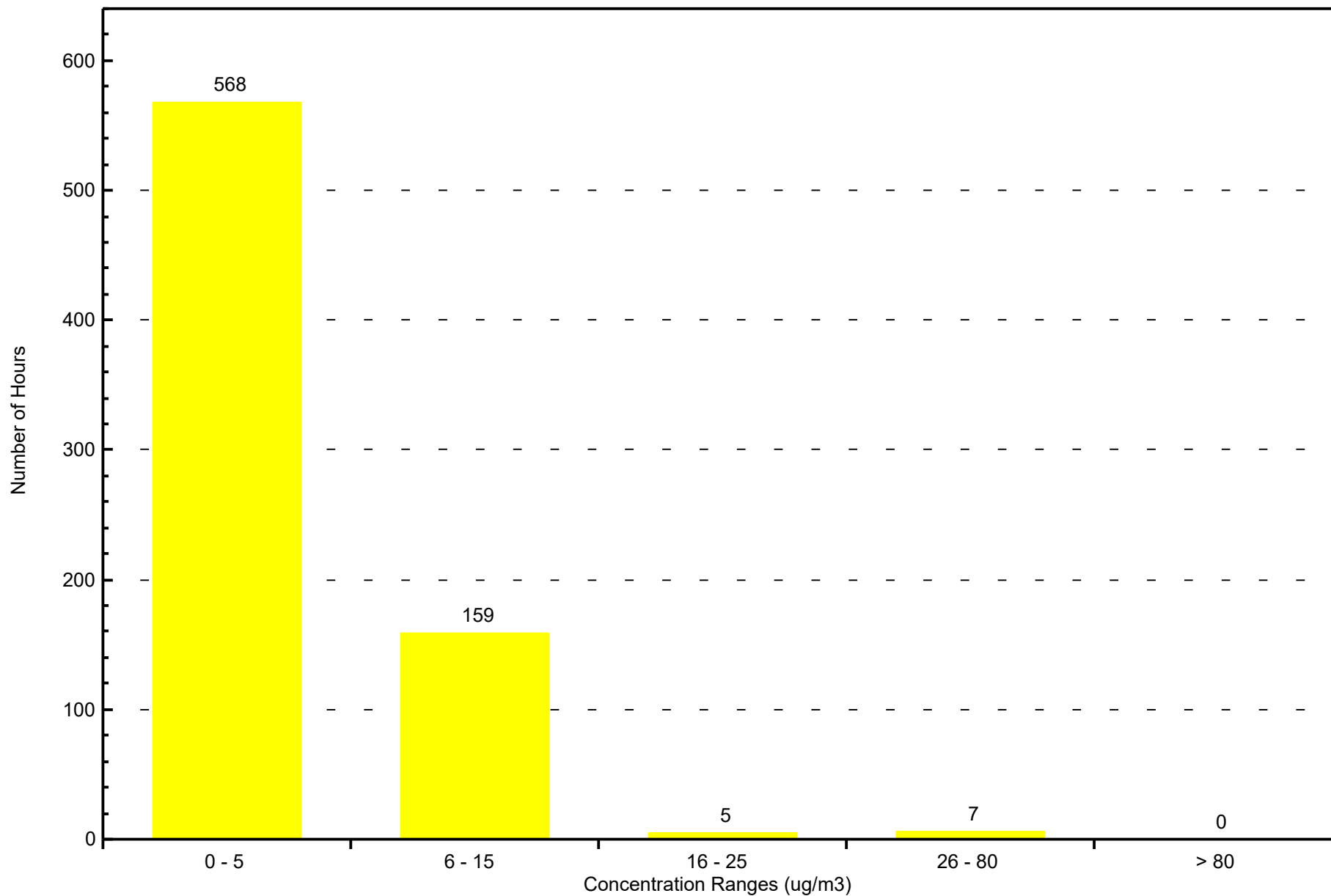
Hourly Averages

PM_{2.5} (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wembley - December 2019



Histogram of Hourly Averages

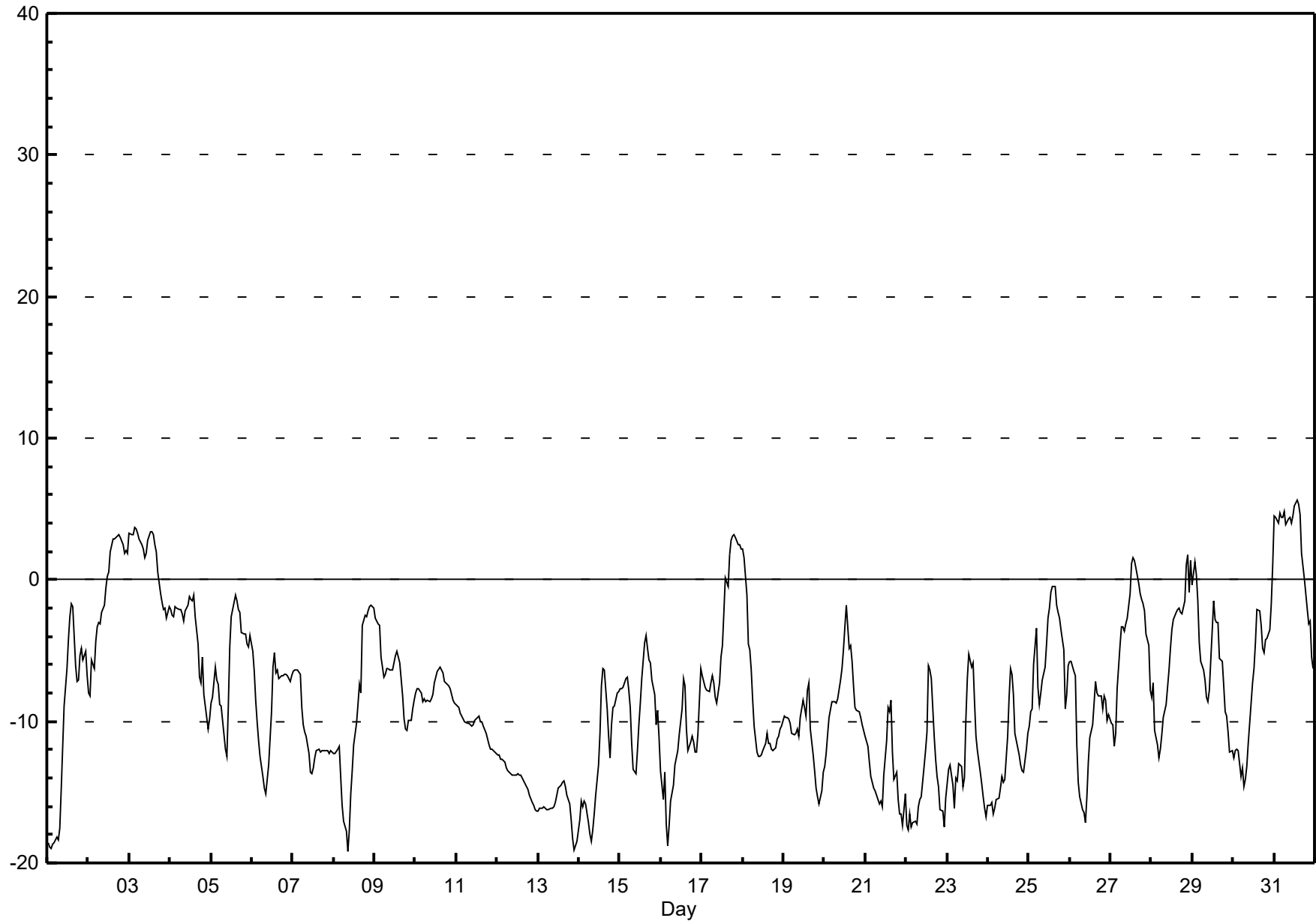
PM_{2.5} (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wembley - December 2019



Hourly Averages

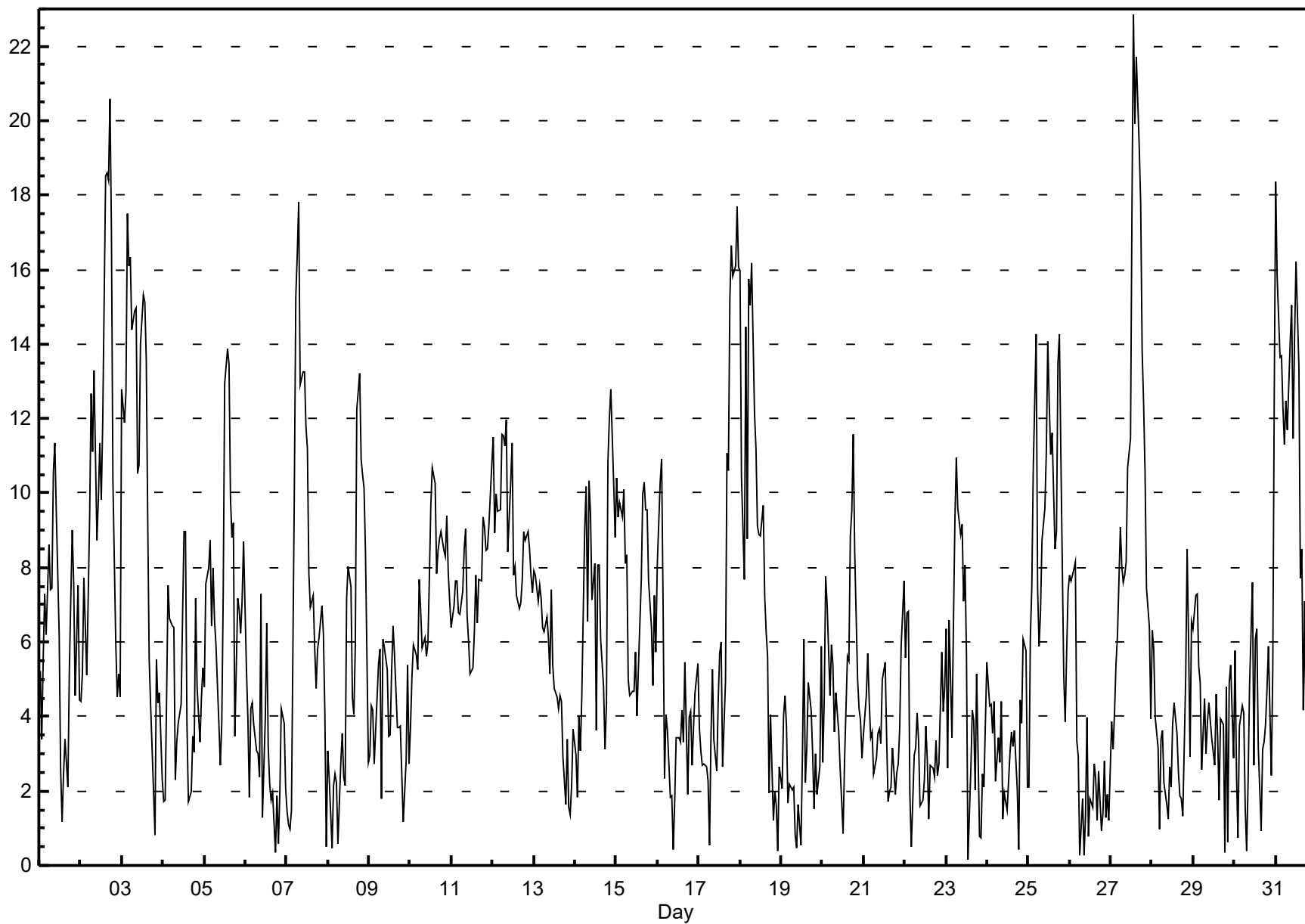
External Temperature (ET) - °C

Wembley - December 2019



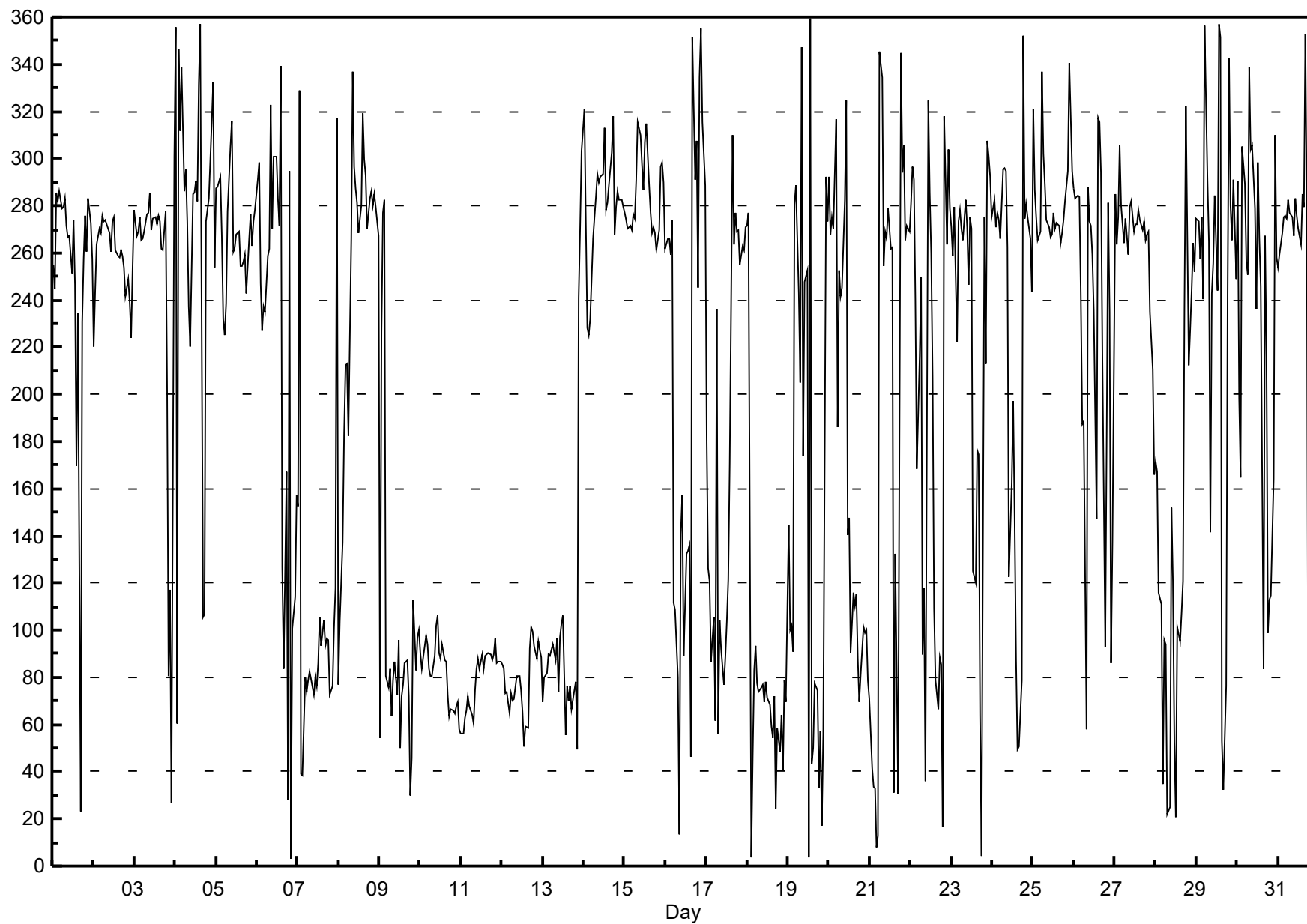
Hourly Averages

Wind Speed (WS) - km/h
Wembley - December 2019



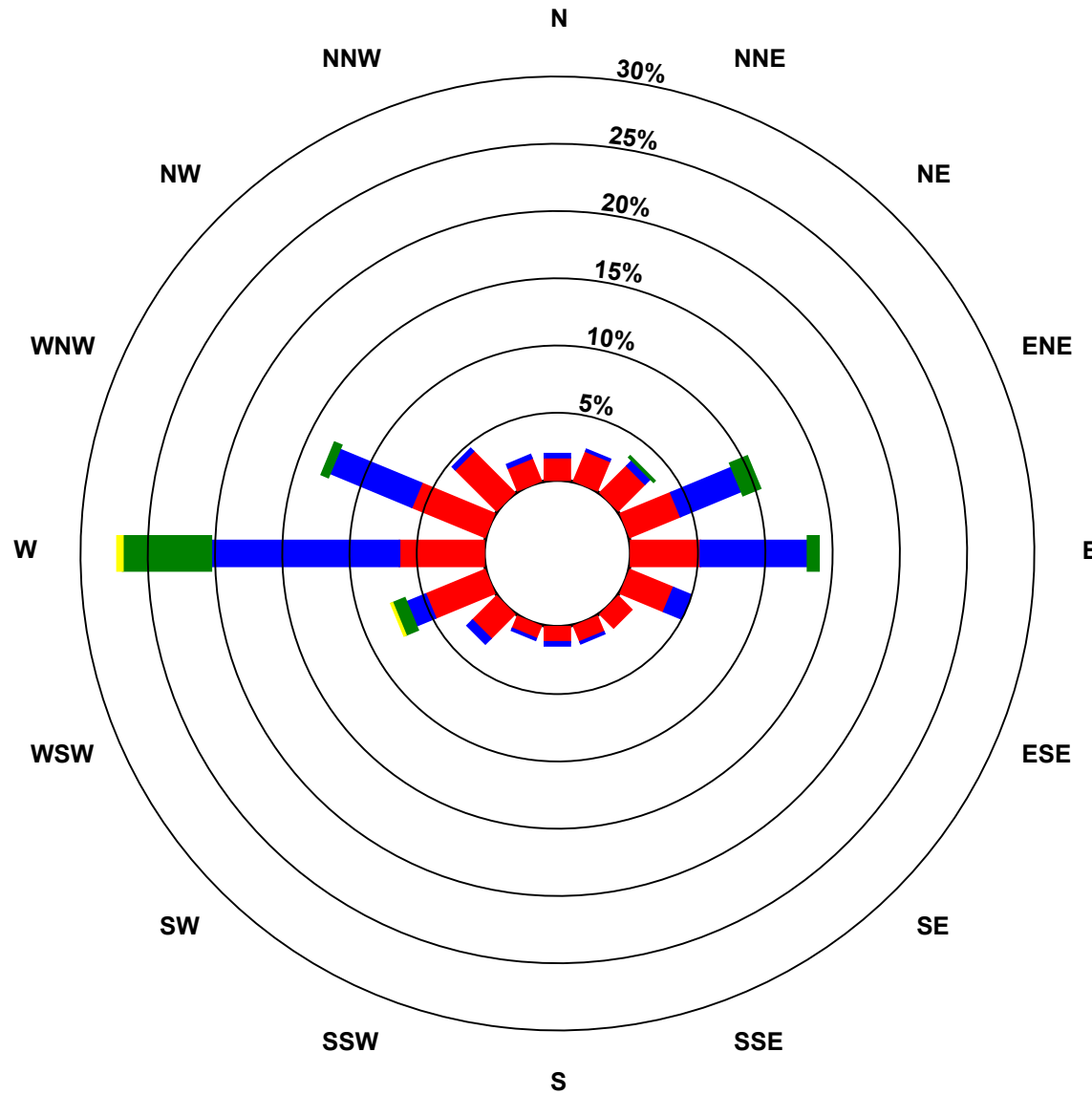
Hourly Averages

Wind Direction (WD) - deg
Wembley - December 2019

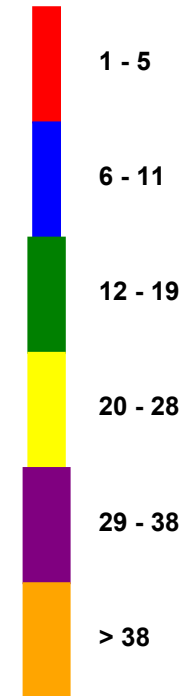


Wind Rose

Wind Speed (WS) (km/h)
Wembley - December 2019



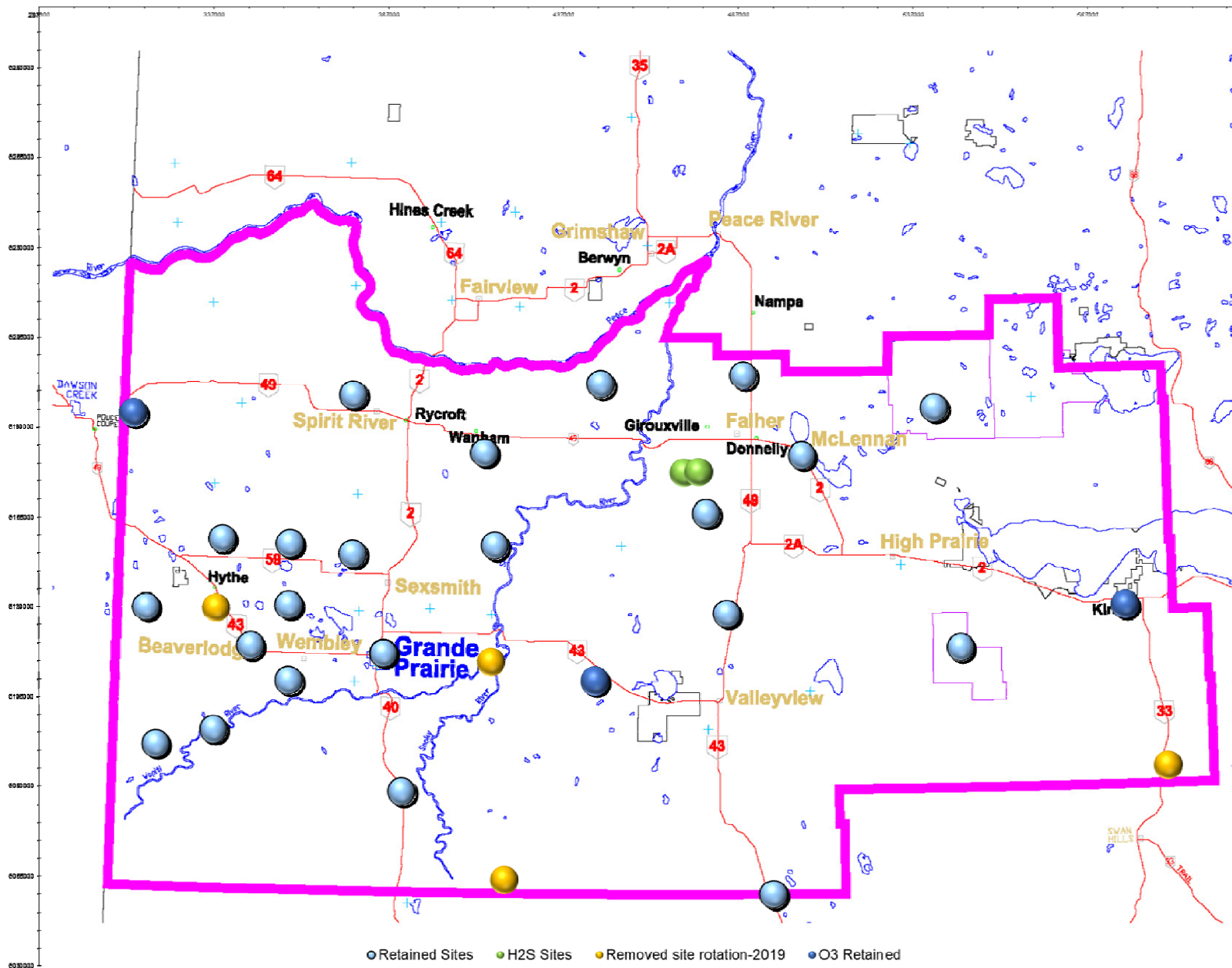
Wind Speed Classes (km/h)



PAZA

Monthly Passive Data Summary

Location of PAZA Passive Monitoring Stations



**Peace Airshed Zone Association - PAZA Passive Stations
December 2020**

Station Number	Station Name	SO2 ppb	O3 ppb	NO2 ppb	H2S ppb	Site Legal
Duplicates						
7a	Steeprock Creek			1.3		
7b	Steeprock Creek			1.2		
24a	Wembley	0.5				
24b	Wembley	0.4				
29a	Smoky Heights			4.6		
29b	Smoky Heights			3.8		
33a	Wapiti	0.2				
33b	Wapiti	0.2				
47a	Kinuso	0.2	30.7			
47b	Kinuso	0.1	22.6			
48a	Deer Mountain 2			0.8		
48b	Deer Mountain 2			0.9		
64a	Girouxville 4				0.3	
64b	Girouxville 4				0.3	
2	Bay Tree	0.2	29.7	1.2		13-16-078-13 W6M
5	Boone Creek	0.4		0.4		16-36-074-11 W6M
7	Steeprock Creek	0.4		1.2		09-35-072-13 W6M
9	Spirit River	0.3		0.3		08-12-079-07 W6M
11	Webber Creek	0.5		0.5		09-36-074-09 W6M
12	Hythe	0.4		0.4		14-36-072-11 W6M
14	Sylvester	0.2		0.2		08-06-069-12 W6M
16	Beaverlodge	0.7		4.3		15-36-071-10 W6M
17	Poplar	0.6		3.9		13-06-073-08 W6M
18	Saddle Hills	0.4		1.3		04-25-074-07 W6M
19	Wanham	0.5		1.9		16-22-077-03 W6M
21	Eaglesham	0.2		1.3		16-21-079-25 W5M
24	Wembley	0.5		5.1		12-31-070-08 W6M
25	Pinto Creek	0.3		1.4		04-24-069-11 W6M
27	Grande Prairie I	0.4		19.9		08-15-071-06 W6M
29	Smoky Heights	0.7		4.2		04-06-075-02 W6M
32	Gold Creek	0.2		7.4		06-33-067-05 W6M
33	Wapiti	0.2		3.2		02-25-071-03 W6M
35	Jean Cote	0.2		0.9		12-35-079-21 W5M
36	Guy	0.2		1.6	0.2	03-04-076-22 W5M
37	Crooked Creek	0.2	43.8	2.5		16-01-071-26 W5M
38	Karr Creek	0.1		1.5		10-16-065-02 W6M
39	Clouston Creek	0.2		2.5		12-01-073-22 W5M
40	McLennan	0.2		2.0		03-29-077-19 W5M
44	Peavine	0.1		0.8		03-05-079-15 W5M
46	Little Smoky	0.1		5.2		12-01-065-21 W5M
47	Kinuso	0.2	26.7	1.9		12-10-073-10 W5M
48	Deer Mountain 2	0.2		0.9		*
49	Grande Prairie HP	0.4		15.5		17-26-071-06 W6M
50	East Prairie	0.1		0.8		13-02-072-15 W5M
63	Girouxville 3				0.6	14-02-077-23 W5M
64	Girouxville 4				0.3	4-08-077-22 W5M

*BDL = Below Detection Level

*N/S - No sample

Passive Summary for December 2019

Stats	Sulphur Dioxide SO ₂	Ozone O ₃	Nitrogen Dioxide NO ₂	Hydrogen Sulphide H ₂ S
	ppb	ppb	ppb	ppb

Passive Summary for December 2019 (PAZA Zone)				
Mean	0.3	33.4	3.1	0.4
Standard Deviation	0.2	9.1	4.4	0.3
Minimum	0.1	26.7	0.2	0.2
Minimum At	Karr Creek (#38)	Kinuso (#47)	Sylvester (#14)	Guy (#36)
Maximum	0.7	43.8	19.9	0.6
Maximum At	Smoky Heights (#29)	Crooked Creek (#37)	Grande Prairie I (#27)	Girouxville 3 (#63)

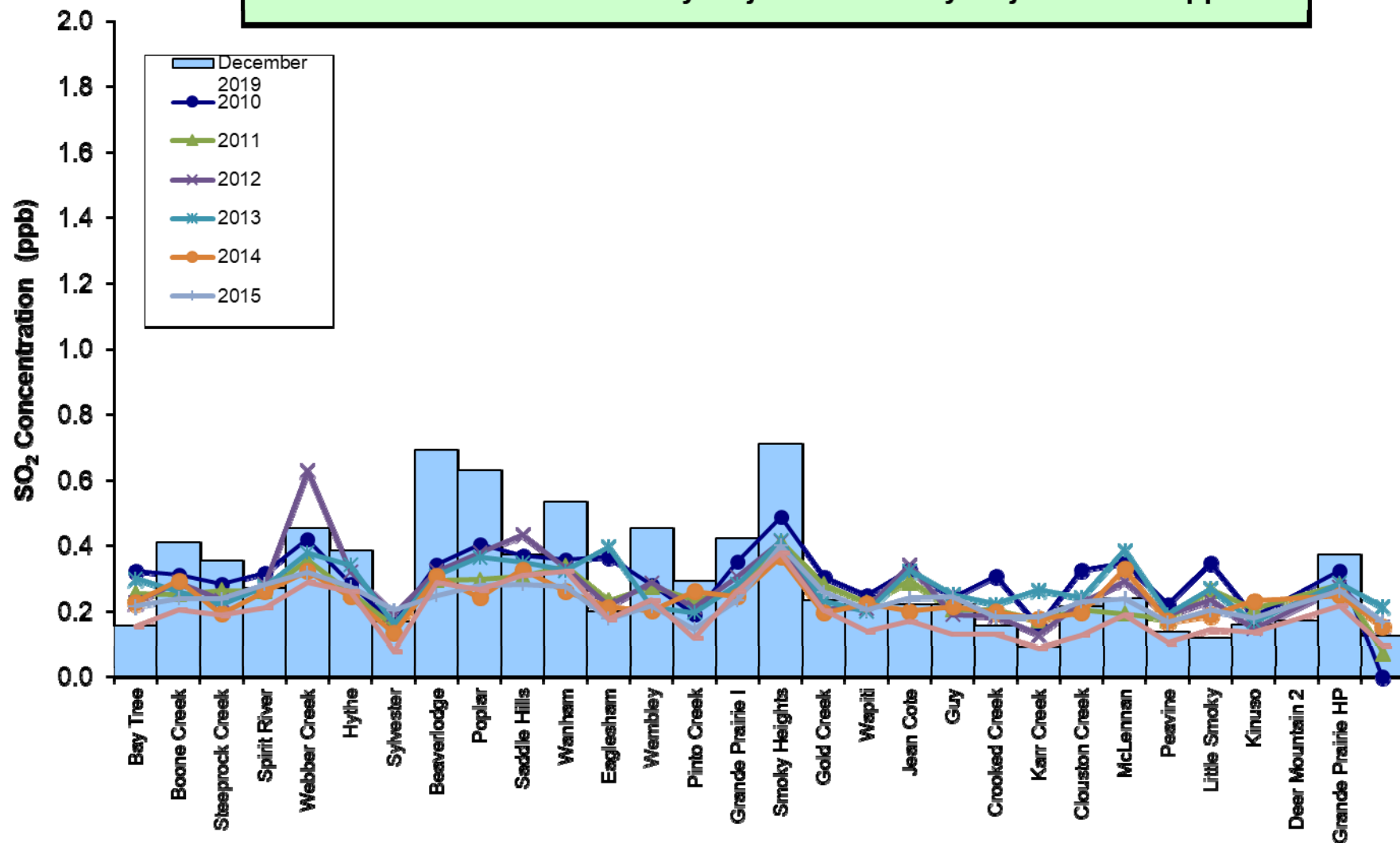
Comparison between Continuous and Passive monitoring at Beaverlodge (passive #16 Beaverlodge)

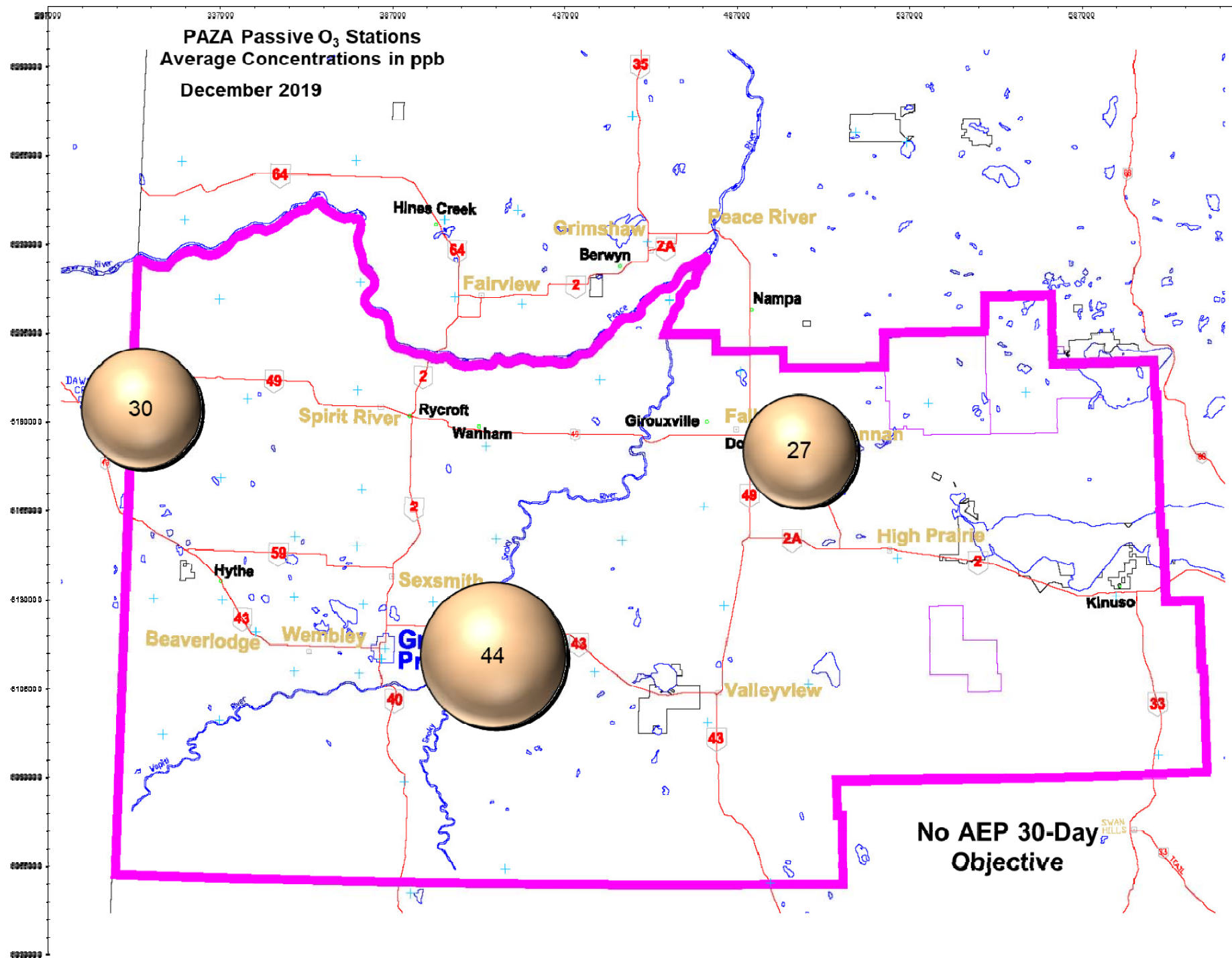
	SO ₂	NO ₂
PAZA Beaverlodge station	0.7	8.3
PAZA Beaverlodge passive	0.2	0.2

Comparison between Continuous and Passive monitoring at Henry Pirker (passive #49 Grande Prairie HP)

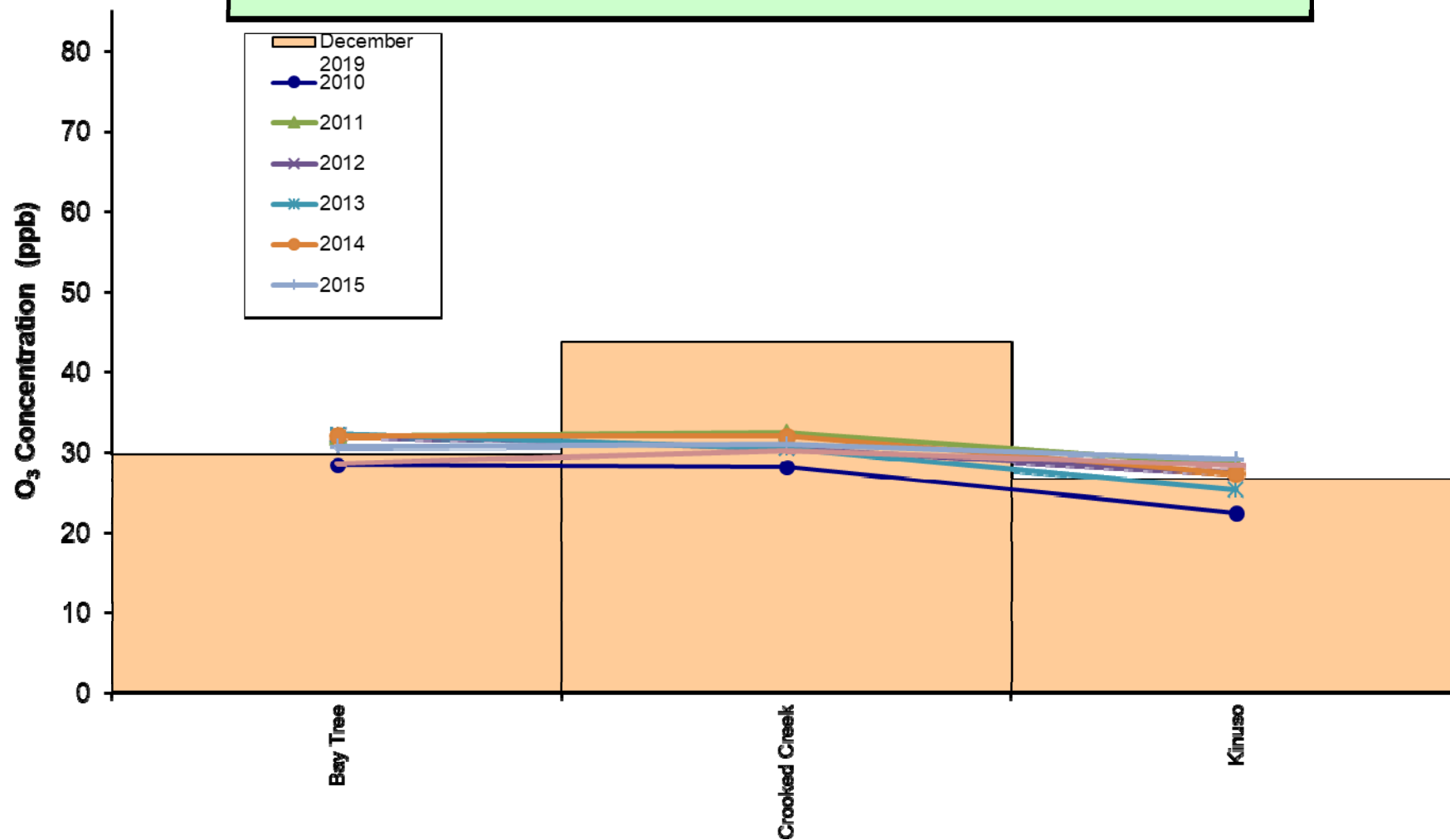
	SO ₂	NO ₂
PAZA Henry Pirker station	0.5	20.0
PAZA Grande Prairie passive	0.3	1.4

Alberta Ambient Air Quality Objective - 30-day Objective is 11 ppb

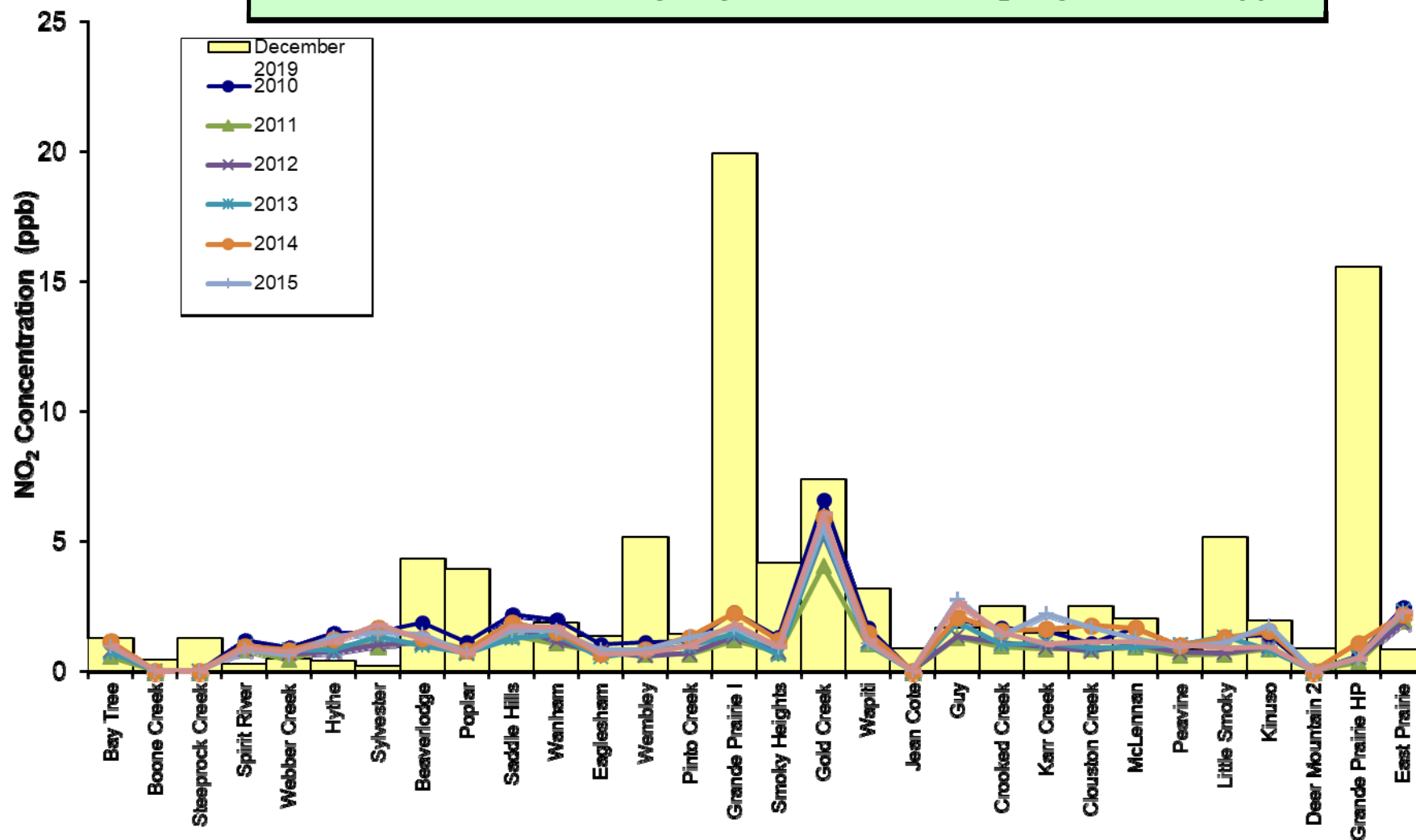


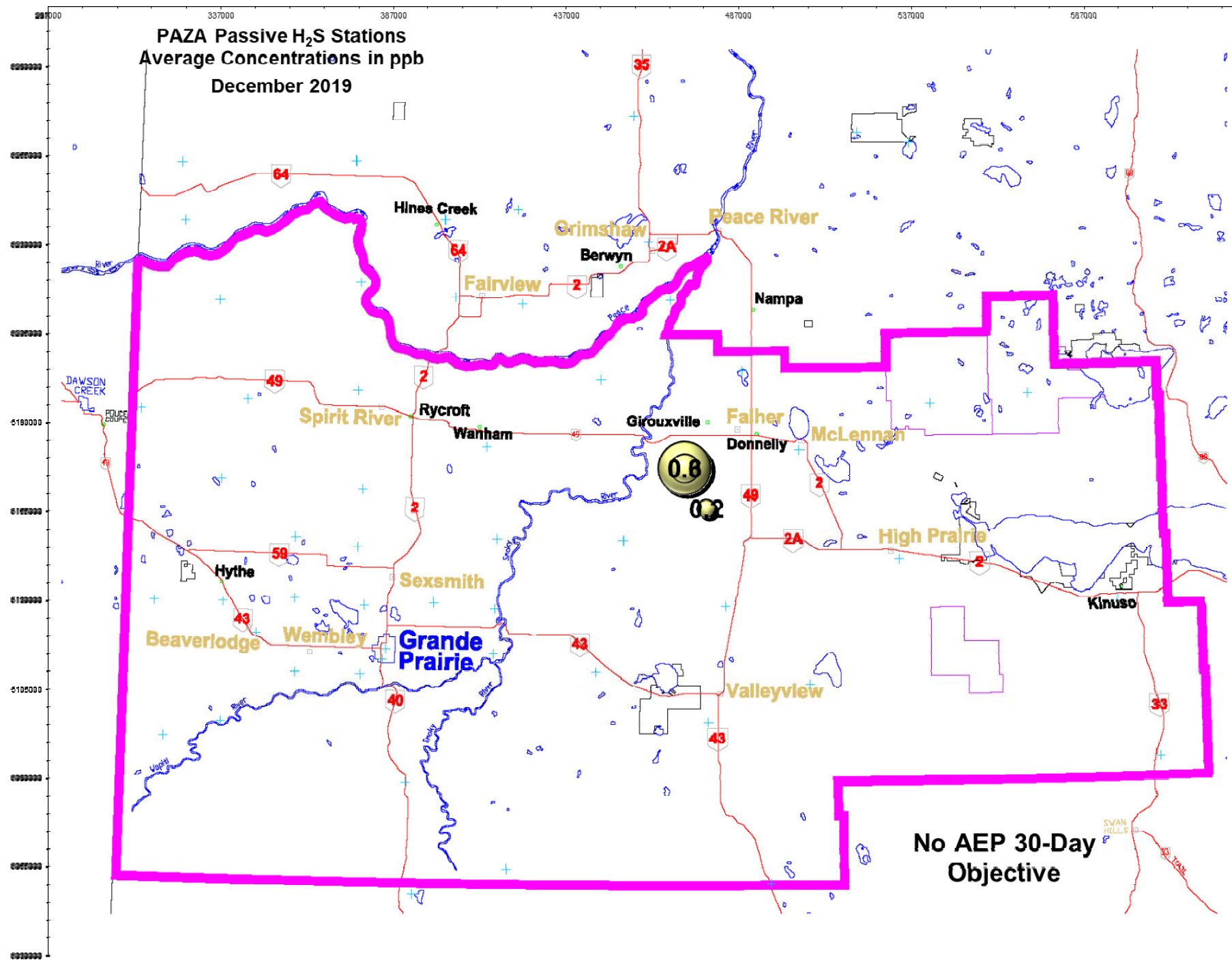


Alberta Ambient Air Quality Objective - No Annual O₃ Objective



Alberta Ambient Air Quality Objective - Annual NO₂ Objective is 24 ppb





**End of Report
PAZA
December 2019
Ambient Air Monitoring Report**