

LAFARGE CANADA INC.

# AMBIENT AIR QUALITY MONTHLY REPORT MAY 2023

JUNE 26, 2023



wsp



# AMBIENT AIR QUALITY MONTHLY REPORT

MAY 2023

LAFARGE CANADA INC.

PROJECT NO.: 171-00556-05  
DATE: JUNE 26, 2023

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June 26, 2023

LAFARGE CANADA INC.  
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**Attention: Nikolaos Veriotes P. Eng.**

Dear Mr. Veriotes,

**Subject: Ambient Air Quality Monthly Report – May 2023**

The following table summarizes the data completeness and reported exceedances of Alberta Ambient Air Quality Objectives (AAAQOs) or Guidelines (AAAQG) at the Lagoon Station for May 2023.

Lagoon	Data Completeness (%)	1-Hour Average	24-hour Average
		Exceedances of AAAQO or AAAQG	Exceedances of AAAQO
TSP	100%	-	3
PM <sub>2.5</sub>	97.6%	50	4
PM <sub>10</sub>	100%	-	-
NO	100%	-	-
NO <sub>2</sub>	100%	0	-
NO <sub>x</sub>	100%	-	-
SO <sub>2</sub>	100%	0	0
Temperature	100%	-	-
Wind Speed / Direction	100%	-	-
Pressure	100%	-	-
Relative Humidity	100%	-	-
Precipitation	100%	-	-

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The following table summarizes the data completeness and reported exceedances of Alberta Ambient Air Quality Objectives (AAAOs) or Guidelines (AAAQG) at the Windridge Station for May 2023.

Windridge	Data Completeness (%)	1-Hour Average	24-hour Average	
		Exceedances of AAAQG	Exceedances of PM <sub>2.5</sub> AAAQO	Exceedances of TSP AAAQO
TSP	100%	-	-	5
PM <sub>2.5</sub>	100%	51	4	-
PM <sub>10</sub>	100%	-	-	-

The GRIMM monitors are considered Industrial Ambient Monitors and are meant for assessing the performance of Lafarge Exshaw’s Fugitive Dust Control Best Management Practices – Program; the GRIMM monitors are not Air Monitoring Directive (AMD) compliant. This Program uses the AAAQOs as Guidelines. The following table summarizes the data completeness and exceedances of the Guidelines at the GRIMM Monitors for May 2023.

GRIMM Stations	Data Completeness (%)	1-Hour Average	24-hour Average	
		Exceedances of PM <sub>2.5</sub> Guidelines	Exceedances of PM <sub>2.5</sub> Guidelines	Exceedances of TSP Guidelines
West	100%	51	3	3
Berm	100%	36	4	10
Entrance	51.2%	18	2	11

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.

Sincerely,



Rowena Seto, B.Sc.  
Air Quality Specialist

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# SIGNATURES

PREPARED BY



June 26, 2023

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Tuonan Li, M.Sc.  
Air Quality Specialist  
Vancouver Region, Environment

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Date

APPROVED<sup>1</sup> BY *(must be reviewed for technical accuracy prior to approval)*



June 26, 2023

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Date

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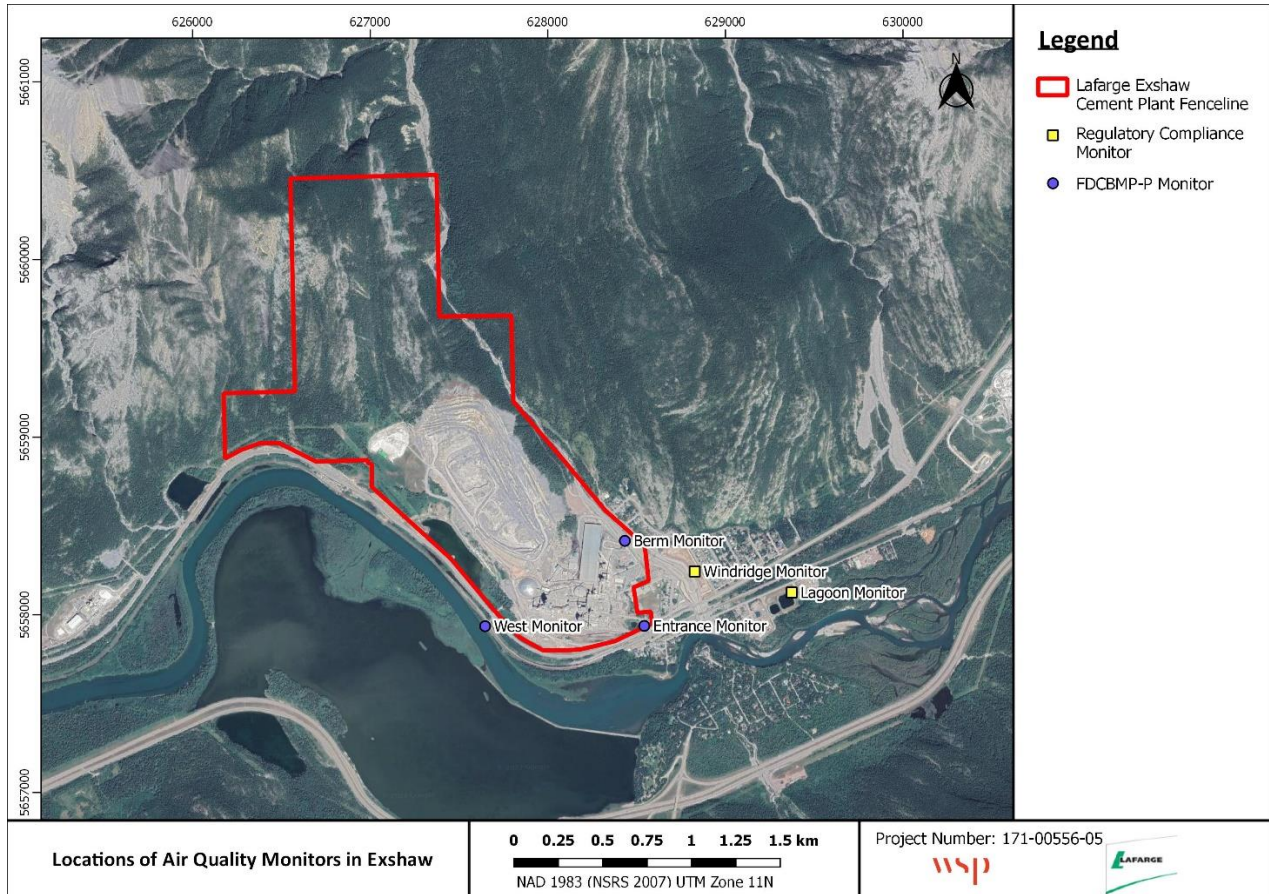
## *APPENDICES*

### **A DATA & CALIBRATION REPORTS**

# 1 INTRODUCTION

This report summarizes the ambient air quality and meteorological data collected at the Lagoon, Windridge, and GRIMM monitors in Exshaw, AB (Figure 1-1). The stations are operated by WSP on behalf of Lafarge Canada Inc. (Lafarge) and are a requirement of Lafarge’s Approval 1702-02-04. This report contains data collected between May 1, 2023 and May 31, 2023.

This monthly report was prepared by Tuonan Li, Air Quality Specialist at WSP, on behalf of Lafarge and was reviewed by Rowena Seto, Air Quality Specialist with WSP.



**Figure 1-1** Locations of Air Quality Monitors in Exshaw

## 1.1 EXSHAW CREEK FLOOD MITIGATION

Due to flood mitigation construction at Exshaw creek (Figure 1-2), the Windridge monitoring station was taken out of operation and removed from the site on May 8, 2019. The flood mitigation work was completed in Summer 2020. The Windridge station was reinstalled on September 1, 2020. The flood mitigation work has left an exposed creek bed area (see Figure below) that is a potential source of fugitive dust between Lafarge’s eastern fenceline and the Windridge station.



**Figure 1-2 Photo of Completed Flood Mitigation Work at Exshaw Creek**

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## 1.2 WILDFIRE IMPACT ON BOW VALLEY AIRSHED

During the month of May regional wildfire activity, including smoke impacts from Alberta, had a drastic impact on air quality in the Bow Valley airshed. Wildfires produce a large amount of suspended particulate matter which can affect air quality and result in AAAQO and AAAQG exceedances. The majority of TSP and PM<sub>2.5</sub> exceedances during the month of May can be attributed to smoke from a regional wildfire, and not specific industrial operations from Lafarge Exshaw.

# 2 MAY 2023 REPORT SUMMARY

This summary section provides the pertinent details on data collected and maintenance/calibration activities at each of the monitoring locations. The monitoring results for each station are described in further detail in their corresponding sections. Maximum hourly concentrations are shown for all particulate matter size fractions, but there are no Alberta Ambient Air Quality Objectives (AAAQO) for 1-hour PM concentrations. The exceedances reported for 1-hour PM<sub>2.5</sub> are those above the 1-hour PM<sub>2.5</sub> Alberta Ambient Air Quality Guidelines (AAAQG).

## 2.1 LAGOON STATION

**Table 2-1 Lagoon station data summary**

Parameter	Data Completeness (%)	1-Hour Average		24-hour Average	
		Maximum Concentration	Exceedances of AAAQO or AAAQG	Maximum Concentration	Exceedances of AAAQO
<b>NO<sub>2</sub> (ppb)</b>	100	26.7	0	11.0	-
<b>SO<sub>2</sub> (ppb)</b>	100	14.8	0	3.3	0
<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	97.6	250.2	50 <sup>1</sup>	155.0	4
<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	100	422.2	-	190.2	-
<b>TSP (µg/m<sup>3</sup>)</b>	100	457.4	-	227.8	3
<b>Temperature (°C)</b>	100	27.8	-	20.1	-
<b>Wind Speed (km/hr) /Direction (Degrees)</b>	100	36.1/W	-	25.4/WSW	-
<b>Precipitation (mm)</b>	100	3.5 <sup>2</sup>	-	31.25 <sup>3</sup>	-

<sup>1</sup> Any exceedances reported for 1-hour PM<sub>2.5</sub> are over the guideline level (AAAQG) of 80 µg/m<sup>3</sup>.

<sup>2</sup> Maximum Daily Total Accumulation of Precipitation (mm) – freezing temperatures can impact the precipitation totals in winter months.

<sup>3</sup> Monthly Total Accumulation of Precipitation (mm) - freezing temperatures can impact the precipitation totals in winter months.

### Data Quality Notes:

- There were 4 days exceeding the 24-hour PM<sub>2.5</sub> AAAQO.
- There were 50 hours exceeding the 1-hour PM<sub>2.5</sub> AAAQG.
- There was 3 days exceeding the 24-hour TSP AAAQO.

### Calibration/Maintenance Notes:

- At the Lagoon station, PM<sub>10</sub> and TSP analyzers recorded 100% uptime for the month of May.
- NO<sub>2</sub> and SO<sub>2</sub> analyzers recorded 100% uptime for the month of May.
- All meteorological analyzers recorded 100% uptime for the month of May.
- The PM<sub>2.5</sub> analyzer recorded 97.6% uptime for the month of May due to 18 hours of equipment malfunction occurring at 2:00 on May 2<sup>nd</sup> through May 9<sup>th</sup>, May 14<sup>th</sup>, May 15<sup>th</sup>, May 19<sup>th</sup>, May 20<sup>th</sup>, and May 23<sup>rd</sup> through May 28<sup>th</sup>.

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## 2.2 WINDRIDGE STATION

**Table 2-2 Windridge station data summary**

Parameter	Data Completeness (%)	1-Hour Average		24-hour Average	
		Maximum Concentration	Exceedances of AAAQG	Maximum Concentration	Exceedances of AAAQO
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	100	235.0	51*	145.5	4
PM <sub>10</sub> (µg/m <sup>3</sup> )	100	409.0	-	182.3	-
TSP (µg/m <sup>3</sup> )	100	602.0	-	202.0	5

\* Any exceedances reported for 1-hour PM<sub>2.5</sub> are over the guideline level (AAAQG) of 80 µg/m<sup>3</sup>.

### Data Quality Notes:

- There were 4 days exceeding the 24-hour PM<sub>2.5</sub> AAAQO.
- There were 51 hours exceeding the 1-hour PM<sub>2.5</sub> AAAQG.
- There were 5 days exceeding the 24-hour TSP AAAQO.

### Calibration/Maintenance Notes:

- The analyzer recorded 100% uptime during the month of May.

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## 2.3 WEST GRIMM

The GRIMM monitors are Industrial Ambient Monitors meant to aid Lafarge in assessing the performance of their Fugitive Dust Control Best Management Practices – Program (FDCBMP-P). The AAAQO are used as Guidelines to evaluate the performance of the FDCBMP-P; however, these Industrial monitors are not Alberta Air Monitoring Directive (AMD) compliant and not required to show compliance with the AAAQO.

**Table 2-3 West station data summary**

Parameter	Data Completeness (%)	1-Hour Average		24-hour Average	
		Maximum Concentration	Exceedances of Guidelines	Maximum Concentration	Exceedances of Guidelines
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	100	259.8	51*	150.0	3
PM <sub>10</sub> (µg/m <sup>3</sup> )	100	361.1	-	184.4	-
TSP (µg/m <sup>3</sup> )	100	361.1	-	184.5	3

\* Any exceedances reported for 1-hour PM<sub>2.5</sub> are over the guideline level (AAAQG) of 80 µg/m<sup>3</sup>.

**Data Quality Notes:**

- There were 3 days exceeding the 24-hour PM<sub>2.5</sub> Guidelines.
- There were 51 hours exceeding the 1-hour PM<sub>2.5</sub> Guidelines.
- There were 3 days exceeding the 24-hour TSP Guidelines.

**Calibration/Maintenance Notes:**

- The analyzer recorded 100% uptime during the month of May.

## 2.4 BERM GRIMM

The GRIMM monitors are Industrial Ambient Monitors meant to aid Lafarge in assessing the performance of their FDCBMP-P. The AAAQO are used as Guidelines to evaluate the performance of the FDCBMP-P; however, these Industrial monitors are not Alberta Air Monitoring Directive (AMD) compliant and not required to show compliance with the AAAQO.

**Table 2-4 Berm station data summary**

Parameter	Data Completeness (%)	1-Hour Average		24-hour Average	
		Maximum Concentration	Exceedances of Guidelines	Maximum Concentration	Exceedances of Guidelines
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	100	216.7	36*	102.7	4
PM <sub>10</sub> (µg/m <sup>3</sup> )	100	568.7	-	141.5	-
TSP (µg/m <sup>3</sup> )	100	1466.8	-	361.4	10

\* Any exceedances reported for 1-hour PM<sub>2.5</sub> are over the guideline level (AAAQG) of 80 µg/m<sup>3</sup>.

**Data Quality Notes:**

- There was 4 days exceeding the 24-hour PM<sub>2.5</sub> Guidelines.
- There were 36 hours exceeding the 1-hour PM<sub>2.5</sub> Guidelines.
- There were 10 days exceeding the 24-hour TSP Guidelines.



### Calibration/Maintenance Notes:

- The analyzer recorded 100% uptime during the month of May.

## 2.5 ENTRANCE GRIMM

The GRIMM monitors are Industrial Ambient Monitors meant to aid Lafarge in assessing the performance of their FDCBMP-P. The AAAQO are used as Guidelines to evaluate the performance of the FDCBMP-P; however, these Industrial monitors are not Alberta Air Monitoring Directive (AMD) compliant and not required to show compliance with the AAAQO.

**Table 2-5** Entrance station data summary

Parameter	Data Completeness (%)	1-Hour Average		24-hour Average	
		Maximum Concentration	Exceedances of Guidelines	Maximum Concentration	Exceedances of Guidelines
PM <sub>2.5</sub> (µg/m <sup>3</sup> )	51.2	142.3	18*	96.5	2
PM <sub>10</sub> (µg/m <sup>3</sup> )	51.2	390.7	-	204.4	-
TSP (µg/m <sup>3</sup> )	51.2	948.4	-	388.2	11

\* Any exceedances reported for 1-hour PM<sub>2.5</sub> are over the guideline level (AAAQG) of 80 µg/m<sup>3</sup>.

### Data Quality Notes:

- There were 2 days exceeding the 24-hour PM<sub>2.5</sub> Guidelines.
- There were 18 hours exceeding the 1-hour PM<sub>2.5</sub> Guidelines.
- There were 11 days exceeding the 24-hour TSP Guidelines.

### Calibration/Maintenance Notes:

- The PM<sub>2.5</sub>, PM<sub>10</sub>, and TSP monitors recorded 51.2% uptime during the month of May due to 362 hours of collection error (i.e. communication error), which occurred on May 5<sup>th</sup> 10:00 through May 6<sup>th</sup> 2:00, May 16<sup>th</sup> 7:00 through May 18<sup>th</sup> 2:00, and May 19<sup>th</sup> 12:00 through May 31<sup>st</sup> at 24:00. And further, 1 hour of equipment change occurring on May 19<sup>th</sup> at 11:00.

# 3 LAGOON STATION

The Lagoon trailer contains NO<sub>x</sub>, SO<sub>2</sub>, TSP, PM<sub>10</sub>, and PM<sub>2.5</sub> analyzers as well as meteorological sensors, and is shown in Figure 3-1. An ambient air quality station has been at this location since 2002, providing a long-term data record for air quality in the Exshaw area.

This section provides a summary of the monitoring activities for the Lagoon ambient air quality station, including: a table of instrumentation (Table 3-1), a data summary table (Table 3-2), site visit notes, a wind rose (Figure 3-9) and tables and graphs illustrating the monitoring results for May 2023.

All of the monitors comply with Alberta Environment and Parks Air Monitoring Directive (2016).

## 3.1 OPERATIONAL SUMMARY

A summary of the station operation for the month is provided in Table 3-1.

**Table 3-1 Instrumentation List at the Lagoon Station**

Parameter Measured	Equipment Description	Notes
<b>PM<sub>2.5</sub> Concentrations</b>	MetOne BAM-1020 FRM Continuous Particulate Monitor	The PM <sub>2.5</sub> monitor was calibrated on May 19 <sup>th</sup> . The monitor had 97.6% uptime for the month of May due to 18 hours of equipment malfunction occurring at 2:00 on May 2 <sup>nd</sup> through May 9 <sup>th</sup> , May 14 <sup>th</sup> , May 15 <sup>th</sup> , May 19 <sup>th</sup> , May 20 <sup>th</sup> , and May 23 <sup>rd</sup> through May 28 <sup>th</sup> .
<b>PM<sub>10</sub> Concentrations</b>	MetOne BAM-1020 Continuous Particulate Monitor	The PM <sub>10</sub> monitor was calibrated on May 19 <sup>th</sup> . The monitor had 100% uptime for the month of May.
<b>TSP Concentrations</b>	MetOne BAM-1020 Continuous Particulate Monitor	The TSP monitor was calibrated on May 19 <sup>th</sup> . The monitor had 100% uptime for the month of May.
<b>Oxides of Nitrogen</b>	TEI 42C	The NO <sub>x</sub> monitor was calibrated on May 9 <sup>th</sup> . The monitor had 100% uptime for the month of May.
<b>Sulphur Dioxide</b>	Teledyne API 102A	The SO <sub>2</sub> monitor was calibrated on May 9 <sup>th</sup> . The monitor had 100% uptime for the month of May.
<b>Precipitation</b>	MetOne 130 Rain/Snow Gauge	The monitor had 100% uptime for the month of May.
<b>Wind Speed</b>	MetOne Wind Sensor	The monitor had 100% uptime for the month of May.
<b>Wind Direction</b>		

<b>Ambient Temperature</b>	MetOne Ambient Temperature Sensor	The monitor had 100% uptime for the month of May.
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**Figure 3-1** Inlets on the top of WSP's Lagoon Station

## 3.2 MONITORING RESULTS AND TRENDS

Table 3-2 summarizes the hourly and daily concentrations recorded in May 2023. Figure 3-2 graphically illustrates the time series for hourly concentrations as well as wind speed and direction, while Figure 3-8 shows daily average concentrations recorded during May 2023 for the pollutants listed in Table 3-2. Table 3-3 summarizes the recorded exceedances. Additionally, Figure 3-3 to Figure 3-7 show the histograms of the hourly concentrations of NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and TSP measured at the Lagoon station.

There was 3 days exceeding the 24-hour TSP (100 µg/m<sup>3</sup>) AAAQO. There were 4 exceedances of the 24-hour PM<sub>2.5</sub> (29 µg/m<sup>3</sup>) AAAQO. Furthermore, there were 50 exceedances of the 1-hour PM<sub>2.5</sub> AAAQG (80 µg/m<sup>3</sup>). As discussed in Section 1.2, the Bow Valley airshed was impacted from regional wildfire activity in May. All the exceedances were primarily attributable to wildfire activity and smoke in the airshed from fires in Alberta.

Historically in May, the average number of 24-hour TSP AAAQO exceedances and 24-hour PM<sub>2.5</sub> AAAQO exceedances are both 0. The maximum number of 24-hour TSP AAAQO exceedances recorded in May was 1 day in 2022. The maximum number of 24-hour PM<sub>2.5</sub> AAAQO exceedances recorded in May was 1 day in 2019.

At the Lagoon station strong wind gusting that typically occurs in the area contributes to increased particulate levels that may arise from multiple sources including the Lafarge Plant, Exshaw Creek, dry sections of the Bow River, highway and rail traffic moving past the station and fugitive emissions from open areas.

**Table 3-2 Summary of May 2023 data at the Lagoon Station**

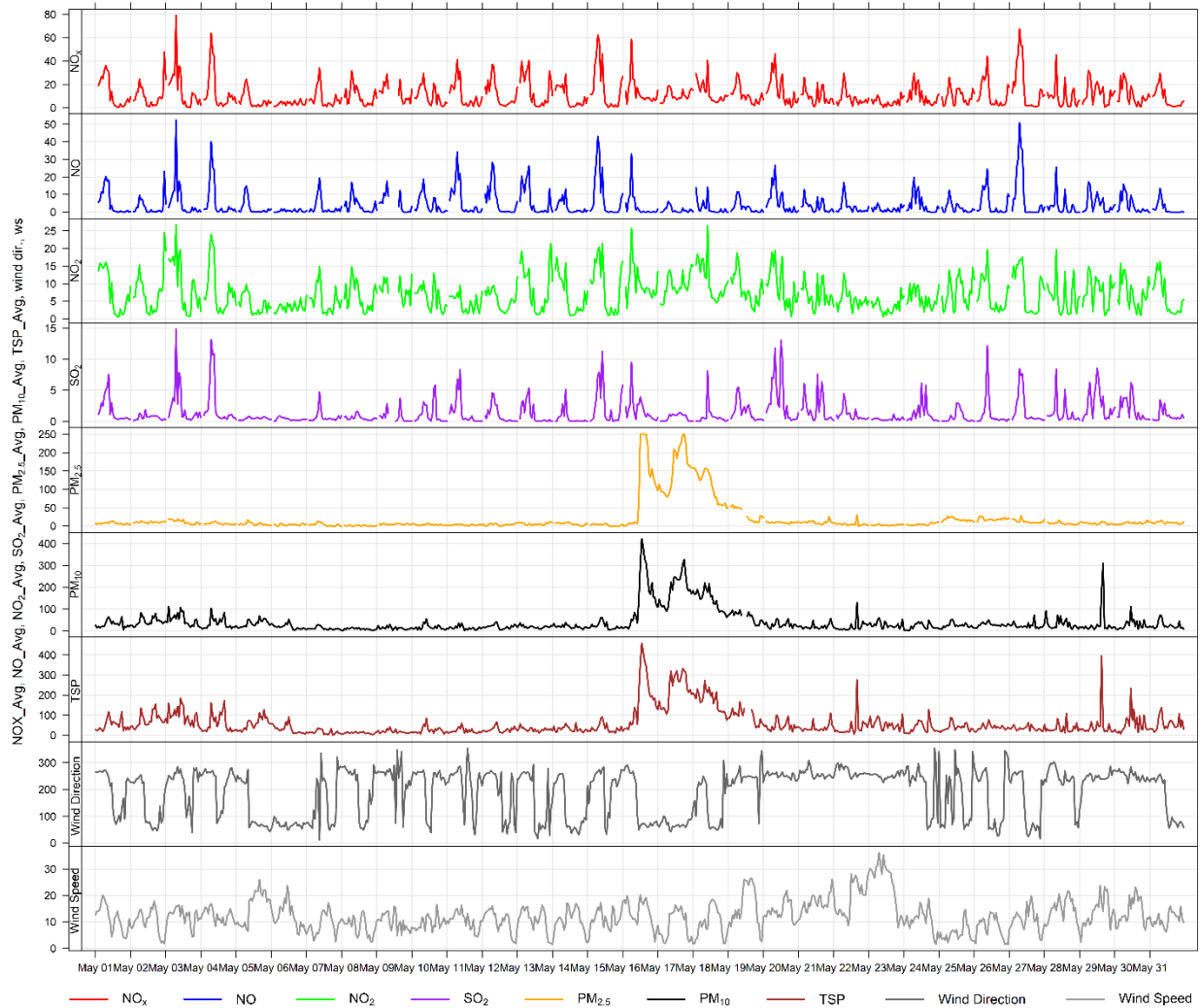
Parameter	Guideline / Objectives		Station	Exceedances		Monthly		1-hour				24-hour		Operational Time (Percent)	
	1-hr	24-hr		1-hr	24-hr	Minimum	Average	Maximum Concentration/ Meteorological Variable	Day	Hour	Wind Speed (km/hr)	Wind Direction (degrees)	Maximum Concentration/ Meteorological Variable		Day
<b>NO<sub>2</sub> (ppb)</b>	159	-	Lagoon	0	-	0.6	7.1	26.7	3	8	16.0	259.9	11.0	18	100.0
<b>SO<sub>2</sub> (ppb)</b>	172	48	Lagoon	0	0	0.0	1.3	14.8	3	8	16.0	259.9	3.3	20	100.0
<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	80	29	Lagoon	50	4	0.0	19.1	250.2	16	18	16.2	58.4	155.0	17	97.6
<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	-	-	Lagoon	-	-	1.0	38.9	422.2	16	14	17.5	71.5	190.2	17	100.0
<b>TSP (µg/m<sup>3</sup>)</b>	-	100	Lagoon	-	3	0.0	57.2	457.4	16	14	17.5	71.5	227.8	17	100.0
<b>Temperature (°C)</b>	-	-	Lagoon	-	-	3.4	14.2	27.8	15	17	6.2	207.2	20.1	21	100.0
<b>Wind Speed (km/hr)/Direction (degrees)</b>	-	-	Lagoon	-	-	1.4	12.1	36.1/W	23	8	36.1	246.9	25.4/WSW	23	100.0
<b>Precipitation (mm)</b>	-	-	Lagoon	-	-	0.0	0.0	3.5 <sup>1</sup>	8	5	9.3	270.6	31.3 <sup>2</sup>	-	100

<sup>1</sup> Maximum Daily Total Accumulation of Precipitation (mm) - freezing temperatures can impact the precipitation totals in winter months

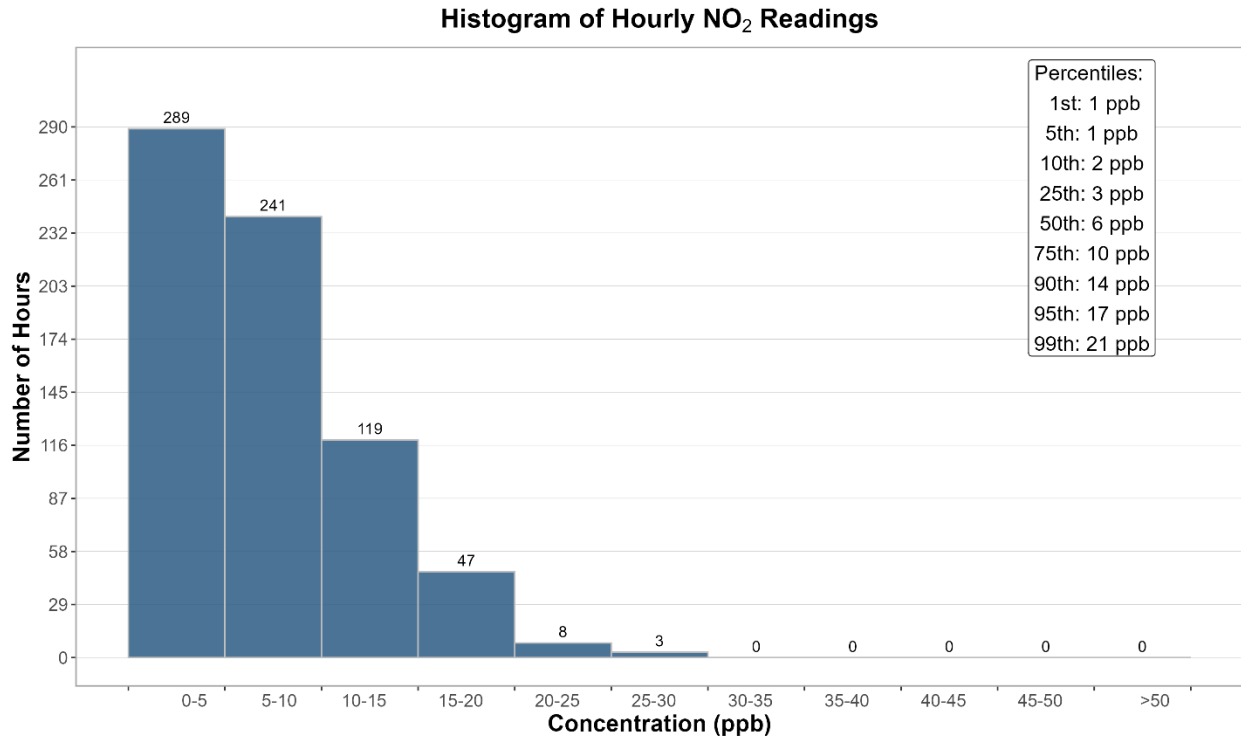
<sup>2</sup> Monthly Total Accumulation of Precipitation (mm) - freezing temperatures can impact the precipitation totals in winter months

**Table 3-3 Days exceeding the TSP AAAQO or PM<sub>2.5</sub> AAAQO at the Lagoon Station**

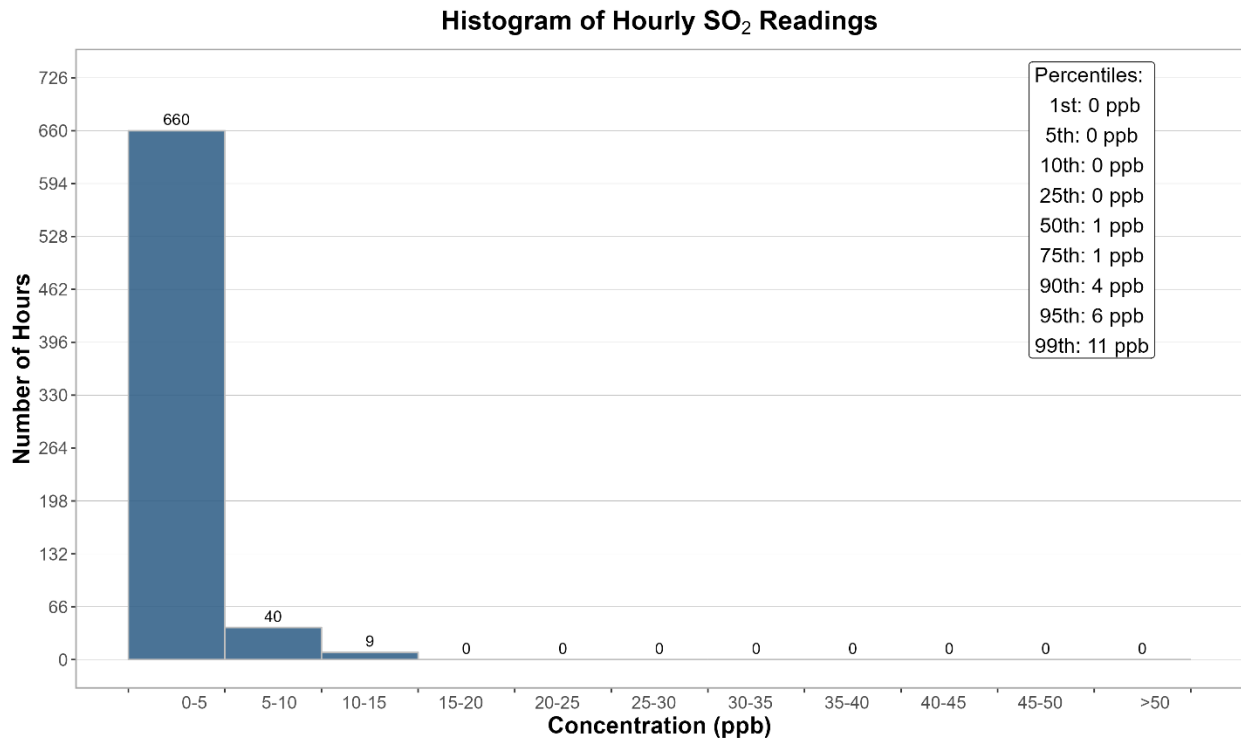
Date	TSP (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	Average Wind Direction (degrees)	Average Wind Speed (km/hr)	Average RH (%)	Root Cause (Provided by Lafarge)
<b>Trailer</b>						
2023-05-16	174.1	99.3	21.6	13.8	44.6	Regional wildfire activity
2023-05-17	227.8	155.0	64.2	9.1	52.4	Regional wildfire activity
2023-05-18	177.0	110.1	70.9	9.5	52.6	Regional wildfire activity
2023-05-19	-	32.1	245.3	15.9	39.2	Regional wildfire activity
<b>Total # of Exceedances</b>	<b>3</b>	<b>4</b>				
<b>Maximum # of Exceedances (May)</b>	<b>1 (2022)</b>	<b>1 (2019)</b>				
<b>Average # of Exceedances (May)</b>	<b>0</b>	<b>0</b>				
<b>Minimum # of Exceedances (May)</b>	<b>0 (2010 - 2021)</b>	<b>0 (2010 - 2018, 2020 - 2022)</b>				



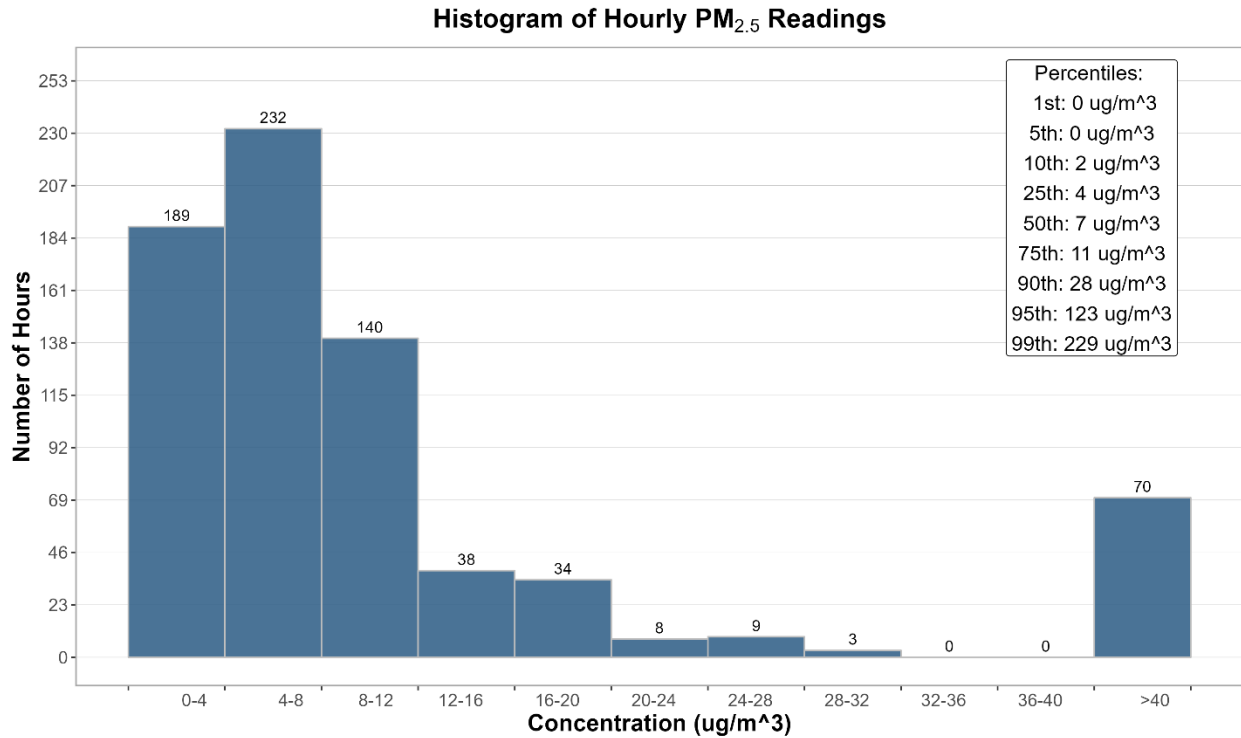
**Figure 3-2 1-hour concentrations of NO<sub>x</sub>, SO<sub>2</sub>, particulate matter, wind direction and wind speed at the Lagoon station**



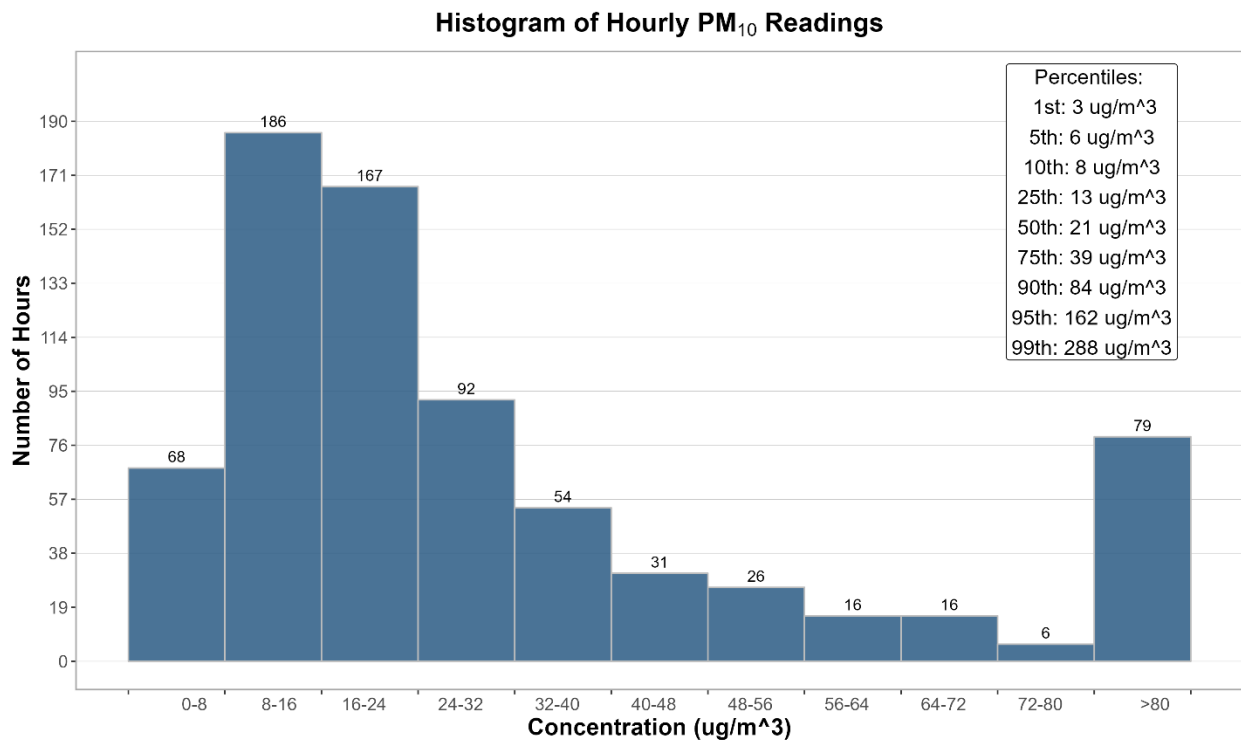
**Figure 3-3** Histogram of hourly NO<sub>2</sub> concentrations at the Lagoon station



**Figure 3-4** Histogram of hourly SO<sub>2</sub> concentrations at the Lagoon station



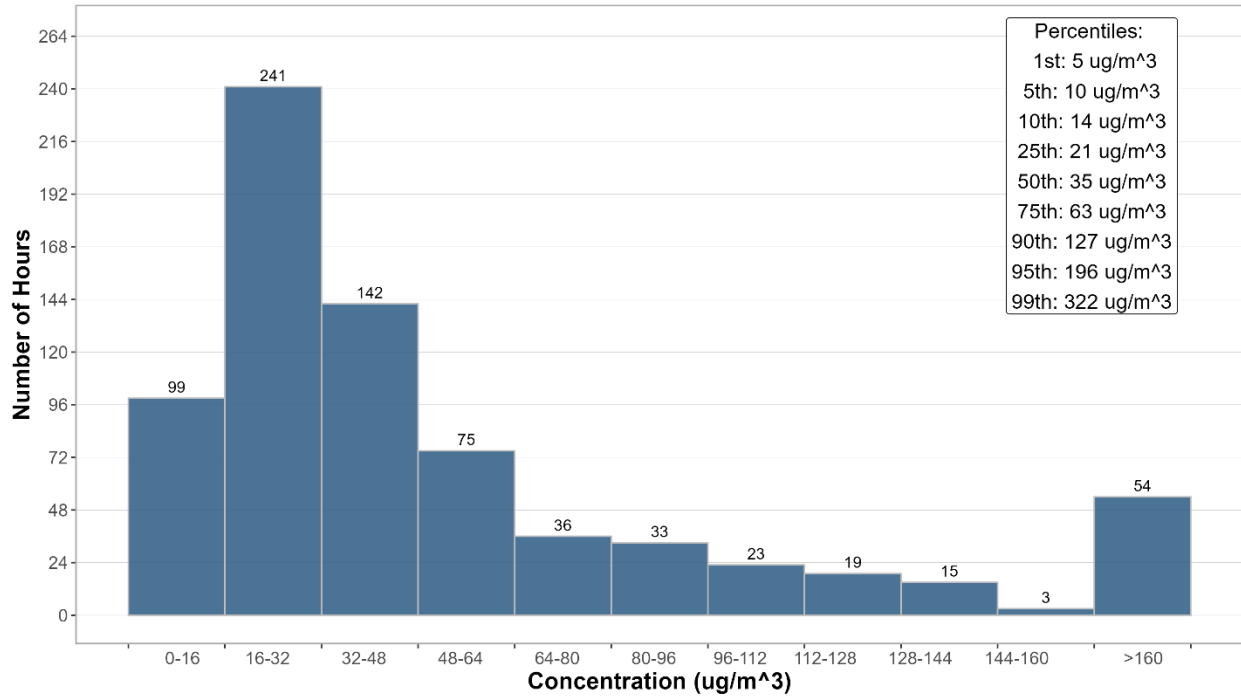
**Figure 3-5 Histogram of hourly PM<sub>2.5</sub> concentrations at the Lagoon station**



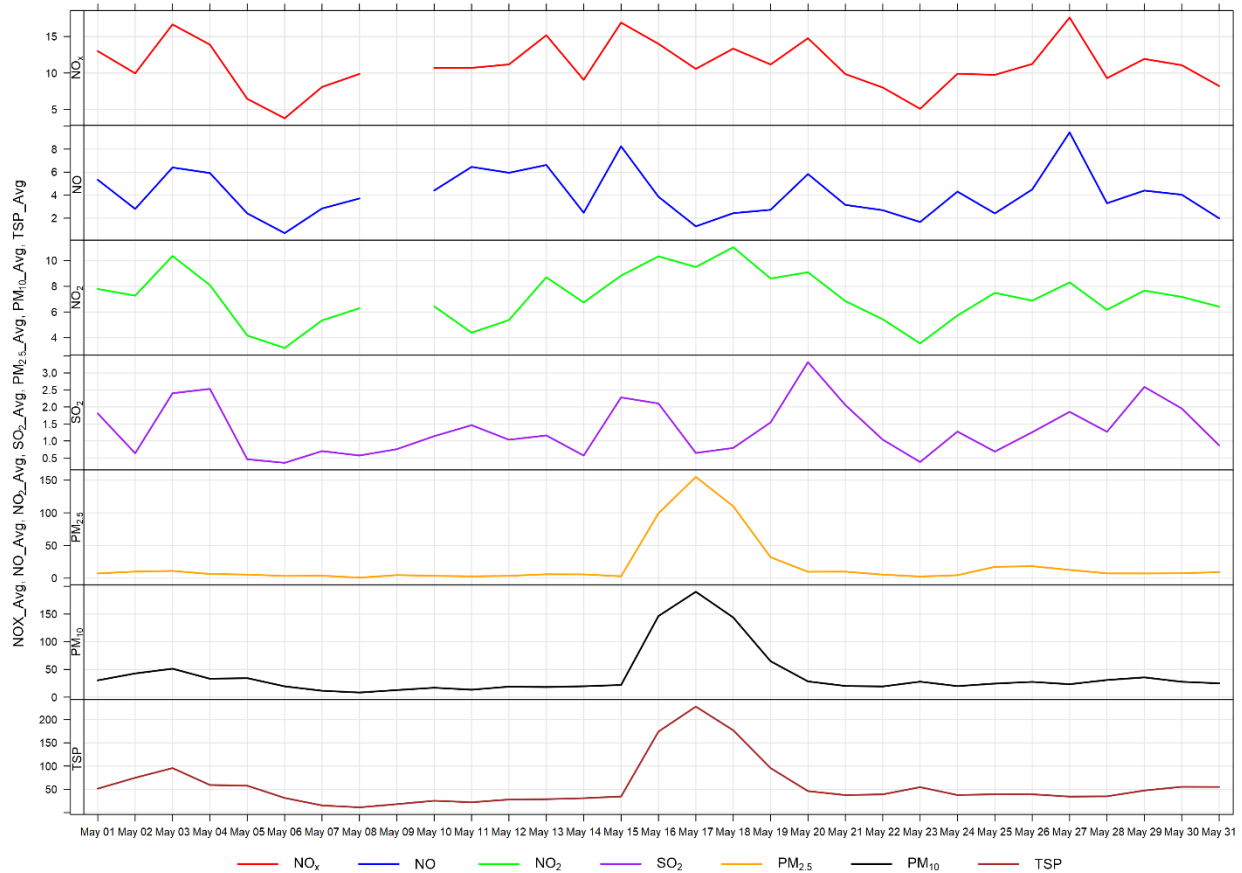
**Figure 3-6 Histogram of hourly PM<sub>10</sub> concentrations at the Lagoon station**



**Histogram of Hourly TSP Readings**



**Figure 3-7 Histogram of hourly TSP concentrations at the Lagoon station**

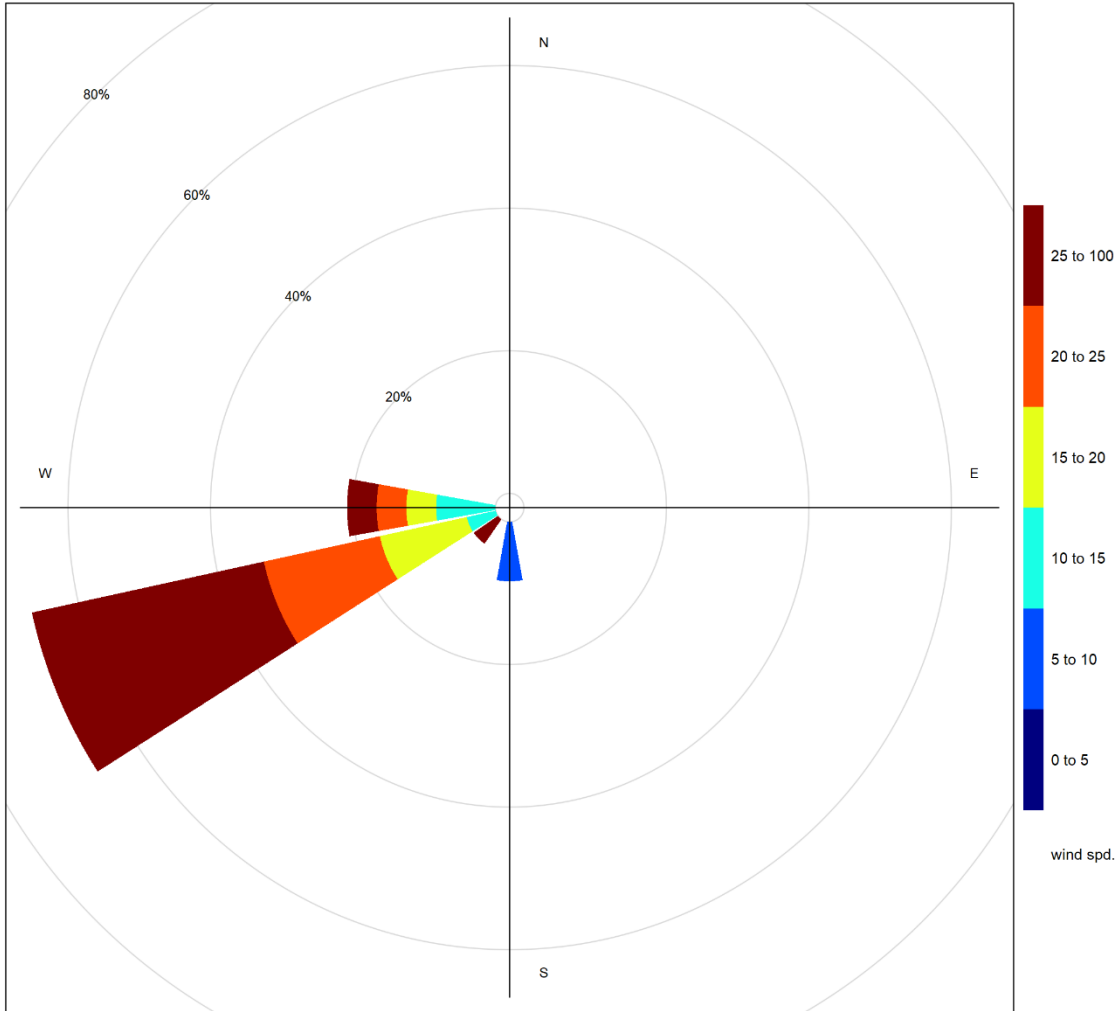


**Figure 3-8 24-hour concentrations of NO<sub>x</sub>, SO<sub>2</sub>, and particulate matter at the Lagoon monitor**

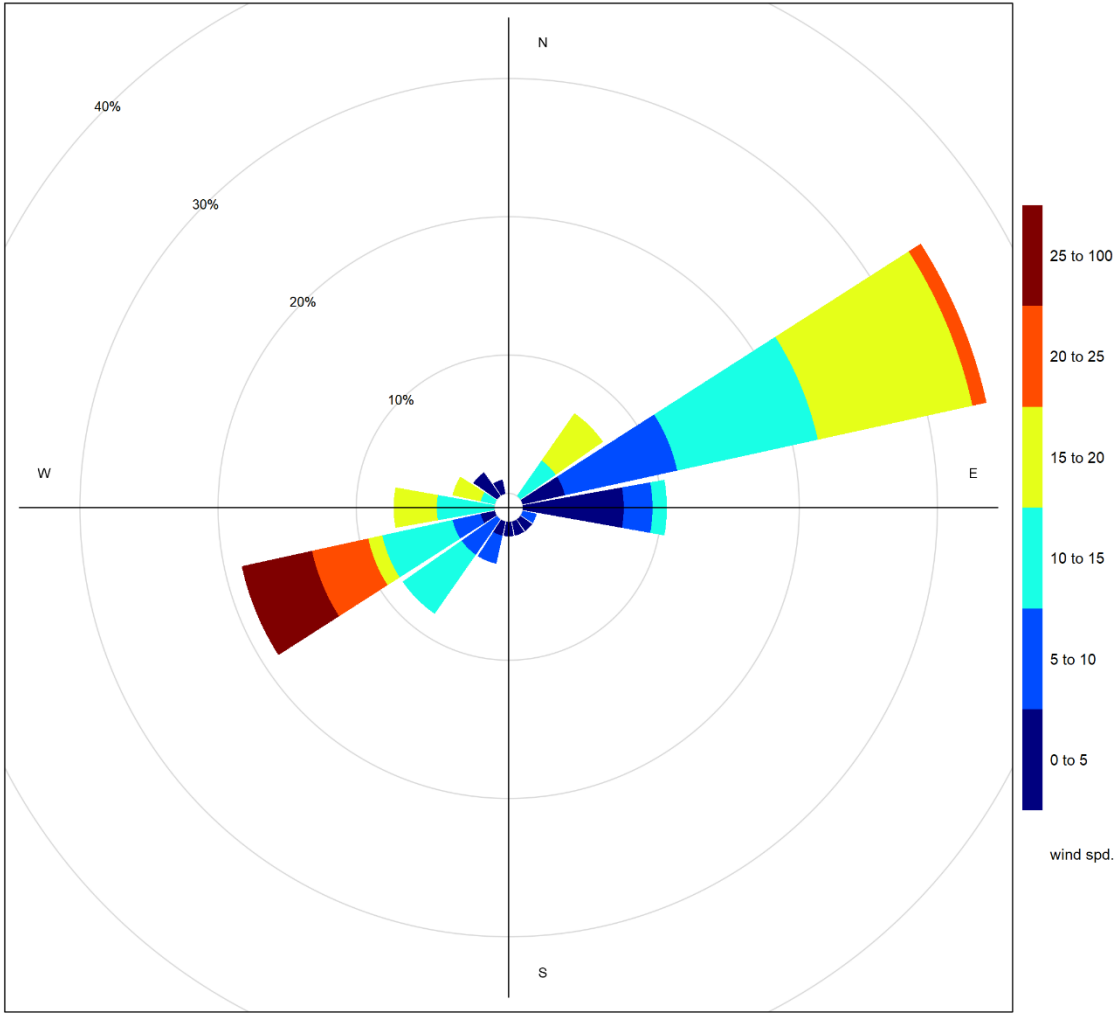
The following wind rose (Figure 3-9) shows the wind rose for the 3 days of TSP exceedances. Figure 3-10 shows the wind rose for the 4 days of PM<sub>2.5</sub> exceedances. The variation in wind conditions producing exceedances shows that, this month, the TSP exceedances were largely driven by wildfire activity rather than windblown fugitive dust, as has been typical.

Figure 3-11 through Figure 3-13 show the variation in concentrations over various time averaging periods for PM, SO<sub>2</sub> and NO<sub>x</sub>. The particulate matter plot in Figure 3-11 typically shows that PM<sub>10</sub> and TSP concentrations have a diurnal pattern associated with Lafarge operations, daytime emissions from traffic and other airshed activities. The diurnal patterns also typically follow the diurnal pattern of higher wind speeds during the daytime hours. Due to the wildfire impacts during the month of May, the diurnal trend this month is less pronounced.

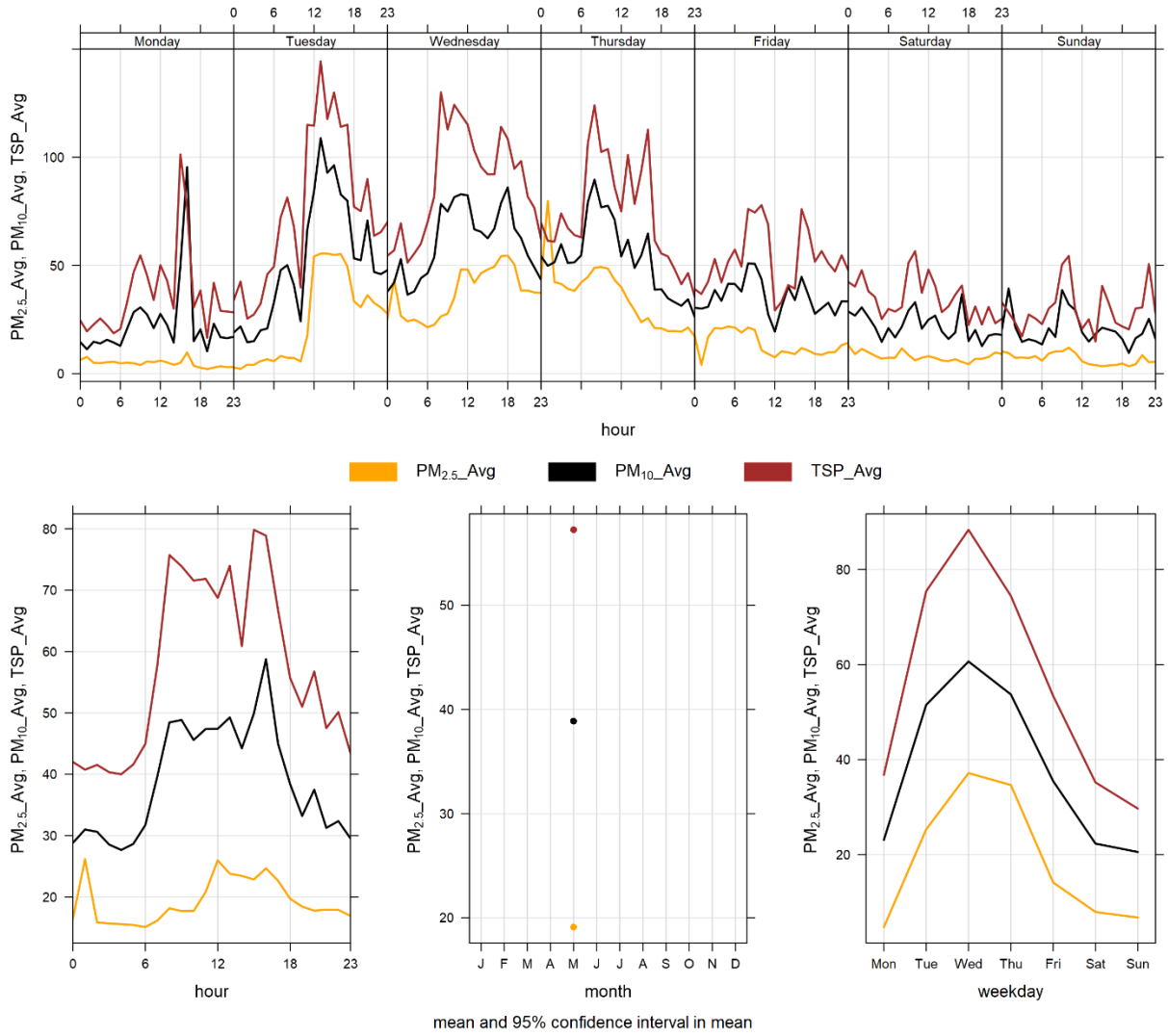
Figure 3-12 shows the variation of SO<sub>2</sub> over various time periods. SO<sub>2</sub> concentrations patterns are dependent on the timing of the highest SO<sub>2</sub> concentrations recorded in the month because in general SO<sub>2</sub> concentrations are very low. Figure 3-13 shows the variation of NO<sub>x</sub>, NO and NO<sub>2</sub>, with the peak of all three pollutants occurring in the early morning. This may be indicative of a peak in traffic.



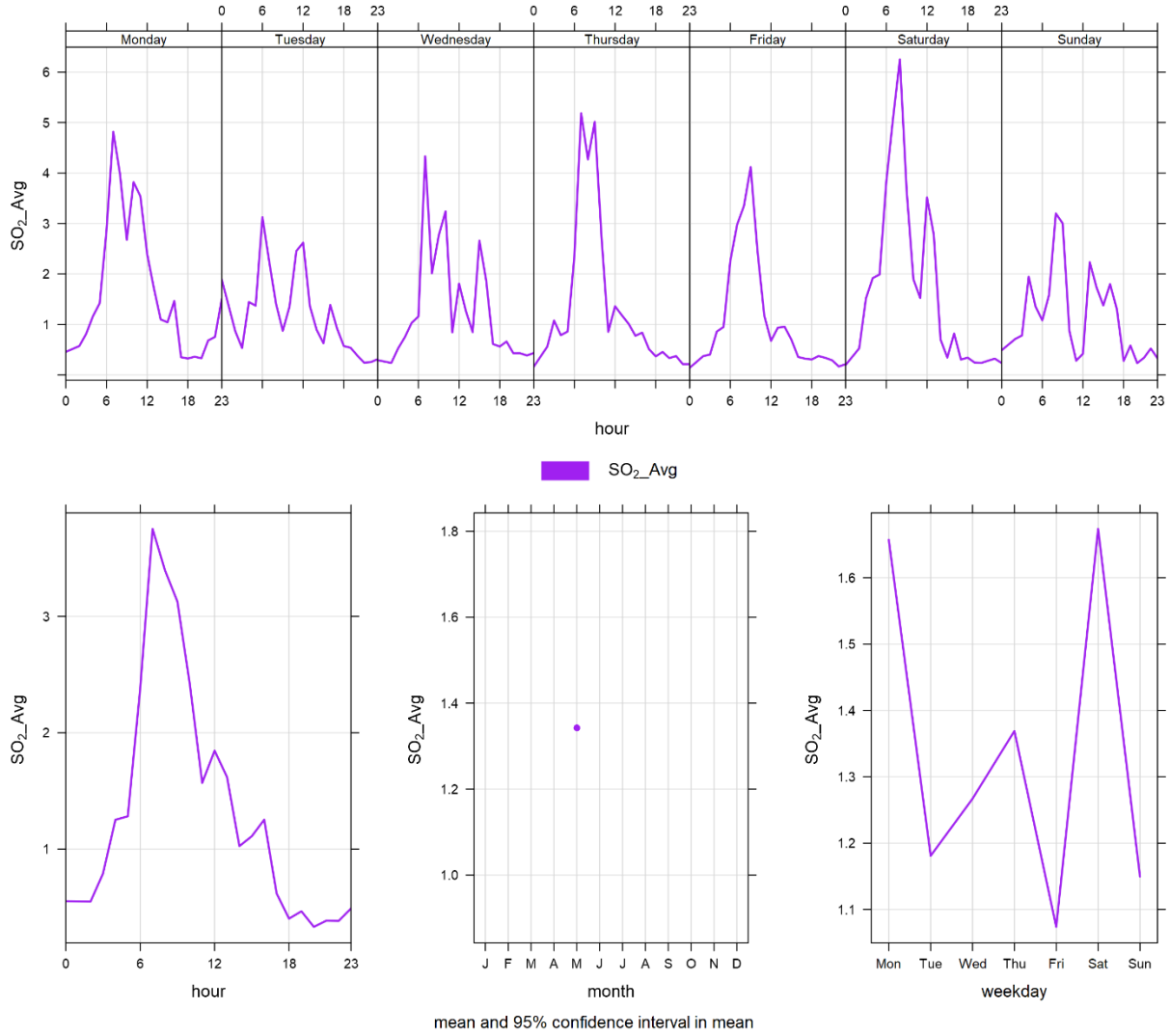
**Figure 3-9 Wind rose for TSP exceedance days recorded at the Lagoon Station**



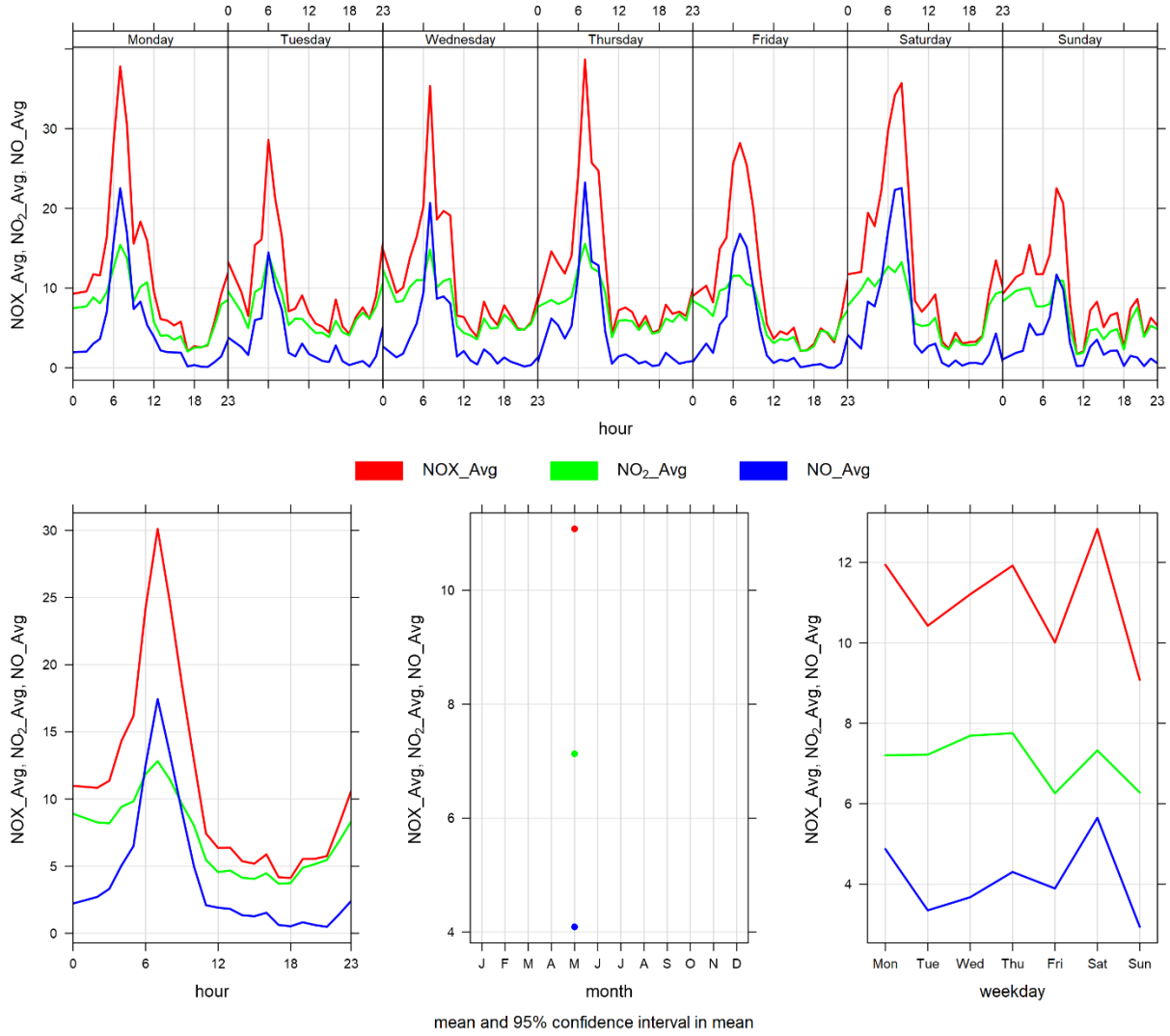
**Figure 3-10 Wind rose for PM<sub>2.5</sub> exceedance days recorded at the Lagoon Station**



**Figure 3-11 Lagoon monitor particulate matter time variation**



**Figure 3-12 Lagoon monitor SO<sub>2</sub> time variation**



**Figure 3-13 Lagoon monitor NO<sub>x</sub> time variation**

# 4 WINDRIDGE STATION

The Windridge station contains TSP, PM<sub>10</sub>, and PM<sub>2.5</sub> analyzers only. This section provides a summary of the monitoring activities for the Windridge ambient air quality station, including: a table of instrumentation (Table 4-1), a data summary table (Table 4-2), a table of recorded exceedances (Table 4-3), site visit notes, and graphs illustrating the monitoring results for May 2023.

All of the monitors comply with Alberta Environment and Parks Air Monitoring Directive (2016).

## 4.1 OPERATIONAL SUMMARY

A summary of the station operation for the month is provided in Table 4-1.

**Table 4-1 Instrumentation List at the Windridge Station**

Parameter Measured	Equipment Description	Notes
<b>PM<sub>2.5</sub> Concentrations</b>	MetOne BAM-1020 FRM Continuous Particulate Monitor	The PM <sub>2.5</sub> monitor was calibrated on May 19 <sup>th</sup> . The monitor recorded 100% uptime during the month of May.
<b>PM<sub>10</sub> Concentrations</b>	MetOne BAM-1020 Continuous Particulate Monitor	The PM <sub>10</sub> monitor was calibrated on May 19 <sup>th</sup> . The monitor recorded 100% uptime during the month of May.
<b>TSP Concentrations</b>	MetOne BAM-1020 Continuous Particulate Monitor	The TSP monitor was calibrated on May 19 <sup>th</sup> . The monitor recorded 100% uptime during the month of May.

## 4.2 MONITORING RESULTS AND TRENDS

Table 4-2 summarizes the hourly and daily concentrations recorded in May 2023, and Table 4-3 summarizes the recorded exceedances. Figure 4-1 illustrates the time series for hourly PM, Figure 4-2 to Figure 4-4 illustrates the histograms for hourly PM, Figure 4-5 illustrates the time series for daily PM, Figure 4-6 displays the wind rose for the 24-hour TSP exceedances, Figure 4-7 displays the wind rose for the 24-hour PM<sub>2.5</sub> exceedances, and Figure 4-8 illustrates the time series for hourly PM over different time periods.

There were 4 exceedances of the 24-hour PM<sub>2.5</sub> AAAQO, 51 exceedances of the 1-hour PM<sub>2.5</sub> AAAQG, and 5 exceedances of the 24-hour TSP AAAQO. As discussed in Section 1.2, the Bow Valley airshed was impacted from regional wildfire activity in May. All the exceedances were primarily attributable to wildfire activity and smoke in the airshed from fires in Alberta.

Historically in May, the average number of 24-hour TSP AAAQO exceedances and 24-hour PM<sub>2.5</sub> AAAQO exceedances is 2 and 0, respectively. The maximum number of 24-hour TSP AAAQO exceedances recorded in May was also 5 days in 2022.

Due to flood mitigation construction at Exshaw creek the Windridge monitoring station was taken out of operation and removed from the site on May 8<sup>th</sup>, 2019. The flood mitigation work was completed in August 2020. The Windridge station was reinstalled for September 1<sup>st</sup>, 2020. As per the photo presented in section 1.1 the flood



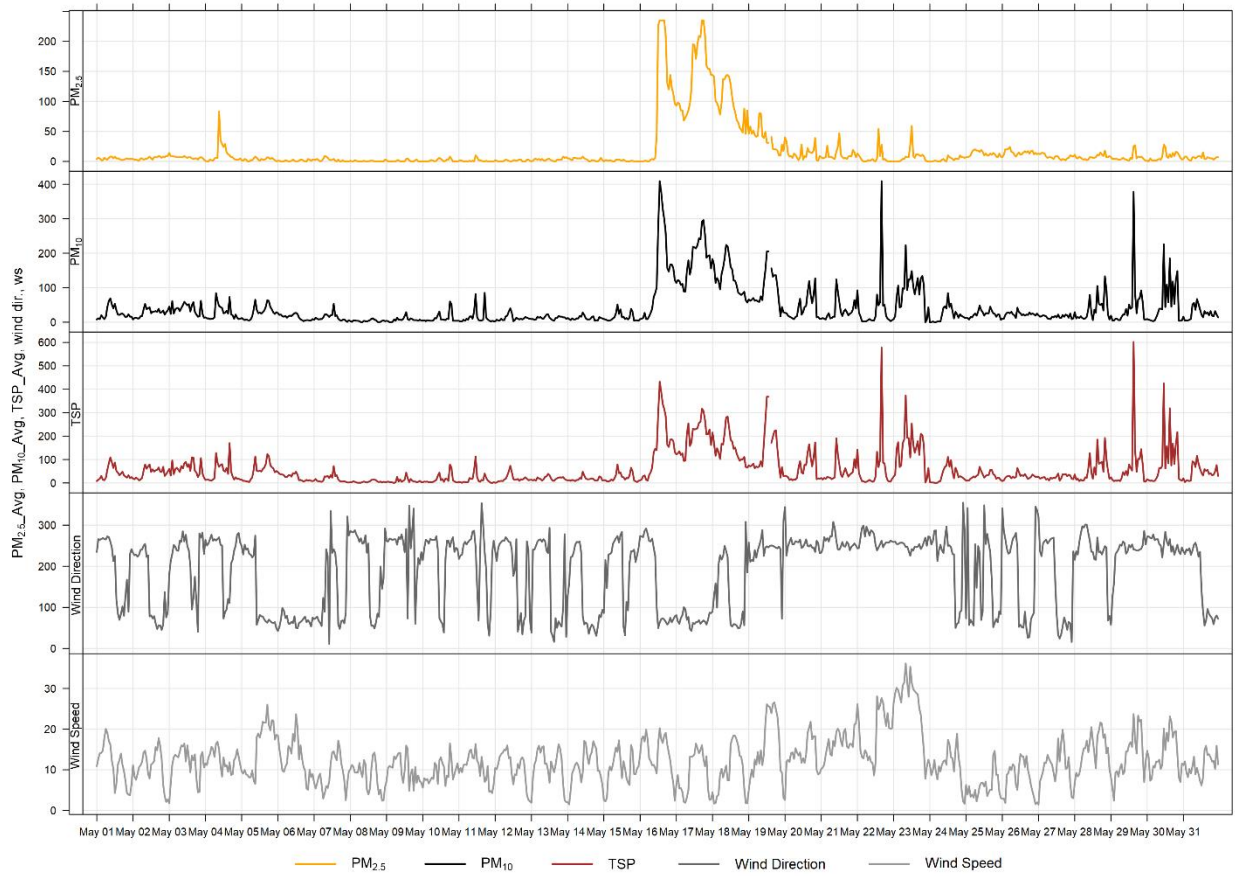
mitigation work has left an exposed creek bed area immediately west of the Windridge monitor that may contribute to an increase in TSP levels. Further, the strong wind gusting that occurred in May would have contributed to increased particulate levels that may have arisen from multiple sources: Lafarge Plant, Exshaw Creek, dry sections of the Bow River, and open areas.

**Table 4-2 Summary of May 2023 data at the Windridge Station**

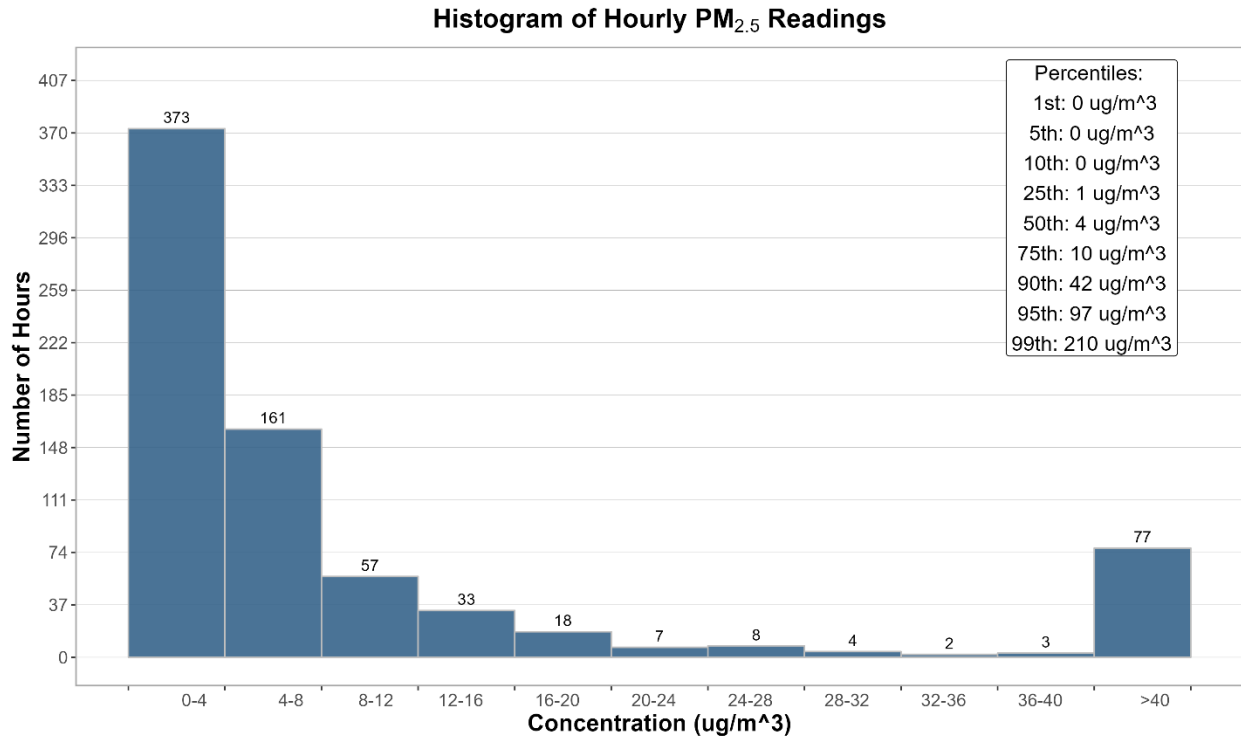
Parameter	Guideline		Station	Exceedances		Monthly		Maximum 1-hour				Maximum 24-hour		Operational Time (Percent)	
	1-hr	24-hr		1-hr	24-hr	Minimum	Average	Maximum Concentration	Day	Hour	Wind Speed (km/hr)	Wind Direction (degrees)	Maximum Concentration		Day
<b>PM<sub>2.5</sub></b> (µg/m <sup>3</sup> )	80	29	Windridge	51	4	0.0	16.9	235.0	16	18	16.2	58.4	145.5	17	100
<b>PM<sub>10</sub></b> (µg/m <sup>3</sup> )	-	-	Windridge	-	-	0.0	40.4	409.0	16	16	18.4	70.5	182.3	17	100
<b>TSP</b> (µg/m <sup>3</sup> )	-	100	Windridge	-	5	0.0	55.9	602.0	29	15	23.7	240.6	202.0	17	100

**Table 4-3 Days exceeding the TSP AAAQO or PM<sub>2.5</sub> AAAQO at the Windridge Station**

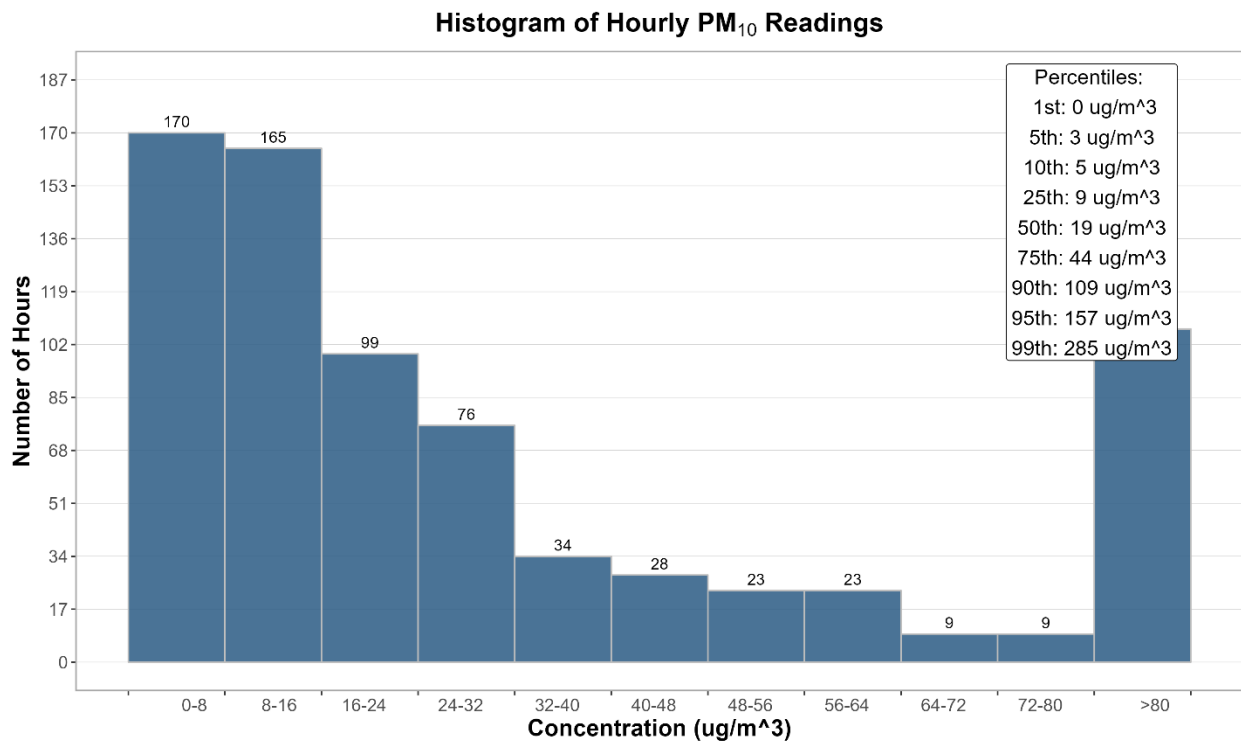
Date	TSP (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	Average Wind Direction (degrees)	Average Wind Speed (km/hr)	Average RH (%)	Root Cause (Provided by Lafarge)
<b>Windridge</b>						
<b>2023-05-16</b>	160.0	94.1	21.6	13.8	44.6	Regional wildfire activity
<b>2023-05-17</b>	202.0	145.5	64.2	9.1	52.4	Regional wildfire activity
<b>2023-05-18</b>	146.6	94.6	70.9	9.5	52.6	Regional wildfire activity
<b>2023-05-19</b>	131.2	37.4	245.3	15.9	39.2	Regional wildfire activity
<b>2023-05-23</b>	140.7	-	249.4	25.4	44.1	High wind event
<b>Total # of Exceedances</b>	<b>5</b>	<b>4</b>				
<b>Maximum # of Exceedances (May)</b>	<b>5 (2022)</b>	<b>0 (2018, 2021, 2022)</b>				
<b>Average # of Exceedances (May)</b>	<b>2</b>	<b>0</b>				
<b>Minimum # of Exceedances (May)</b>	<b>1 (2018, 2021)</b>	<b>0 (2018, 2021, 2022)</b>				



**Figure 4-1 1-hour particulate matter concentrations recorded at the Windridge monitor**



**Figure 4-2 Histogram of hourly PM<sub>2.5</sub> concentrations at the Windridge station**



**Figure 4-3 Histogram of hourly PM<sub>10</sub> concentrations at the Windridge station**

### Histogram of Hourly TSP Readings

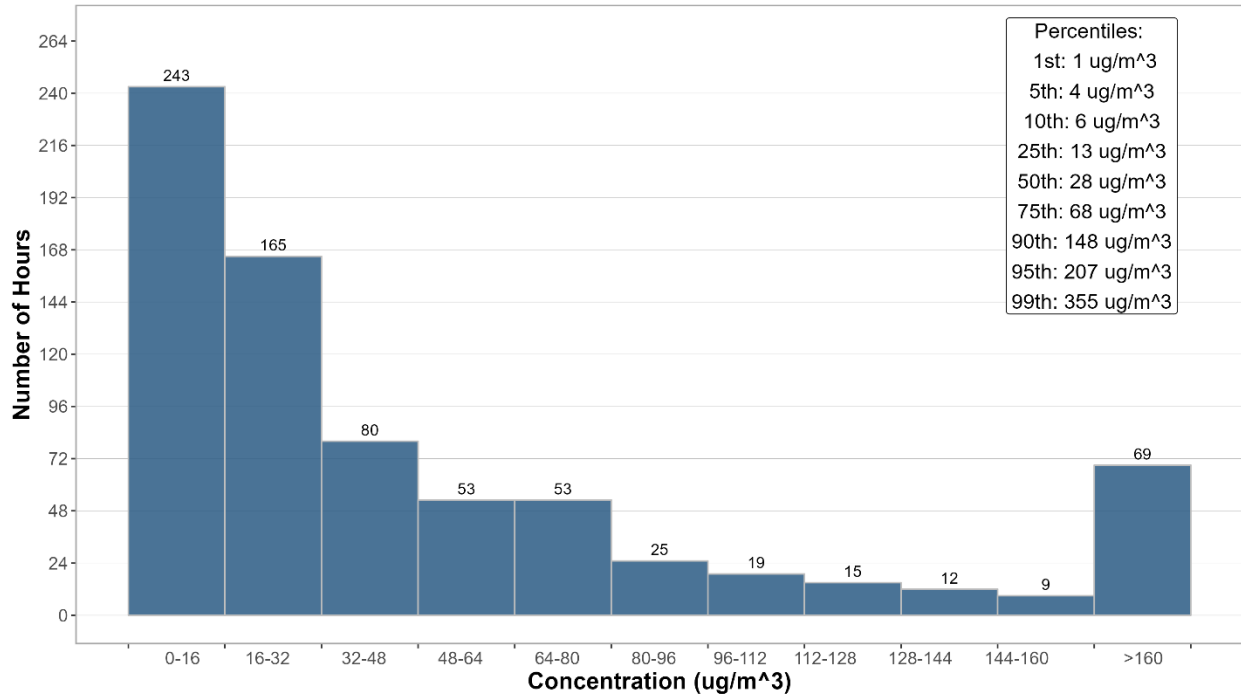
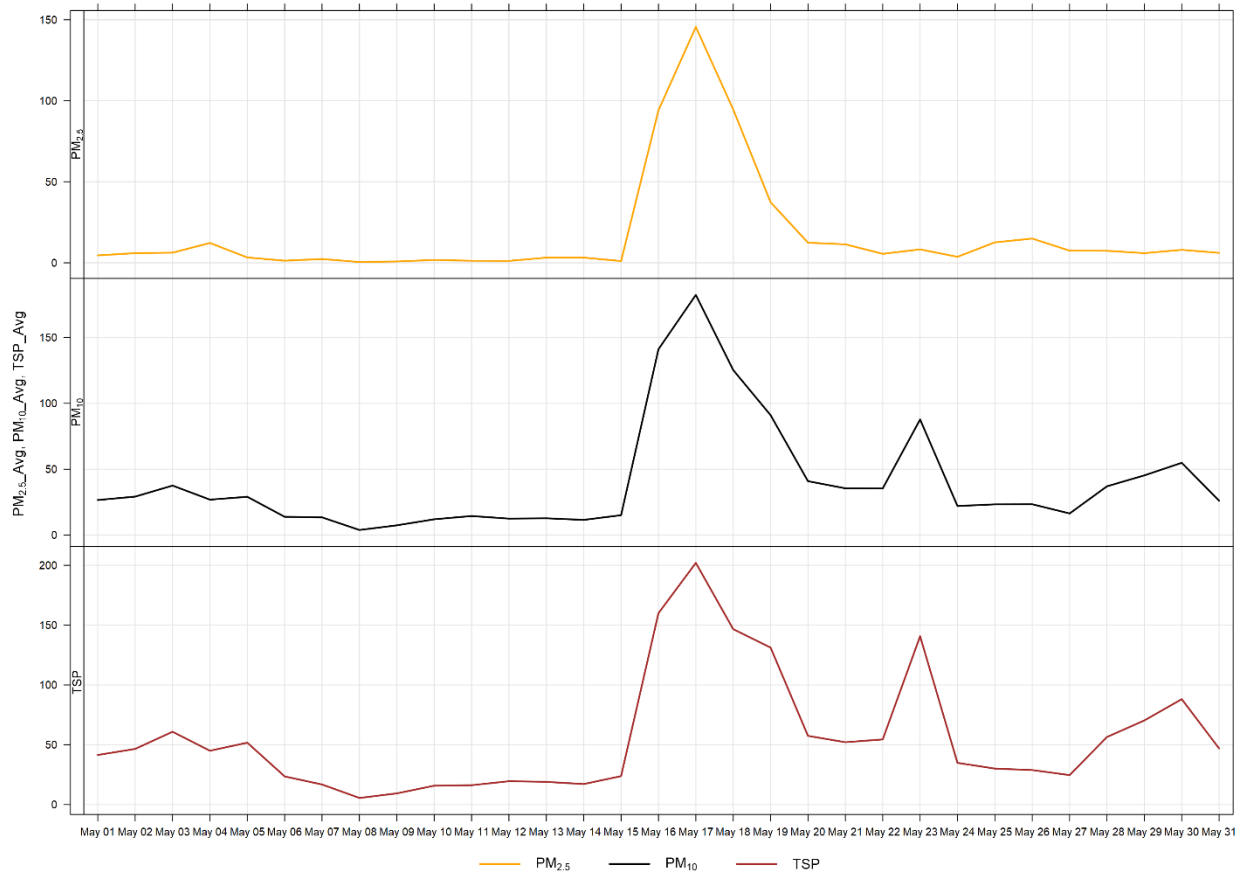


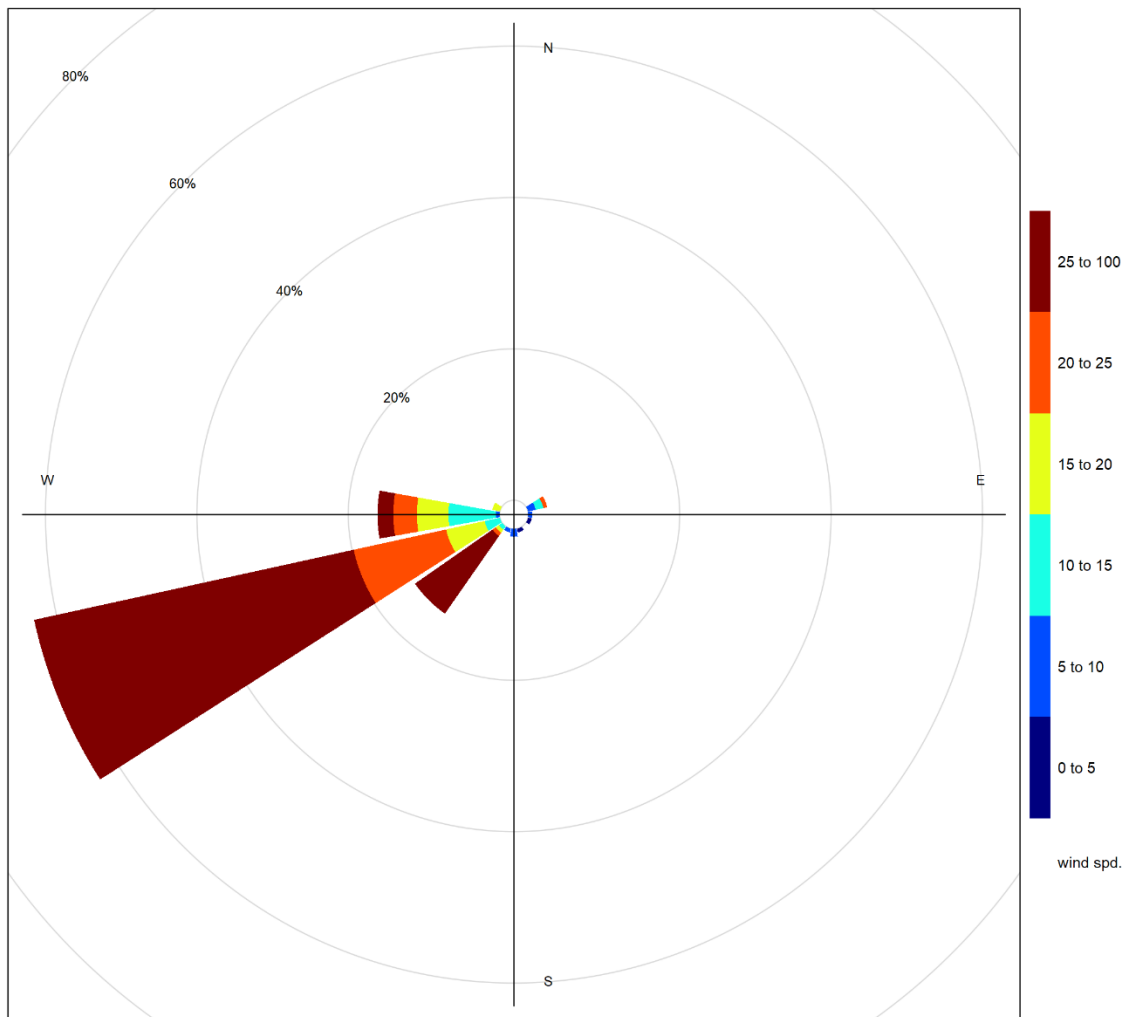
Figure 4-4 Histogram of hourly TSP concentrations at the Windridge station



**Figure 4-5 24-hour particulate matter concentrations at the Windridge monitor**

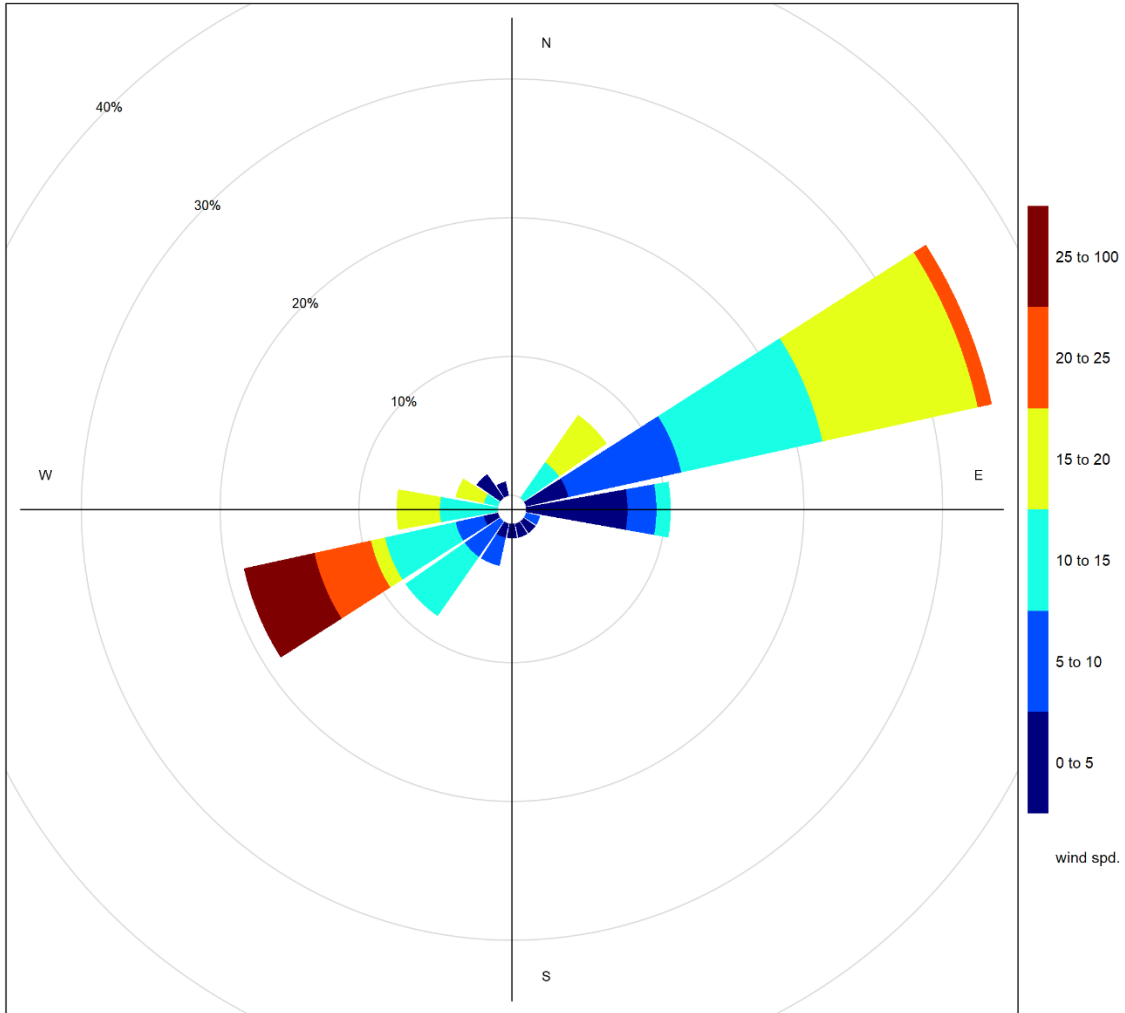
Figure 4-6 shows the wind rose for the 5 days of TSP exceedances. Figure 4-7 shows the wind rose for the 4 days of PM<sub>2.5</sub> exceedances. The variation in wind conditions producing exceedances shows that, this month, the TSP exceedances were largely driven by wildfire activity rather than windblown fugitive dust, as has been typical.

Figure 4-8 illustrates the hourly PM concentrations recorded at the Windridge monitor, averaged over different time periods. The plot across the top shows the variation of PM over the course of a week, while the bottom three plots show the changes in PM over the course of a day, month and weekday, respectively. Figure 4-8 is based on data collected during May 2023. Similar to the Lagoon station, it shows a more muted diurnal pattern associated with Lafarge operations, daytime emissions from traffic and wildfire smoke impacts in May. The diurnal patterns also follow the diurnal pattern of higher wind speeds during the daytime hours.

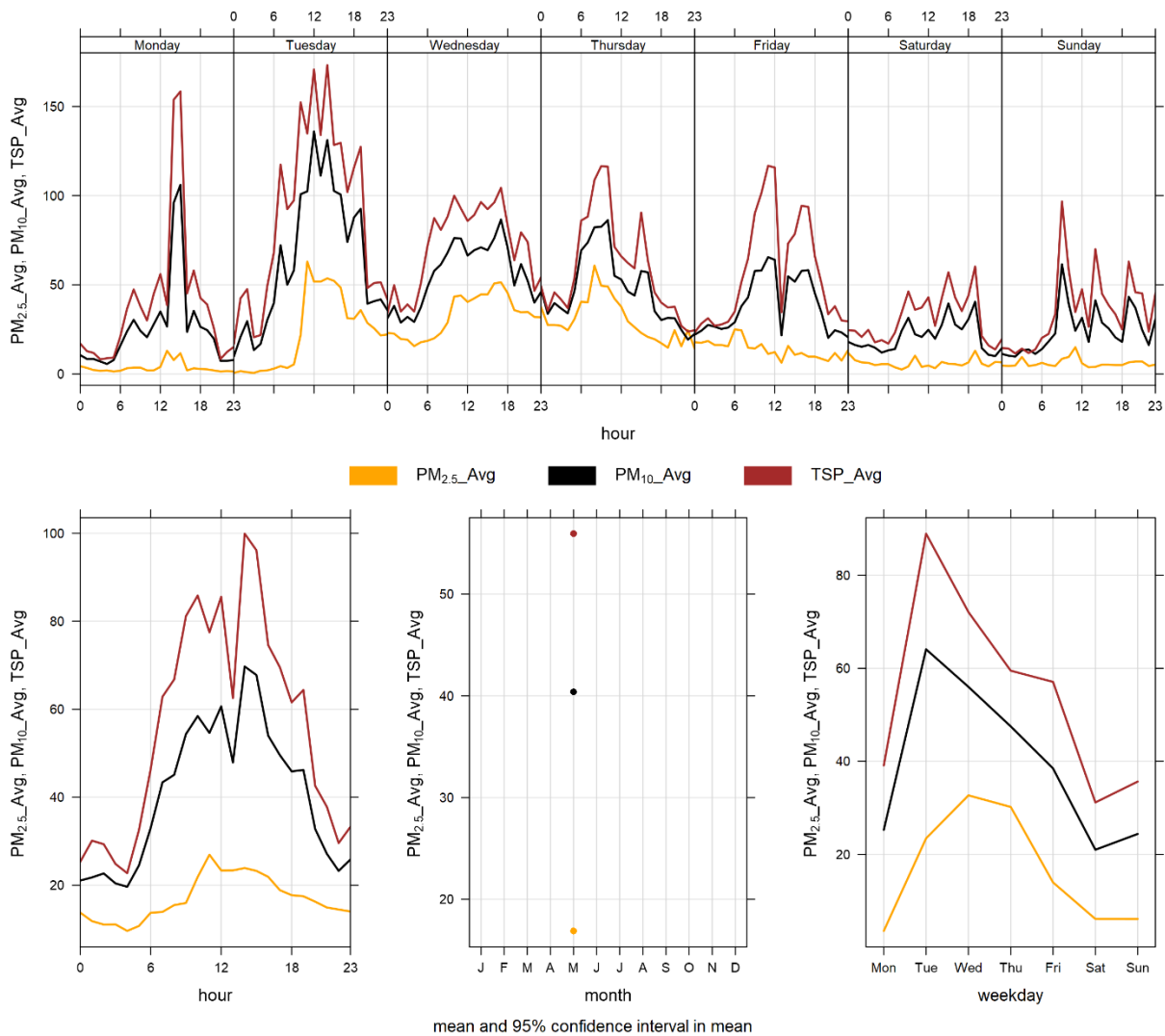


**Figure 4-6** Wind rose for TSP exceedance days recorded at the Windridge Station





**Figure 4-7** Wind rose for PM<sub>2.5</sub> exceedance days recorded at the Windridge Station



**Figure 4-8 Windridge particulate matter time variation**

# 5 WEST INDUSTRIAL GRIMM

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## 5.1 OPERATIONAL SUMMARY

A summary of the station operation for the month is provided in Table 5-1.

**Table 5-1 Instrumentation List at the West monitoring location**

Parameter Measured	Equipment Description	Notes
PM <sub>2.5</sub> , PM <sub>10</sub> , TSP Concentrations	GRIMM 365 Continuous Particulate Monitor	The analyzer had 100% uptime during the month of May.

---

## 5.2 MONITORING RESULTS AND TRENDS

The West GRIMM was moved to its current location in order to monitor “background” PM concentrations since the predominant wind pattern is from west to east in the valley. Table 5-2 summarizes the maximum 1-hour and 24-hour concentrations recorded over the course of the month, and Table 5-3 summarizes the recorded exceedances. This is an industrial monitor that is not Alberta Air Monitoring Directive (AMD) compliant and is not required to show compliance with the AAAQO.

Figure 5-1 and Figure 5-2 show the hourly and daily PM<sub>2.5</sub>, PM<sub>10</sub> and TSP concentrations recorded over the month.

There were 3 exceedances of the 24-hour TSP Guideline (100 µg/m<sup>3</sup>) and 3 exceedances of the 24-hour PM<sub>2.5</sub> (29µg/m<sup>3</sup>) Guideline. Further, there were 51 hours exceeding the 1-hour PM<sub>2.5</sub> Guideline. As discussed in Section 1.2, the Bow Valley airshed was impacted from regional wildfire activity in May. All the exceedances were primarily attributable to wildfire activity and smoke in the airshed from fires in Alberta.

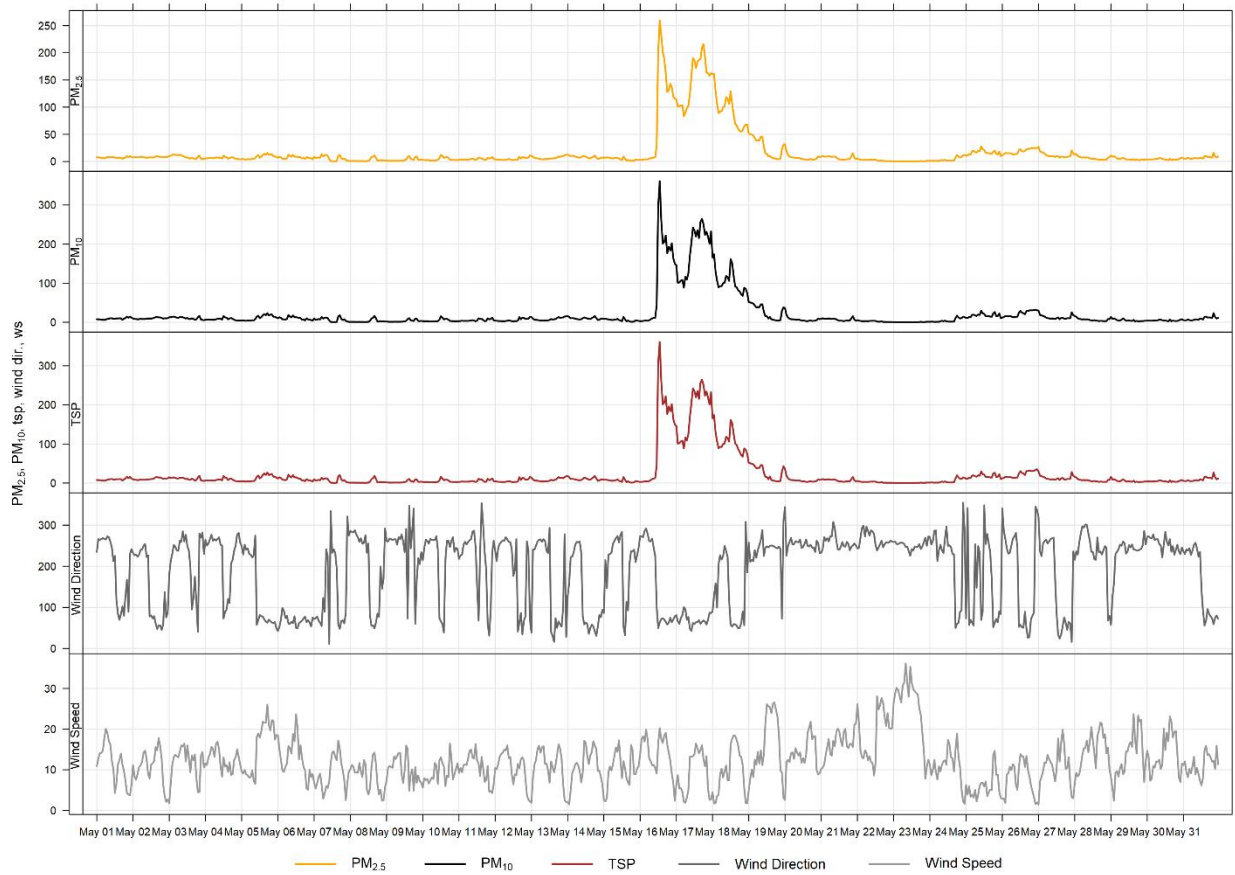
Historically during the month of May, the West monitor records an average of 0 exceedances of both the 24-hour TSP and PM<sub>2.5</sub> guidelines. The maximum number of 24-hour PM<sub>2.5</sub> AAAQO exceedances recorded in May was 1 day in 2014 and 2019.

**Table 5-2 Summary of May 2023 data at the West GRIMM**

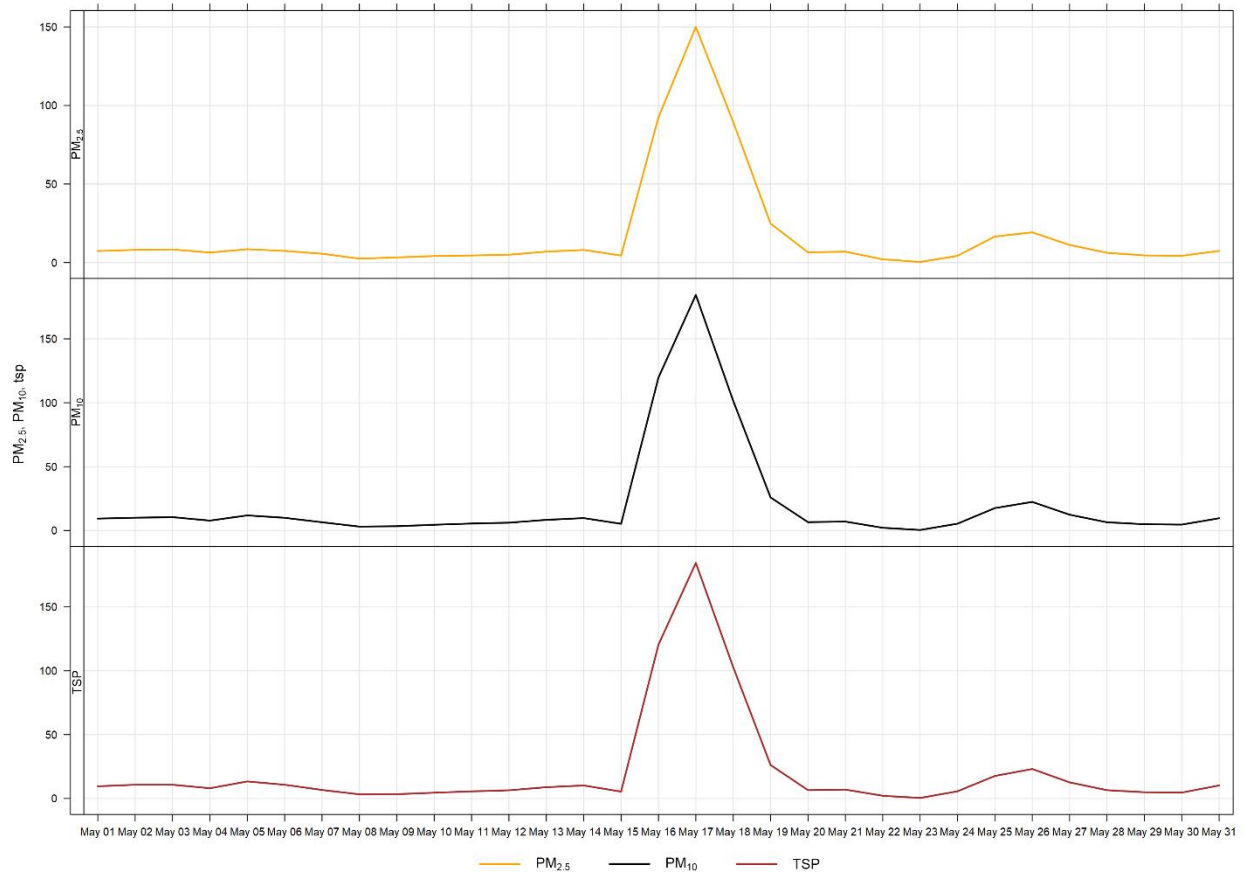
Parameter	Guideline		Station	Exceedances		Monthly		Maximum 1-hour					Maximum 24-hour		Operational Time (Percent)
	1-hr	24-hr		1-hr	24-hr	Minimum	Average	Maximum Concentration	Day	Hour	Wind Speed (km/hr)	Wind Direction (degrees)	Maximum Concentration	Day	
<b>PM<sub>2.5</sub></b> (µg/m <sup>3</sup> )	80	29	West	51	3	0.1	17.4	259.8	16	13	20.2	63.3	150.0	17	100
<b>PM<sub>10</sub></b> (µg/m <sup>3</sup> )	-	-	West	-	-	0.1	20.7	361.1	16	13	20.2	63.3	184.4	17	100
<b>TSP</b> (µg/m <sup>3</sup> )	-	100	West	-	3	0.1	21.0	361.1	16	13	20.2	63.3	184.5	17	100

**Table 5-3 Days exceeding the TSP AAAQO or PM<sub>2.5</sub> AAAQO at the West Station**

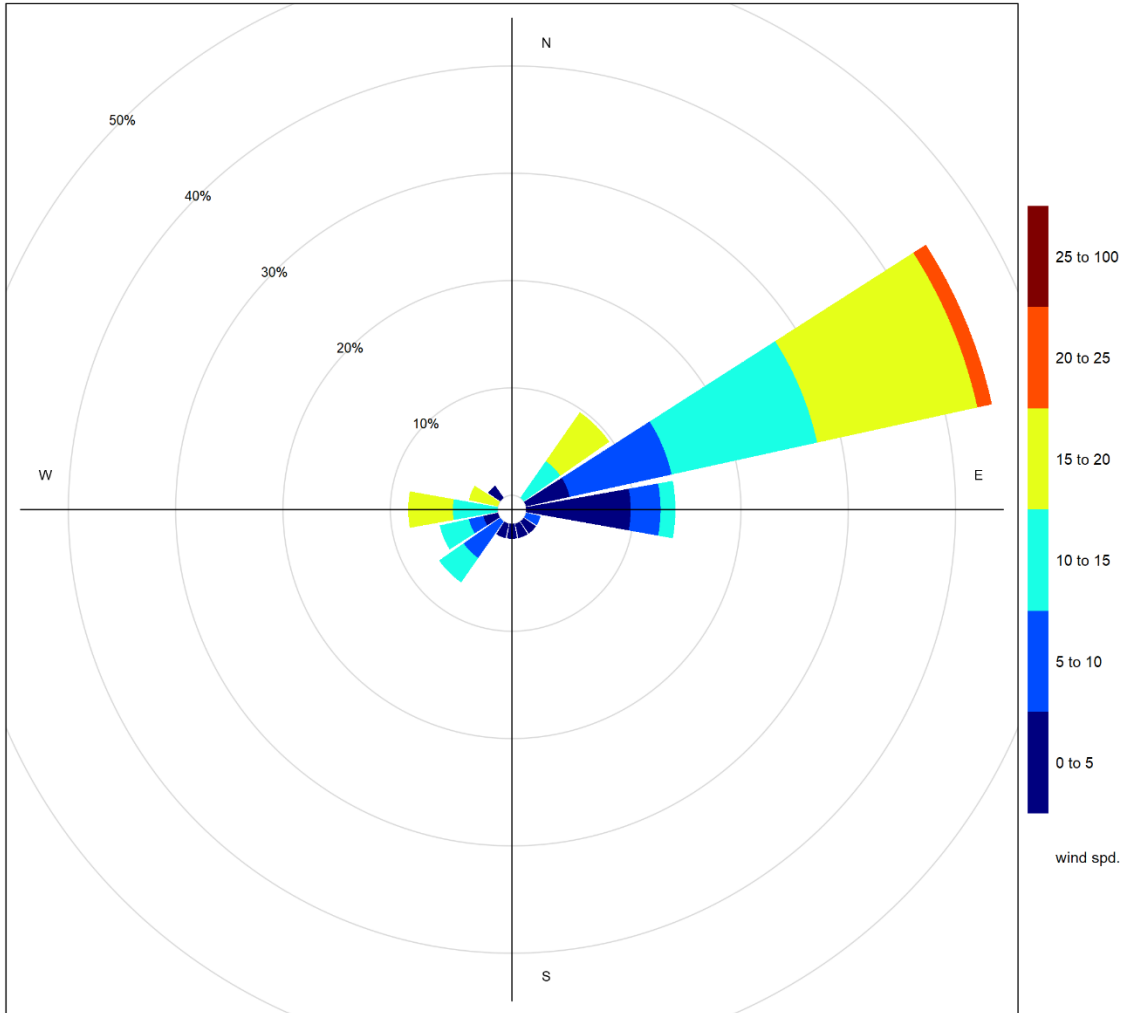
Date	TSP (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	Average Wind Direction (degrees)	Average Wind Speed (km/hr)	Average RH (%)	Root Cause (Provided by Lafarge)
<b>West</b>						
<b>2023-05-16</b>	120.4	92.5	21.6	13.8	44.6	Regional wildfire activity
<b>2023-05-17</b>	184.5	150.0	64.2	9.1	52.4	Regional wildfire activity
<b>2023-05-18</b>	102.8	89.5	70.9	9.5	52.6	Regional wildfire activity
<b>Total # of Exceedances</b>	<b>3</b>	<b>3</b>				
<b>Maximum # of Exceedances (May)</b>	<b>0 (2010 - 2022)</b>	<b>1 (2014, 2019)</b>				
<b>Average # of Exceedances (May)</b>	<b>0</b>	<b>0</b>				
<b>Minimum # of Exceedances (May)</b>	<b>0 (2010 - 2022)</b>	<b>0 (2010 - 2013, 2015 - 2018, 2020 - 2022)</b>				



**Figure 5-1 1-hour particulate matter concentrations at the West monitor**

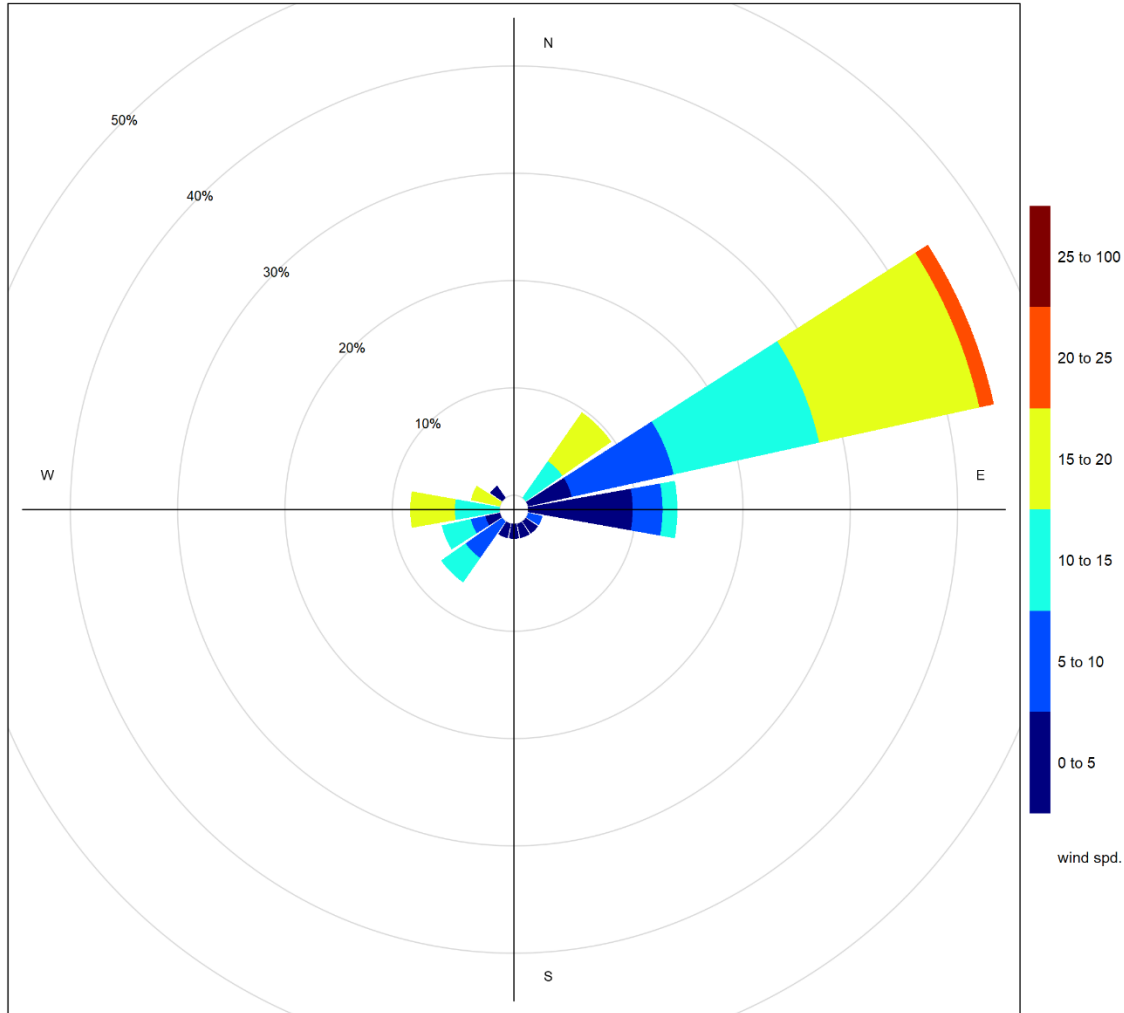


**Figure 5-2 24-hour particulate matter concentrations at the West monitor**



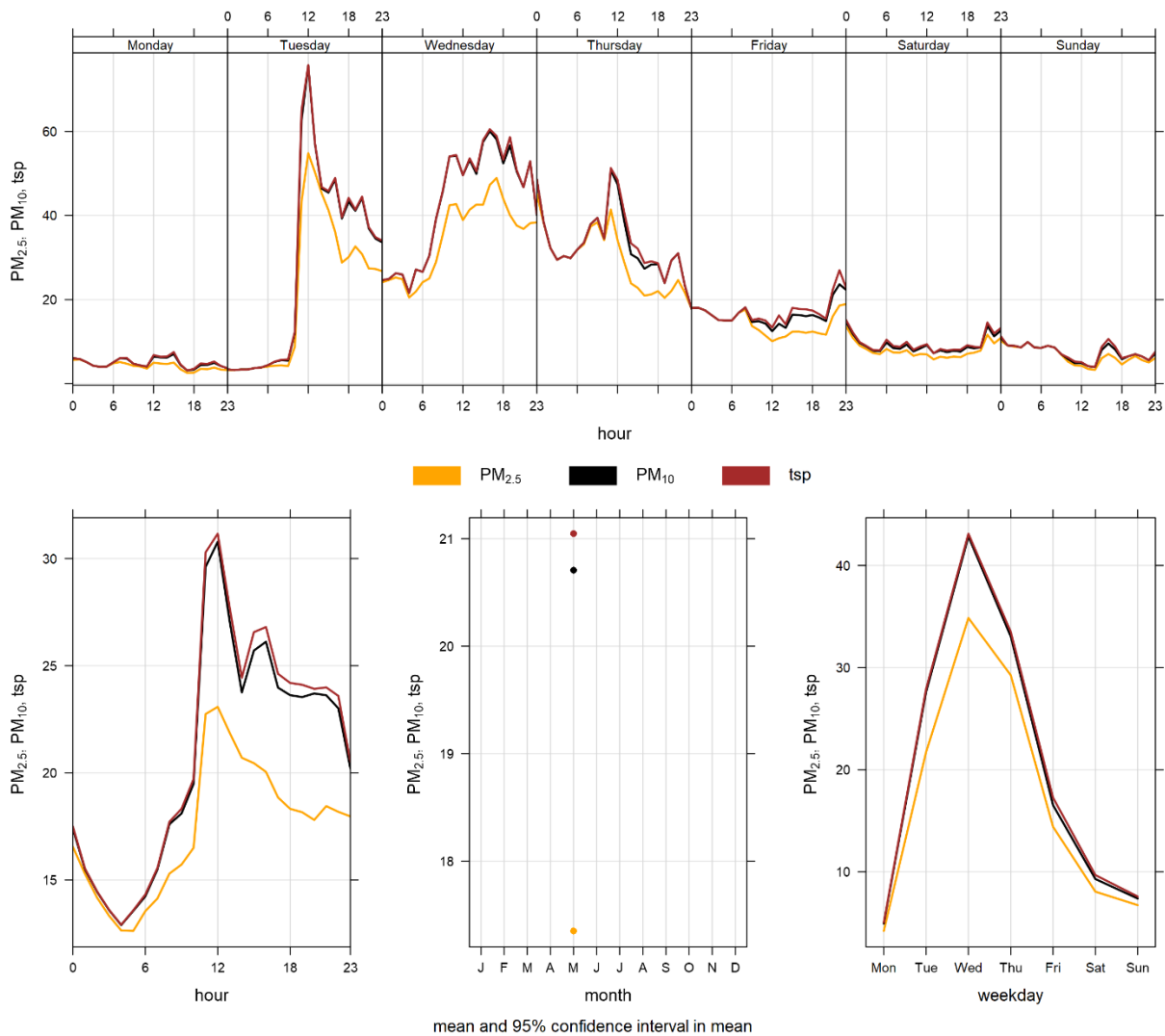
**Figure 5-3 Wind rose for TSP exceedance days recorded at the West GRIMM**





**Figure 5-4 Wind rose for PM<sub>2.5</sub> exceedance days recorded at the West GRIMM**

Figure 5-3 shows the wind rose for the 3 days of TSP exceedances, while Figure 5-4 shows the wind rose for the 3 days of PM<sub>2.5</sub> exceedances. The variation in wind conditions producing exceedances shows that wildfire activity rather than windblown fugitive dust was the primary air quality issue this month. Figure 5-5 illustrates the hourly PM concentrations recorded at the West monitor, averaged over different time periods. The plot across the top shows the variation of PM over the course of a week, while the bottom three plots show the changes in PM over the course of a day, month and weekday, respectively. Figure 5-5 is based on data collected during May 2023. The diurnal pattern is skewed due to the wildfire activities recorded in May. Historically this monitor saw daily variations in PM that were more likely a result of higher traffic volume during daylight hours than specific Lafarge operations. The West monitor was moved to its current location (Figure 1-1) on December 1<sup>st</sup>, 2021, and will continue to be evaluated to better understand influences from background sources, Lafarge Exshaw, as well as highway and rail sources.



**Figure 5-5 West monitor particulate matter time variation**

# 6 BERM INDUSTRIAL GRIMM

## 6.1 OPERATIONAL SUMMARY

A summary of the station operation for the month is provided in Table 6-1.

**Table 6-1 Instrumentation List at the Berm monitoring location**

Parameter Measured	Equipment Description	Notes
PM <sub>2.5</sub> , PM <sub>10</sub> , TSP Concentrations	GRIMM 365 Continuous Particulate Monitor	The analyzer had 100% uptime during the month of May.

## 6.2 MONITORING RESULTS AND TRENDS

The Berm monitor was placed at its current location as a result of the dispersion modelling conducted for the facility. Figure 6-1 and Figure 6-2 show the hourly and daily PM<sub>2.5</sub>, PM<sub>10</sub>, and TSP concentrations recorded over the month. Table 6-2 summarizes the maximum 1-hour and 24-hour PM concentrations recorded during the month, and Table 6-3 summarizes the recorded exceedances. This is an industrial monitor that is not Alberta Air Monitoring Directive (AMD) compliant and is not required to show compliance with the AAAQO.

There were 10 and 4 exceedances of the 24-hour TSP (100 µg/m<sup>3</sup>) and PM<sub>2.5</sub> (29 µg/m<sup>3</sup>) Guidelines, respectively. There were 36 hours exceeding the 1-hour PM<sub>2.5</sub> Guideline. As discussed in Section 1.2, the Bow Valley airshed was impacted from regional wildfire activity in May. Several exceedances were primarily attributable to wildfire activity and smoke in the airshed from fires in Alberta.

Historically during the month of May, the Berm monitor records an average of 8 and 0 exceedances of the 24-hour TSP and PM<sub>2.5</sub> guidelines, respectively. The maximum number of TSP exceedances recorded during May occurred in 2010, 2012 and 2022 where there were 16 days that exceeded the guideline. On the other hand, the maximum number of PM<sub>2.5</sub> exceedances in May was 2 days in 2022.

It should also be noted that the GRIMM monitors become more conservative in the reported PM concentrations as the size fraction increases. The PM<sub>2.5</sub> size fraction has been shown to match other regulatory approved PM<sub>2.5</sub> monitors, but the TSP concentrations recorded by the GRIMM tend to be higher than regulatory approved monitors (Levelton, 2015).

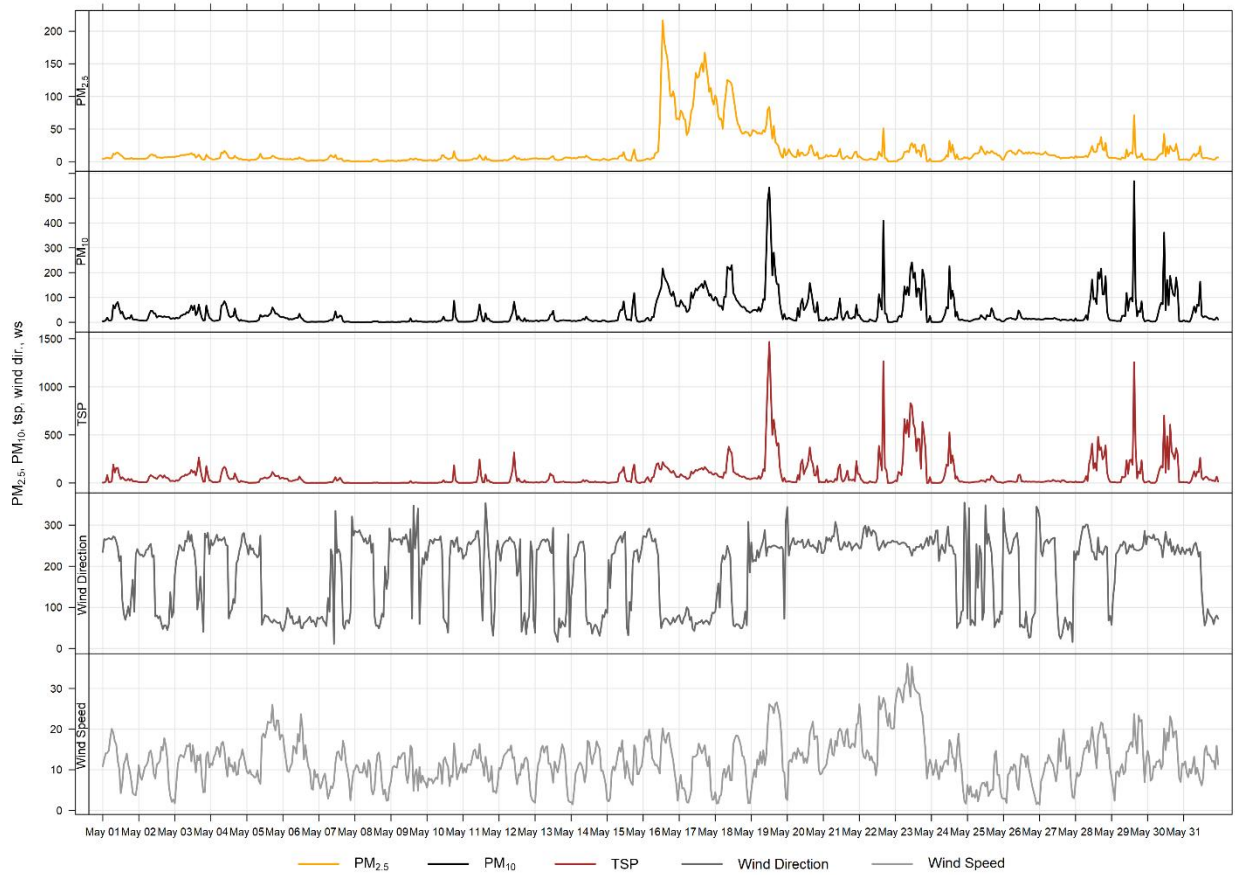
The Berm monitor is located along a ridge at the edge of the Lafarge property and is in an area where on-site trucks drive through site, which can create fugitive dust. Quarry blasting also has the potential to impact short term PM immediately following a blast. The strong wind gusting that occurred in May would have also contributed to increased particulate levels that may have arisen from multiple sources: Lafarge Plant, Exshaw Creek, dry sections of the Bow River, and open areas.

**Table 6-2 Summary of May 2023 data at the Berm GRIMM**

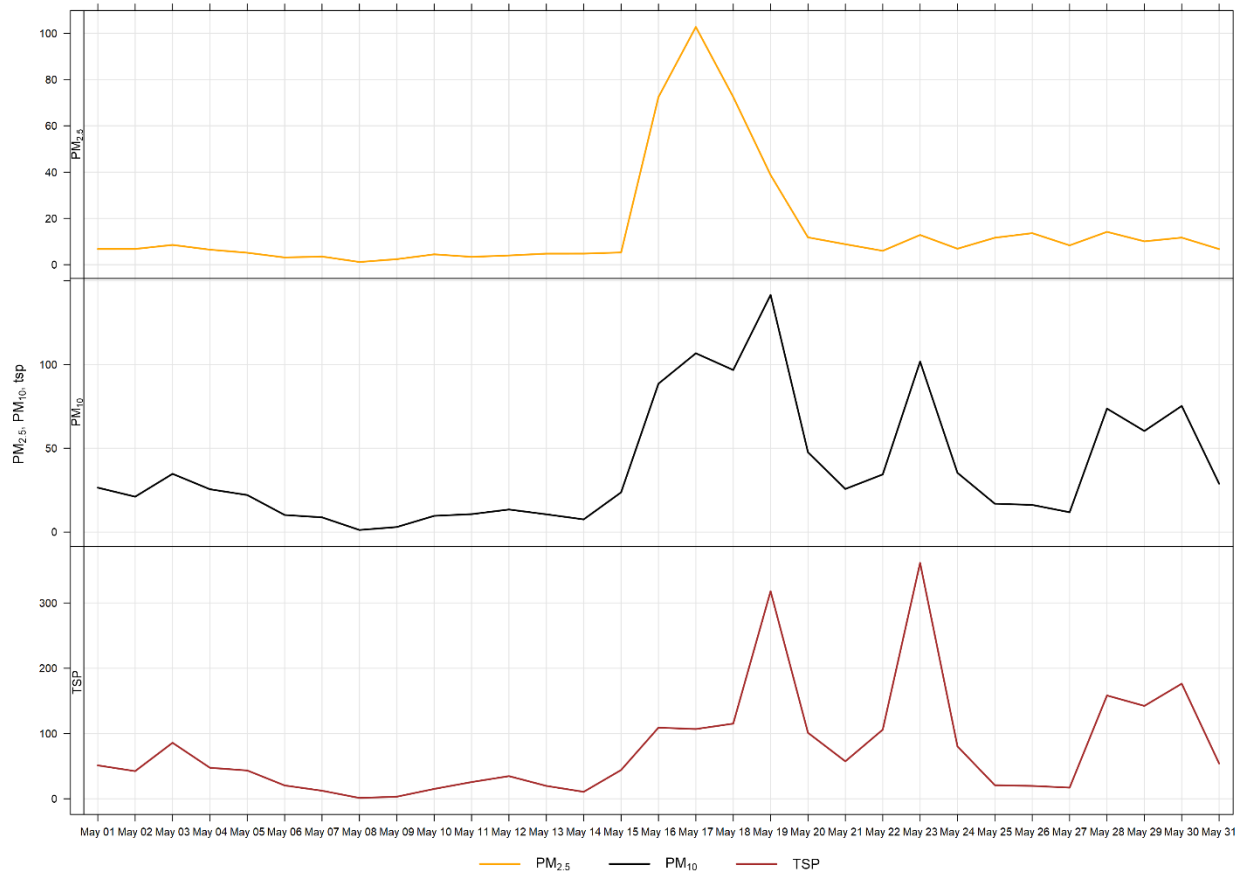
Parameter	Guideline		Station	Exceedances		Monthly		Maximum 1-hour				Maximum 24-hour		Operational Time (Percent)	
	1-hr	24-hr		1-hr	24-hr	Minimum	Average	Maximum Concentration	Day	Hour	Wind Speed (km/hr)	Wind Direction (degrees)	Maximum Concentration		Day
<b>PM<sub>2.5</sub></b> (µg/m <sup>3</sup> )	80	29	Berm	36	4	0.4	15.5	216.7	16	13	20.2	63.3	102.7	17	100
<b>PM<sub>10</sub></b> (µg/m <sup>3</sup> )	-	-	Berm	-	-	0.4	38.4	568.7	29	15	23.7	240.6	141.5	19	100
<b>TSP</b> (µg/m <sup>3</sup> )	-	100	Berm	-	10	0.4	77.5	1466.8	19	12	26.1	248.4	361.4	23	100

**Table 6-3 Days exceeding the Guideline for TSP or PM<sub>2.5</sub> at the Berm Monitor**

Date	TSP (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	Average Wind Direction (degrees)	Average Wind Speed (km/hr)	Average RH (%)	Root Cause (Provided by Lafarge)
<b>Berm</b>						
2023-05-16	109.0	72.4	21.6	13.8	44.6	Regional wildfire activity
2023-05-17	106.9	102.7	64.2	9.1	52.4	Regional wildfire activity
2023-05-18	115.1	72.5	70.9	9.5	52.6	Regional wildfire activity
2023-05-19	318.0	38.8	245.3	15.9	39.2	Regional wildfire activity
2023-05-20	101.2	-	251.1	14.1	32.3	
2023-05-22	105.9	-	261.8	18.7	59.0	
2023-05-23	361.4	-	249.4	25.4	44.1	High wind event
2023-05-28	158.3	-	254.1	14.9	40.5	
2023-05-29	142.3	-	244.5	13.5	42.4	
2023-05-30	176.4	-	252.7	13.8	44.5	
<b>Total # of Exceedances</b>	<b>10</b>	<b>4</b>				
<b>Maximum # of Exceedances (May)</b>	<b>16 (2010, 2012, 2022)</b>	<b>2 (2022)</b>				
<b>Average # of Exceedances (May)</b>	<b>8</b>	<b>0</b>				
<b>Minimum # of Exceedances (May)</b>	<b>2 (2014, 2019, 2020)</b>	<b>0 (2010 – 2018, 2020-2021)</b>				



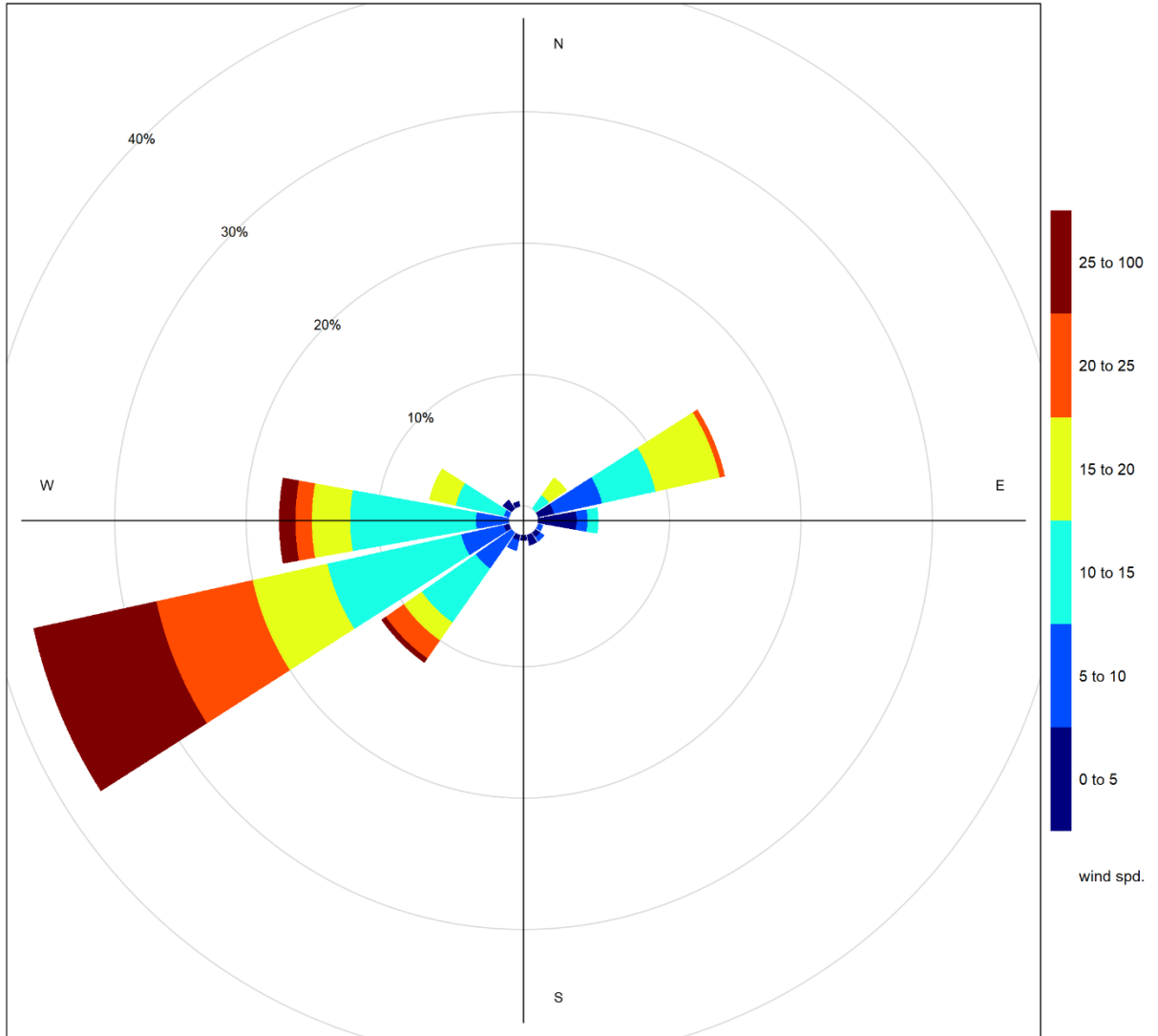
**Figure 6-1 1-hour particulate matter concentrations recorded at the Berm monitor**



**Figure 6-2 24-hour particulate matter concentrations recorded at the Berm monitor**

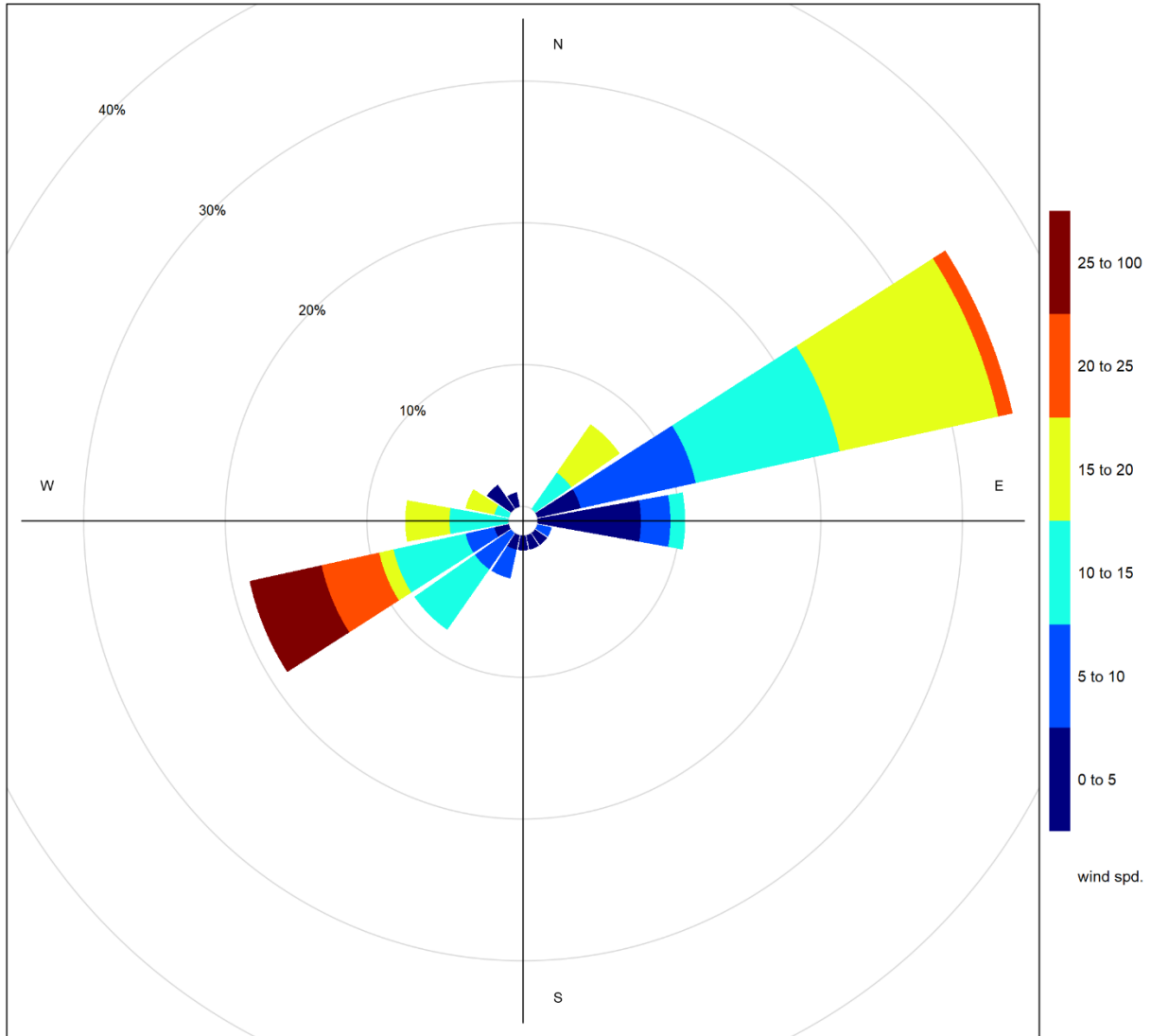
Figure 6-3 shows the wind rose for the 10 days of TSP exceedances. Figure 6-4 shows the wind rose for 4 days of PM<sub>2.5</sub> exceedances. The variation in wind conditions producing exceedances shows that both wildfire activity and windblown fugitive dust were the primary air quality issue this month.

Figure 6-5 shows the variation of PM recorded at the Berm monitor over various time averaging periods. The Berm monitor diurnal pattern is associated with Lafarge operations, but also daytime emissions from other activities and sources in Exshaw.

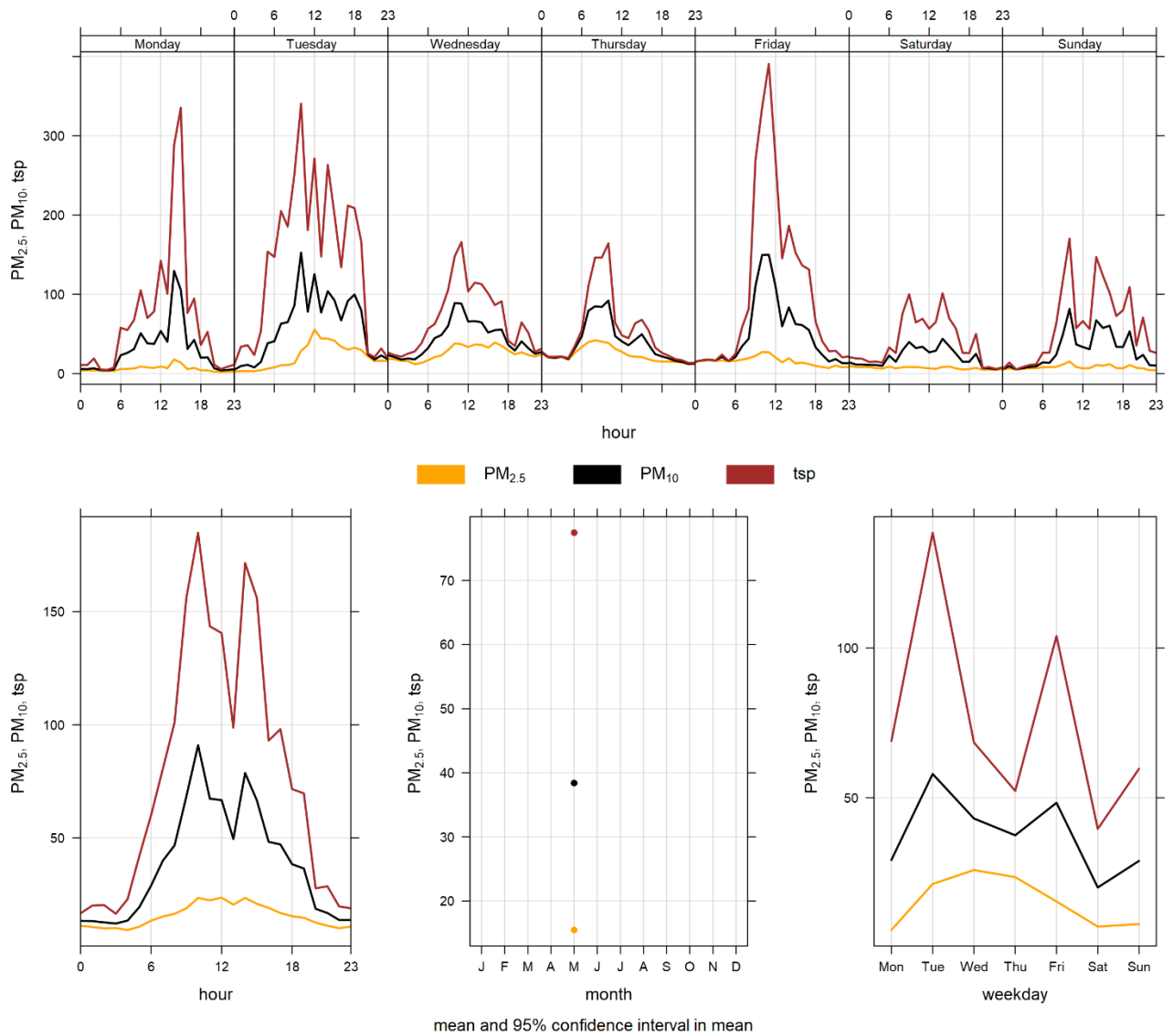


**Figure 6-3 Windrose for TSP exceedance days recorded at the Berm GRIMM**





**Figure 6-4 Windrose for PM<sub>2.5</sub> exceedance days recorded at Berm GRIMM**



**Figure 6-5 Berm particulate matter time variation**

# 7 ENTRANCE INDUSTRIAL GRIMM

## 7.1 OPERATIONAL SUMMARY

A summary of the station operation for the month is provided in Table 7-1.

**Table 7-1 Instrumentation List at the Entrance monitoring location**

Parameter Measured	Equipment Description	Notes
PM <sub>2.5</sub> , PM <sub>10</sub> , TSP Concentrations	GRIMM 365 Continuous Particulate Monitor	The analyzer had 51.2% uptime during the month of May due to 362 hours of collection error (i.e. communication error), which occurred on May 5 <sup>th</sup> 10:00 through May 6 <sup>th</sup> 2:00, May 16 <sup>th</sup> 7:00 through May 18 <sup>th</sup> 2:00, and May 19 <sup>th</sup> 12:00 through May 31 <sup>st</sup> at 24:00. And further, 1 hour of equipment change occurring on May 19 <sup>th</sup> at 11:00.

## 7.2 MONITORING RESULTS AND TRENDS

The Entrance monitor was placed at its current location as a result of the dispersion modelling conducted for the facility. Figure 7-1 and Figure 7-2 show the hourly and daily PM<sub>2.5</sub>, PM<sub>10</sub>, and TSP concentrations recorded over the month. Table 7-2 summarizes the maximum 1-hour and 24-hour PM concentrations recorded during the month. Table 7-3 summarizes the recorded exceedances. This is an industrial monitor that is not Alberta Air Monitoring Directive (AMD) compliant and is not required to show compliance with the AAAQO.

During the month of May, there were 11 and 2 exceedances of the 24-hour TSP (100 µg/m<sup>3</sup>) and PM<sub>2.5</sub> (29 µg/m<sup>3</sup>) Guidelines, respectively. There was 18 hours exceeding the 1-hour PM<sub>2.5</sub> Guideline. As discussed in Section 1.2, the Bow Valley airshed was impacted from regional wildfire activity in May. Several exceedances were primarily attributable to wildfire activity and smoke in the airshed from fires in Alberta.

Historically, the Entrance monitor records an average of 12 and 0 exceedances of the 24-hour TSP and PM<sub>2.5</sub> guidelines respectively, during the month of May. The maximum number of TSP exceedances recorded during May occurred in 2014, which had 20 days that exceeded the guideline. The maximum number of 24-hour PM<sub>2.5</sub> AAAQO exceedances recorded in May was 3 days in 2019.

It should also be noted that the GRIMM monitors become more conservative in the reported PM concentrations as the size fraction increases. The PM<sub>2.5</sub> size fraction has been shown to match other regulatory approved PM<sub>2.5</sub> monitors, but the TSP concentrations recorded by the GRIMM tend to be higher than regulatory approved monitors (Levelton, 2015).

The Entrance monitor is impacted by fugitive dust from plant activities, and high wind events. Trucks also pass near to the Entrance monitor as they enter and exit the Lafarge facility for loading and deliveries. Additionally, the monitor is closely located to Highway 1A. Traffic, particularly large trucks, can create dust while crossing over the

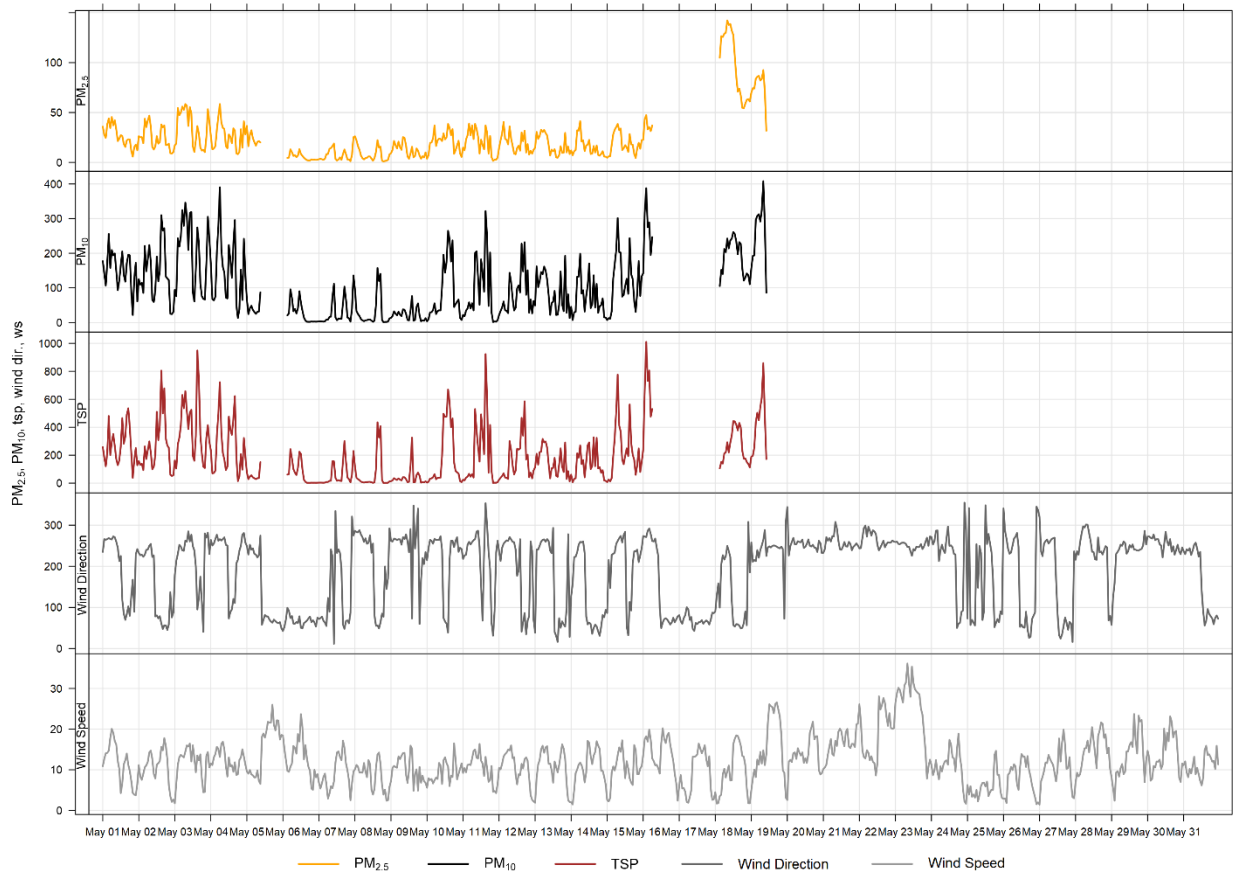
railway tracks. This can all lead to the monitor recording high TSP concentrations, which are typically associated with fugitive dust sources.

**Table 7-2 Summary of May 2023 data at the Entrance GRIMM**

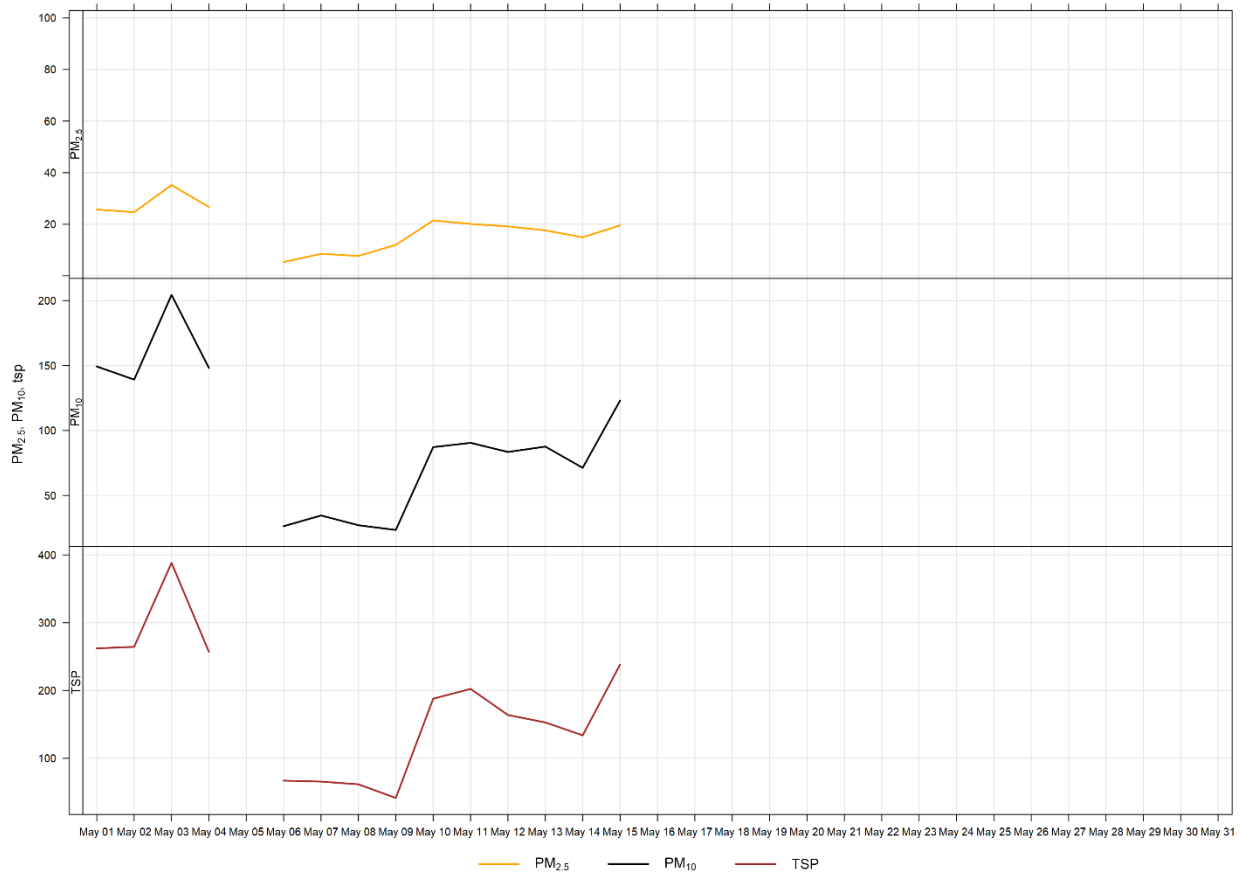
Parameter	Guideline		Station	Exceedances		Monthly		Maximum 1-hour					Maximum 24-hour		Operational Time (Percent)
	1-hr	24-hr		1-hr	24-hr	Minimum	Average	Maximum Concentration	Day	Hour	Wind Speed (km/hr)	Wind Direction (degrees)	Maximum Concentration	Day	
<b>PM<sub>2.5</sub></b> (µg/m <sup>3</sup> )	80	29	Entrance	18	2	1.0	25.0	142.3	18	8	9.6	249.3	96.5	18	51.2
<b>PM<sub>10</sub></b> (µg/m <sup>3</sup> )	-	-	Entrance	-	-	1.0	104.8	390.7	4	6	13.1	265.8	204.4	3	51.2
<b>TSP</b> (µg/m <sup>3</sup> )	-	100	Entrance	-	11	1.0	195.3	948.4	3	15	13.5	95.0	388.2	3	51.2

**Table 7-3 Days exceeding the Guideline for TSP or PM<sub>2.5</sub> at the Entrance Monitor**

Date	TSP (ug/m <sup>3</sup> )	PM <sub>2.5</sub> (ug/m <sup>3</sup> )	Average Wind Direction (degrees)	Average Wind Speed (km/hr)	Average RH (%)	Root Cause (Provided by Lafarge)
<b>Entrance</b>						
2023-05-01	262.1	-	248.5	11.4	38.1	
2023-05-02	264.5	-	103.1	10.2	44.7	
2023-05-03	388.2	35.2	244.5	12.1	39.2	
2023-05-04	257.0	-	253.2	12.4	49.6	
2023-05-10	187.9	-	257.7	9.6	72.4	
2023-05-11	202.4	-	257.1	10.4	66.4	
2023-05-12	163.9	-	258.9	10.2	53.1	
2023-05-13	152.9	-	295.0	10.9	45.9	
2023-05-14	133.9	-	51.8	10.7	49.0	
2023-05-15	238.3	-	248.4	10.6	42.3	
2023-05-18	257.0	96.5	70.9	9.5	52.6	Regional wildfire activity
<b>Total # of Exceedances</b>	<b>11</b>	<b>2</b>				
<b>Maximum # of Exceedances (May)</b>	<b>20 (2014)</b>	<b>3 (2019)</b>				
<b>Average # of Exceedances (May)</b>	<b>12</b>	<b>0</b>				
<b>Minimum # of Exceedances (May)</b>	<b>2 (2020)</b>	<b>0 (2010, 2012, 2013, 2015, 2017, 2018, 2020 - 2022)</b>				



**Figure 7-1 1-hour particulate matter concentrations recorded at the Entrance monitor**

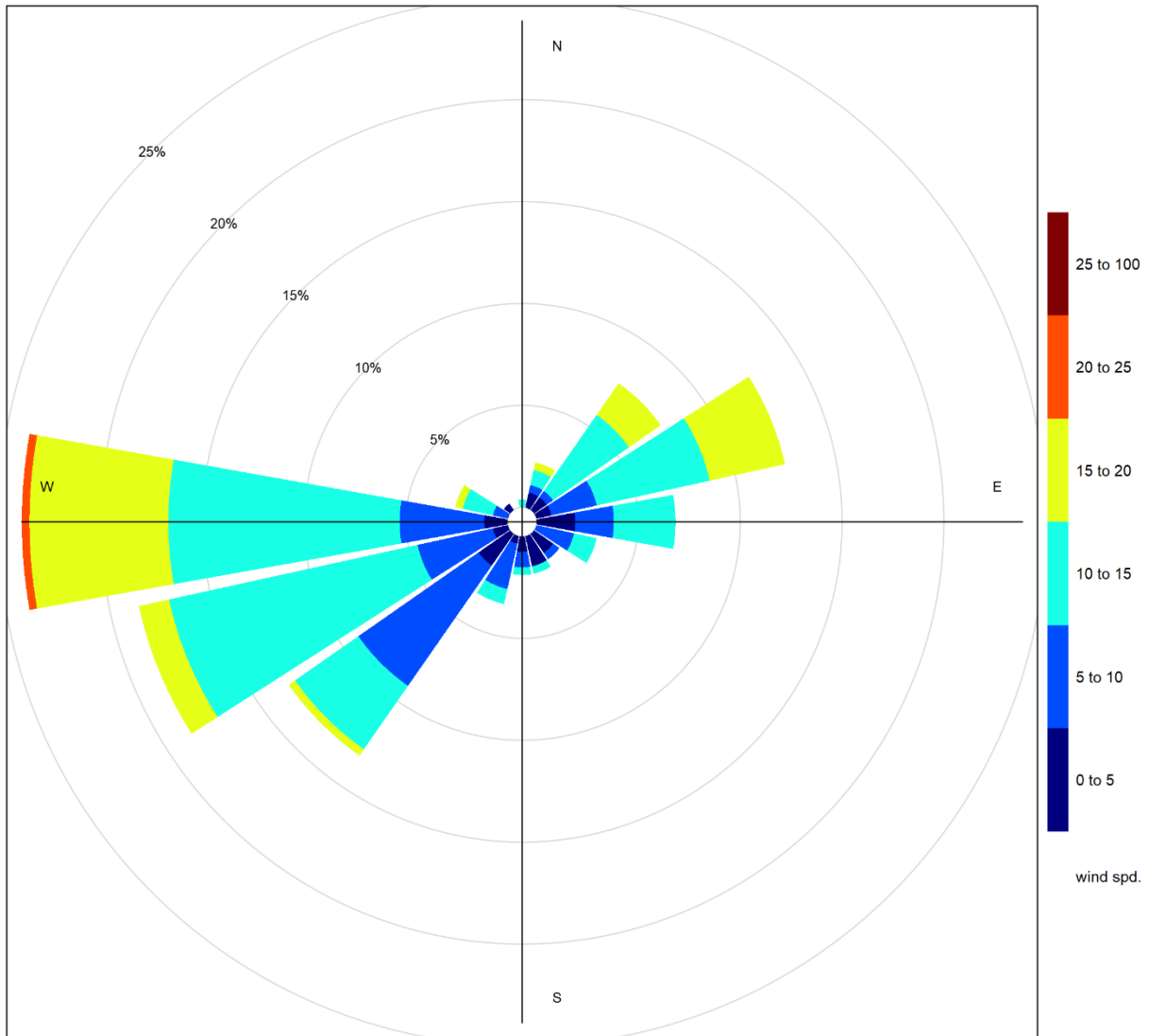


**Figure 7-2 24-hour particulate matter concentrations recorded at the Entrance monitor**

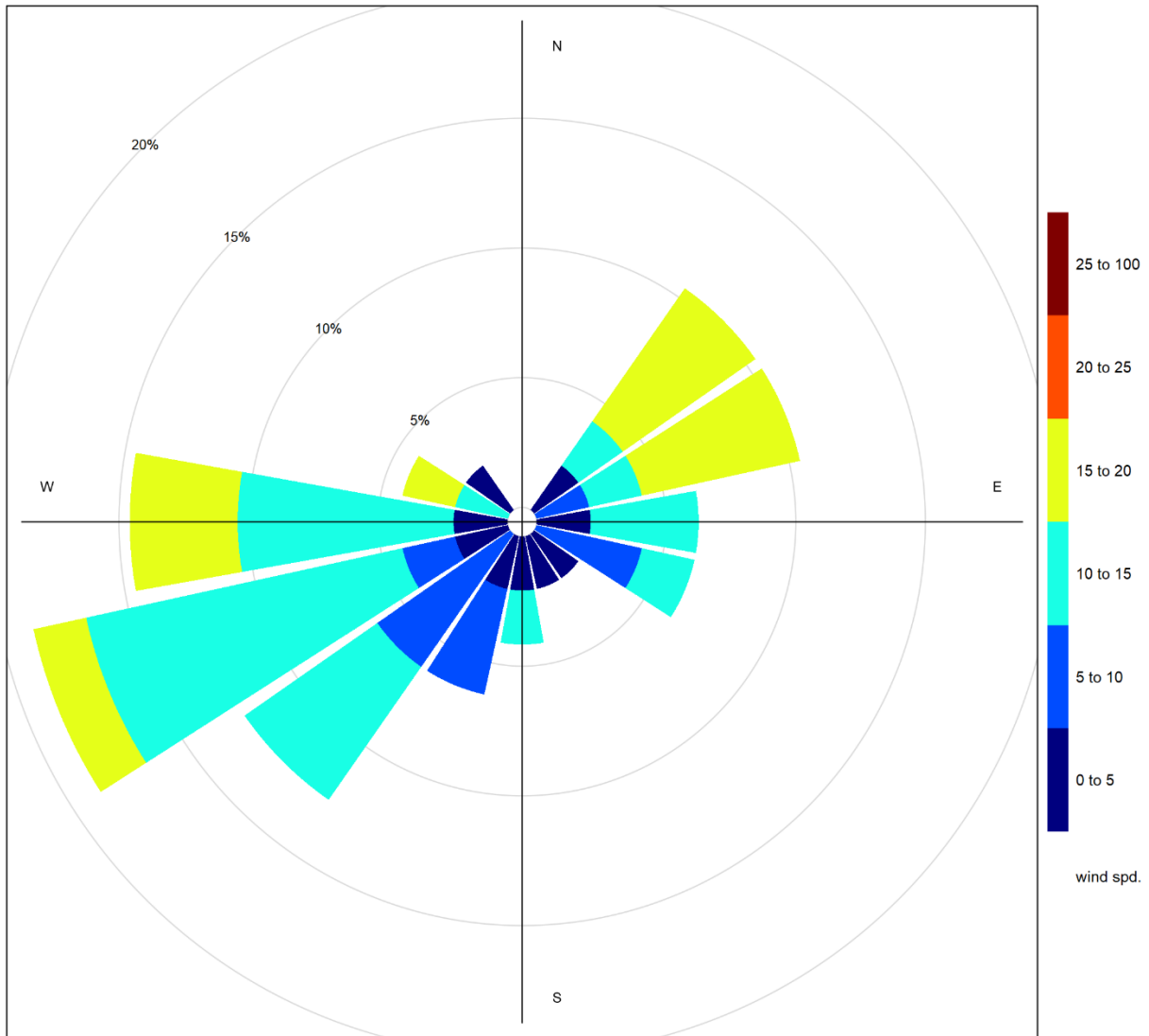
Figure 7-3 shows the wind rose for the 11 days of TSP exceedances. Figure 7-4 shows the wind rose for the 2 days of PM<sub>2.5</sub> exceedances. The wind rose shows that the wind predominately came from the west-southwest direction. This month many of the TSP exceedances were driven by windblown fugitive dust, and winds from the west which suggest impacts from the Lafarge Facility. The variation in wind conditions producing exceedances also shows the impact of wildfire activity.

Figure 7-5 illustrates the hourly PM concentrations recorded at the Entrance monitor, averaged over different time periods. The plot across the top shows the variation of PM over the course of a week, while the bottom three plots show the changes in PM over the course of a day, month, and weekday, respectively. Figure 7-5 is based on data collected during May 2023. The diurnal pattern differs from the Windridge, Lagoon and Berm stations and are likely more influenced by daytime traffic emission (from vehicles serving Lafarge as well as regular highway traffic) given its location near the highway entrance to Lafarge.

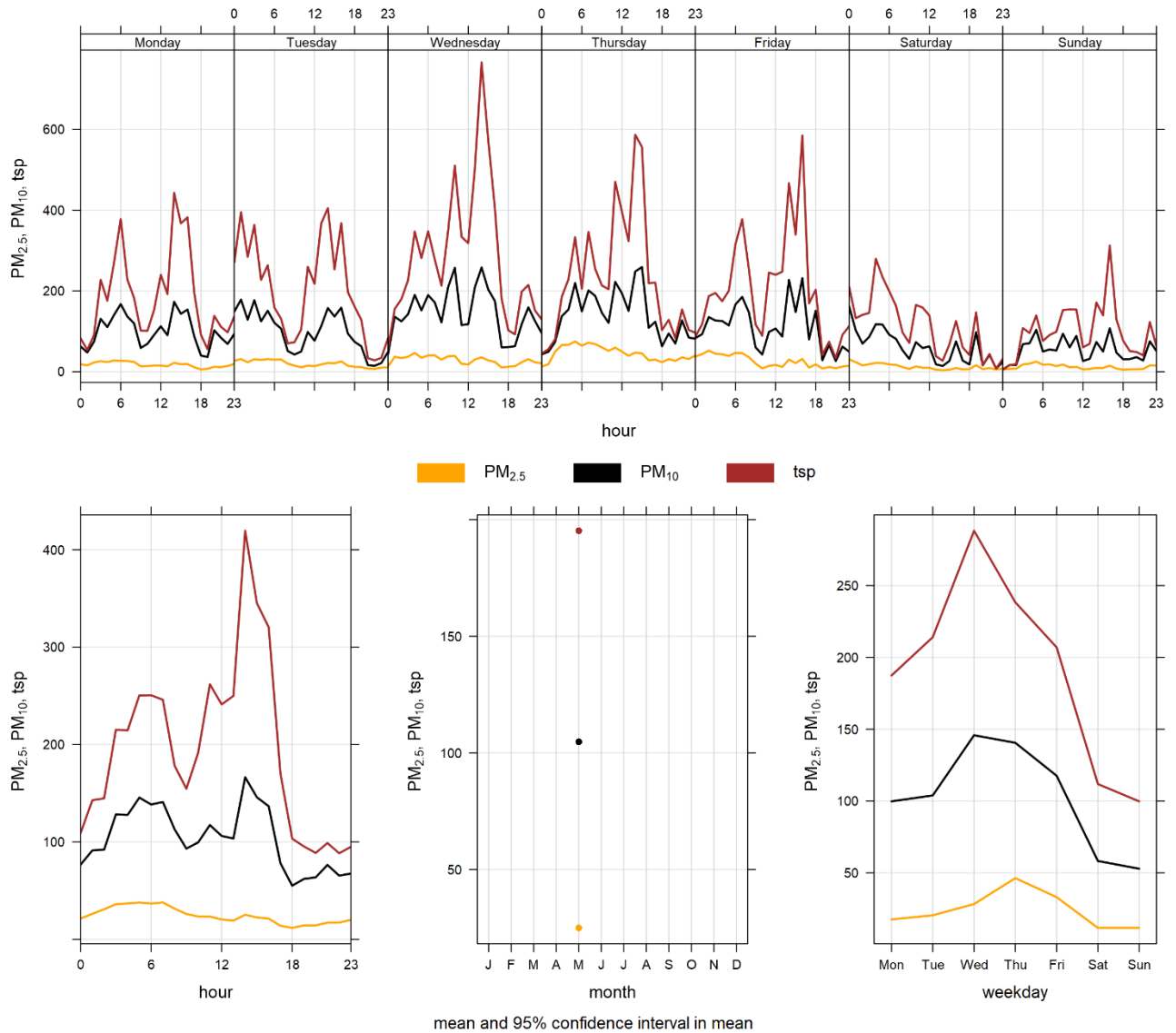




**Figure 7-3 Wind rose for TSP exceedance days recorded at the Entrance GRIMM**



**Figure 7-4 Wind rose for PM<sub>2.5</sub> exceedance days recorded at the Entrance GRIMM**



**Figure 7-5 Entrance particulate mater time variation**

# BIBLIOGRAPHY

- Alberta Environment and Parks. (2016, June). Alberta Ambient Air Quality Objectives and Guidelines Summary. Alberta, Canada.
- Alberta Environment and Parks. (2016, April). Air Monitoring Directive. Alberta, Canada.
- Carslaw, D.C. and K. Ropkins, (2012). Openair — an R package for air quality data analysis. Environmental Modelling & Software. Volume 27–28, 52–61.
- Levelton Consultants Ltd. (2015, June 15). Comparison of GRIMM and E-BAM Data. Alberta, Can

# APPENDIX

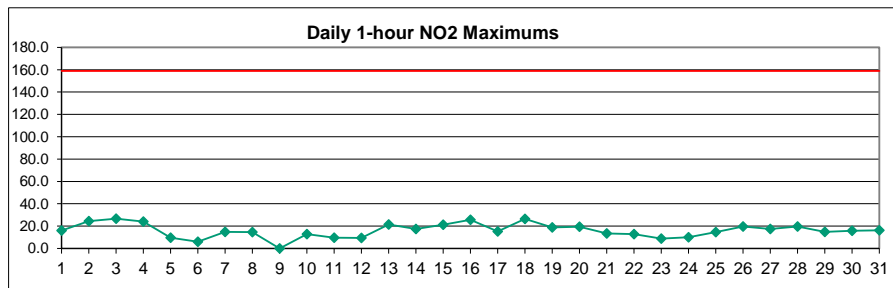
## A DATA & CALIBRATION REPORTS

# APPENDIX



# Lagoon NO<sub>2</sub> (ppb) – May 2023

Day	HOUR																								MEAN	MAX	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	14.4	S	13.7	15.7	15.4	14.4	15.0	16.1	14.8	12.9	4.5	10.3	3.7	1.5	1.3	0.6	0.6	2.8	1.2	1.3	2.4	4.8	6.8	4.9	7.8	16.1	
2	9.3	S	6.1	6.3	10.5	11.1	15.3	10.6	10.6	6.6	6.4	1.8	1.4	1.1	3.8	1.6	2.5	2.0	3.0	7.5	8.7	7.8	8.7	24.5	7.3	24.5	
3	19.4	S	17.1	16.3	16.7	17.6	15.3	26.7	9.2	18.4	19.6	5.6	2.5	4.7	1.1	0.9	0.7	0.8	10.4	11.2	8.5	6.2	3.1	6.1	10.4	26.7	
4	2.1	S	6.0	5.5	7.5	11.3	20.6	24.0	21.5	20.3	6.5	2.3	1.6	3.2	1.9	1.4	2.8	3.4	4.0	10.2	7.3	8.9	6.0	7.8	8.1	24.0	
5	3.9	S	4.7	3.5	7.4	7.7	7.7	9.7	7.8	7.5	3.0	1.1	1.5	1.6	1.4	2.6	1.3	1.7	2.1	5.3	5.2	1.7	4.5	2.9	4.2	9.7	
6	3.4	S	1.7	1.5	2.3	3.2	4.2	4.0	2.5	3.5	1.8	4.5	3.4	4.2	2.2	3.0	5.0	3.3	2.3	3.4	6.1	3.5	2.5	2.3	3.2	6.1	
7	6.7	S	6.0	5.9	5.6	3.3	6.6	11.1	10.4	14.9	9.4	1.6	1.7	2.0	1.2	2.9	3.0	2.2	1.3	4.5	9.3	5.2	5.1	3.1	5.3	14.9	
8	5.4	S	5.7	10.0	3.0	3.8	9.6	14.7	11.8	8.4	11.6	10.6	6.9	3.8	4.8	1.7	1.2	1.7	3.7	2.4	3.8	2.2	8.1	9.8	6.3	14.7	
9	7.3	S	9.4	8.2	7.5	11.9	10.3	11.7	7.2	C	C	C	C	C	C	7.7	12.2	6.8	3.5	4.3	8.2	7.1	8.2	3.8	-	-	
10	12.7	S	7.2	7.3	7.4	8.6	9.6	8.0	10.7	7.8	7.0	3.8	2.8	1.8	4.7	12.9	10.4	2.8	8.4	4.9	2.2	1.3	1.8	4.1	6.4	12.9	
11	3.6	S	6.4	6.3	6.5	5.8	6.1	7.3	6.0	9.5	3.3	1.7	2.1	2.8	1.4	1.9	5.1	4.1	1.5	3.5	6.9	3.1	1.5	4.3	4.4	9.5	
12	7.8	S	8.0	6.6	9.0	6.9	7.4	9.1	9.5	7.3	6.8	4.1	2.8	2.4	2.1	1.8	1.5	2.3	2.9	4.5	5.7	5.5	4.6	5.2	5.4	9.5	
13	11.9	S	15.7	19.3	15.4	11.7	12.2	12.4	14.4	5.8	3.7	8.8	2.1	1.4	1.3	1.2	1.9	3.6	1.9	5.7	4.6	5.5	18.3	21.4	8.7	21.4	
14	10.7	S	14.0	17.5	13.9	11.7	11.4	10.5	8.0	15.8	7.1	2.8	1.0	1.0	1.1	1.2	1.8	3.4	2.3	3.1	2.2	2.5	7.8	4.2	6.7	17.5	
15	7.9	S	11.1	9.9	10.6	17.1	16.0	19.5	20.4	11.8	21.3	12.8	3.4	2.3	1.0	1.0	3.3	1.8	1.1	2.8	1.2	1.8	10.0	14.8	8.8	21.3	
16	16.2	S	9.1	3.0	9.6	13.1	25.8	16.2	15.5	7.5	14.8	11.1	10.1	8.7	8.6	7.3	8.8	8.7	8.5	7.0	6.0	8.2	6.7	7.3	10.3	25.8	
17	13.4	S	4.2	3.9	4.2	8.0	7.9	13.1	13.9	12.6	8.4	9.0	8.2	7.1	8.0	8.9	8.5	13.9	9.8	8.9	7.9	9.8	13.4	15.3	9.5	15.3	
18	15.1	S	15.3	18.4	16.8	13.3	17.0	17.1	12.0	11.5	26.5	9.1	8.3	5.9	5.8	5.4	4.6	5.0	6.9	7.8	6.3	6.9	9.1	9.9	11.0	26.5	
19	10.8	S	11.7	10.0	12.9	12.5	18.8	16.7	12.9	6.3	7.5	7.7	5.4	7.5	8.0	6.5	3.3	2.8	2.0	6.6	4.4	3.8	8.8	11.2	8.6	18.8	
20	7.1	S	10.0	9.3	11.8	15.3	19.0	14.8	19.4	12.1	6.7	5.5	14.1	17.7	5.8	2.6	5.7	3.1	5.7	0.7	2.5	10.6	4.8	4.8	9.1	19.4	
21	7.5	S	8.6	8.2	13.5	9.0	7.5	4.4	5.8	6.4	1.9	1.4	3.3	12.8	3.8	6.0	12.0	12.5	3.9	6.9	4.8	4.0	6.8	6.4	6.8	13.5	
22	3.4	S	4.6	2.1	4.8	5.1	7.3	12.9	10.8	6.5	6.4	7.9	3.8	1.6	5.7	6.2	4.5	2.8	5.4	3.8	4.7	4.8	6.2	3.9	5.4	12.9	
23	5.1	S	5.0	3.1	4.3	4.3	6.1	5.1	2.6	2.2	0.6	2.1	1.0	3.0	2.0	1.6	1.6	3.2	4.2	2.7	5.0	2.3	8.9	5.8	3.6	8.9	
24	6.4	S	4.2	5.2	10.0	5.0	8.5	10.1	6.4	9.4	9.5	3.6	6.2	3.9	2.1	6.5	3.5	6.1	3.3	2.3	3.2	5.0	4.2	7.1	5.7	10.1	
25	9.7	S	6.4	1.8	2.5	5.3	6.8	13.8	10.6	6.8	1.7	2.2	11.6	12.0	14.3	10.1	10.8	4.6	5.7	3.2	2.6	8.1	7.0	14.7	7.5	14.7	
26	11.2	S	5.0	5.8	9.3	12.9	12.4	10.8	11.9	19.7	11.5	3.3	2.8	3.0	2.3	4.6	2.6	1.9	3.9	2.4	2.6	2.9	6.0	9.6	6.9	19.7	
27	8.7	S	11.8	15.0	11.4	15.3	15.4	16.8	16.7	17.5	10.1	2.3	1.8	1.8	2.0	2.4	1.8	1.6	1.4	1.7	2.2	12.1	11.6	9.7	8.3	17.5	
28	8.4	S	10.0	7.8	7.2	6.8	5.2	6.1	19.7	6.5	2.2	1.0	1.6	3.0	13.4	4.1	1.4	1.4	1.6	9.7	13.9	3.9	1.4	5.7	6.2	19.7	
29	6.3	S	3.5	6.4	6.6	7.1	14.9	14.0	11.0	2.1	6.9	12.0	10.9	11.0	7.7	8.0	10.2	1.1	1.2	2.5	2.5	12.5	8.7	9.2	7.7	14.9	
30	10.2	S	5.4	4.2	15.8	9.8	14.0	13.9	11.0	5.2	2.8	9.5	8.4	4.8	3.2	1.2	4.4	1.6	1.1	8.4	6.7	5.4	6.1	12.0	7.2	15.8	
31	9.7	S	8.3	9.4	12.4	15.8	13.8	16.3	10.2	6.3	11.4	4.2	2.2	2.8	1.9	1.8	1.5	1.4	1.5	2.3	2.0	1.8	4.9	5.6	6.4	16.3	
NO.	31	-	31	31	31	31	31	31	31	30	30	30	30	30	30	31	31	31	31	31	31	31	31	31	31	707	100.0%
MEAN	8.9	-	8.3	8.2	9.4	9.8	11.9	12.8	11.5	9.6	8.0	5.5	4.6	4.7	4.1	4.1	4.5	3.7	3.7	4.9	5.1	5.5	6.8	8.3			
MAX	19.4	-	17.1	19.3	16.8	17.6	25.8	26.7	21.5	20.3	26.5	12.8	14.1	17.7	14.3	12.9	12.2	13.9	10.4	11.2	13.9	12.5	18.3	24.5			



Number of 1HR Exceedences	0
Number of Non-Zero Readings	707
Maximum 1-HR Average	26.7 PPB
Maximum 24-HR Average	11.0 PPB
Operational Time	744 HRS
Monthly Calibration	6
Operational Uptime	100.0 %
Standard Deviation	4.9
Monthly Average	7.1 PPB

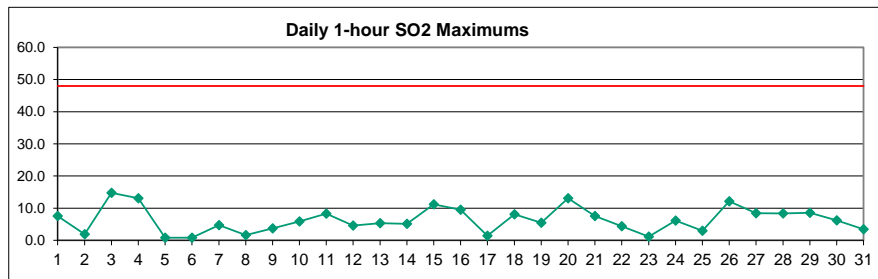






# Lagoon SO<sub>2</sub> (ppb) – May 2023

Day	HOUR																								MEAN	MAX	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	1.0	S	1.1	1.7	2.9	2.4	4.2	5.1	5.5	7.5	1.1	3.0	1.1	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.5	0.6	0.5	0.3	1.8	7.5	
2	0.4	S	0.1	0.2	0.3	0.3	1.3	1.1	0.4	0.5	1.9	0.7	0.7	0.7	0.9	0.8	0.9	0.9	0.8	0.7	0.4	0.2	0.2	0.4	0.6	1.9	
3	0.3	S	0.6	1.8	2.8	3.8	3.2	14.8	2.8	7.9	6.9	0.8	0.8	1.8	0.5	0.3	0.4	0.2	0.4	0.8	1.1	1.5	0.6	1.5	2.4	14.8	
4	0.6	S	1.0	1.6	1.5	2.0	6.4	13.1	10.7	10.8	1.5	0.9	0.7	0.5	0.5	0.5	0.7	0.4	0.4	1.0	1.0	1.1	0.6	0.6	2.5	13.1	
5	0.3	S	0.2	0.2	0.2	0.2	0.4	0.4	0.7	0.8	0.6	0.5	0.4	0.5	0.6	0.6	0.4	0.4	0.6	0.7	0.6	0.5	0.4	0.3	0.5	0.8	
6	0.3	S	0.0	0.1	0.5	0.8	0.8	0.6	0.6	0.6	0.4	0.5	0.4	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.4	0.8	
7	0.3	S	0.2	0.2	0.2	0.2	0.5	0.7	1.7	4.7	1.9	0.4	0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.2	0.5	0.9	0.4	0.7	4.7
8	0.9	S	0.7	0.8	0.3	0.3	0.4	0.8	0.4	0.5	1.5	1.6	1.0	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.1	0.3	0.5	0.5	0.6	1.6	
9	0.4	S	0.9	0.8	0.5	1.3	0.6	2.8	1.3	C	C	C	C	0.1	0.2	0.6	3.7	0.9	0.3	0.0	0.0	0.1	0.0	0.0	0.8	3.7	
10	0.0	S	0.0	0.2	0.3	0.9	1.1	1.2	3.1	2.6	2.7	0.6	0.4	0.1	1.0	5.2	5.8	0.2	0.3	0.3	0.0	0.0	0.0	0.0	1.1	5.8	
11	0.0	S	1.3	2.7	1.6	1.4	2.3	6.7	5.0	8.3	1.0	0.3	0.4	0.5	0.2	0.2	0.5	0.8	0.2	0.1	0.0	0.0	0.0	0.0	1.5	8.3	
12	0.0	S	0.9	0.4	1.8	1.1	2.2	4.6	4.4	2.6	2.7	1.2	0.5	0.4	0.4	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	1.0	4.6	
13	0.0	S	0.5	3.0	3.3	1.4	3.5	4.4	5.3	1.1	0.5	2.7	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.1	0.3	1.2	5.3	
14	0.0	S	0.0	0.0	0.6	0.7	1.0	2.8	0.9	5.1	1.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.6	5.1	
15	0.0	S	0.0	0.2	0.4	2.1	3.7	7.5	7.9	3.8	11.2	6.0	0.8	0.3	0.2	0.2	1.8	0.1	0.1	0.2	0.2	0.1	1.4	4.4	2.3	11.2	
16	5.8	S	2.4	0.6	1.9	2.7	9.5	3.2	1.3	0.3	2.7	2.7	3.9	2.9	2.1	1.1	0.7	1.3	0.9	0.8	0.5	0.4	0.3	0.2	2.1	9.5	
17	0.6	S	0.0	0.1	0.0	0.1	0.1	0.5	1.1	0.9	1.2	1.0	1.0	1.0	1.2	1.4	1.3	1.0	0.9	1.0	0.4	0.0	0.0	0.0	0.6	1.4	
18	0.0	S	0.0	0.0	0.0	0.0	0.6	0.6	0.4	0.4	8.1	1.6	1.4	0.8	0.7	0.7	0.6	0.4	0.6	0.5	0.3	0.3	0.1	0.1	0.8	8.1	
19	0.2	S	0.4	1.0	1.3	2.0	5.2	5.5	3.9	1.0	1.8	2.3	1.4	2.4	2.6	1.6	0.6	0.7	0.2	0.2	0.3	0.3	0.3	0.3	1.5	5.5	
20	0.2	S	1.4	2.1	2.7	2.7	7.1	6.9	11.7	5.3	2.7	2.3	13.1	10.4	2.1	0.4	2.5	0.5	0.6	0.1	0.3	0.4	0.3	0.4	3.3	13.1	
21	1.4	S	1.8	2.1	6.1	3.4	1.7	1.0	1.8	1.1	0.2	0.2	0.9	7.6	1.5	3.5	6.3	4.3	0.3	0.4	0.3	0.6	0.7	0.3	2.1	7.6	
22	0.2	S	0.9	0.5	1.0	1.1	1.6	4.4	3.3	1.1	1.3	1.3	0.4	0.4	0.4	2.0	0.9	0.4	0.6	0.5	0.4	0.4	0.3	0.4	1.0	4.4	
23	0.6	S	0.3	0.3	0.5	0.4	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	1.1	0.5	0.2	0.5	0.2	0.4	0.7	0.4	1.1	
24	0.3	S	0.2	0.3	0.5	0.2	1.1	1.8	0.5	1.4	2.6	0.7	6.1	2.5	1.0	5.7	1.4	1.0	0.8	0.6	0.2	0.2	0.2	0.1	1.3	6.1	
25	0.0	S	0.0	0.0	0.0	0.1	0.1	0.3	0.9	0.5	0.3	0.6	3.0	2.9	2.6	1.7	1.5	0.4	0.4	0.2	0.0	0.1	0.1	0.1	0.7	3.0	
26	0.1	S	0.0	0.0	0.1	0.5	1.2	1.4	4.4	12.1	4.9	0.8	0.4	0.5	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.0	1.3	12.1	
27	0.3	S	0.2	0.9	1.2	3.1	3.9	8.4	7.4	7.6	3.9	0.6	0.5	0.5	0.5	0.7	0.5	0.4	0.4	0.5	0.4	0.4	0.3	0.2	1.9	8.4	
28	0.3	S	0.9	0.8	0.8	1.0	1.1	1.8	8.4	1.1	0.2	0.3	0.4	0.9	5.2	1.6	0.3	0.4	0.4	1.5	0.4	0.3	0.4	0.5	1.3	8.4	
29	0.2	S	0.1	0.8	1.1	1.2	4.4	6.3	2.8	0.4	4.0	5.8	8.6	6.8	4.0	2.3	4.0	0.5	0.3	0.6	0.5	2.0	1.1	1.8	2.6	8.6	
30	2.3	S	0.7	0.7	4.0	2.2	3.7	3.7	3.8	2.4	0.6	6.2	5.6	2.9	1.0	0.3	1.4	0.4	0.3	1.0	0.5	0.4	0.4	0.3	2.0	6.2	
31	0.3	S	0.3	0.2	0.2	0.2	0.2	3.4	2.6	1.1	2.9	1.1	0.8	1.0	0.6	0.6	0.5	0.6	0.4	0.6	0.4	0.5	1.1	0.6	0.9	3.4	
NO.	31	-	31	31	31	31	31	31	31	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	709	100.0%	
MEAN	0.6	-	0.5	0.8	1.3	1.3	2.4	3.8	3.4	3.1	2.4	1.6	1.8	1.6	1.0	1.1	1.3	0.6	0.4	0.5	0.3	0.4	0.4	0.5			
MAX	5.8	-	2.4	3.0	6.1	3.8	9.5	14.8	11.7	12.1	11.2	6.2	13.1	10.4	5.2	5.7	6.3	4.3	0.9	1.5	1.1	2.0	1.4	4.4			



Number of 1HR Exceedences	0	Operational Time	744 HRS
Number of Non-Zero Readings	670	Operational Uptime	100.0 %
Maximum 1-HR Average	14.8 PPB	Monthly Average	1.3 PPB
Maximum 24-HR Average	3.3 PPB		
Monthly Calibration	4		
Standard Deviation	2.056		





















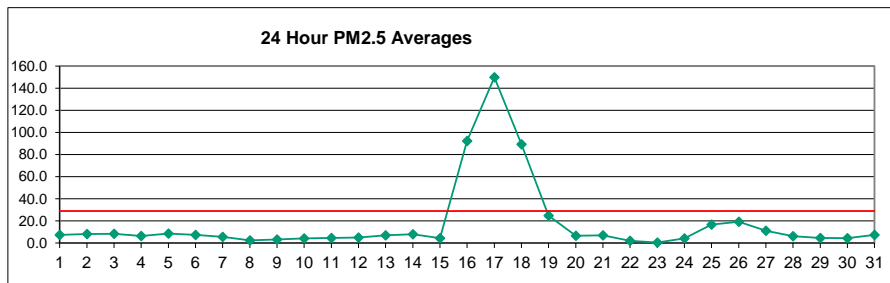






# West PM<sub>2.5</sub> (µg/m<sup>3</sup>) – May 2023

Day	HOUR																								MEAN	MAX
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1	7.6	7.3	6.5	6.1	5.9	6.7	8.2	8.1	7.8	8.0	8.1	7.1	7.1	6.6	7.0	6.9	4.8	6.6	7.2	9.8	8.1	9.8	8.0	7.5	7.4	9.8
2	7.7	7.9	7.7	7.6	9.0	8.1	8.1	7.1	7.3	7.2	7.6	7.5	7.3	7.8	9.2	9.4	8.9	8.6	8.0	7.5	8.4	8.0	8.5	10.4	8.1	10.4
3	10.3	12.4	12.7	12.2	11.7	11.5	12.5	11.4	9.7	8.8	7.3	7.6	5.8	5.5	6.7	5.8	4.3	5.1	8.6	10.8	5.2	4.8	4.6	5.7	8.4	12.7
4	5.7	6.1	6.5	6.4	6.2	6.3	7.5	7.2	7.2	6.7	5.5	10.7	8.4	7.9	5.1	6.6	7.3	7.8	6.2	5.0	4.8	4.1	4.1	4.3	6.4	10.7
5	4.4	4.1	3.5	4.3	4.2	3.8	5.4	4.8	6.5	10.1	11.4	6.9	8.8	12.1	14.1	12.1	15.8	12.2	13.2	13.4	9.4	9.4	8.1	6.8	8.5	15.8
6	8.6	7.6	5.1	5.0	4.6	5.8	12.5	10.2	8.8	12.1	8.7	9.0	8.6	8.1	7.9	5.7	6.6	4.7	8.0	6.8	6.5	5.6	4.0	8.7	7.5	12.5
7	6.3	7.3	7.2	7.3	13.4	9.4	11.1	12.3	10.5	4.6	0.9	0.6	0.4	0.4	0.6	10.2	12.0	5.9	4.0	5.3	2.6	1.8	0.9	0.8	5.7	13.4
8	1.0	0.9	0.9	0.7	0.8	0.8	0.6	0.8	0.6	0.4	0.8	1.0	3.4	7.9	9.0	11.0	6.5	1.6	1.9	2.5	2.2	2.3	1.7	1.8	2.5	11.0
9	1.3	1.0	1.1	1.0	1.2	1.2	1.1	1.1	1.2	1.3	1.7	2.4	3.6	8.0	10.3	5.0	4.1	3.0	8.2	8.9	3.0	3.0	3.6	2.8	3.3	10.3
10	2.8	2.5	2.9	2.2	1.7	1.9	2.0	2.0	2.4	3.0	5.8	11.9	10.0	6.7	7.9	8.5	6.3	3.3	3.1	2.8	2.8	2.7	2.7	3.0	4.2	11.9
11	3.2	3.8	3.4	3.4	3.5	3.4	3.8	4.7	5.4	4.1	2.6	4.2	7.0	5.9	5.8	4.0	3.0	3.1	6.8	5.3	6.0	8.2	4.7	3.9	4.5	8.2
12	3.8	3.2	3.1	2.8	2.8	2.7	3.1	4.0	4.5	3.8	2.8	2.5	3.1	2.9	3.9	8.8	5.5	7.8	8.0	6.1	6.6	7.1	11.2	10.4	5.0	11.2
13	9.0	6.3	5.9	5.8	5.0	4.6	4.1	4.0	4.5	4.5	4.8	5.2	5.7	5.1	6.1	6.1	7.2	9.2	8.4	9.7	10.1	11.4	12.1	12.9	7.0	12.9
14	10.6	10.1	10.6	10.2	9.2	8.2	7.5	7.2	7.7	9.9	9.9	8.9	7.2	6.1	5.7	7.3	8.6	10.8	7.0	4.5	5.3	7.1	7.2	7.0	8.1	10.8
15	7.0	7.6	7.3	6.5	5.8	5.6	6.7	6.7	6.5	5.4	4.1	2.6	9.0	5.0	1.7	3.0	1.6	1.0	1.1	1.4	3.4	2.9	2.9	2.8	4.5	9.0
16	3.0	3.3	4.1	4.1	3.8	5.0	5.9	6.7	7.4	7.6	30.5	202.9	259.8	232.8	201.5	189.1	163.3	128.0	130.8	143.1	137.4	118.8	116.0	114.2	92.5	259.8
17	101.0	101.9	106.3	103.4	83.3	90.1	98.0	102.7	124.7	157.0	190.4	186.6	172.1	183.7	186.9	188.7	210.0	216.0	192.4	163.8	162.7	157.8	162.5	160.9	150.0	216.0
18	161.0	129.5	106.3	89.0	92.5	92.5	99.9	101.3	118.4	115.1	106.0	129.6	105.3	86.0	69.3	66.1	59.7	56.1	55.1	57.3	64.6	68.1	67.8	51.2	89.5	161.0
19	50.6	49.4	47.8	42.9	38.2	38.8	38.6	45.8	45.8	26.7	15.5	13.8	9.6	9.8	7.7	6.1	5.7	4.9	4.1	4.1	5.5	22.9	30.4	31.8	24.9	50.6
20	18.4	12.3	9.1	7.7	7.6	7.4	6.5	6.2	6.7	5.8	4.6	4.4	4.0	3.0	2.8	3.8	4.6	3.3	3.5	4.0	5.5	9.3	7.9	8.9	6.5	18.4
21	10.2	8.9	8.9	9.2	9.7	8.9	8.4	9.0	9.0	7.3	5.4	3.6	4.0	3.5	2.9	3.8	4.0	4.4	4.4	10.0	15.3	6.6	4.2	5.5	7.0	15.3
22	4.1	3.4	2.9	2.8	3.0	3.0	2.8	3.3	3.5	3.6	3.5	1.8	1.1	1.4	1.9	0.8	0.8	0.6	0.6	0.6	0.5	0.5	0.3	2.1	4.1	4.1
23	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	1.0	0.4	0.3	0.7	1.0	1.2	1.0	0.4	1.2
24	1.5	1.3	0.9	1.0	1.1	1.0	2.1	2.7	2.1	2.9	1.9	1.5	1.3	1.4	1.5	1.7	7.6	11.8	8.9	7.3	8.3	11.4	11.8	10.9	4.3	11.8
25	10.9	13.6	12.9	19.1	19.2	17.3	16.3	19.6	18.5	27.8	22.4	21.2	15.9	15.6	15.3	14.5	13.8	18.0	20.0	14.1	12.8	18.1	10.0	11.8	16.6	27.8
26	13.3	15.6	15.3	15.2	15.4	14.7	13.0	12.9	13.8	14.2	21.2	22.5	19.0	18.4	19.2	22.5	22.5	23.5	24.4	24.2	25.2	24.8	24.7	26.7	19.3	26.7
27	18.4	17.4	16.1	14.4	12.1	10.4	10.0	9.3	9.7	9.4	8.4	9.6	9.6	6.9	8.8	9.0	7.5	7.9	8.5	9.0	9.4	20.3	14.3	13.1	11.2	20.3
28	13.6	10.1	8.6	7.9	7.2	7.8	7.1	7.6	7.2	5.7	4.7	4.3	5.5	4.0	4.0	2.9	3.6	3.4	3.0	3.0	3.1	6.9	7.9	11.2	6.3	13.6
29	8.7	9.6	8.1	5.4	4.6	4.3	5.9	6.6	5.5	3.8	3.9	3.8	3.6	3.3	4.4	2.4	3.4	2.8	2.4	3.2	2.9	3.6	3.7	3.8	4.6	9.6
30	4.0	3.8	3.8	4.0	4.3	4.8	5.0	6.3	5.8	4.8	4.1	3.6	3.2	2.4	5.0	2.7	3.8	3.4	3.1	3.3	4.5	6.1	7.2	5.3	4.4	7.2
31	5.1	5.2	6.8	5.5	4.7	5.1	6.0	6.3	5.8	5.5	6.7	6.1	5.4	9.6	10.0	8.2	8.3	8.3	6.9	15.9	9.1	7.4	9.3	11.4	7.4	15.9
NO.	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	744	100%
MEAN	16.5	15.3	14.2	13.3	12.6	12.6	13.5	14.1	15.3	15.7	16.5	22.7	23.1	21.9	20.7	20.5	20.0	18.9	18.3	18.2	17.8	18.4	18.2	18.0		
MAX	161.0	129.5	106.3	103.4	92.5	92.5	99.9	102.7	124.7	157.0	190.4	202.9	259.8	232.8	201.5	189.1	163.3	128.0	130.8	143.1	137.4	118.8	116.0	114.2		



Number of 24HR Exceedences	3	Proposed Guideline
Number of Non-Zero Readings	744	
Maximum 1-HR Average	259.8 UG/M3	
Maximum 24-HR Average	150.0 UG/M3	
IZS Calibration Time		Operational Time 744 HRS
Down Time	0	Operational Uptime 100.0 %
Standard Deviation	36.95	Monthly Average 17.4 UG/M3

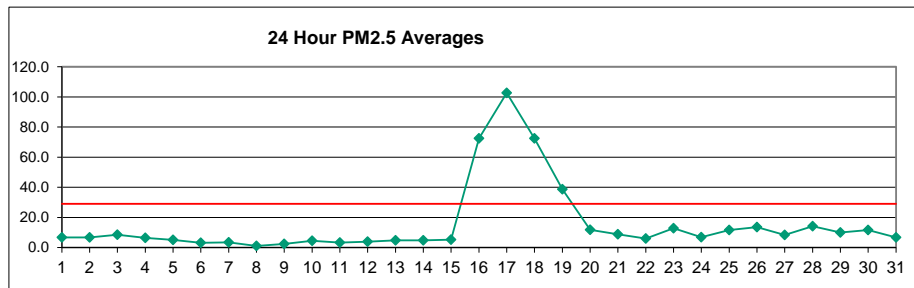






# Berm PM<sub>2.5</sub> (µg/m<sup>3</sup>) – May 2023

DAY	HOUR																								MEAN	MAX	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	4.7	5.3	6.2	5.3	5.0	5.5	12.2	11.2	13.2	13.5	11.9	9.7	8.6	5.7	4.3	4.3	4.8	4.3	5.8	4.2	4.2	4.6	4.1	4.4	6.8	13.5	
2	4.5	4.6	4.4	4.2	4.9	5.7	8.7	10.6	11.0	9.1	9.5	6.4	6.6	6.3	6.1	6.0	6.8	6.5	6.7	7.2	6.7	6.9	7.3	6.9	6.8	11.0	
3	8.2	7.9	8.6	9.9	10.0	10.4	10.2	11.0	10.7	11.8	13.1	10.4	11.1	6.2	8.0	10.7	7.6	3.9	3.2	3.5	10.7	7.7	5.4	4.8	8.5	13.1	
4	3.5	3.5	3.8	4.4	4.8	5.4	13.7	12.8	16.5	14.3	10.6	6.3	5.1	5.2	5.3	9.0	6.4	5.3	3.5	4.4	3.1	3.0	2.9	3.2	6.5	16.5	
5	2.1	2.1	2.9	2.7	3.4	3.3	4.7	6.8	12.1	6.4	4.9	4.9	5.2	5.0	5.5	5.9	9.1	8.1	6.3	5.7	4.9	4.0	4.0	3.9	5.2	12.1	
6	3.8	3.5	3.8	3.4	4.2	3.2	3.6	4.2	4.1	4.1	6.7	4.7	4.6	3.3	2.4	1.2	1.0	1.5	2.3	2.0	1.6	1.7	2.0	2.2	3.1	6.7	
7	2.3	2.1	1.9	2.2	3.0	4.2	7.9	10.1	7.7	6.4	10.4	4.6	3.6	4.2	5.0	1.6	0.7	1.3	1.7	1.4	0.7	0.5	0.6	0.4	3.5	10.4	
8	0.5	0.9	0.5	0.4	0.6	0.5	0.5	0.9	0.6	0.4	0.7	2.8	3.7	3.3	3.2	0.6	0.7	0.6	0.6	0.7	1.3	1.5	1.0	1.5	1.2	3.7	
9	1.8	0.9	0.8	0.7	1.8	0.9	2.1	2.1	2.3	1.9	2.4	2.8	4.8	3.9	2.7	4.9	4.6	2.6	3.3	3.0	1.9	1.8	1.8	1.5	2.4	4.9	
10	2.2	2.5	2.3	1.4	2.6	1.3	2.2	3.8	3.8	10.0	9.4	6.6	5.8	3.5	4.4	5.2	5.5	16.0	6.5	4.1	2.0	2.1	2.1	2.0	4.5	16.0	
11	1.9	2.2	2.2	2.4	2.4	3.1	4.8	5.0	4.1	6.0	10.3	6.6	2.7	2.6	7.9	3.0	4.0	2.3	1.9	1.1	1.2	1.2	1.2	1.4	3.4	10.3	
12	1.6	1.4	2.4	2.7	2.1	2.3	3.9	5.0	6.3	9.1	7.0	3.8	5.4	3.8	3.0	2.7	4.0	2.7	3.8	3.7	4.2	4.8	5.0	5.0	4.0	9.1	
13	5.3	4.3	4.5	4.9	4.6	4.3	4.0	4.0	4.2	5.9	7.3	8.6	3.8	2.9	2.3	2.4	2.7	3.4	5.1	6.3	6.6	6.0	6.4	5.0	4.8	8.6	
14	5.1	6.0	4.8	5.5	7.1	6.6	6.6	6.9	6.4	9.3	7.2	5.8	4.3	2.9	2.6	3.2	3.2	2.6	2.2	2.4	3.9	4.2	3.5	2.6	4.8	9.3	
15	2.2	3.2	3.9	4.5	5.0	4.6	4.7	8.2	9.2	8.7	14.7	6.0	2.8	2.3	2.0	1.8	10.9	18.6	5.5	1.5	1.2	1.2	1.8	2.2	5.3	18.6	
16	2.6	4.0	4.6	3.6	3.4	5.6	5.3	12.8	13.7	15.7	60.8	139.9	216.7	184.6	170.0	159.7	134.2	101.1	99.9	107.8	96.6	65.2	66.1	64.4	72.4	216.7	
17	78.4	75.0	65.9	64.4	40.8	45.2	57.9	77.8	83.0	105.1	136.1	128.4	130.5	142.8	150.6	137.6	167.2	147.3	128.7	106.8	113.1	93.6	87.4	101.6	102.7	167.2	
18	94.1	70.3	64.7	65.9	50.4	84.2	102.8	125.4	123.8	122.1	118.4	101.4	86.4	68.9	58.1	54.4	46.6	43.1	43.1	46.0	45.0	44.1	39.2	41.6	72.5	125.4	
19	48.3	47.4	46.2	43.2	44.3	42.7	42.6	48.1	45.8	56.1	79.7	83.8	57.9	35.3	54.7	30.1	27.2	24.5	14.9	9.2	5.9	20.0	9.6	12.8	38.8	83.8	
20	19.0	14.1	10.6	8.4	7.1	6.7	18.2	8.6	13.3	13.6	10.0	9.6	10.8	13.0	23.2	25.4	16.7	9.5	9.6	14.6	4.5	5.3	4.9	6.4	11.8	25.4	
21	7.1	10.3	7.6	8.3	9.9	8.3	8.1	8.9	8.2	13.5	19.6	6.7	3.9	4.9	7.5	8.4	5.5	5.2	5.3	10.1	14.6	15.3	6.5	8.4	8.8	19.6	
22	6.2	4.4	3.2	2.8	2.3	2.8	4.4	4.1	3.6	3.2	3.0	4.8	15.3	10.8	8.1	51.0	5.2	4.8	0.7	0.6	0.5	0.6	0.9	0.7	6.0	51.0	
23	0.6	3.1	3.7	4.4	7.4	14.7	14.8	16.3	14.4	24.9	28.4	21.7	26.5	13.2	17.5	16.9	7.5	24.5	26.4	15.2	0.5	0.7	4.2	0.7	12.8	28.4	
24	0.6	0.6	0.7	0.5	0.8	0.8	1.3	3.3	4.8	9.8	7.5	31.9	14.6	25.6	12.5	4.3	10.9	3.8	3.6	4.1	4.8	7.0	5.5	6.5	6.9	31.9	
25	3.8	4.9	6.7	10.5	12.4	12.9	12.7	15.1	23.6	18.9	14.5	11.0	15.8	13.8	13.4	16.8	14.5	12.4	12.5	9.8	9.5	7.7	3.3	3.0	11.6	23.6	
26	8.3	13.2	15.5	16.4	17.2	13.7	13.2	10.6	12.9	17.7	17.1	15.3	12.3	12.5	14.2	12.2	14.8	12.7	13.2	14.3	13.0	11.7	12.8	12.4	13.6	17.7	
27	10.8	11.3	12.6	15.2	12.1	10.5	9.7	9.9	9.5	9.8	8.0	7.0	7.0	4.8	5.4	6.0	5.8	5.6	5.9	6.1	6.9	6.6	5.2	8.8	8.3	15.2	
28	6.2	7.4	6.6	7.2	6.9	7.8	9.2	6.6	11.7	16.4	23.9	15.6	14.4	15.6	27.4	26.3	37.7	19.2	17.2	28.8	10.0	6.2	6.0	6.3	14.2	37.7	
29	5.6	5.6	5.3	4.6	4.1	3.4	6.7	5.5	5.2	18.5	8.0	12.6	14.0	12.0	71.1	12.0	5.8	7.8	7.2	12.6	4.8	2.9	3.2	3.9	10.1	71.1	
30	3.7	3.3	2.5	2.8	3.2	4.3	8.2	10.5	12.5	12.4	42.7	8.3	23.2	12.2	24.3	19.2	16.0	16.3	26.9	16.0	2.9	2.8	2.9	3.9	11.7	42.7	
31	3.3	3.9	2.3	2.4	5.0	9.4	12.1	8.0	12.2	11.9	23.8	7.3	4.9	5.5	5.6	5.3	4.5	4.4	3.5	3.1	3.7	6.4	6.4	7.2	6.8	23.8	
NO.	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	744	100%
MEAN	11.2	10.6	10.1	10.2	9.3	10.8	13.5	15.3	16.5	18.9	23.5	22.4	23.6	20.5	23.5	20.9	19.1	16.8	15.4	14.7	12.6	11.2	10.1	10.8			
MAX	94.1	75.0	65.9	65.9	50.4	84.2	102.8	125.4	123.8	122.1	136.1	139.9	216.7	184.6	170.0	159.7	167.2	147.3	128.7	107.8	113.1	93.6	87.4	101.6			



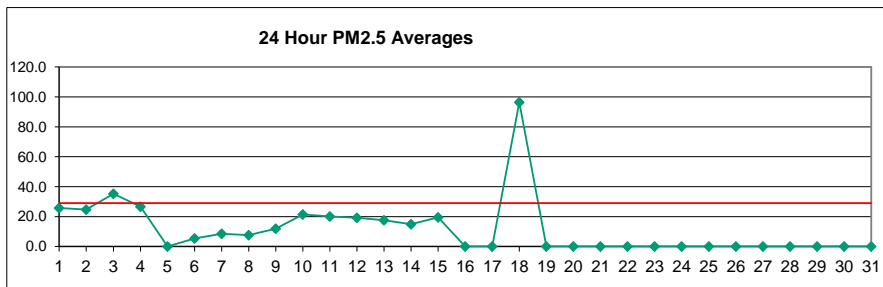
Number of 24HR Exceedences	4	Proposed Guideline
Number of Non-Zero Readings	744	
Maximum 1-HR Average	216.7 UG/M3	
Maximum 24-HR Average	102.7 UG/M3	
Monthly Calibration	0	Operational Time
Standard Deviation	28.1	Operational Uptime
		Monthly Average
		744 HRS
		100.0 %
		15.5 UG/M3





# Entrance PM<sub>2.5</sub> (µg/m<sup>3</sup>) – May 2023

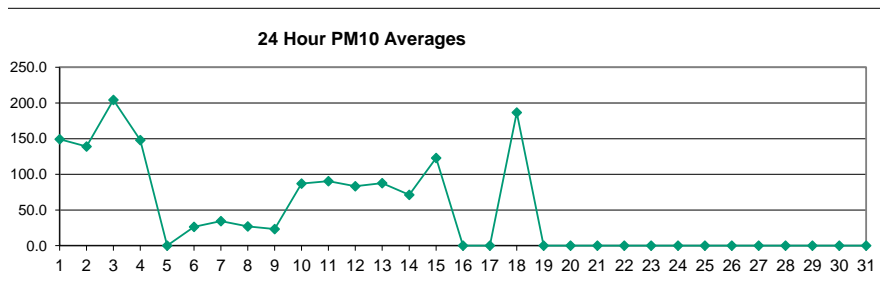
Day	HOUR																								MEAN	MAX
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1	27.7	24.5	38.1	44.0	34.4	45.5	37.1	42.2	33.0	21.5	23.7	27.2	26.5	18.5	15.5	22.0	23.2	23.0	11.4	5.8	15.4	17.9	12.2	26.2	25.7	45.5
2	25.2	25.4	19.2	43.7	35.4	42.1	46.8	35.6	15.3	12.9	16.0	26.2	18.9	20.3	38.0	35.1	37.1	17.5	17.5	18.7	9.2	8.9	10.4	17.1	24.7	46.8
3	19.0	54.6	47.3	50.0	55.9	52.7	58.4	56.8	36.5	55.5	49.1	16.0	10.5	22.3	36.4	28.9	14.8	11.9	12.6	10.3	25.1	53.3	41.1	26.4	35.2	58.4
4	13.1	13.8	16.4	32.6	46.4	58.4	39.8	34.6	33.5	16.4	14.2	28.0	25.8	19.1	34.1	31.9	9.1	8.3	10.6	33.2	14.8	41.2	28.2	36.6	26.7	58.4
5	16.3	27.4	32.2	24.2	20.3	16.9	20.5	21.3	20.0	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
6	K	K	4.5	4.9	13.0	10.3	6.5	7.1	5.3	6.9	13.2	8.5	6.5	4.7	3.3	2.3	2.1	2.0	3.0	2.5	2.8	2.5	2.8	3.2	5.4	13.2
7	3.5	3.2	2.6	3.7	8.3	8.4	13.6	14.4	16.3	18.9	3.6	1.9	2.9	5.0	2.6	8.5	12.9	8.3	2.9	3.0	1.3	7.6	25.3	26.1	8.5	26.1
8	22.1	16.3	12.6	6.8	4.2	3.0	4.3	4.7	6.0	5.9	3.8	1.7	4.3	10.6	22.2	14.9	15.6	1.7	1.0	1.4	1.8	2.6	8.0	9.2	7.7	22.2
9	12.5	21.5	17.4	14.1	20.8	15.3	12.6	25.4	24.6	17.0	5.9	3.7	9.0	15.6	5.0	6.5	13.9	11.7	7.0	3.8	6.1	5.0	10.0	3.7	12.0	25.4
10	7.3	19.6	20.0	24.1	37.0	16.4	22.1	23.8	23.5	21.4	29.0	23.1	25.1	38.5	34.8	27.3	33.4	8.6	12.1	16.9	21.7	8.9	5.5	14.9	21.5	38.5
11	12.2	23.1	27.2	38.8	27.2	37.1	23.4	38.6	33.6	25.7	8.9	22.7	17.5	13.1	37.0	29.9	8.8	26.5	5.2	1.6	2.8	2.5	4.9	14.7	20.1	38.8
12	22.2	29.1	40.5	23.7	22.6	18.1	36.1	24.0	16.7	8.9	8.2	14.4	16.7	11.8	30.0	21.3	31.7	9.9	18.3	7.8	11.6	8.7	12.7	14.7	19.1	40.5
13	30.6	23.6	26.3	32.7	30.4	32.5	29.4	27.0	17.4	7.0	12.8	11.1	13.3	5.1	4.7	7.4	16.2	9.6	9.8	29.6	10.1	15.8	8.4	12.0	17.6	32.7
14	7.2	11.1	12.5	32.2	31.8	41.4	21.0	22.1	11.3	16.8	17.9	22.6	8.4	8.7	16.4	10.0	17.0	7.4	6.8	8.6	11.2	5.8	5.8	4.7	14.9	41.4
15	6.0	6.2	17.4	28.1	32.7	35.4	38.5	32.3	33.9	12.4	14.2	17.3	15.2	10.5	28.4	18.1	17.7	8.5	4.4	14.2	19.6	13.7	22.3	22.7	19.6	38.5
16	43.3	47.3	33.1	35.4	31.3	36.9	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
17	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
18	K	K	104.9	126.5	125.7	128.9	130.0	142.3	137.8	138.7	132.0	127.7	106.4	85.6	71.0	73.9	67.0	54.7	54.3	58.8	62.8	63.4	61.0	69.8	96.5	142.3
19	74.3	74.0	83.8	85.9	86.7	82.0	83.7	92.5	71.5	31.7	EC	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
20	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
21	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
22	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
23	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
24	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
25	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
26	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
27	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
28	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
29	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
30	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
31	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
NO.	16	16	18	18	18	18	17	17	17	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	381	51%
MEAN	21.4	26.3	30.9	36.2	36.9	37.8	36.7	37.9	31.5	26.1	23.5	23.5	20.5	19.3	25.3	22.5	21.4	14.0	11.8	14.4	14.4	17.2	17.2	20.1		
MAX	74.3	74.0	104.9	126.5	125.7	128.9	130.0	142.3	137.8	138.7	132.0	127.7	106.4	85.6	71.0	73.9	67.0	54.7	54.3	58.8	62.8	63.4	61.0	69.8		



Number of 24HR Exceedences	2	Proposed Guideline	
Number of Non-Zero Readings	381		
Maximum 1-HR Average	142.3 UG/M3		
Maximum 24-HR Average	96.5 UG/M3		
Monthly Calibration	0	Operational Time	381 HRS
Standard Deviation	24.9	Operational Uptime	51.2 %
		Monthly Average	25.0 UG/M3

# Entrance PM<sub>10</sub> (µg/m<sup>3</sup>) – May 2023

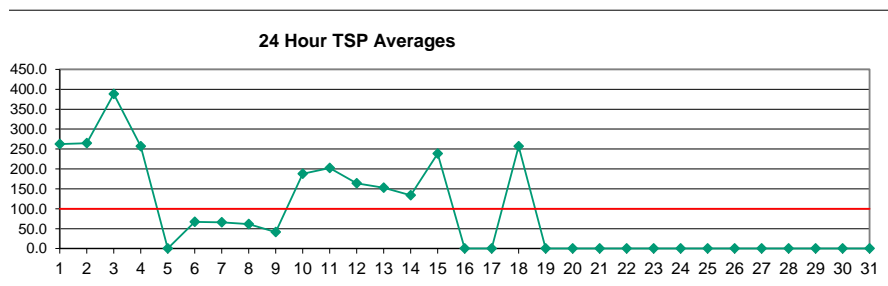
Day	HOUR																								MEAN	MAX	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	141.9	106.5	171.5	255.7	157.6	209.3	194.1	199.3	148.5	93.3	121.5	165.2	205.3	138.0	118.0	170.7	195.9	194.0	88.2	21.7	128.5	172.5	61.0	125.1	149.3	255.7	
2	109.9	115.0	85.5	221.2	148.1	182.9	223.4	174.9	65.3	59.5	92.4	190.3	118.7	148.9	310.0	265.7	272.2	133.0	127.4	122.1	25.5	24.3	30.5	94.2	139.2	310.0	
3	75.9	243.0	219.5	248.6	324.9	279.3	346.1	307.7	209.2	316.8	318.9	86.6	60.9	153.5	274.5	230.9	112.7	75.8	68.5	66.5	169.0	305.2	243.4	168.4	204.4	346.1	
4	67.8	64.1	74.6	201.7	280.4	390.7	210.1	160.2	143.7	72.1	69.6	223.6	182.5	129.1	225.6	295.7	51.0	12.7	38.5	152.5	65.2	241.9	136.6	66.5	148.2	390.7	
5	24.4	41.1	48.3	36.3	30.4	25.2	30.8	32.0	87.4	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
6	K	K	20.7	26.6	95.9	71.5	32.7	39.3	26.2	41.2	90.4	56.8	34.2	14.4	5.7	2.3	2.1	2.0	3.0	2.5	2.8	2.5	2.8	3.2	26.3	95.9	
7	3.5	3.2	2.6	3.7	8.3	8.4	15.9	17.3	73.3	112.0	14.9	6.7	11.5	11.0	10.6	56.0	103.6	66.1	14.7	12.0	2.6	40.2	135.9	94.9	34.5	135.9	
8	33.1	24.5	18.8	9.9	6.1	4.0	6.4	7.0	8.8	8.8	5.6	2.2	5.6	50.2	157.3	119.9	140.4	7.4	1.0	1.7	1.8	2.7	11.9	13.7	27.0	157.3	
9	18.7	32.3	26.1	21.1	31.2	22.9	18.8	38.0	36.9	25.5	7.4	6.3	34.8	76.3	5.0	7.5	44.8	55.3	20.7	3.8	6.7	5.0	12.6	3.7	23.4	76.3	
10	9.8	29.3	29.9	36.1	55.5	24.6	33.1	35.3	35.1	102.9	195.5	144.2	174.2	264.7	241.8	176.1	237.1	44.8	53.1	60.0	66.6	13.2	7.4	22.2	87.2	264.7	
11	18.2	34.6	40.8	58.2	40.8	55.6	35.1	201.0	205.6	128.7	51.5	182.5	144.1	89.1	321.5	249.9	47.9	202.0	28.9	1.6	3.0	2.5	6.8	22.0	90.5	321.5	
12	33.3	43.6	60.7	35.5	34.0	27.2	143.6	115.7	69.4	34.9	42.5	98.4	106.9	87.0	227.4	147.7	231.7	80.0	150.8	28.4	66.5	26.4	62.1	49.6	83.5	231.7	
13	161.9	102.2	118.4	145.9	139.5	161.5	150.5	123.6	79.8	22.1	56.0	60.4	91.3	21.9	22.6	50.8	147.7	52.7	33.0	192.6	28.5	81.1	12.9	45.4	87.6	192.6	
14	7.2	29.6	31.0	132.3	132.8	198.6	83.8	93.1	31.6	76.1	105.6	170.3	41.6	52.9	136.3	43.9	111.4	28.2	47.3	50.4	69.7	15.3	14.3	7.2	71.3	198.6	
15	12.7	11.3	32.5	126.8	167.8	208.1	301.4	203.3	201.7	74.8	79.8	106.2	126.3	83.0	243.6	139.4	125.5	62.4	30.8	85.8	177.6	76.9	133.4	142.6	123.1	301.4	
16	317.7	387.8	275.1	288.9	194.8	246.6	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
17	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
18	K	K	105.3	152.0	140.3	212.4	203.2	242.4	214.1	237.1	242.4	261.3	255.5	233.6	197.2	232.0	227.0	156.5	121.2	130.1	141.6	136.9	110.5	156.1	186.8	261.3	
19	192.2	194.0	296.7	308.2	312.5	291.6	325.4	408.2	283.8	85.9	EC	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
20	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
21	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
22	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
23	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
24	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
25	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
26	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
27	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
28	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
29	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
30	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
31	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-
<b>NO.</b>	16	16	18	18	18	18	17	17	17	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	381	51%
<b>MEAN</b>	76.8	91.4	92.1	128.3	127.8	145.6	138.5	141.1	113.0	93.2	99.6	117.4	106.2	103.6	166.5	145.9	136.7	78.2	55.1	62.1	63.7	76.4	65.5	67.6			
<b>MAX</b>	317.7	387.8	296.7	308.2	324.9	390.7	346.1	408.2	283.8	316.8	318.9	261.3	255.5	264.7	321.5	295.7	272.2	202.0	150.8	192.6	177.6	305.2	243.4	168.4			



Number of Non-Zero Readings	381
Maximum 1-HR Average	390.7 UG/M3
Maximum 24-HR Average	204.4 UG/M3
Monthly Calibration	0
Standard Deviation	92.12
Operational Time	381 HRS
Operational Uptime	51.2 %
Monthly Average	104.8 UG/M3

# Entrance TSP ( $\mu\text{g}/\text{m}^3$ ) – May 2023

Day	HOUR																								MEAN	MAX	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	183.4	120.7	214.6	480.1	200.3	294.5	351.1	265.2	171.4	128.4	162.2	261.7	465.3	282.5	330.9	489.0	535.4	401.3	214.3	37.9	164.5	251.0	128.1	157.8	262.1	535.4	
2	130.8	139.4	93.4	262.2	172.3	235.2	298.1	218.8	99.1	117.2	201.6	509.8	307.5	408.8	804.8	499.3	678.5	319.1	268.9	253.1	60.4	51.1	56.4	161.9	264.5	804.8	
3	104.6	278.1	325.4	411.3	630.5	535.2	657.7	517.1	386.3	505.4	524.2	194.2	160.3	337.2	948.4	746.7	344.2	211.9	118.0	108.2	327.4	415.4	295.5	234.3	388.2	948.4	
4	69.9	72.4	89.3	337.6	499.1	722.5	356.1	216.4	168.3	93.7	116.9	475.6	382.4	345.6	459.9	622.5	184.6	14.0	48.8	207.4	96.5	322.8	190.1	75.4	257.0	722.5	
5	28.2	47.5	55.5	41.3	34.5	28.5	35.0	36.7	150.0	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
6	K	K	61.2	64.8	242.8	177.1	100.7	74.4	58.4	108.7	224.2	208.4	98.3	24.4	8.8	2.3	2.1	2.0	3.0	2.5	2.8	2.5	2.8	3.2	67.1	242.8	
7	3.5	3.2	2.6	3.7	8.3	8.4	15.9	17.3	156.2	155.6	38.1	16.7	21.0	16.8	15.0	157.5	301.0	153.0	40.4	28.3	5.4	61.0	229.9	117.3	65.7	301.0	
8	38.4	28.2	21.5	10.6	6.1	4.0	6.6	7.2	9.0	9.4	6.0	2.2	5.6	100.7	434.9	327.1	407.3	21.6	1.0	1.7	1.8	2.7	12.2	13.7	61.6	434.9	
9	19.3	35.2	28.1	22.4	33.9	25.0	19.8	42.8	41.4	28.7	7.4	9.4	127.8	325.3	5.0	7.5	57.3	74.7	53.6	6.7	6.7	5.0	12.6	3.7	41.5	325.3	
10	9.8	32.6	34.0	41.5	63.8	27.7	37.2	38.8	39.8	194.9	496.3	473.9	476.3	669.6	583.5	400.2	463.7	148.7	87.1	76.8	68.9	13.9	7.4	24.5	187.9	669.6	
11	20.2	39.3	46.3	66.4	46.3	64.2	40.2	529.9	376.1	257.4	154.2	491.8	364.9	207.4	923.1	615.4	74.8	416.3	84.5	1.6	3.0	2.5	6.8	24.9	202.4	923.1	
12	38.6	50.6	70.1	40.4	38.1	29.2	300.2	237.0	128.0	62.7	88.9	245.4	239.9	247.7	466.6	339.3	584.9	169.2	202.8	42.0	74.1	33.8	91.3	112.8	163.9	584.9	
13	210.1	132.5	220.4	226.3	316.4	291.3	297.7	253.0	135.7	34.2	106.2	109.3	180.6	52.4	45.4	133.0	248.6	118.0	79.7	290.5	29.1	85.1	12.9	60.4	152.9	316.4	
14	7.2	29.6	35.2	212.5	183.3	269.8	136.6	164.6	41.4	149.9	270.0	291.1	99.7	121.5	327.5	121.6	323.6	105.6	113.9	73.5	92.1	20.0	16.0	7.2	133.9	327.5	
15	25.7	12.7	35.8	191.8	321.3	510.9	775.9	412.1	367.1	168.1	135.3	196.0	248.4	193.4	562.3	285.8	203.8	166.4	59.7	127.9	248.0	80.0	152.1	239.9	238.3	775.9	
16	662.5	1010.1	732.0	805.1	475.6	530.1	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
17	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
18	K	K	105.3	152.0	140.3	212.4	220.2	292.2	219.7	289.4	341.8	443.2	441.2	417.4	377.1	430.5	398.5	231.2	175.4	176.4	151.2	136.9	112.8	189.2	257.0	443.2	
19	195.6	254.2	435.7	503.3	450.7	543.6	612.6	858.9	482.1	171.8	EC	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
20	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
21	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
22	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
23	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
24	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
25	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
26	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
27	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
28	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
29	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
30	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
31	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	-	-	
<b>NO.</b>	16	16	18	18	18	17	17	17	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	381	51%
<b>MEAN</b>	109.2	142.9	144.8	215.2	214.6	250.5	250.7	246.0	178.2	154.7	191.6	261.9	241.3	250.0	419.6	345.2	320.6	170.2	103.4	95.4	88.8	98.9	88.5	95.1			
<b>MAX</b>	662.5	1010.1	732.0	805.1	630.5	722.5	775.9	858.9	482.1	505.4	524.2	509.8	476.3	669.6	948.4	746.7	678.5	416.3	268.9	290.5	327.4	415.4	295.5	239.9			



Number of 24HR Exceedences	11	Proposed Guideline
Number of Non-Zero Readings	381	
Maximum 1-HR Average	948.4 UG/M3	
Maximum 24-HR Average	388.2 UG/M3	
Monthly Calibration	0	Operational Time
Standard Deviation	196.7	Operational Uptime
		Monthly Average
		381 HRS
		51.2 %
		195.3 UG/M3