LOWER HUNTER AIR QUALITY REVIEW OF AMBIENT AIR QUALITY DATA

MAY 2014

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Lower Hunter Air Quality Review of Ambient Air Quality Data

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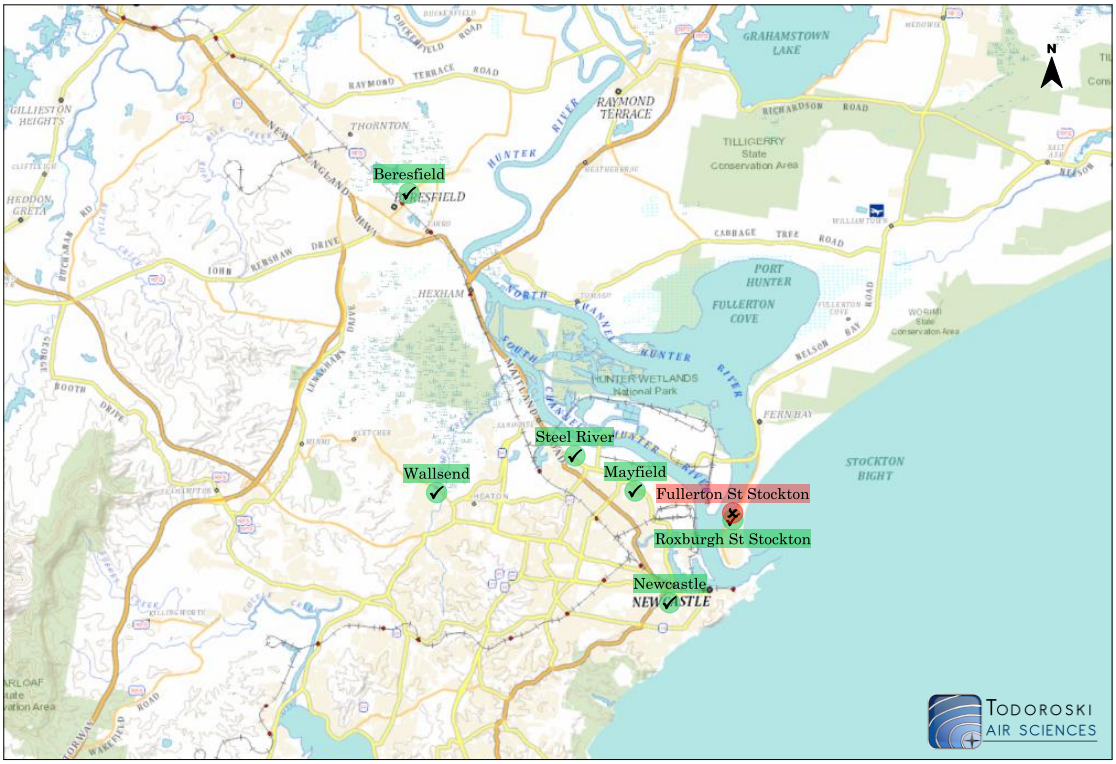
EXECUTIVE SUMMARY

This report has been prepared by Todoroski Air Sciences for the NSW Environment Protection Authority (NSW EPA) and presents ambient air quality monitoring data recorded in the Lower Hunter region for the month of May 2014. The results indicate that the air quality was generally good in the Lower Hunter Region during May.

The data summary (shown below) indicates that in May 2014, the Fullerton St Stockton monitor recorded PM_{10} levels above the criterion of 50µg/m^3. All other data recorded in May were below the applicable criteria. Further details are provided in the report. The full data are provided in the Appendices.

Lower Hunter Air Quality Pictorial Summary - May 2014



Lower Hunter Air Quality Tabular Summary - May 2014

Site	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)	SO_2 (µg/m^3)	NH_3 (ppm)
	24-hour average	24-hour average	24-hour average	1-hour average	1-hour average	1-hour average
	Air Quality Impact Criteria					
	50	25*	228	246	570	0.46
Wallsend	✓	✓	✓	✓	✓	-
Newcastle	✓	-	✓	✓	✓	-
Beresfield	✓	✓	✓	✓	✓	-
Fullerton St Stockton	×	✓	-	✓	-	✓
Roxburgh St Stockton	-	-	-	✓	-	-
Fullerton St Stockton HVAS	✓	-	-	-	-	-
Steel River HVAS	✓	-	-	-	-	-
Mayfield HVAS	✓	-	-	-	-	-

✓ - All data below applicable criteria

× - At least one elevated level above applicable criteria

\- - Not applicable

HVAS - High Volume Air Sampler

* - Advisory reporting standard for $PM_{2.5}$ concentrations (refer to Section 5.1)

1 INTRODUCTION

This report has been prepared by Todoroski Air Sciences on behalf of the NSW EPA. It provides a summary and analysis of the available ambient air quality and meteorological data collected in the Lower Hunter region during May 2014.

2 PROJECT SCOPE

The following outlines the scope of work for this project.

- Provide a monthly report written in plain English to the NSW EPA summarising and analysing available air quality data and meteorological information.
- The report will be published on the EPA's website and will assess the available data recorded at: Beresfield, Wallsend, Newcastle, Mayfield, Steel River and Stockton.
- The aim is to provide a simplified report that is accessible and contains results that would be clearly understood by the general public.

The work is for the period of ten months from September 2013 to June 2014.

3 THE PURPOSE OF AMBIENT MONITORING

It is important to note that the data presented in this report are from both EPA and industry monitoring sites. The EPA and the industry sites collect data for different purposes and this needs to be understood when comparing the data to the criteria.

The EPA monitoring sites are specifically designed to measure the likely levels of pollutants that the general population in the area would experience, whereas industry monitoring sites are specifically designed to measure the maximum pollutant levels that may occur due to a particular industry.

Data from the EPA sites can be compared with national air quality standards. Where the levels measured at the EPA monitoring sites are above the national standards on a prolonged and consistent basis, this indicates that some investigation of the potential cause of the issue may be warranted to determine whether any action on a regional level would reduce or better manage the pollutant levels. In the case of PM_{10}, it is noted that the national standards permit five days annually above the criteria to allow for events such as bushfires and dust storms.

Data from industry monitoring sites can be compared with EPA impact assessment criteria. Where the levels measured at industry monitoring sites are above the impact assessment criteria on a prolonged and consistent basis, this indicates that further investigation is warranted to determine whether industry is responsible, and if so whether action to reduce or better manage the pollutant can be taken.

Whether there is any harmful effect on an individual will depend on many additional factors, and not just on the measured level of a pollutant. These factors include the total exposure to the pollutant, individual circumstances (age, health, body mass, levels of pollutants at work), levels of other pollutants in the area, and many other factors.

Where pollutant levels are below the criteria generally, harm would not be expected to occur, but it does not follow that harm automatically occurs when pollutant levels are above the criteria.

The criteria serve to highlight potential issues with the levels of pollutants that may warrant more detailed examination. The criteria may also serve to prioritise action in various areas, for example areas with the highest pollutant levels and highest populations or highest exposure would be expected to receive priority action.

4 AIR QUALITY MONITORING SITES

Figure 4-1 and **Table 4-1** summarise the locations and recorded parameters of the air quality monitoring sites in the Lower Hunter in May 2014.

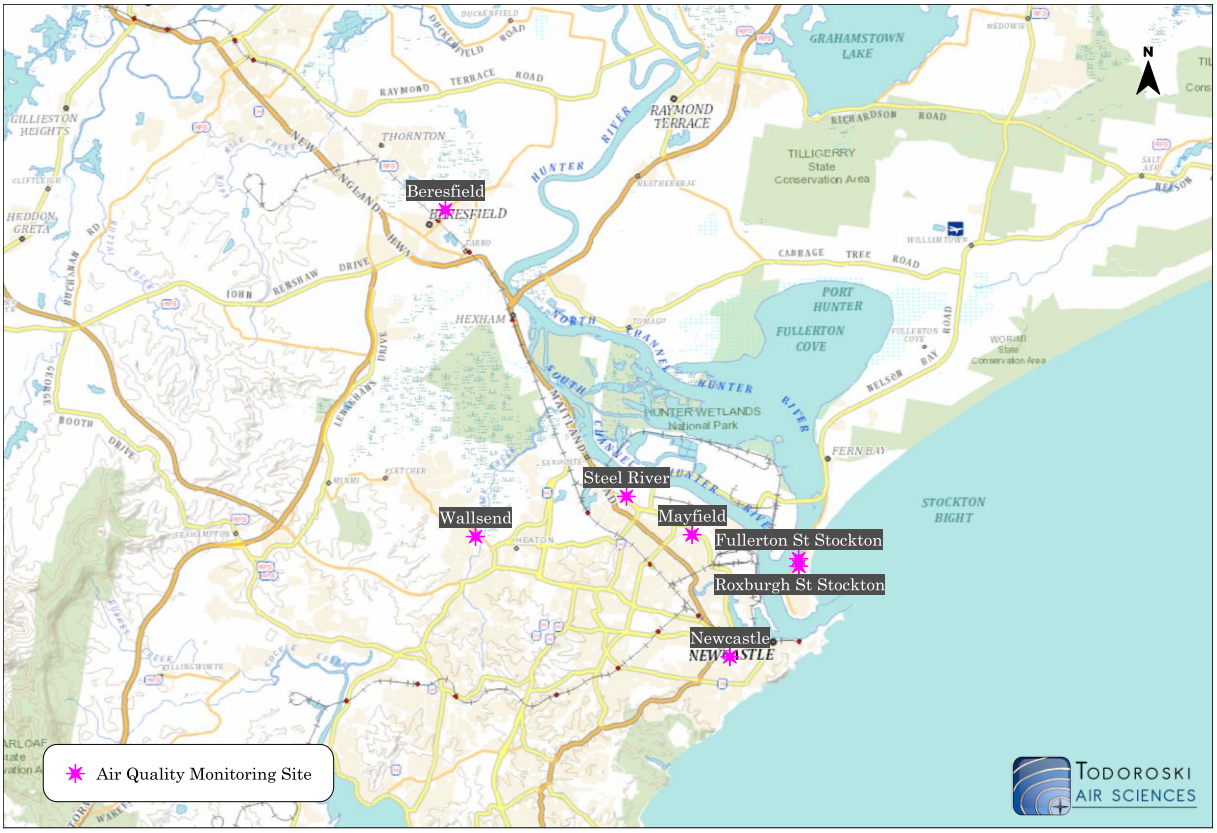


Figure 4-1: Monitoring site locations

Table 4-1: Monitoring sites

Monitoring Station	Type	Recorded Parameters	Recording Periods
Beresfield	NSW EPA site	PM_{10} (TEOM), $PM_{2.5}$, NO_2, SO_2, WS, WD	Hourly/Daily
Wallsend	NSW EPA site	PM_{10} (TEOM), $PM_{2.5}$, NO_2, SO_2, WS, WD	Hourly/Daily
Newcastle	NSW EPA site	PM_{10} (TEOM), NO_2, SO_2, WS, WD	Hourly/Daily
Fullerton St Stockton	Industry site	PM_{10} (TEOM), $PM_{2.5}$, NO_2, NH_3, WS, WD	Hourly/Daily
Roxburgh St Stockton	Industry site	NO_2	Hourly
Fullerton St Stockton (HVAS)	Industry site	PM_{10} (HVAS)	Every 6th Day
Steel River	Industry site	PM_{10} (HVAS)	Every 6th Day
Mayfield	Industry site	PM_{10} (HVAS)	Every 6th Day

PM_{10} - Particulate matter < 10µm
$PM_{2.5}$ - Particulate matter < 2.5µm
TEOM - Tapered Element Oscillating Microbalance (which samples air continuously)
NO_2 - Nitrogen dioxide
SO_2 - Sulfur dioxide
NH_3 - Ammonia
WS - Wind speed
WD - Wind direction
HVAS - High volume air sampler (which samples for a 24-hour period every 6 days)

5 AIR QUALITY CRITERIA

The sections below identify the key pollutants currently being monitored at the Lower Hunter air quality monitoring sites and the applicable air quality criteria.

5.1 Particulate matter

Particulate matter consists of particles of varying size and composition. The total mass of all particles suspended in air is defined as the Total Suspended Particulate matter (TSP). The upper size range for TSP is nominally taken to be 30 micrometres (µm) as in practice particles larger than 30 to 50µm will settle out of the atmosphere too quickly to be regarded as air pollutants.

The TSP is defined further into two sub-components. They are PM_{10} particles, particulate matter with aerodynamic diameters of 10µm or less, and $PM_{2.5}$, particulate matter with aerodynamic diameters of 2.5µm or less.

Table 5-1 summarises the air quality goals that are relevant to particulate pollutants as outlined in the NSW Environment Protection Agency (EPA) document "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (**NSW DEC, 2005**).

Table 5-1: EPA air quality impact assessment criteria

Pollutant	Averaging Period	Criterion
Total suspended particulates (TSP)	Annual	90µg/m^3
Particulate Matter < 10µm (PM_{10})	Annual	30µg/m^3
	24-hour	50µg/m^3

Source: **NSW DEC, 2005**

5.1.1 $PM_{2.5}$ concentrations

The NSW EPA currently do not have impact assessment criteria for $PM_{2.5}$ concentrations, however the National Environment Protection Council (NEPC) has released a variation to the National Environment Protection Measure (NEPM) (**NEPC, 2003**) to include advisory reporting standards for $PM_{2.5}$ (see **Table 5-2**). As with the NEPM goals, the advisory reporting standards apply to the average, or general exposure of a population, rather than to "hot spot" locations such as industry monitoring sites.

Table 5-2: Advisory standard for $PM_{2.5}$ concentrations

Pollutant	Averaging Period	Concentration
Particulate Matter < 2.5µm ($PM_{2.5}$)	24-hour	25µg/m^3
	Annual	8µg/m^3

Source: **NEPC, 2003**

5.2 Other air pollutants

Nitrogen dioxide (NO_2) is reddish-brown in colour (at high concentrations) with a characteristic odour and can irritate the lungs and lower resistance to respiratory infections such as influenza. NO_2 belongs to a family of reactive gases called nitrogen oxides (NO_x). These gases form when fuel is burned at high temperatures, and mainly originates from motor vehicles, power generators and industrial boilers (**USEPA, 2013**). NO_x may also be generated by blasting activities. It is important to note that when formed, NO_2 is generally a small fraction of the total NO_x generated.

Sulfur dioxide (SO_2) is a colourless, toxic gas with a pungent and irritating smell. It commonly arises in industrial emissions due to the sulfur content of the fuel. SO_2 can have impacts upon human health and the habitability of the environment for flora and fauna. SO_2 emissions are a precursor to acid rain, which can be an issue in the northern hemisphere; however it is not known to be an issue in NSW.

Ammonia (NH_3) is a colourless gas with a pungent smell familiar to most people because ammonia is used in smelling salts and household cleaners such as bleach and window cleaning products. It also occurs naturally in air, soil and water and is found in fertilisers. Ammonia is a corrosive substance and the main toxic effects are restricted to the sites of direct contact with ammonia (i.e., skin, eyes, respiratory tract). For example, if you spilt a bottle of concentrated ammonia on the floor, you would smell a strong ammonia odour; you might cough, and your eyes might water because of irritation. If you were exposed to very high levels of ammonia, you would experience more harmful effects. For example, if you walked into a dense cloud of ammonia or if your skin comes in contact with concentrated ammonia, your skin, eyes, throat, or lungs may be severely burned (**ATSDR, 2004**).

Table 5-3 summarises the air quality goals for NO_2, SO_2 and NH_3.

Table 5-3: Air quality impact assessment criteria for air pollutants

Pollutant	Averaging period	Criterion
NO_2	1-hour	246µg/m^3
	Annual	62µg/m^3
SO_2	10-minute	712µg/m^3
	1-hour	570µg/m^3
	24-hour	228µg/m^3
	Annual	60µg/m^3
NH_3	1-hour	0.46ppm

Source: **NSW DEC, 2005**

5.3 Summary of applicable criteria for this assessment

The particulate and gaseous pollutants monitored in the Lower Hunter have air quality criteria which are averaged over short and long time periods. Annually averaged criteria require a full year of data.

As this report only looks at one month of ambient air quality data, the annually averaged criteria are not applicable. The SO_2 10-minute average criterion was not included as 10-minute monitoring data are not available. Therefore the criteria relevant to this assessment are those averaged over the shorter time periods (1-hour and 24-hours).

Table 5-4 summarises the applicable air quality criteria for this assessment.

Table 5-4: Air quality impact assessment criteria used in this assessment

Pollutant	Averaging Period	Type	Concentration
Particulate Matter < 10µm (PM_{10})	24-hour	Criterion	50µg/m^3
Particulate Matter < 2.5µm ($PM_{2.5}$)	24-hour	Advisory Reporting Standard	25µg/m^3
Nitrogen Dioxide (NO_2)	1-hour	Criterion	246µg/m^3
Sulfur Dioxide (SO_2)	1-hour	Criterion	570µg/m^3
	24-hour	Criterion	228µg/m^3
Ammonia (NH_3)	1-hour	Criterion	0.46ppm

6 METEOROLOGICAL MONITORING DATA

Representative wind speed and direction data have been obtained from the Beresfield, Wallsend, Newcastle and Stockton air quality monitoring stations. The data are presented as a series of windroses. For an example of how to read a windrose, refer to **Figure A-1** in **Appendix A**.

Figure 6-1 presents the May 2014 windroses for Beresfield, Wallsend, Newcastle and Stockton.

The Beresfield weather station recorded a predominance of west-northwest and northwest wind directions during May.

The Wallsend weather station recorded a high proportion of winds from the south-southwest during May. The station also recorded winds from the north-westerly quadrant. The wind speeds recorded at Wallsend were typically lower than those recorded at other monitors. The low wind speeds from the south-southwest indicate potential valley drainage flows influenced by the local terrain features.

The Newcastle weather station recorded predominant wind directions from the northwest and north-northwest.

The Stockton weather station recorded a high proportion of west-northwest wind directions, with wind speeds which were generally higher than the other stations. The higher wind speeds at the Stockton weather station are to be expected as it is located in a relatively unsheltered coastal location.

Figure 6-1 shows some differences between the distributions of winds at the four meteorological stations. The variation in localised winds is clear to see, however the four locations also display a similar underlying trend in the wind distribution patterns, with the common winds tending to originate from the Hunter Valley.

The prevailing wind patterns indicate that emissions from industry and urban sources are likely to be recorded more frequently at the Stockton and Newcastle stations in May. However as wind speeds are also generally high at Stockton, there is also likely to be some increased level of dilution or dispersion of air emissions in the ambient air.

Figure 6-1: May Windroses - Beresfield, Wallsend, Newcastle and Stockton

7 AMBIENT AIR QUALITY MONITORING DATA

7.1 Preamble

The monitoring data in this report are presented in raw form as provided to Todoroski Air Sciences by the NSW EPA.

The 24-hour average data presented in this report have been averaged using the 1-hour average readings. Days which contain less than 75% data (less than 18 hours of 1-hour average data) have not been included in this report.

All of the monitoring data provided to Todoroski Air Sciences are presented in graphical format in **Appendix B** and tabulated format in **Appendix C**.

7.2 Analysis of Monitoring Data

Table 7-1 presents a summary of the maximum pollutant levels occurring during May 2014. The results indicate that air quality was generally good in the Lower Hunter area during May.

The Fullerton St Stockton monitor recorded 24-hour average PM_{10} levels above the relevant criterion of 50µg/m^3. The ambient air concentrations recorded by all other monitors were below the relevant criteria during May 2014.

Table 7-1: Maximum pollutant levels - May 2014

	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)	SO_2 (µg/m^3)
	24-hour average	24-hour average	24-hour average	1-hour average	1-hour average
	Air Quality Impact Criteria				
	50	25*	228	246	570
Wallsend	22.8	13.3	14.1	54.5	52.4
Newcastle	42.4	-	14.5	67.7	78.6
Beresfield	39.9	12.9	17.8	56.4	52.4
Fullerton St Stockton	**55.5**	21.4	-	67.5	-
Roxburgh St Stockton	-	-	-	108.5	-
Fullerton St Stockton HVAS	39.0	-	-	-	-
Steel River HVAS	27.6	-	-	-	-
Mayfield HVAS	29.0	-	-	-	-

* Advisory reporting standard for $PM_{2.5}$ concentrations (refer to Section 5.1)

- Not applicable

7.3 PM_{10}

Figure 7-1 presents all of the 24-hour average PM_{10} monitoring results recorded in the Lower Hunter region in May 2014.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, PM_{10} levels were generally very good or good in May. The Newcastle and Fullerton St Stockton TEOM monitors recorded

fair levels on two days and the Beresfield and Fullerton St Stockton HVAS monitors recorded fair levels on one day.

The Fullerton St Stockton monitor recorded poor levels with 24-hour average PM_{10} concentrations above the relevant criterion of 50µg/m^3 on 25 and 26 May.

All other data recorded at the Lower Hunter monitoring sites were below the 24-hour average PM_{10} criterion level of 50µg/m^3.

Figure B-1 to **Figure B-4** in **Appendix B** present the 1-hour average PM_{10} data in graphical form for each individual site. There is no criterion that applies to 1-hour average PM_{10} levels and these 1-hour results are not intended to be compared with the PM_{10} criterion. It is a normal occurrence, and it is expected that in the normal environment, 1-hour average PM_{10} levels will fluctuate more significantly than 24-hour average PM_{10} levels.

7.4 $PM_{2.5}$

Figure 7-2 presents all of the 24-hour average $PM_{2.5}$ monitoring data recorded in the Lower Hunter region in May 2014.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate that $PM_{2.5}$ levels were very good to good at all locations at all times except Fullerton St Stockton which experienced fair levels on three days.

All data were below the advisory reporting standard on all days.

Figure B-5 to **Figure B-7** in **Appendix B** present the 1-hour average $PM_{2.5}$ data in graphical form for each individual site. There is no criterion that applies to 1-hour average $PM_{2.5}$ levels and these 1-hour results are not intended to be compared with the $PM_{2.5}$ advisory reporting standard. It is a normal occurrence, and it is expected that in the normal environment 1-hour average $PM_{2.5}$ levels will fluctuate more significantly than 24-hour average $PM_{2.5}$ levels.

7.5 Nitrogen dioxide NO_2

Figure 7-3 presents the 1-hour average NO_2 monitoring data recorded in the Lower Hunter region in May 2014.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate the NO_2 levels were very good at all monitors at all times except the Roxburgh St Stockton monitor which recorded 13 1-hour average concentrations with good levels.

All data were below the applicable criterion on all days.

7.6 Sulfur dioxide SO_2

Figure 7-4 presents the 1-hour average SO_2 monitoring data recorded in the Lower Hunter region in May 2014.

Relative to the Air Quality Index, as shown by the coloured bands in the figure, the data indicate the SO_2 levels were very good all of the time at all of the monitors.

All data were below the applicable criterion on all days.

Figure B-8 to **Figure B-10** in **Appendix B** present the 24-hour average SO_2 data in graphical form for each individual station.

7.7 Ammonia NH_3

Figure 7-5 presents the 1-hour average NH_3 monitoring data recorded at the Fullerton St Stockton monitor in May 2014.

The data indicate that the measured levels of NH_3 were below the applicable criterion on all days.

Figure 7-5 also presents the 1-hour average wind direction data recorded at the Fullerton St Stockton monitor in May 2014.

The figure shows that NH_3 levels above 0.1ppm were generally associated with winds from the west and west-northwest.

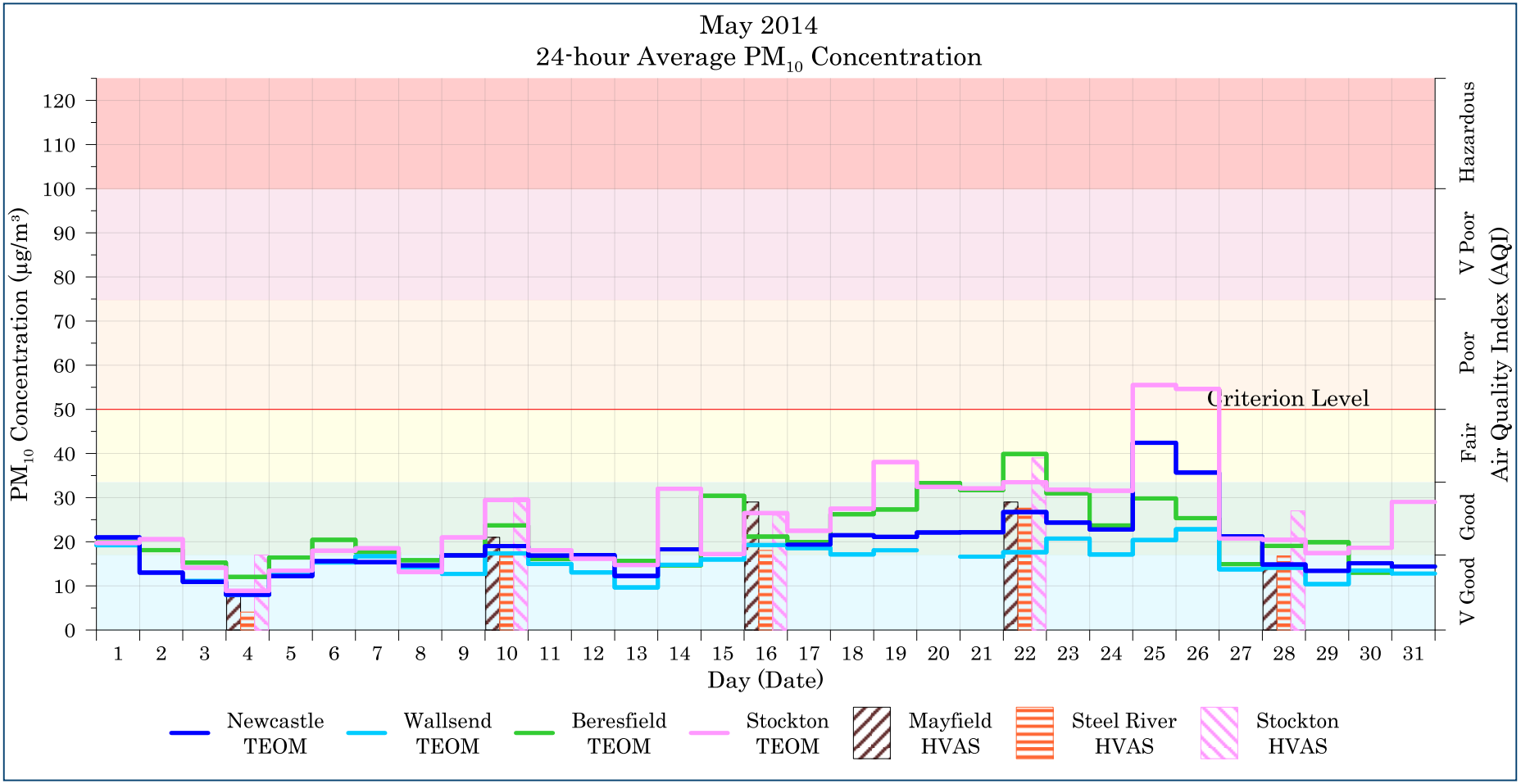


Figure 7-1: Lower Hunter 24-hour average PM_{10} levels – May 2014

PM_{10} levels were generally very good or good in May. The Newcastle and Fullerton St Stockton TEOM monitors recorded fair levels on two days and the Beresfield and Fullerton St Stockton HVAS monitors recorded fair levels on one day. The Fullerton St Stockton TEOM monitor also recorded poor levels with two 24-hour average concentrations above the relevant criterion of 50µg/m^3 on 25 and 26 May.

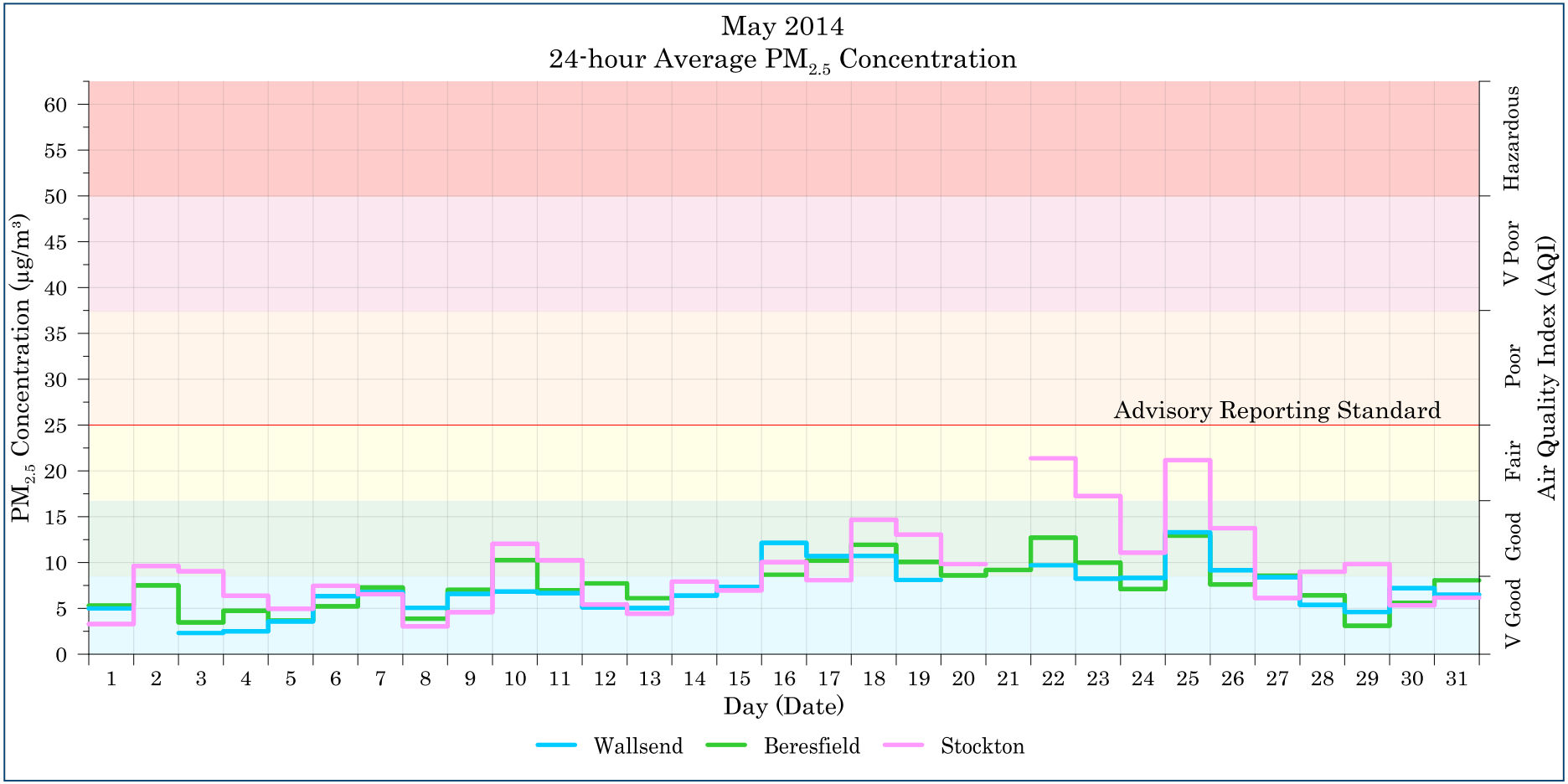


Figure 7-2: Lower Hunter 24-hour average $PM_{2.5}$ levels – May 2014

$PM_{2.5}$ levels were very good to good at all locations at all times except Fullerton St Stockton which experienced fair levels on three days. All data recorded at the Lower Hunter monitoring sites during May were below the 24-hour average $PM_{2.5}$ advisory reporting standard of 25µg/m^3.

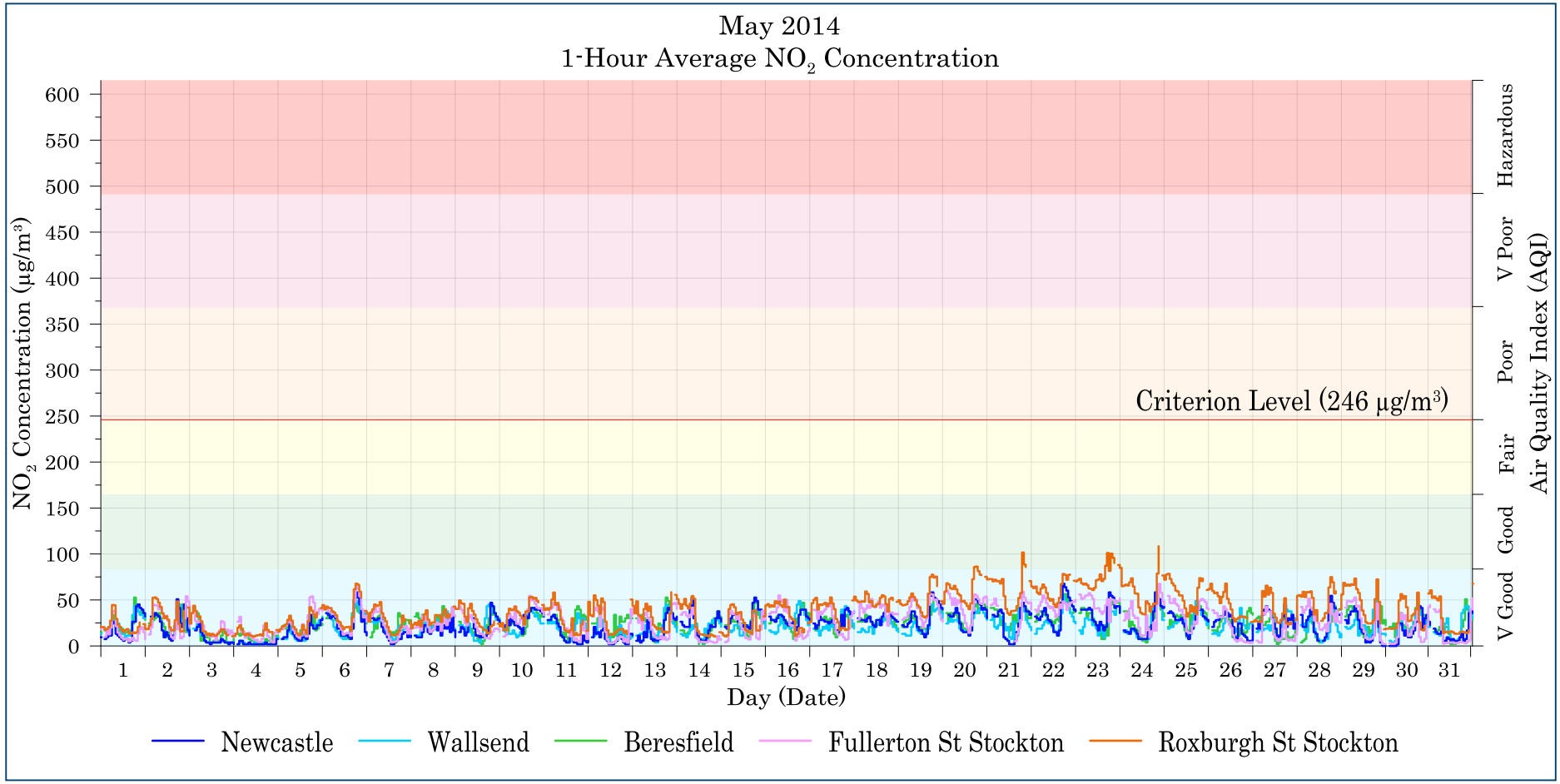


Figure 7-3: Lower Hunter 1-hour average NO_2 levels – May 2014

All data recorded at the Lower Hunter monitoring sites were below the 1-hour average NO_2 criterion level of 246µg/m^3 during May. Measured levels of NO_2 were very good at all monitors at all times except the Roxburgh St Stockton monitor which recorded 13 1-hour average concentrations with good levels.

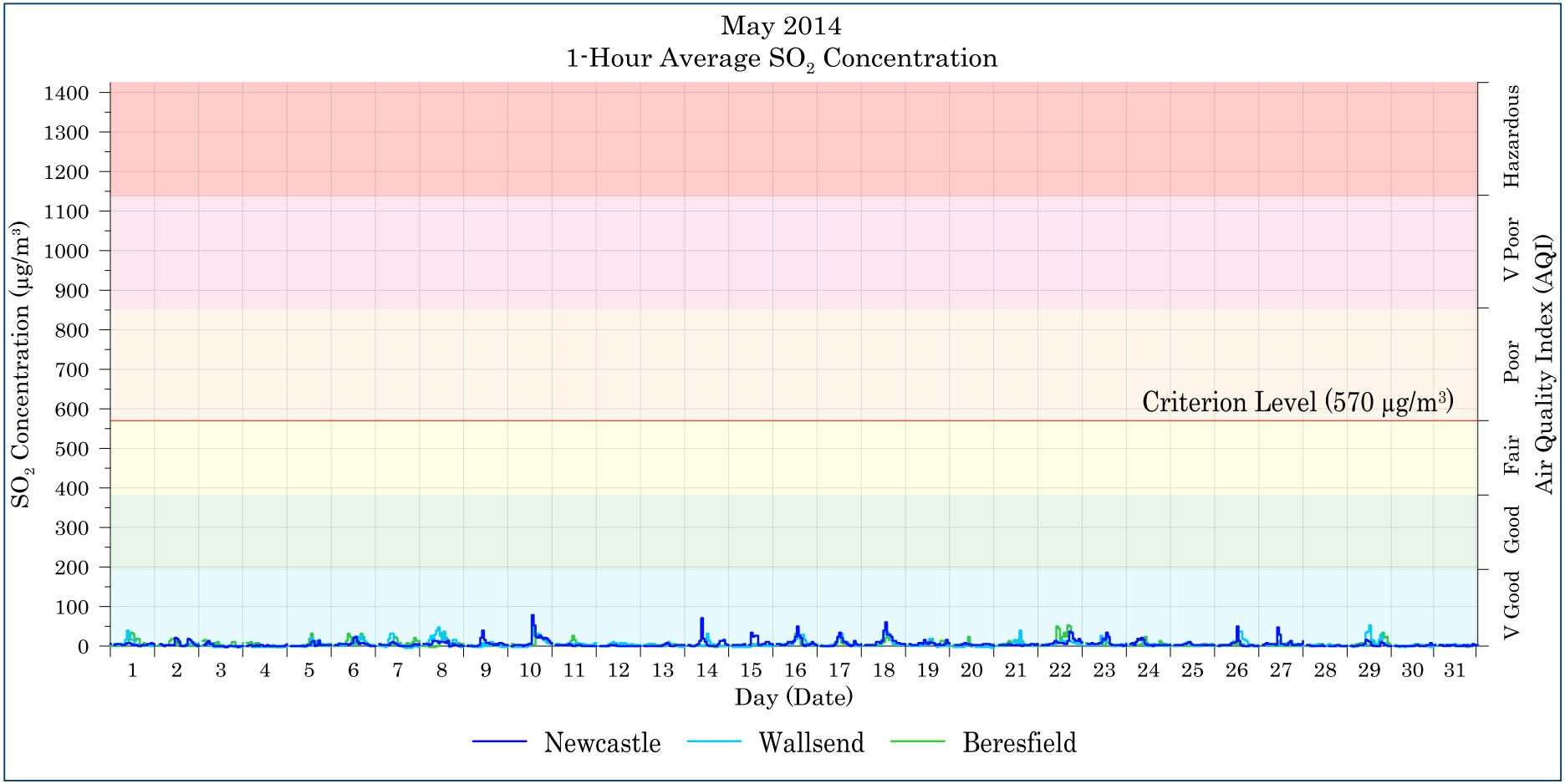


Figure 7-4: Lower Hunter 1-hour average SO_2 levels – May 2014

All data recorded at the Lower Hunter monitoring sites were below the 1-hour average SO_2 criterion level of 570µg/m^3 during May. Measured levels of SO_2 were very good at all monitors at all times.

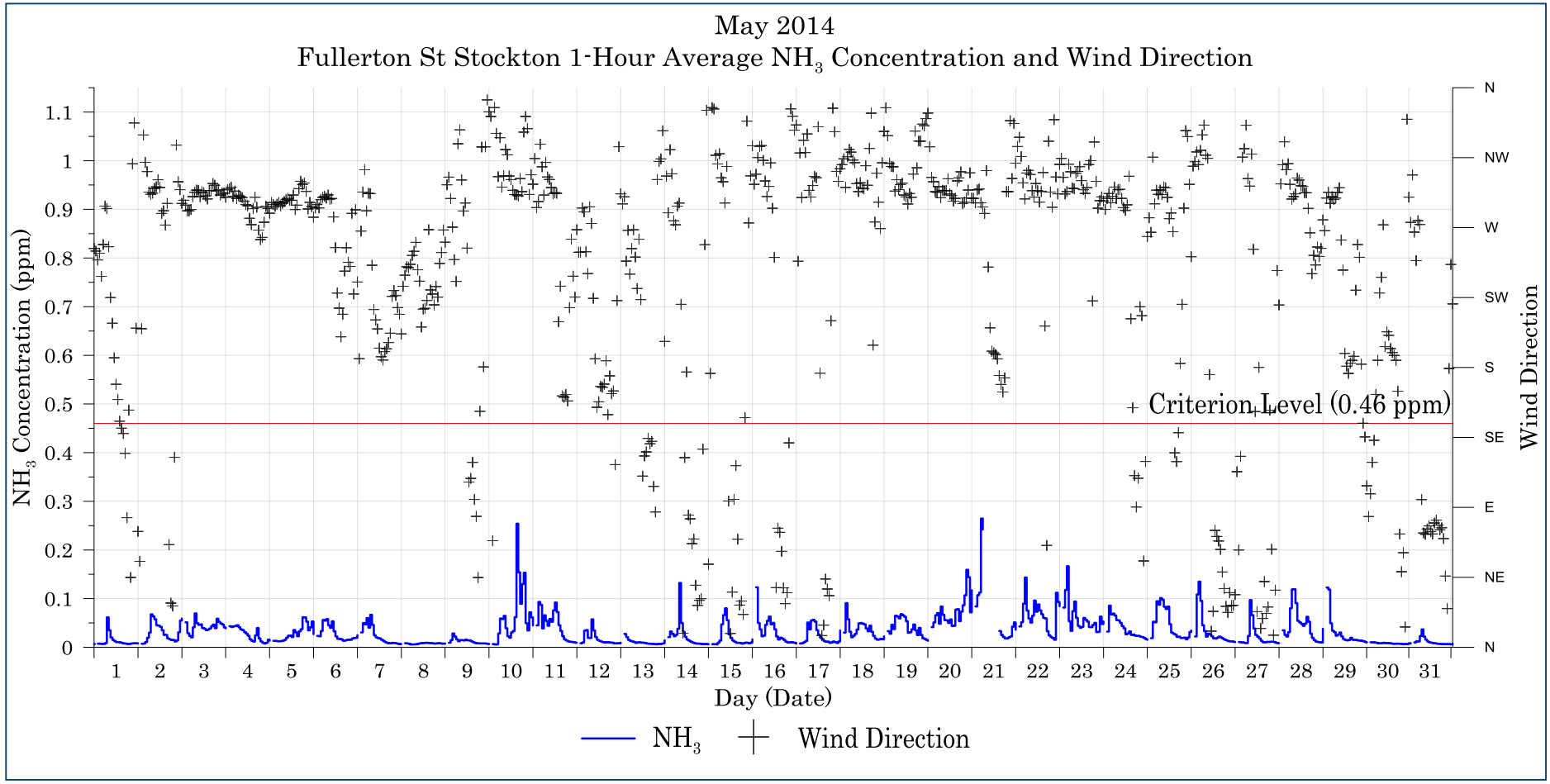


Figure 7-5: Lower Hunter 1-hour average NH_3 levels – May 2014

All NH_3 data recorded at the Fullerton St Stockton monitor were below the 1-hour average criterion of 0.46ppm. NH_3 levels above 0.1ppm were generally associated with winds from the west and west-northwest.

8 ANALYSIS OF ELEVATED POLLUTANT LEVELS

8.1 Fullerton St Stockton – 25 May 2014

- 24-hour average PM_{10} level of 55.5µg/m^3 on 25 May 2014

Figure 8-1 presents a plot of the 1-hour average PM_{10}, wind speed and wind direction data recorded at Fullerton St Stockton on 25 May 2014. The 1-hour average PM_{10} levels recorded at Newcastle, Wallsend and Beresfield have also been included.

The data presented in **Figure 8-1** show that the Fullerton St Stockton and Newcastle monitors recorded elevated PM_{10} levels at 6pm, after a shift in wind direction from a north-westerly to a south-easterly. The elevated levels at the Fullerton St Stockton monitor continued until midnight, whereas the Newcastle monitor returned to levels similar to those recorded at Beresfield and Wallsend by 9pm.

The elevated PM_{10} levels at Newcastle and Fullerton St Stockton may have occurred due to the change in wind direction and the drop in wind speed reducing air dispersion. The source of the high levels is unlikely to be industry, but may be dust from urban areas of Newcastle and Stockton and also salt in the air arising from the action of relatively large waves.

8.2 Fullerton St Stockton – 26 May 2014

- 24-hour average PM_{10} level of 54.6µg/m^3 on 26 May 2014

Figure 8-2 presents a plot of the 1-hour average PM_{10}, wind speed and wind direction data recorded at Fullerton St Stockton on 26 May 2014. The 1-hour average PM_{10} levels recorded at Newcastle, Beresfield and Wallsend have also been included.

The data presented in **Figure 8-2** show that the Fullerton St Stockton monitor recorded elevated PM_{10} levels in the evening during periods of relatively light winds from the northeast. The Newcastle monitor generally showed a similar trend in recorded levels at this time, however the levels were lower than those recorded at Fullerton St Stockton.

Given the wind direction and the location of the Fullerton St Stockton TEOM monitor in relation to Stockton Beach, it is likely that the elevated PM_{10} levels recorded at the monitors during these wind conditions were impacted by salt laden air or particulates blowing from the northeast along the surf break of Stockton Beach. It is also possible that the elevated levels recorded by the monitors were impacted by a localised source.

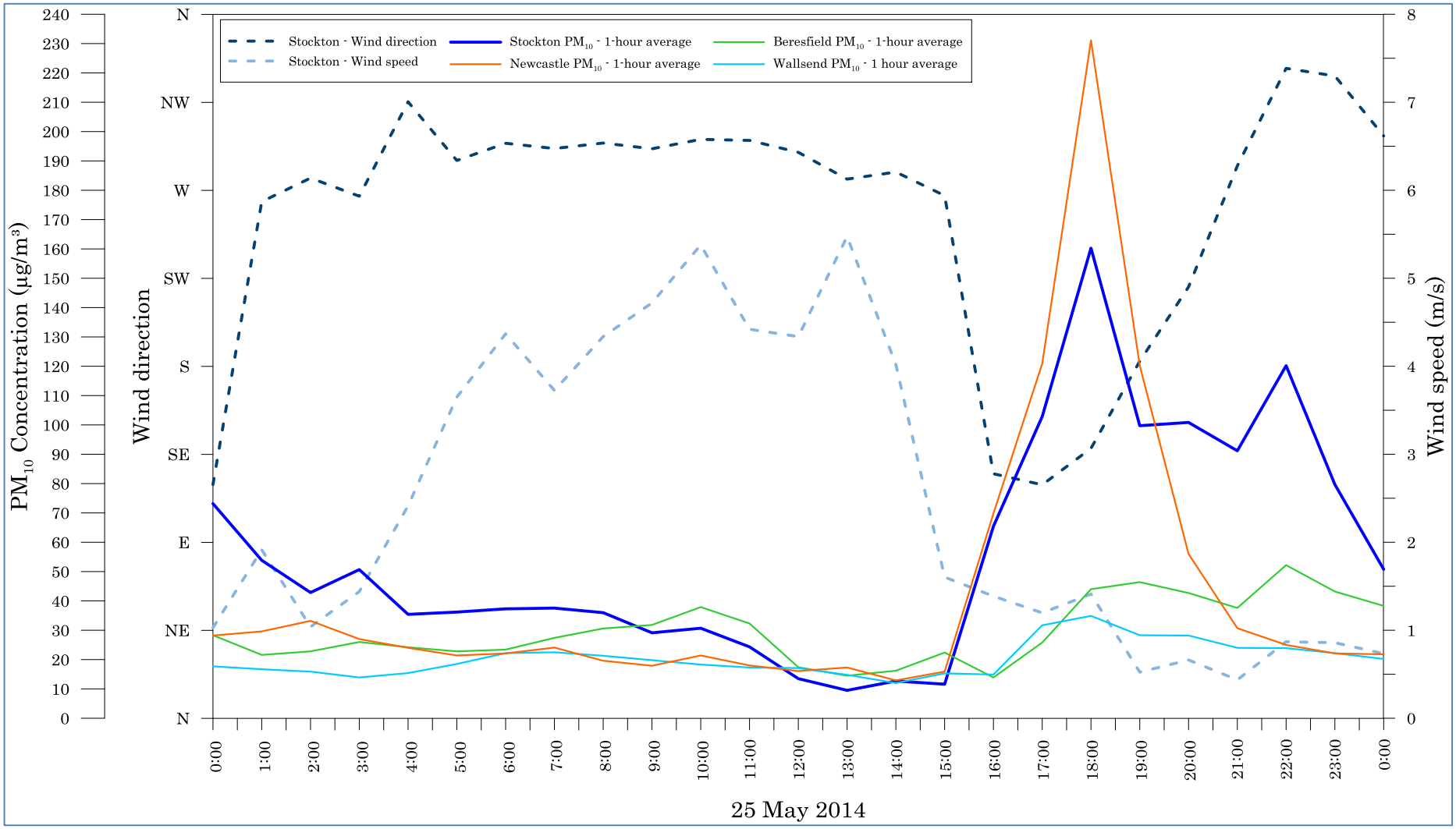


Figure 8-1: Analysis of elevated PM_{10} levels on 25 May - Fullerton St Stockton

Fullerton St Stockton and Newcastle monitors recorded elevated PM_{10} levels after a shift in wind direction from a north-westerly to a south-easterly.

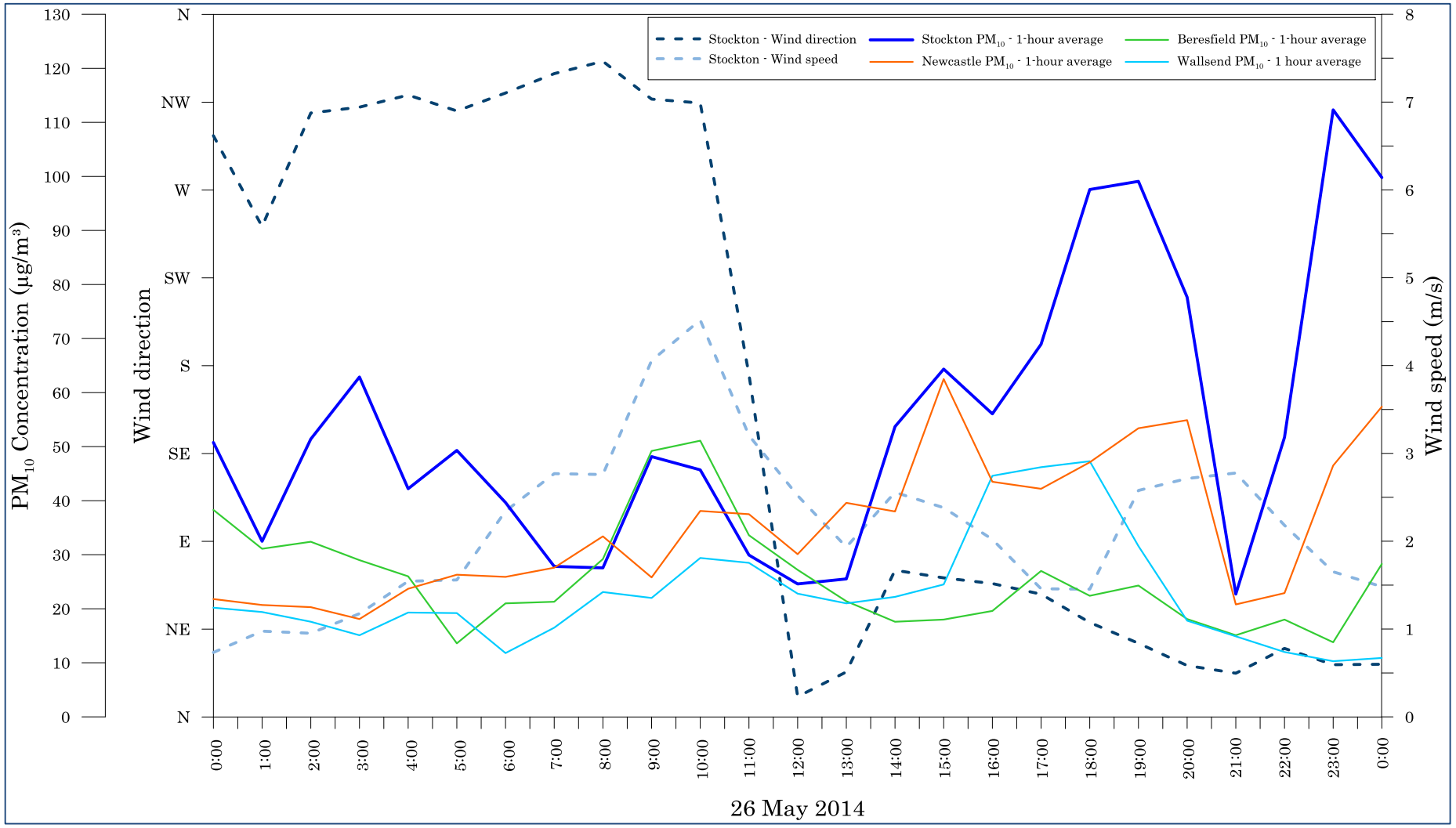


Figure 8-2: Analysis of elevated PM_{10} levels on 26 May - Fullerton St Stockton

Fullerton St Stockton recorded elevated PM_{10} levels associated with light winds from the northeast.

9 CONCLUSIONS

The results indicate that the monitoring stations recorded good air quality for the majority of the time in May.

The Fullerton St Stockton monitor recorded 24-hour average PM_{10} levels above the relevant criterion of 50µg/m^3 on 25 and 26 May.

Relative to the Air Quality Index:

- The measured levels of NO_2 were very good at all monitors at all times except the Roxburgh St Stockton monitor which recorded 13 1-hour average concentrations with good levels;
- The measured levels of SO_2 were very good at all monitors at all times;
- The measured levels of $PM_{2.5}$ were very good to good at all locations at all times except Fullerton St Stockton which experienced fair levels on three days; and,
- The measured PM_{10} levels were generally very good or good in May. The Newcastle and Fullerton St Stockton TEOM monitors recorded fair levels on two days, and the Beresfield and Fullerton St Stockton HVAS monitors recorded fair levels on one day. The Fullerton St Stockton TEOM monitor also recorded two days with poor levels.

On this basis it can be concluded that the air quality in the Lower Hunter was generally good during May 2014.

10 REFERENCES

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"Public Health Statement for Ammonia", Agency for Toxic Substances and Disease Registry September 2004.

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Appendix A

How to read a windrose

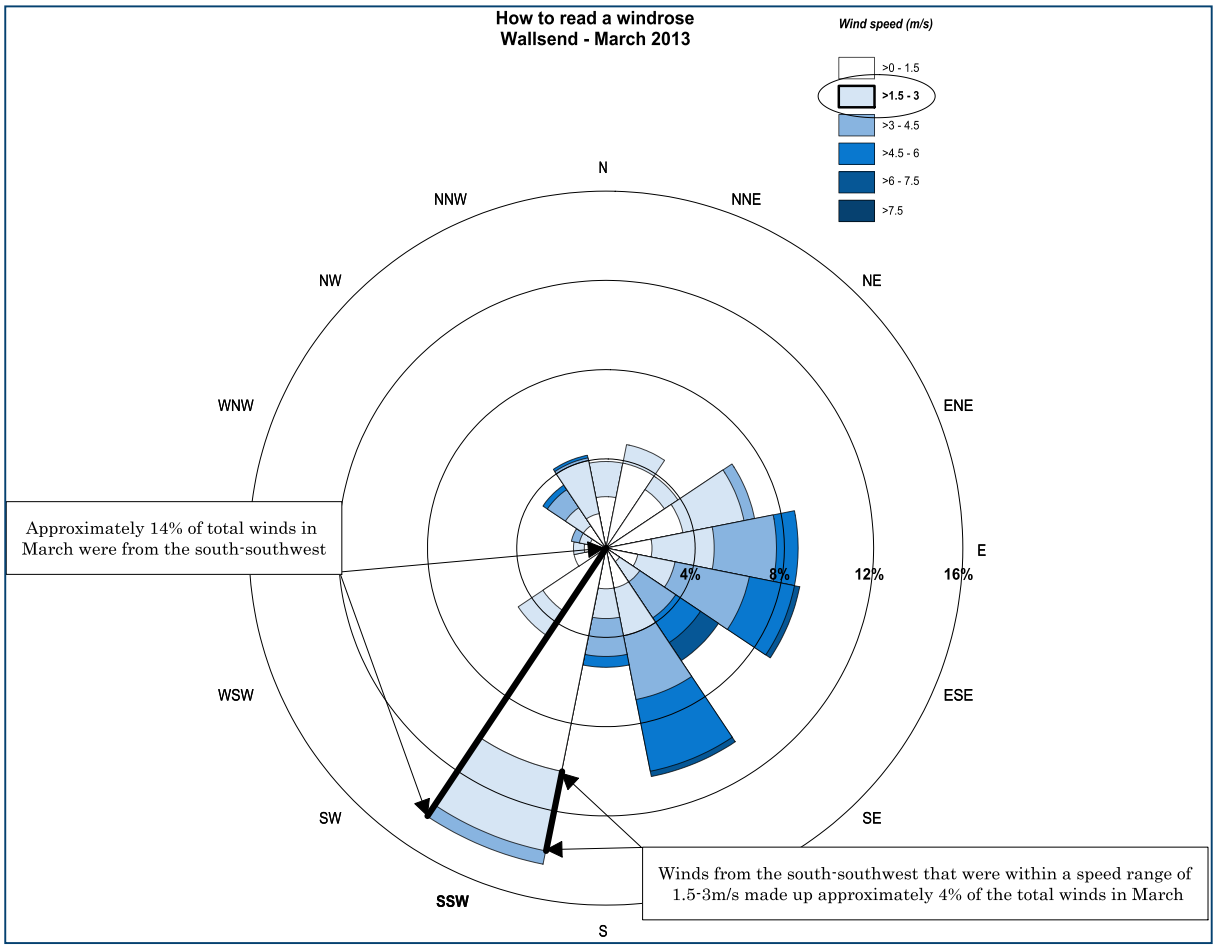

Figure A-1: How to read a windrose

Appendix B

Monitoring Data (Graphical)

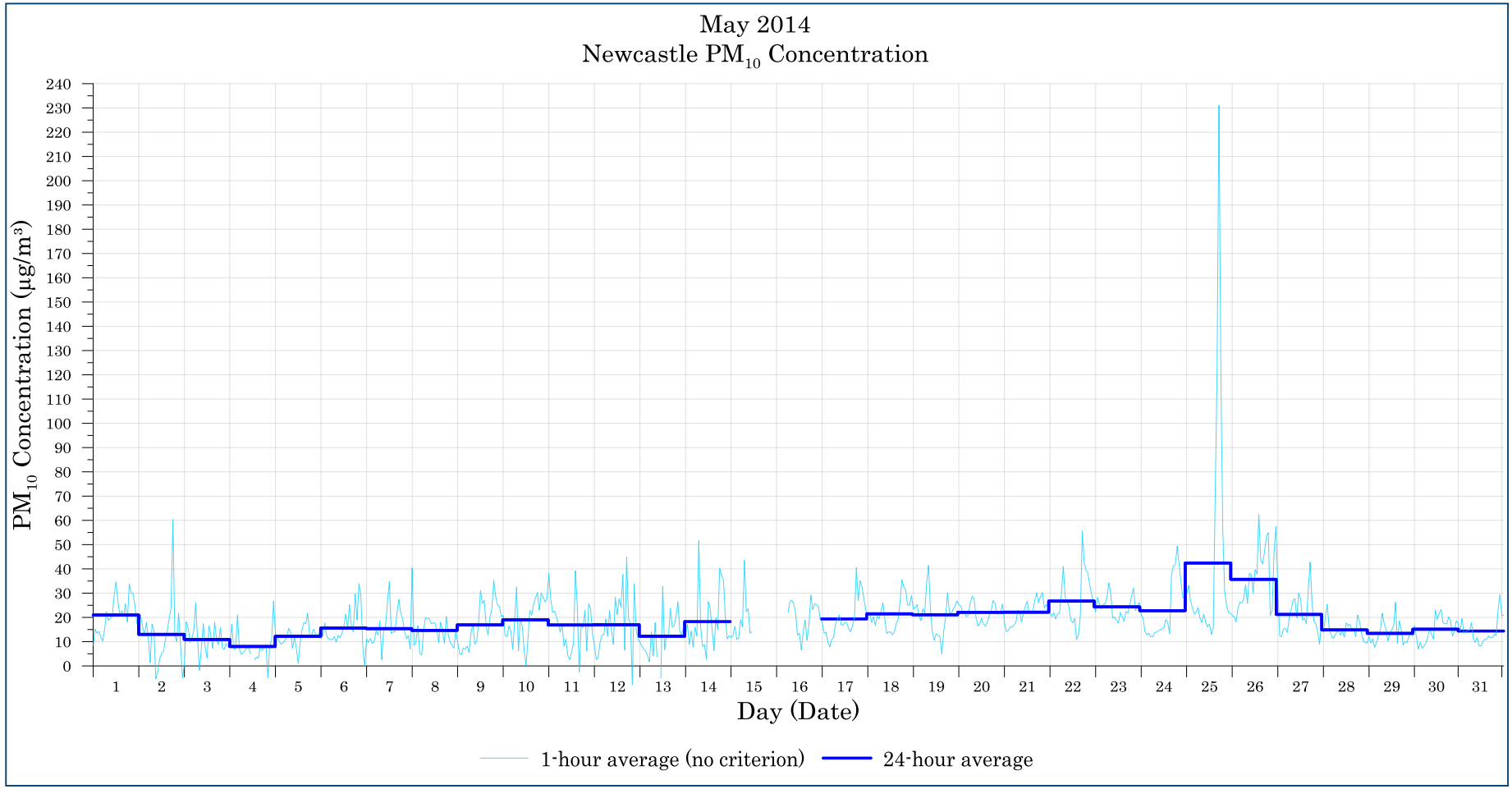

Figure B-1: Newcastle PM_{10} concentration - May

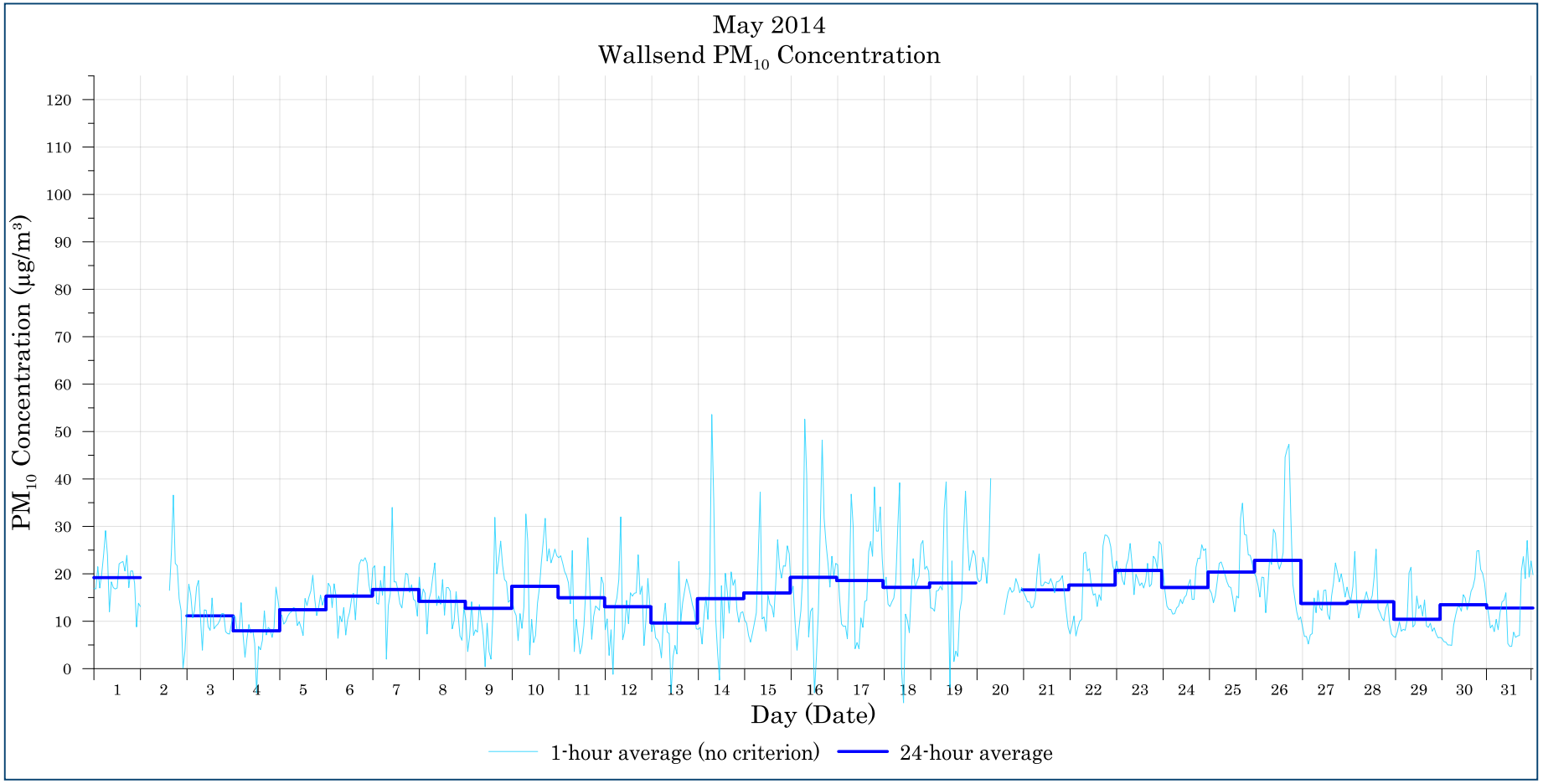

Figure B-2: Wallsend PM_{10} concentration - May

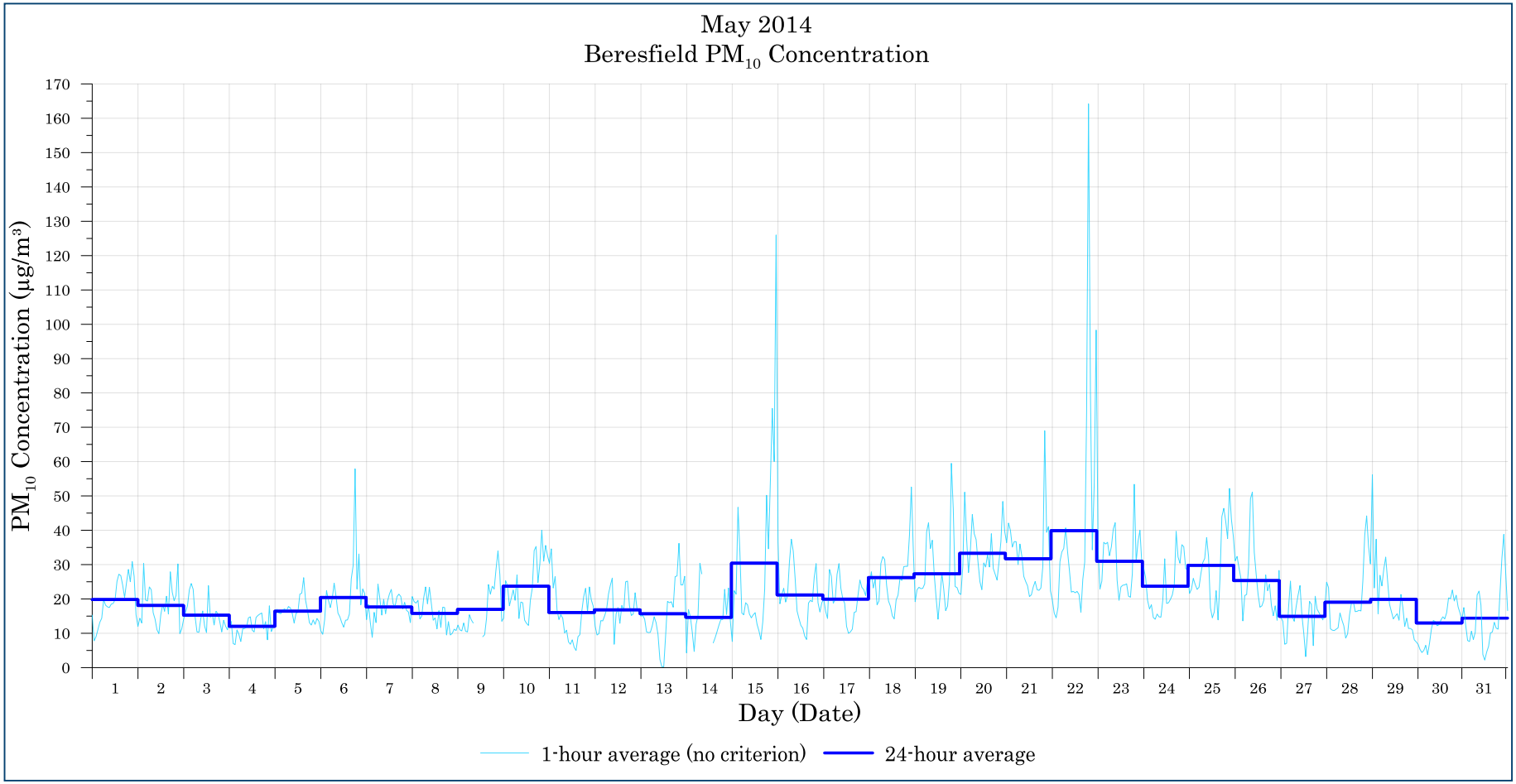

Figure B-3: Beresfield PM_{10} concentration - May

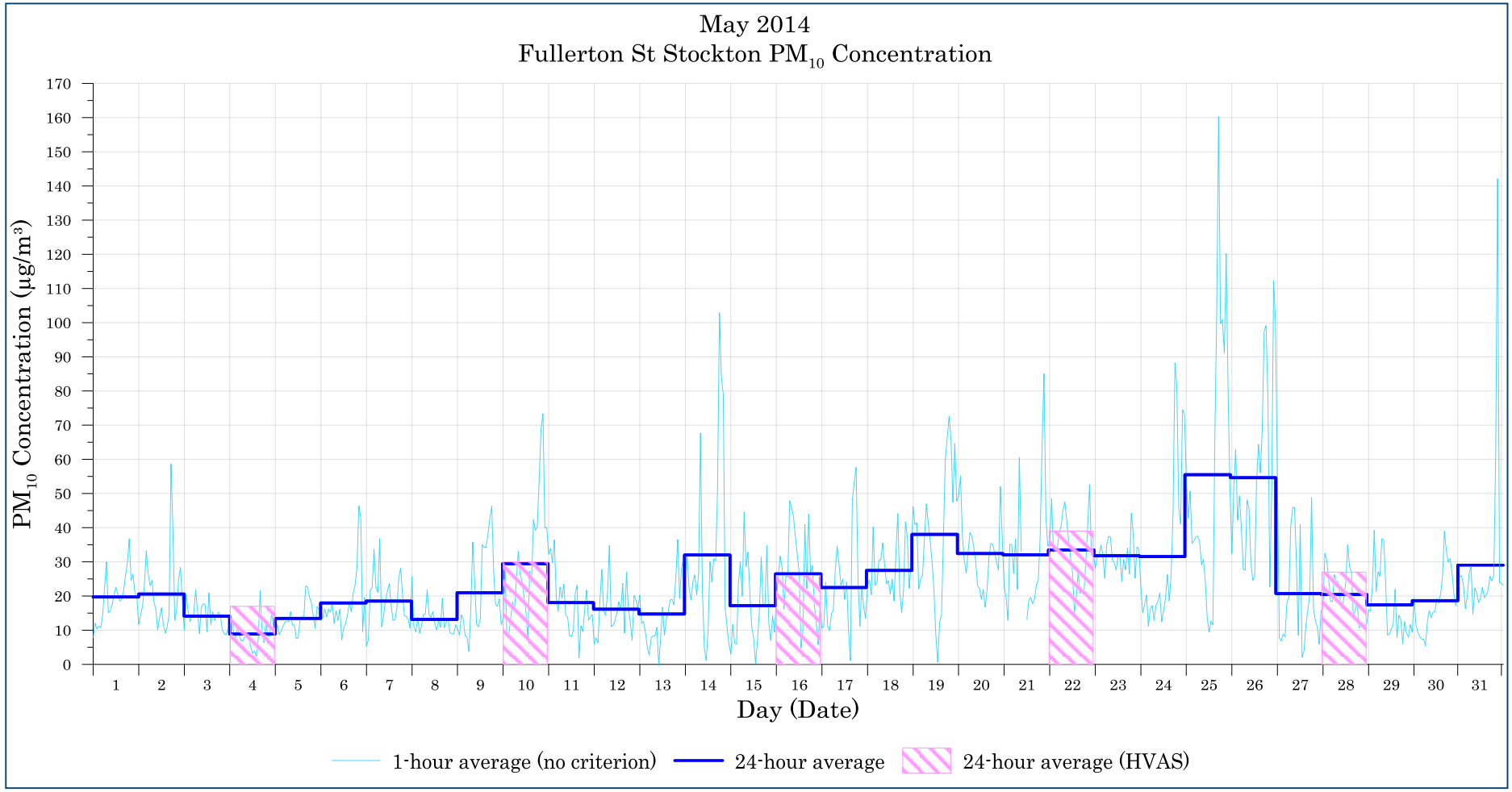

Figure B-4: Stockton PM_{10} concentration - May

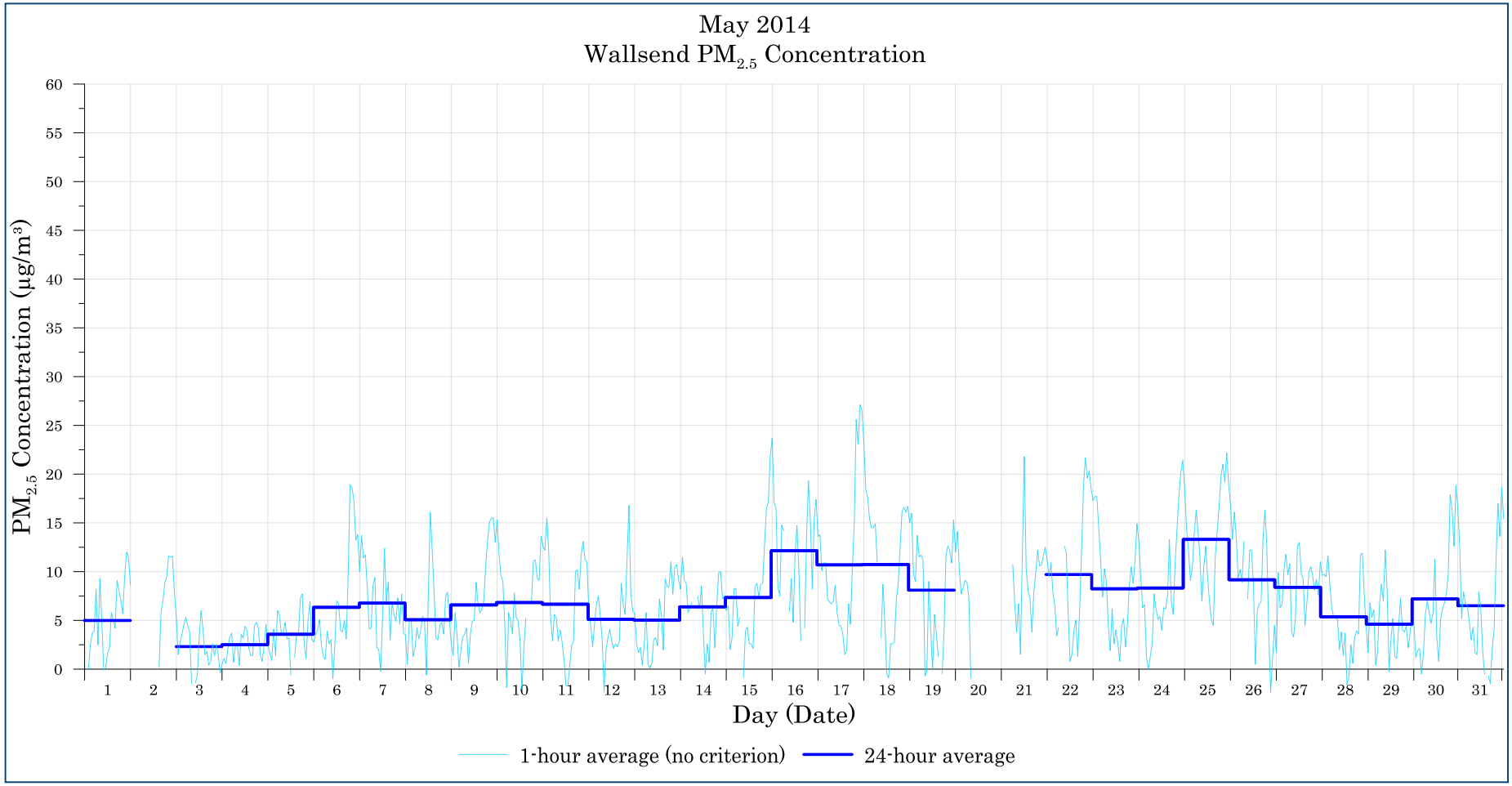

Figure B-5: Wallsend $PM_{2.5}$ concentration - May

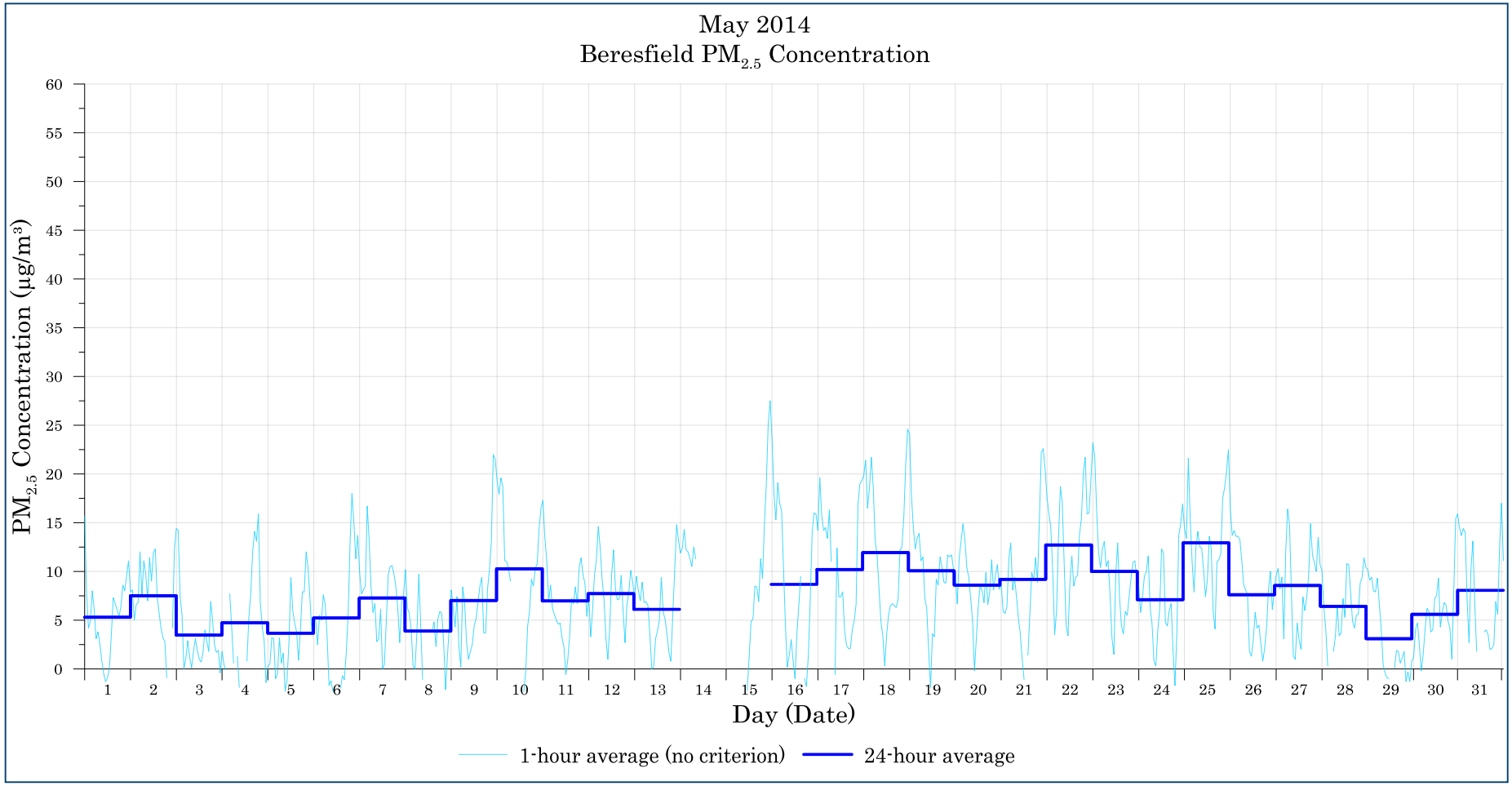

Figure B-6: Beresfield $PM_{2.5}$ concentration - May

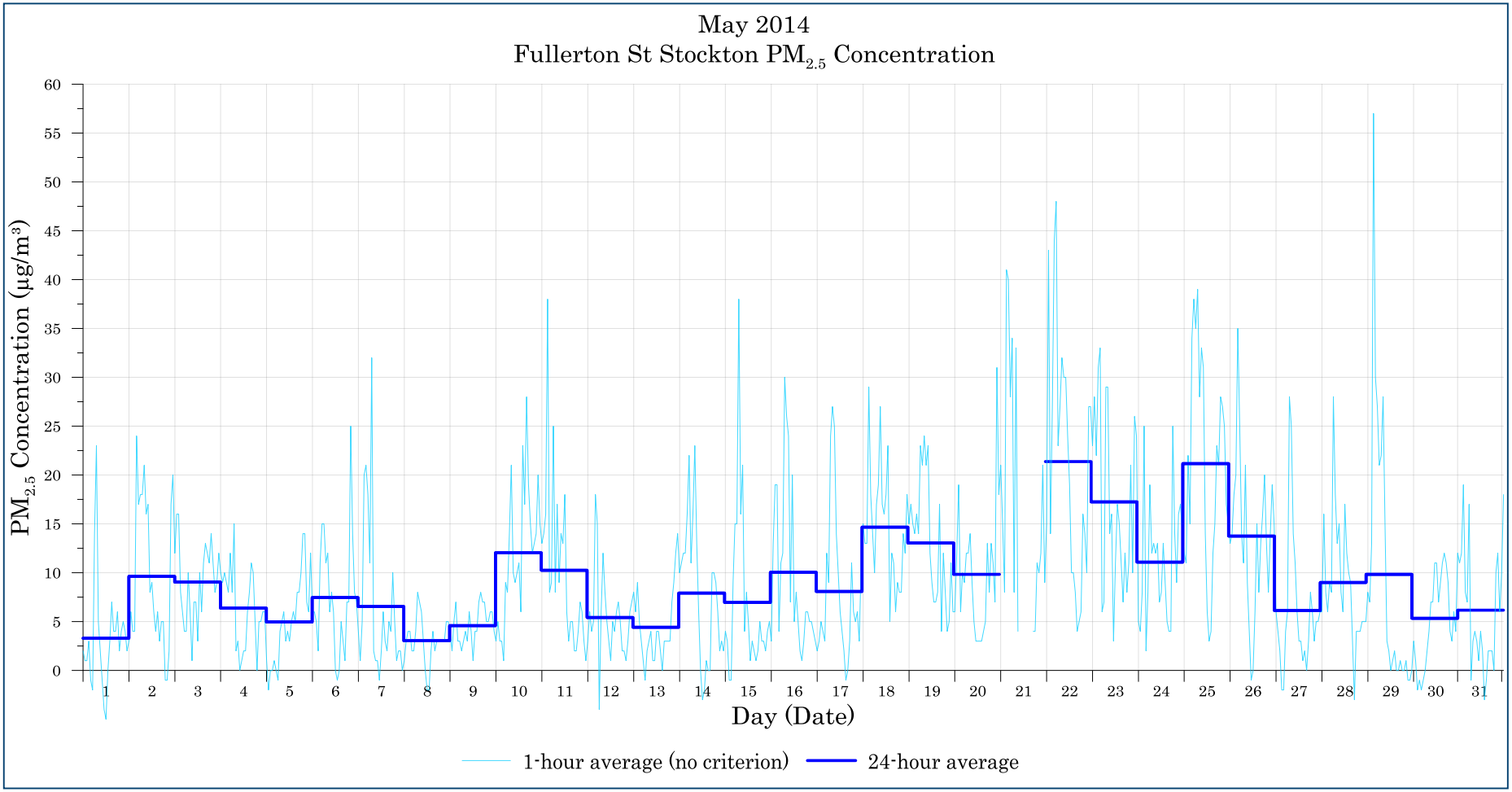

Figure B-7: Stockton $PM_{2.5}$ concentration - May

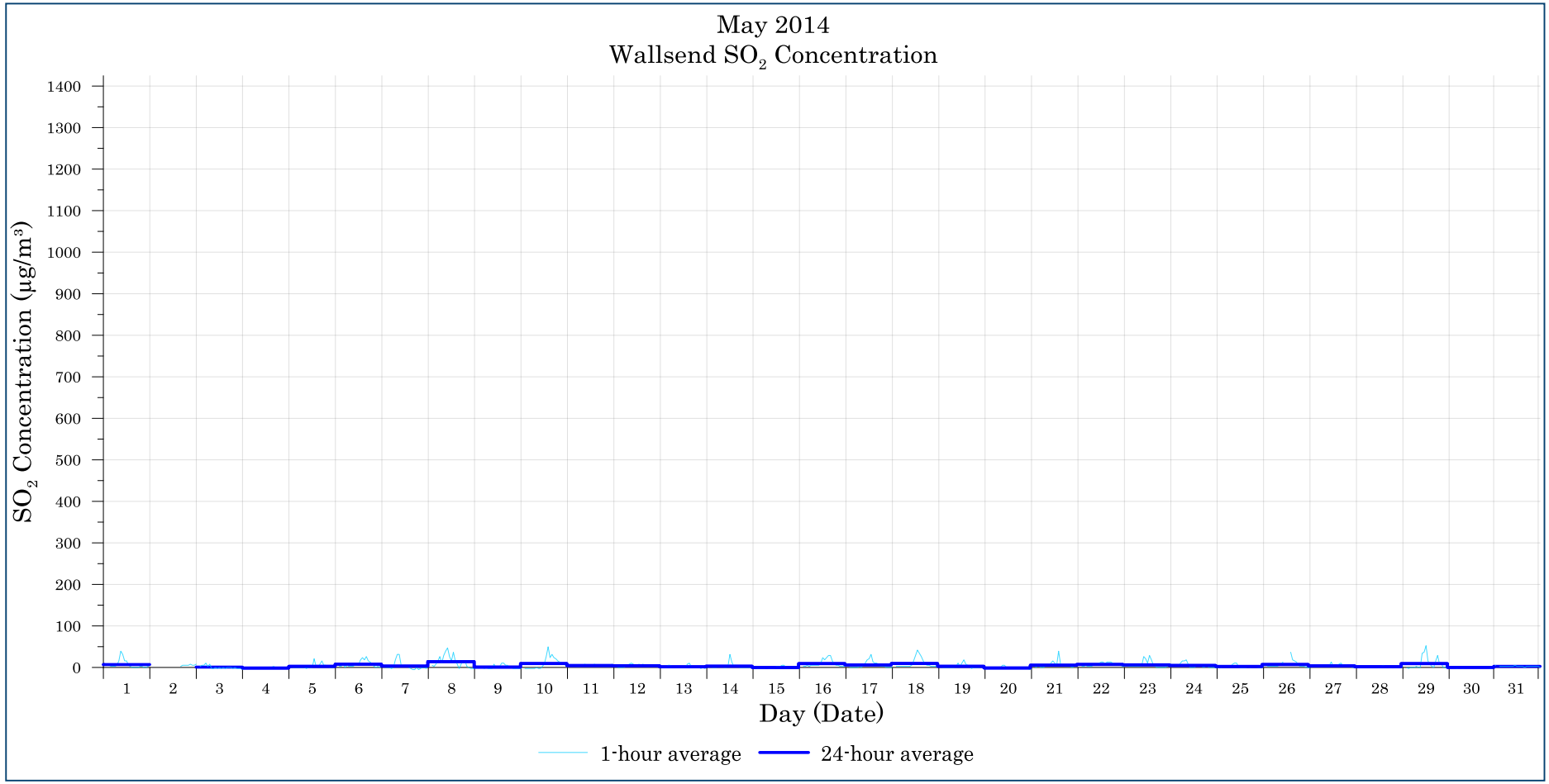

Figure B-8: Wallsend SO_2 concentration - May

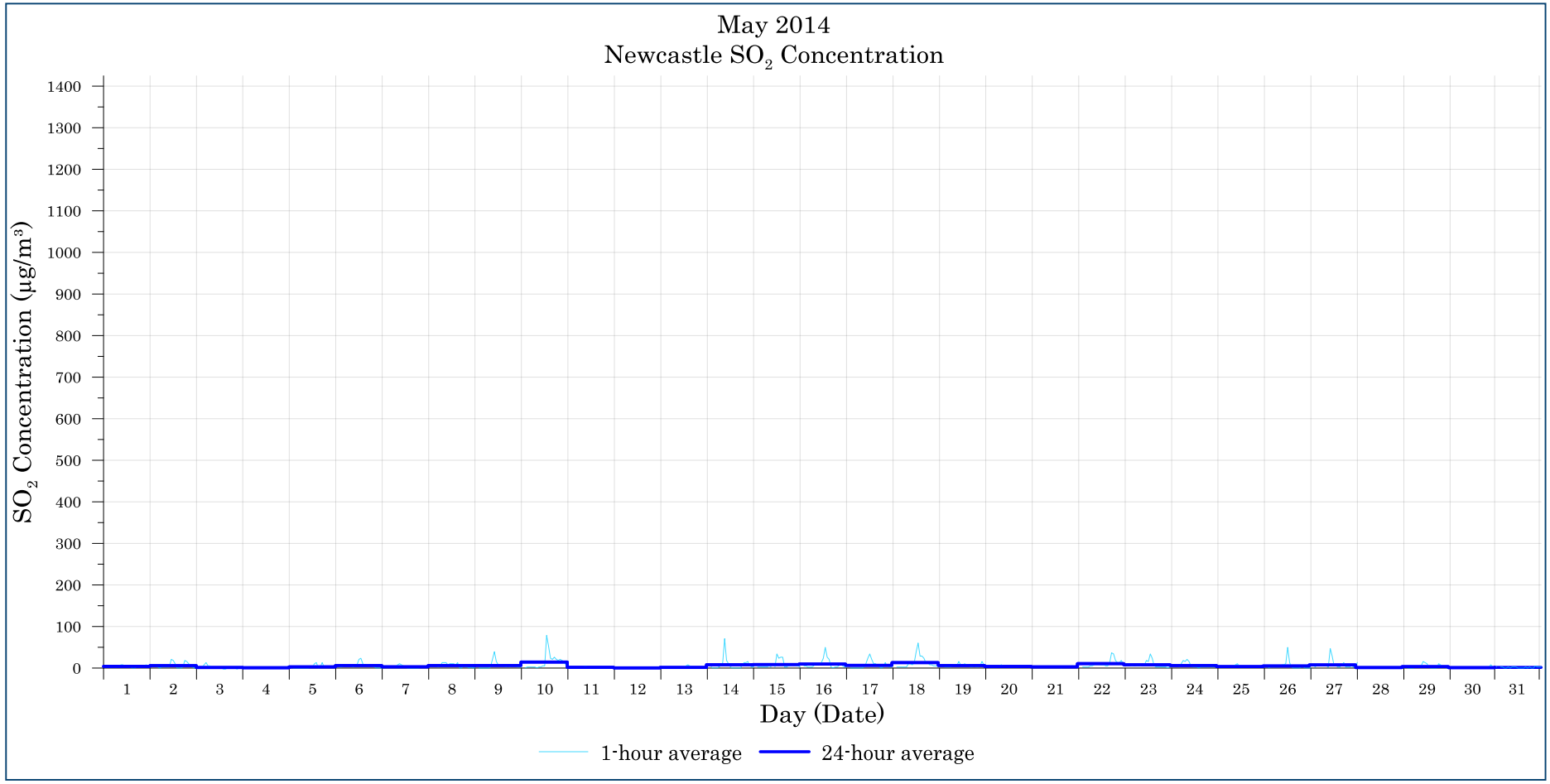

Figure B-9: Newcastle SO_2 concentration - May

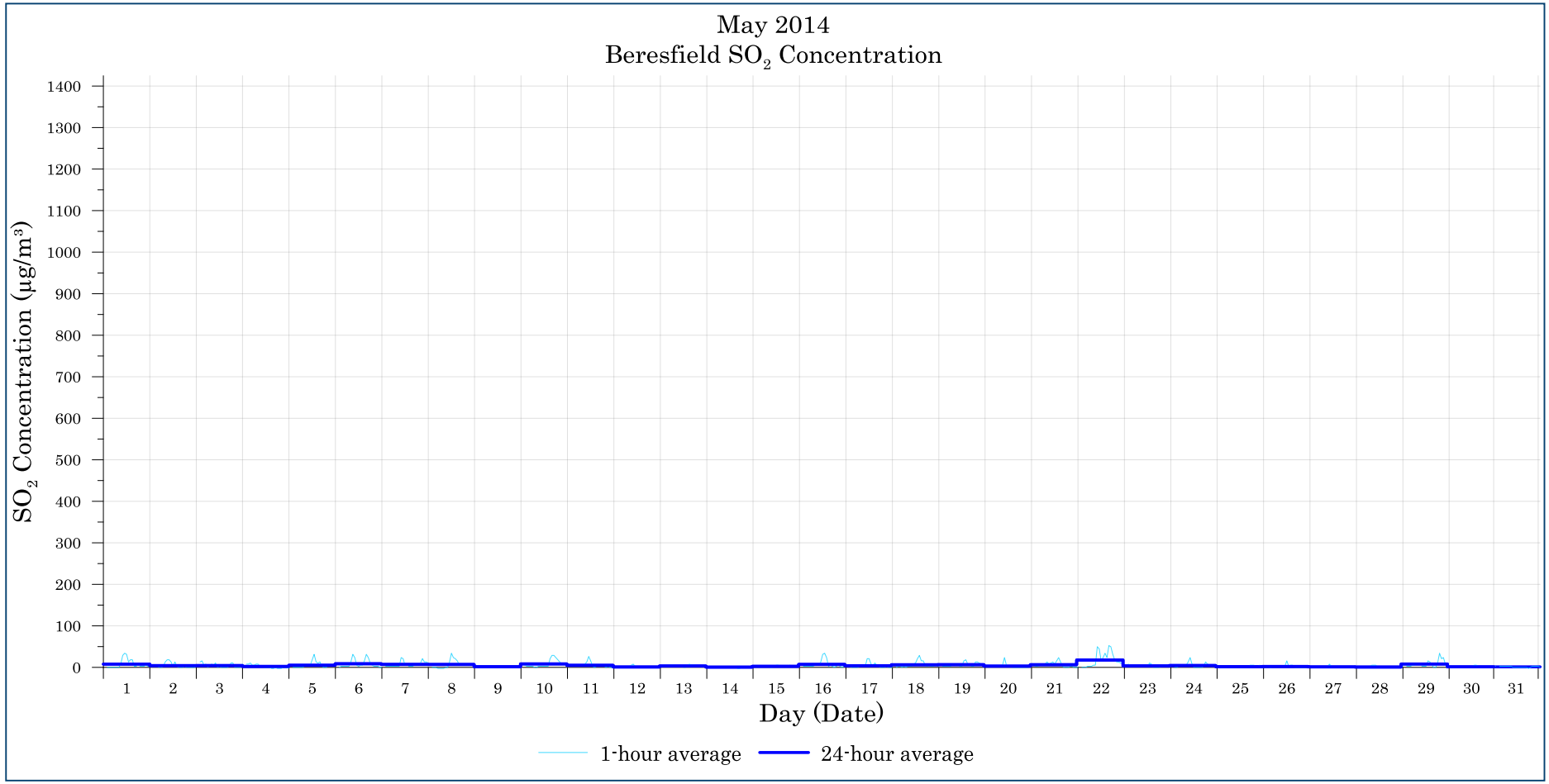

Figure B-10: Beresfield SO_2 concentration - May

Appendix C

Monitoring Data (Tabulated)

Table C-1: May 24-hour average monitoring data

	PM_{10} (µg/m³)				$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)		
Date	Walls end	Newcastle	Beresfield	Fullerton St Stockton	Wallsend	Beresfield	Fullerton St Stockton	Wallsend	Newcastle	Beresfield
01/05/2014	19.2	21.0	19.8	19.7	5.0	5.3	3.3	6.9	4.1	7.9
02/05/2014	-	13.0	18.1	20.6	-	7.5	9.6	-	5.8	4.2
03/05/2014	11.1	10.9	15.3	14.1	2.3	3.5	9.0	0.8	1.3	4.3
04/05/2014	8.0	8.0	12.0	8.9	2.5	4.7	6.4	-1.5	0.8	2.3
05/05/2014	12.4	12.2	16.4	13.5	3.6	3.7	5.0	2.6	2.8	5.0
06/05/2014	15.3	15.6	20.4	18.0	6.3	5.2	7.5	7.7	6.0	8.7
07/05/2014	16.7	15.4	17.7	18.5	6.8	7.3	6.5	3.2	3.0	7.1
08/05/2014	14.2	14.6	15.8	13.1	5.1	3.9	3.0	14.1	6.0	6.9
09/05/2014	12.7	16.9	16.9	21.0	6.6	7.0	4.6	0.8	6.2	1.6
10/05/2014	17.4	19.0	23.7	29.5	6.8	10.3	12.0	9.3	14.5	8.3
11/05/2014	15.0	16.9	16.1	18.1	6.7	7.0	10.3	4.6	1.7	4.9
12/05/2014	13.1	17.0	16.8	16.1	5.1	7.7	5.4	4.2	0.5	0.9
13/05/2014	9.6	12.2	15.7	14.7	5.0	6.1	4.4	1.6	1.5	3.3
14/05/2014	14.8	18.3	14.6	32.0	6.4	-	7.9	3.0	8.0	0.6
15/05/2014	16.0	-	30.4	17.2	7.3	-	7.0	-0.2	8.5	2.5
16/05/2014	19.2	-	21.2	26.5	12.1	8.7	10.0	9.2	9.6	7.1
17/05/2014	18.6	19.3	20.0	22.5	10.7	10.2	8.1	6.2	6.5	4.0
18/05/2014	17.1	21.5	26.2	27.5	10.7	11.9	14.7	9.5	13.1	6.3
19/05/2014	18.1	21.1	27.3	38.0	8.1	10.1	13.0	2.7	6.0	6.5
20/05/2014	-	22.1	33.3	32.4	-	8.6	9.8	-1.3	3.8	3.0
21/05/2014	16.6	22.1	31.7	32.1	-	9.2	-	5.4	2.9	6.4
22/05/2014	17.6	26.7	39.9	33.5	9.7	12.7	21.4	7.2	10.7	17.8
23/05/2014	20.7	24.3	31.0	31.8	8.2	10.0	17.3	6.3	7.9	3.5
24/05/2014	17.1	22.8	23.7	31.5	8.3	7.1	11.1	4.8	6.0	4.4
25/05/2014	20.4	42.4	29.8	55.5	13.3	12.9	21.2	2.4	3.5	1.7
26/05/2014	22.8	35.7	25.3	54.6	9.2	7.6	13.8	7.1	5.0	2.1
27/05/2014	13.7	21.2	14.9	20.7	8.4	8.6	6.1	3.8	7.5	1.1
28/05/2014	14.1	14.8	19.1	20.4	5.4	6.4	9.0	1.8	1.2	0.8
29/05/2014	10.4	13.4	19.9	17.4	4.6	3.1	9.8	9.2	3.4	8.1
30/05/2014	13.5	15.1	13.0	18.6	7.2	5.6	5.3	0.1	1.0	1.3
31/05/2014	12.8	14.4	14.4	29.0	6.5	8.1	6.2	2.6	1.6	1.3

- Not applicable

Table C-2: May 24-hour average HVAS monitoring data

Date	PM_{10} (HVAS) (µg/m³)		
	Steel River	Mayfield	Fullerton St Stockton
04/05/2014	4	8	17
10/05/2014	17	21	30
16/05/2014	18	29	26
22/05/2014	28	29	39
28/05/2014	17	14	27

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