A STUDY OF AIRBORNE POLLUTANTS AT AMBIENT LEVELS IN THE VILLAGE OF PEN-Y-FFORDD, FLINTSHIRE JANUARY TO AUGUST 2013

Report written by	**Jeff Hood**	**Date: Oct 2013**
Designation	**Senior Consultant**	
Report approved by	**Ben Anstee**	**Date: Oct 2013**
Designation	**Principal Consultant**	

NORTHUMBRIAN WATER
Scientific Services
Northumberland Dock Road,
Wallsend, Tyne and Wear NE28 0QD, UK
Telephone: (0191) 296 8500 Fax: (0191) 296 8560
www.nw-ss.co.uk

CONTENTS

EXECUTIVE SUMMARY

Client Name:	Hanson Cement, Padeswood Works, Flintshire
Grid Reference of Monitoring Site:	SJ 3015 6125
Description of Monitoring Site:	Bowling Club car park, Pen-y-ffordd
Client Contact:	Victoria Smith
Name of Monitoring Company:	Northumbrian Water Scientific Services
Site Personnel:	Jeff Hood

This report summarises the PM_{10}, oxides of nitrogen, sulphur dioxide and carbon monoxide concentrations recorded at the Pen-y-ffordd air quality station during January to August 2013. Meteorological information was also collected.

Airborne Pollutant (ppb unless otherwise stated)	***Average Values January - August***
Sulphur Dioxide	0.79
Nitrogen Dioxide	9.69
Nitric Oxide	12.11
Carbon Monoxide (ppm)	0.13
PM_{10} ($\mu g/m^3$)	12.9

Pollution Events

The concentrations of pollutants did not exceed, and fell well below the long and short-term UK Air Quality Standards.

Summary of Equipment Faults and Data Issues

During June and July the unit developed a power fault which resulted in poor data from the SO2 and NOx instruments. This data was unable to be ratified. The power problem has now been rectified.

1.0 SCOPE OF WORK

Monitoring Location	Determinands measured
Pen-y-ffordd Bowls Club	**Automated, continuous methods:** Carbon monoxide, Oxides of nitrogen, Nitrogen dioxide, Nitric oxide, Sulphur dioxide, PM_{10}, $PM_{2.5}$

2.0 SAMPLING METHODS

Determinand	Reference Method	Sampling Method
Carbon monoxide	Based on AURN Procedures	Direct measurement of Carbon monoxide using a gas filter correlation infra-red analyser with a resolution of 10ppb, calibrated on-site using traceable standards.
Oxides of nitrogen	Based on AURN Procedures	Direct measurement of NO, NO_2 and NO_x using a chemiluminescence analyser with a resolution of 1ppb, calibrated on-site using traceable standards.
Sulphur Dioxide	Based on AURN Procedures	Direct measurement of Sulphur dioxide using a UV fluorescence analyser with a resolution of 1ppb, calibrated on-site using traceable standards.
PM_{10}	Manufacturer's Instructions	Measured using a Teom Analyser.This is a recognised as a reference method for use on the AURN.

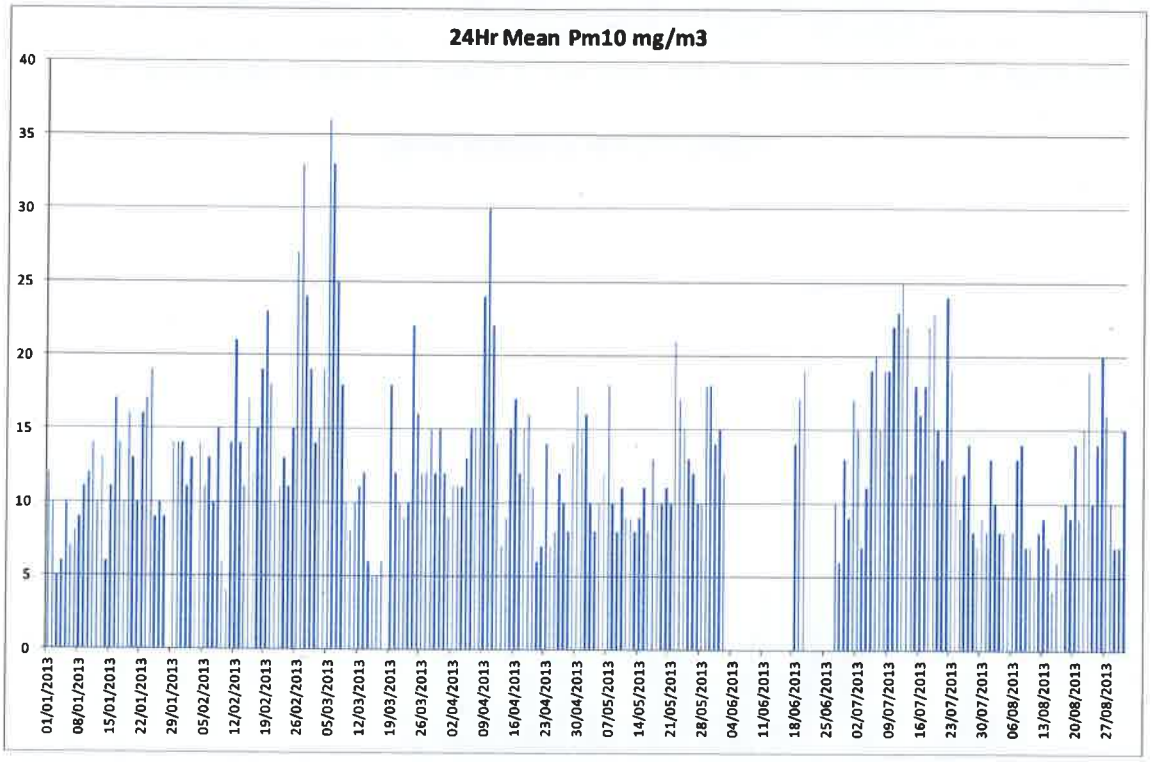
The AURN Procedures are those used to produce ambient air concentration data for DEFRA from the **A**utomated **U**rban and **R**ural **N**etwork of air monitoring stations.

3.0. COMPARISON WITH AIR QUALITY STANDARDS & OBJECTIVES

3.1 PM_{10}

UK Air Quality Standards for protection of human health		
Concentration	**Measured as**	**Date to be achieved by**
40 µg/m^3	Annual Mean	31 December 2004
50 µg/m^3	24-hour (midnight-midnight) mean not to be exceeded more than 35 times a year	31 December 2004

The mean PM_{10} concentration over the monitoring period was calculated to be 13.1 µg/m^3.



The graph illustrates the 24-hour (midnight to midnight) means for PM_{10}. During this period:

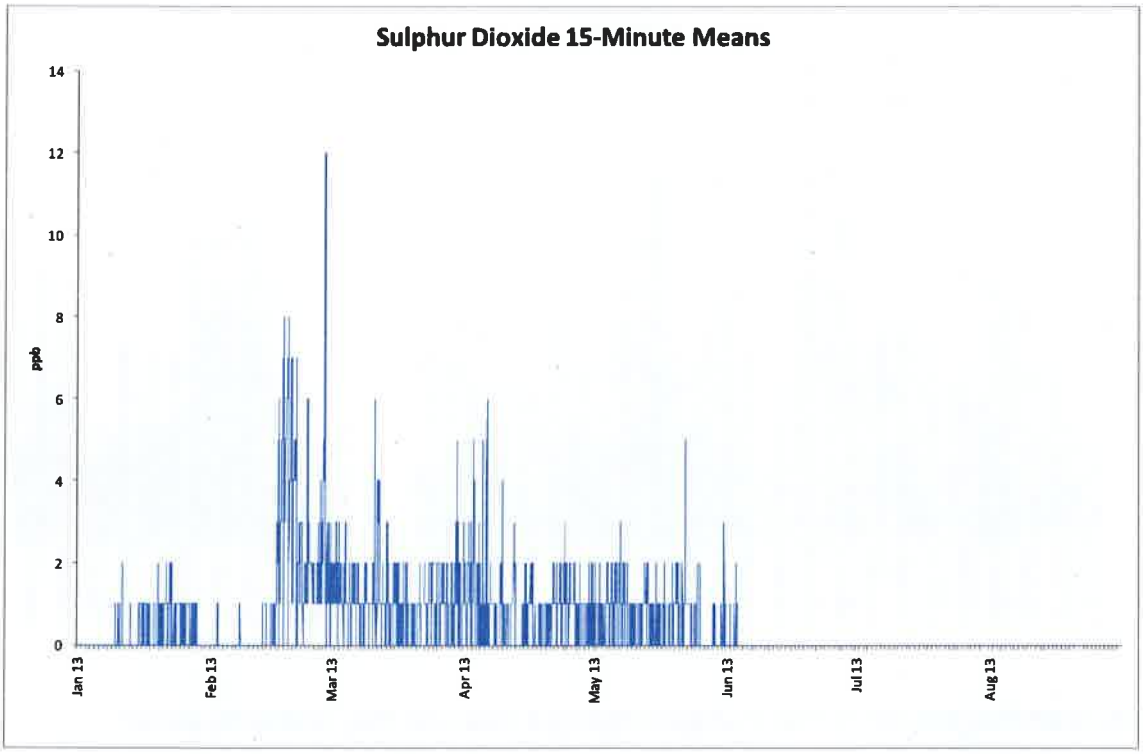
Maximum 24-hour mean 36 µg/m^3

Number of 24-hour means greater than 50 µg/m^3 0

3.2 Sulphur Dioxide

UK Air Quality Standards for protection of human health		
Concentration	**Measured as**	**Date to be achieved by**
100 ppb	15-minute mean not to be exceeded more than 35 times a year	31 December 2005
132 ppb	1-hour mean not to be exceeded more than 24 times a year	31 December 2004
47 ppb	24-hour (midnight to midnight) mean not to be exceeded more than 3 times a year	31 December 2004

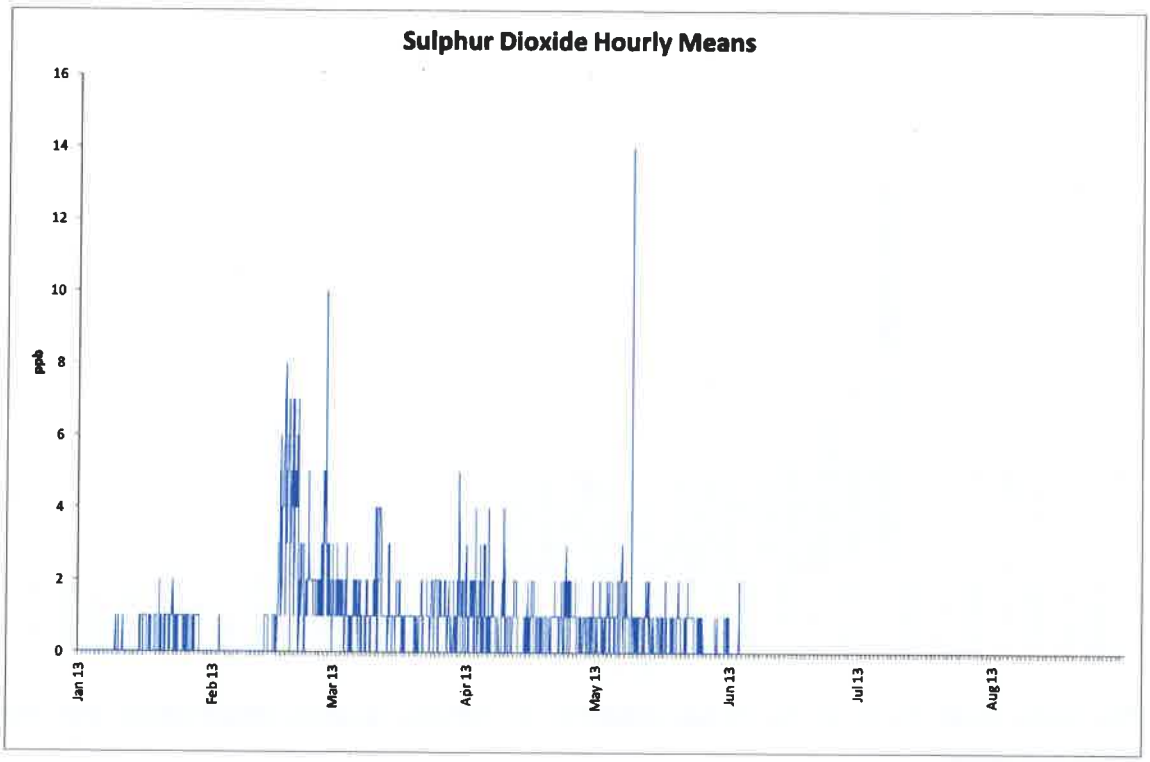
The average SO_2 concentration during this period was 0.79 ppb. The data is presented below.



The above graph illustrates the 15-minute average concentrations over the monitoring period.

During this period:

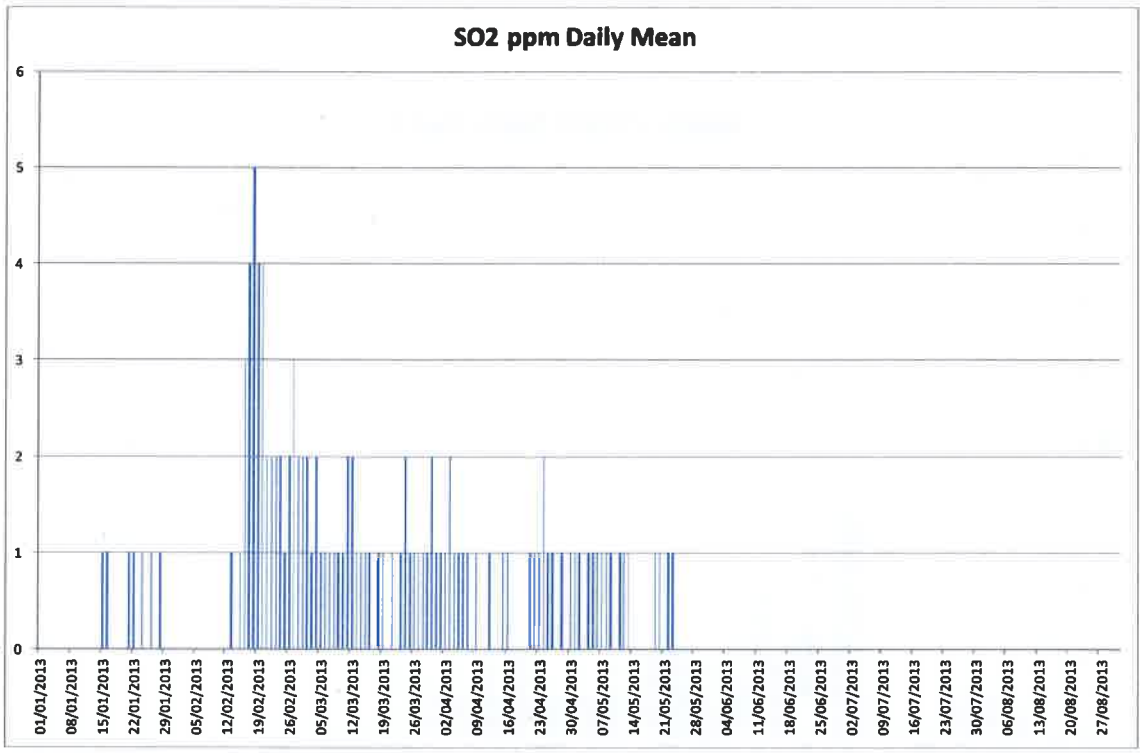
Maximum 15-minute mean	12 ppb
Number of 15-minute means greater than 100 ppb	0



The above graph illustrates the 1-hour average concentrations over the monitoring period.

During this period:

Maximum 1-hour mean	14 ppb
Number of 1-hour means greater than 132 ppb	0



The above graph illustrates the 24-hour (midnight to midnight) average concentrations over the monitoring period.

During this period:

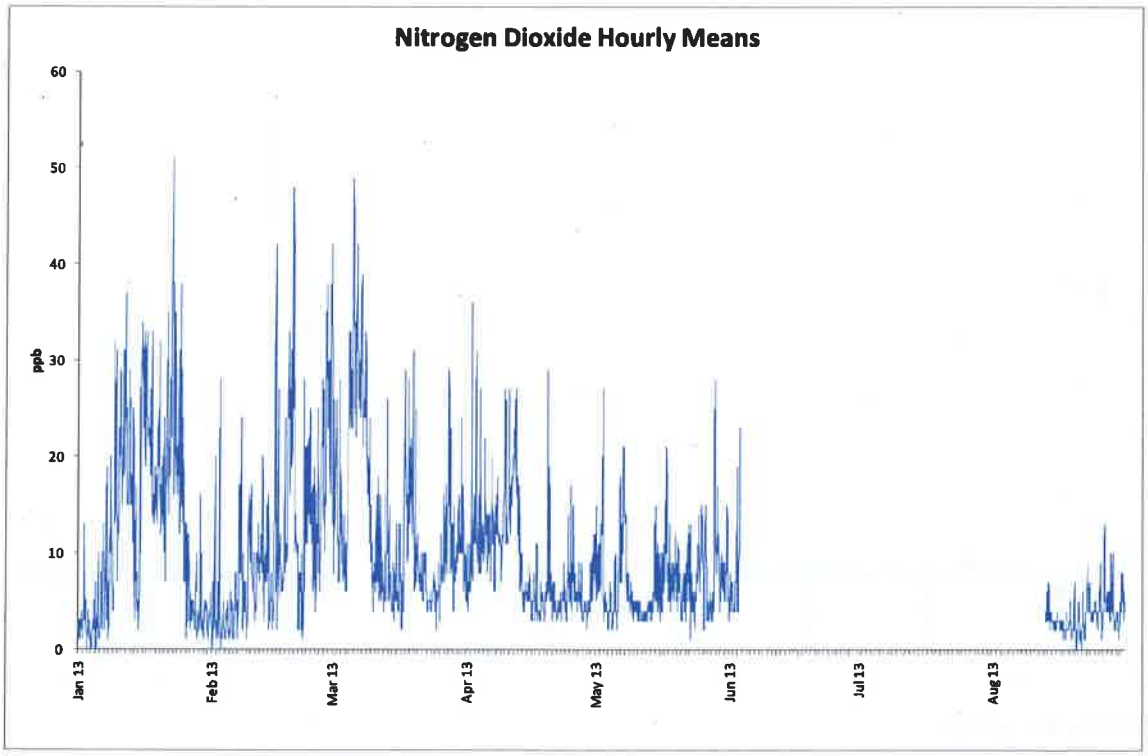
Maximum 24-hour (midnight to midnight) mean 5 ppb

Number of 24-hour (midnight to midnight) means greater than 47 ppb 0

3.3 Nitrogen Dioxide

UK Air Quality Standards for protection of human health		
Concentration	**Measured as**	**Date to be achieved by**
105 ppb	1-hour mean not to be exceeded more than 18 times a year	31 December 2005
21 ppb	Annual Mean	31 December 2005

The average NO_2 concentration over the monitoring period was 9.69 ppb.



The above graph illustrates the 1-hour average concentrations over the monitoring period.

During this period:

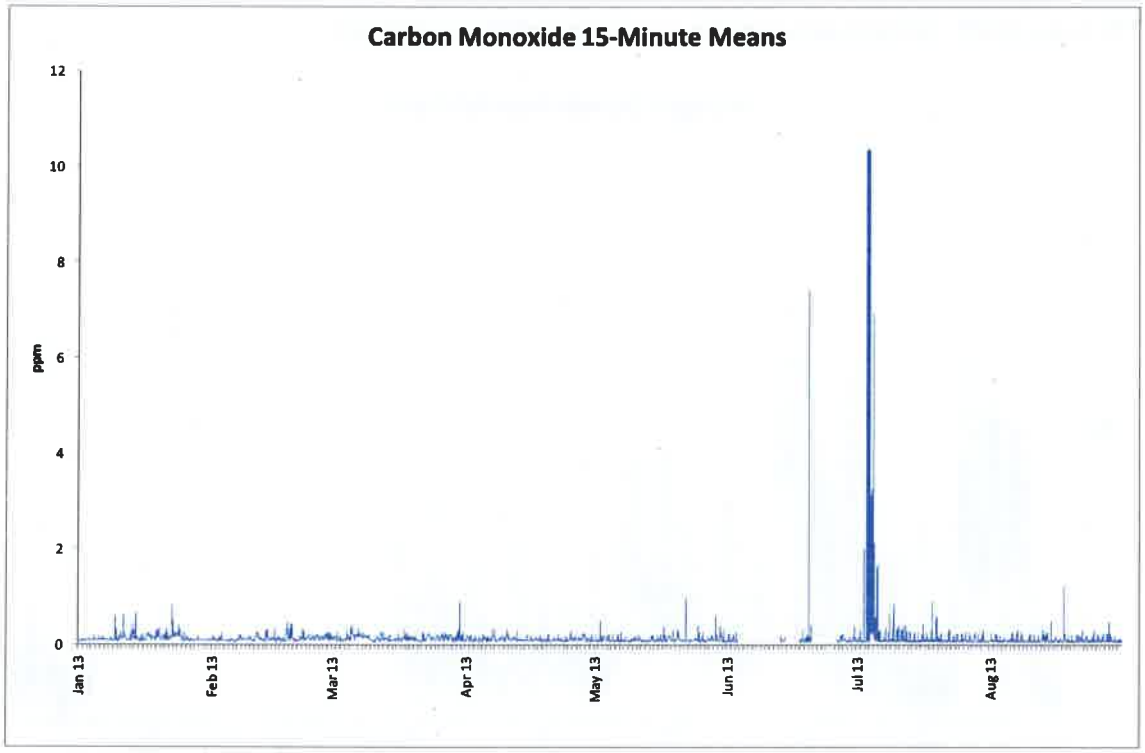
Maximum 1-hour mean 51 ppb

Number of 1-hour means greater than 105 ppb 0

3.4 Carbon Monoxide

UK Air Quality Standards for protection of human health		
Concentration	**Measured as**	**Date to be achieved by**
8.6 ppm	8 hour running mean	31 December 2003

The average CO concentration over the monitoring period was 0.12 ppm.



During this period:

Maximum 8-hour running mean	3.1 ppm
Number of 8-hour running means greater than 8.6ppm	0

4.0. COMPARISON WITH WHO GUIDELINES AND EAL's

In addition to comparing the results with the National Air Quality Standards, it is useful to compare them with other recognised guidelines, particularly the values based on long-term exposure that are not covered by the NAQS.

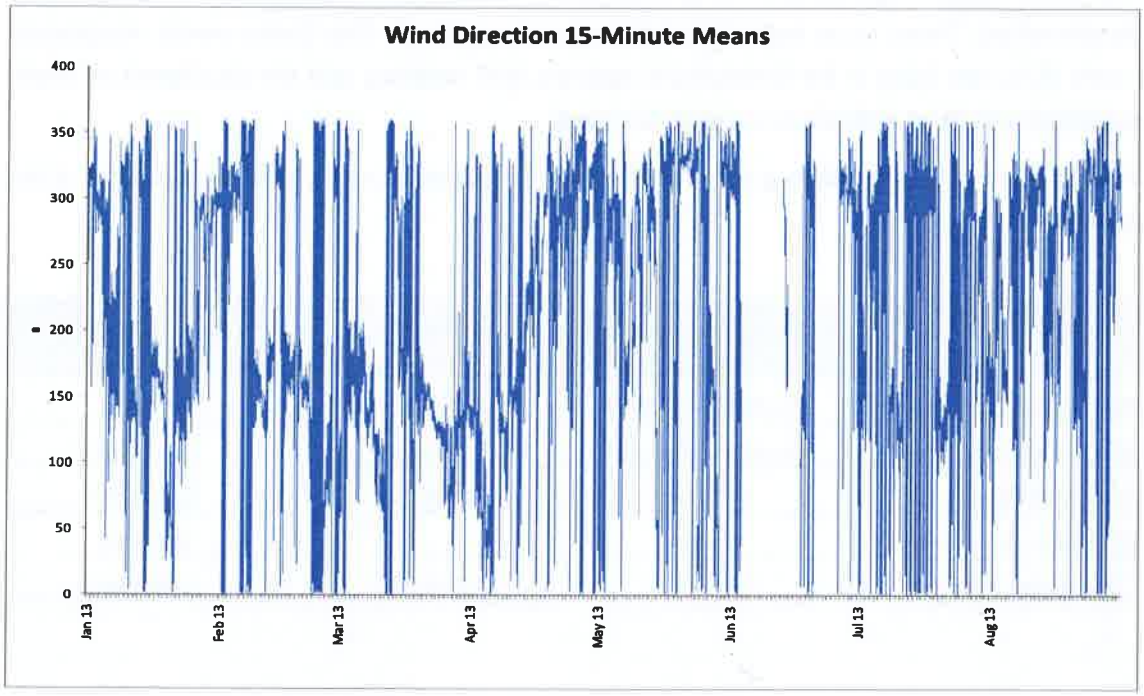
The World Health Organisation has set out a set of international guidelines based on health considerations. These cover both short and long term exposure. The Environmental Assessment Levels (EAL) are listed in the Environment Agency's BAT guidance and are also based on health considerations. Short and long term values are listed.

These are set out in the following table. In all cases, the guideline values were not exceeded at this location.

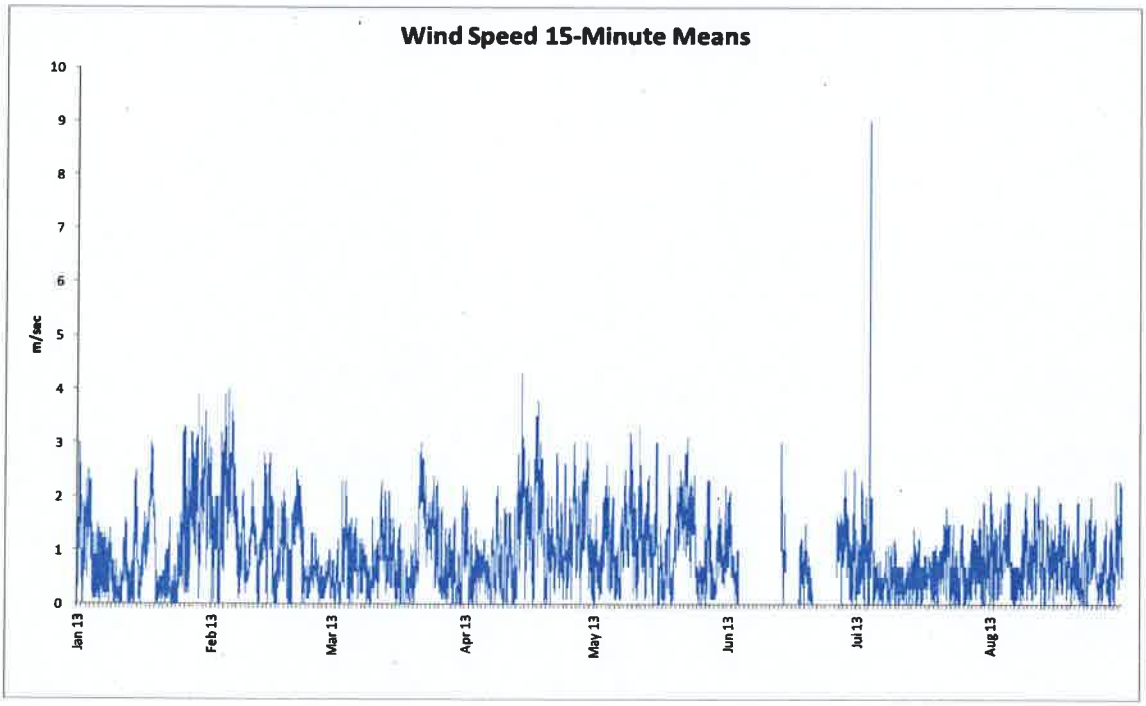
Parameter	WHO Guideline	Long Term EAL	Jan –Aug 2013 Figures
NO_2 (Annual average)	As AQS – 21ppb	As AQS – 21ppb	9.7 ppm
NO (Annual average)	No value provided	230 ppb	12.11 ppm
SO_2 (Annual average)	17.5ppb	17.5ppb	0.79 ppm
CO (Max. 8hr average)	8ppm	-	3.1 ppm
CO (Annual average)	-	0.28ppm	0.12 ppm

5.0 METEOROLOGICAL DATA AND TRENDS

Meteorological data was collected continuously throughout the survey in order to examine any trends in pollutant levels linked to the weather, in particular the wind direction. The following graph illustrates the distribution of wind direction during January – August 2013.



The pattern showing wind strength is indicated in the chart below.



6.0 SUMMARY OF FINDINGS

The study has produced the following findings for the months of January - August 2013:

i) The concentrations fell within the health based guidelines issued by the World Health Organisation.

ii) The concentrations fell within the Long Term Environmental Assessment Levels issued by the Environment Agency within the Best Available Technique guidance for suitability of abatement technologies from industrial processes and subsequent impact on health.

iii) The concentrations of the other pollutants did not exceed, and fell well below the long and short-term UK Air Quality Standards.