



AIR QUALITY UNIT



**REPORT ON THE MONITORING OF
AIRBORNE PARTICULATE MATTER (PM₁₀)**

ST STEPHEN

1st – 30th June 2008

Air Quality Unit
Cornwall College, TR15 3RD (caqf@cornwall.ac.uk)

Report on the monitoring of airborne particulate matter (PM₁₀) at St Stephen

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Commissioned by St Stephen Parish Council

1.0 Introduction

This is the second phase of an ambient airborne particulate matter monitoring programme that started 1st August 2006, to determine the impact of the new china clay tip extension (Scarcewater) on local air quality. The National Air Quality Strategy (NAQS) has set mean PM₁₀ concentration objective values of 50 µg m⁻³ over a 24-hr period (maximum of 35 exceedances in a 12-month period) and 40 µg m⁻³ 12-month mean that should have been met by 31/12/2004. The National Environmental Technology Centre (NETCEN) have estimated a background PM₁₀ concentration of between 16 µg m⁻³ and 21 µg m⁻³ for the St Stephen area (Figure 1).

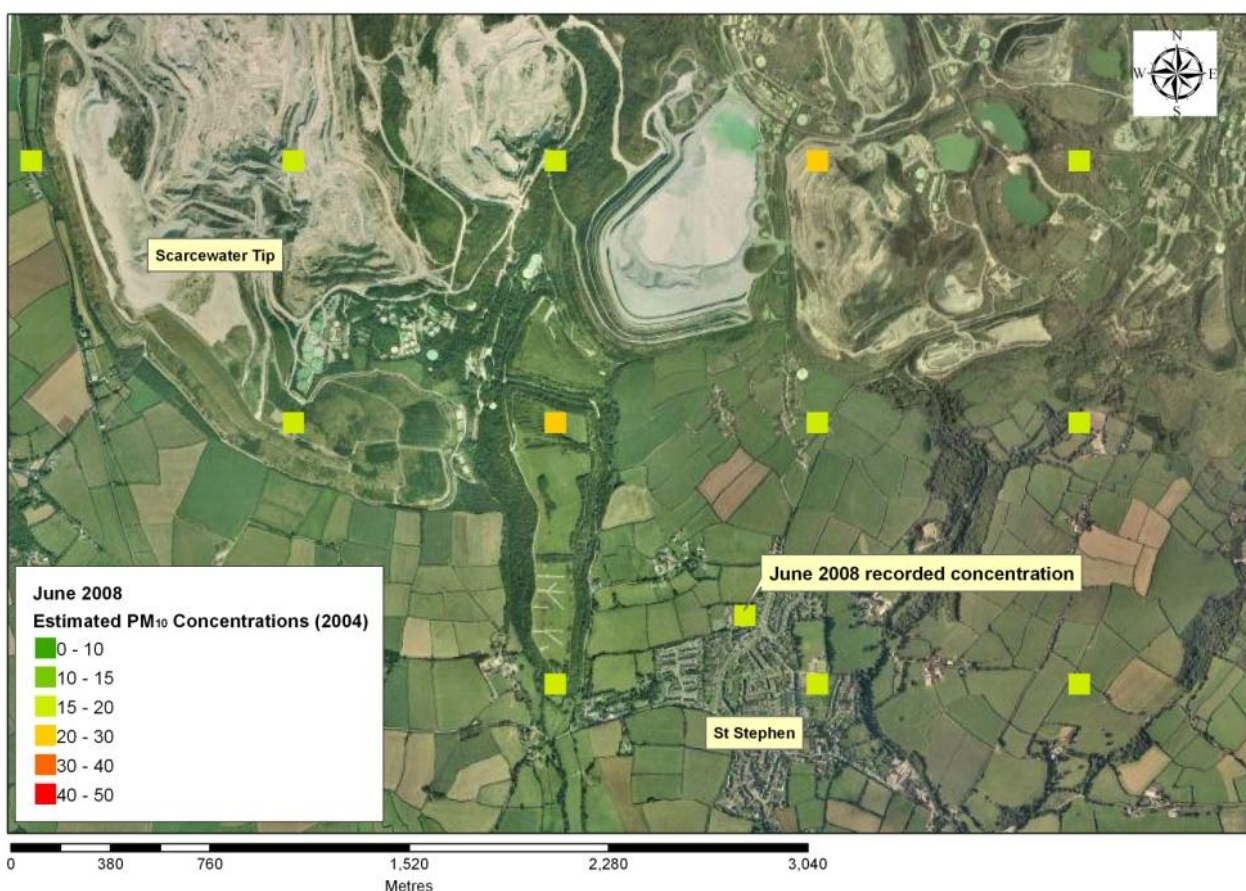


Figure 1. NETCEN estimated PM₁₀ concentrations (2004) and the mean concentration recorded in June 2008 at St Stephen Primary School.

1.1 St Stephen Primary School

An Osiris particulate monitor is mounted on the wall of St Stephen Primary School and is collocated with a wind direction/speed sensor. The site was changed from the pre-Scarcewater tip monitoring surveys due to the removal of a temporary building. The new site is at the same height approximately 25 metres from the original site.

2.0 Equipment

The Osiris airborne particulate monitor (Turnkey Instruments) employs a light scattering technique that gives a continuous and simultaneous indication of the TSP (Total Suspended Particulates), PM₁₀ (particulate matter with a diameter of less than 10 µm), PM_{2.5}, (particulate matter with a diameter of less than 2.5 µm) and PM_{1.0} (particulate matter with a diameter of less than 1 µm) mass fractions. For details of the Osiris monitor see the February 2004 report (www.caqf.org.uk).

The wind direction/speed sensor is supplied by Turnkey Instruments and is compatible with the Osiris particulate monitor.

3.0 Results

3.1 Data collection

Data collection at St Stephen Primary School during the period 1st – 30th June 2008 was 90% complete, data was lost between the 23rd – 25th June due to a software fault. Data capture for the comparative NETCEN-owned Automatic Urban Roadside Network (AURN) site at Harwell was 98% complete and the roadside TEOM particulate monitor located in Penzance recorded a data capture value of 84%

Data from Penzance and Harwell monitors are used for comparison to identify regional and national particulate events. Although the monitor at Penzance is within the county, it is located at a busy roadside and therefore has a contribution from traffic; Harwell is a rural site and is still within the regional airflow.

3.2 15-minute and 1-hour PM₁₀ concentrations

Recorded PM₁₀ concentrations were very low throughout June with only a few instances where PM concentrations >40 µg m⁻³. There were 3 short-lived events on the 2/6, 4/6 and the 6/6 where concentrations exceeded 40 µg m⁻³ for <1-hour; the event on the 6/6 the recorded the highest concentration of 132.4 µg m⁻³, however this lasted less than 30 minutes. Between 7/6 – 23/6 a mean concentration of 15.7 µg m⁻³ was recorded. Towards the end of the month PM₁₀ concentrations did begin to increase slightly with sustained periods of PM₁₀ concentration at ~40 µg m⁻³ recorded on the 29/6 and 30/6.

The comparison sites at Penzance and Harwell recorded very similar concentrations throughout June. The Penzance monitor recorded the highest 1-hour mean of 240.3 µg m⁻³ on the 27/6, however this seemed localised.

3.3 24-hour and month concentrations

There was no exceedance of the Government's NAQS 24-hour mean concentration objective of 50 µg m⁻³ recorded in June (Figure 4). St Stephen recorded the highest 24-hour mean concentration on 6 days during June on the 4/6, 14/6, 19 – 20/6 and the 29 – 30/6. Penzance recorded the highest 24-hour mean in June of 41 µg m⁻³ however this was due to the short-lived, localised event mentioned above.

The monthly mean PM₁₀ concentration recorded at St Stephen Primary School for June 2008 was 19.4 µg m⁻³ compared with 25.7 µg m⁻³ in Penzance and 18.3 µg m⁻³ in Harwell.

3.4 Wind data

The wind was almost entirely from the NW quadrant (Figure 5). PM₁₀ concentration with regard to wind direction was highest from a southerly direction (Figure 6), particularly the SSW which correlates to activity towards the end of June.

4.0 Discussion

There were no exceedances of the NAQS 24-hour mean during June. Although wind direction was dominated by the NW quadrant, the direction of Scarcewater; highest concentrations were received from the SW quadrant.

The Osiris monitor suffered a software fault from the 23rd – 25th June. However as recorded concentrations correlated well with the comparison sites throughout the rest of June, it is suggested that this would have been the case from the 23rd – 25th and therefore there would have been no exceedance during this time.

5.0 Summary

- There were no exceedances of the NAQS 24-hour objective for PM₁₀ of 50 µg m⁻³.
- The mean PM₁₀ concentration during June 2008 at St Stephen Primary School was 19.4 µg m⁻³; this would not exceed the NAQS annual mean objective.
- The wind was predominantly from the NW quadrant; however PM₁₀ concentrations were dominated by sources in SW quadrant.

A total of 3 exceedances of the NAQS 24-hour mean objective (50 µg m⁻³) have been recorded in the last 12-months and 33 exceedances since the second phase of monitoring began on August 1st 2006. The NAQS permits thirty five exceedances of the objective over a 12-month calendar year.

Confidentiality

All sampling results from the monitoring site at St Stephen Primary School will be the property of St Stephen Parish Council, and will be subject to strict confidentiality and not disclosed to any third party without prior formal permission from St Stephen Parish Council.

Disclaimer

Cornwall College cannot accept any responsibility for the use to which the information is put, nor for decisions, inferences or conclusions that are made on the basis of the information provided. No responsibility is taken for the accuracy of the sampling unless this is done under our own supervision.

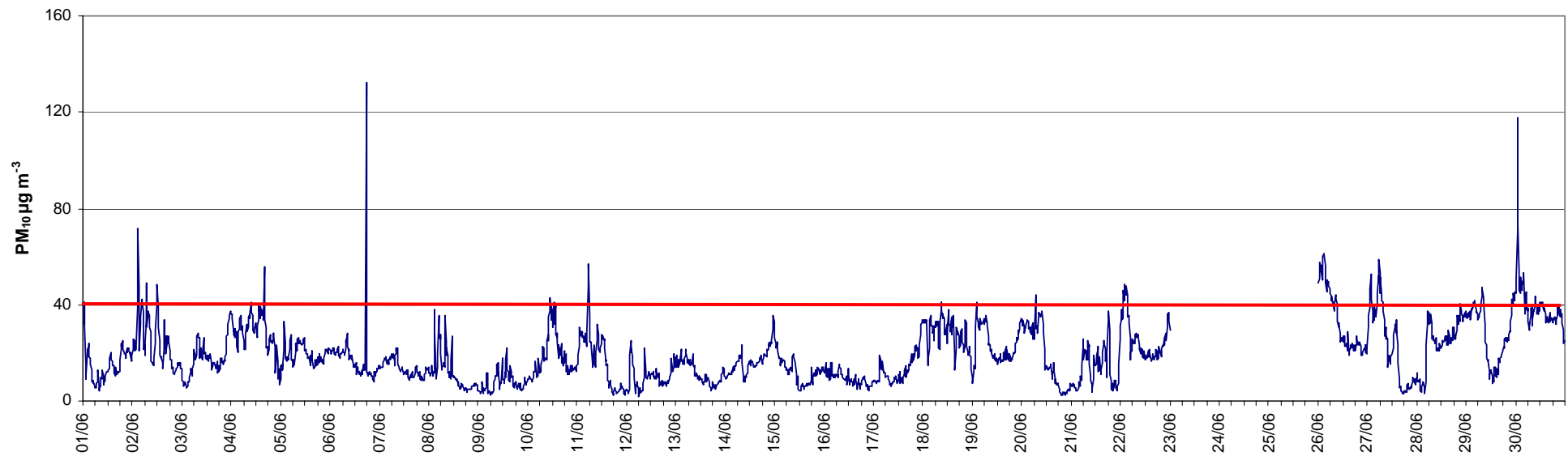


Figure 2. 15-minute mean PM₁₀ concentrations recorded at St Stephen Primary School (June 2008) (red line indicates NAQS annual mean objective)

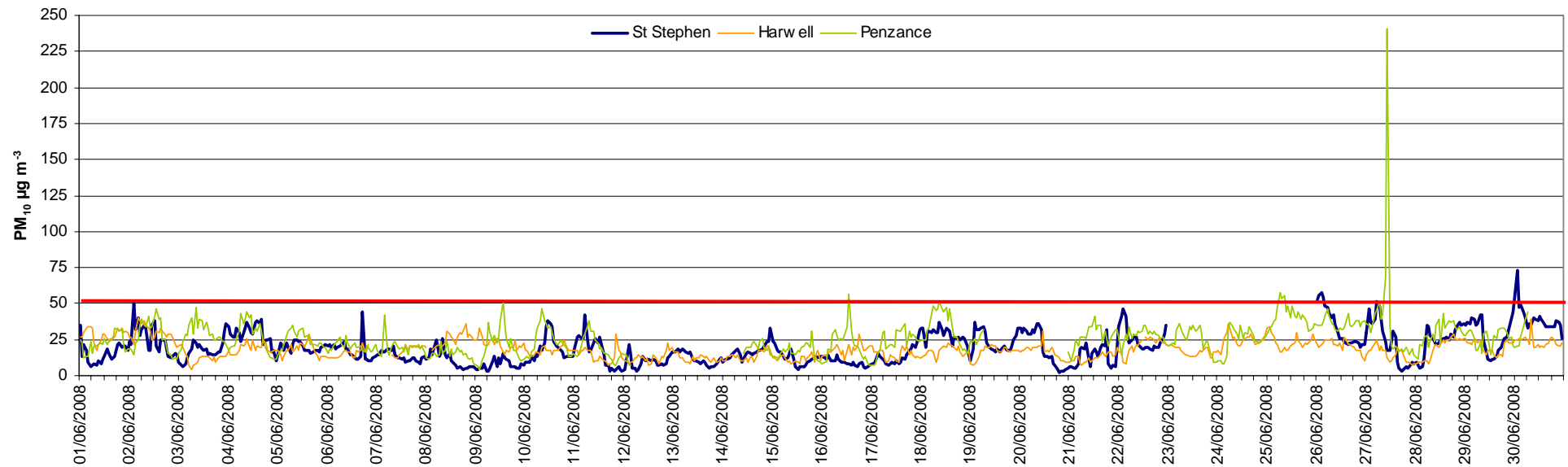


Figure 3. 1-hour mean PM₁₀ concentrations recorded at St Stephen Primary School, Penzance and Harwell (June 2008) (red line indicates NAQS 24-hour mean objective)

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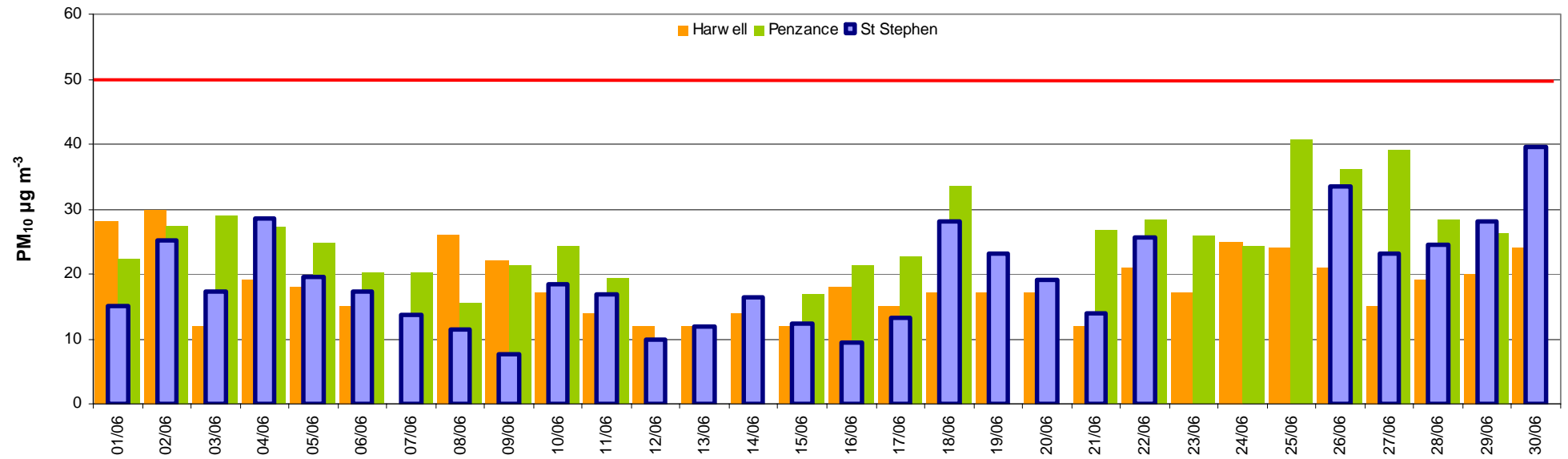


Figure 4. 24-hour mean PM₁₀ concentration recorded at St Stephen Primary School, Harwell and Penzance (June 2008) (red line indicates NAQS 24-hour mean objective)

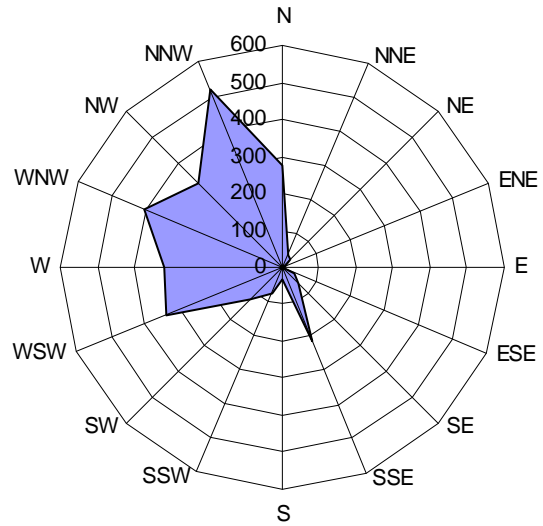
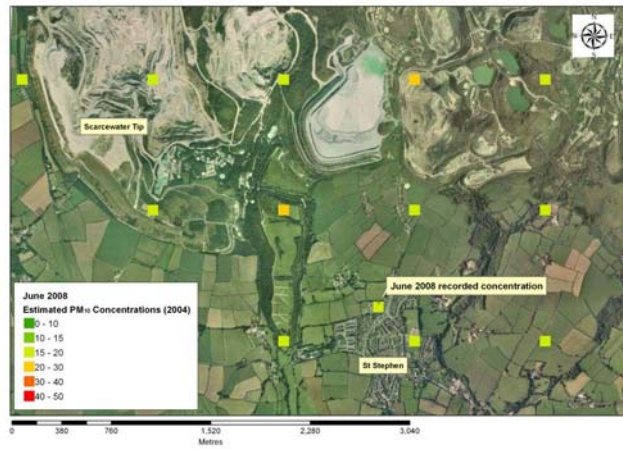
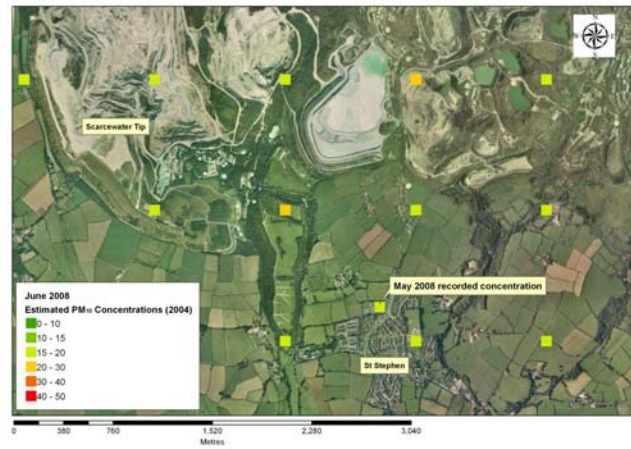


Figure 5. Wind direction frequency recorded at St Stephen Primary School (June 2008) (Axis represents number of 1/4-hour periods)



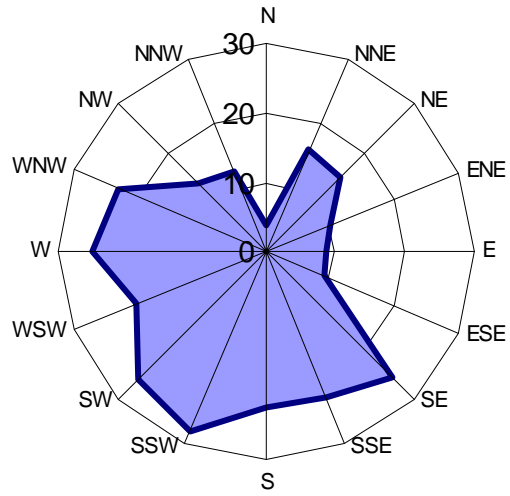


Figure 6. PM10 concentration with regard to wind direction recorded at St Stephen Primary School (June 2008)