

# Network

The newsletter for the UK Air Quality Monitoring Network **Issue 8**

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## CEN standards and measurement methods

# PM<sub>10</sub> equivalence tests under way

In previous editions of *Network* we have highlighted the discrepancy in measurement methods for PM<sub>10</sub>. A detailed field test programme to determine the performance of a wide range of PM<sub>10</sub> samplers and analysers has been commissioned by Defra and the Devolved Administrations. The tests are designed to show whether these instruments are capable of demonstrating equivalence with the EU reference sampler.

The potential losses of semi-volatile species (such as ammonium nitrate) from the TEOM analyser, which is widely deployed in the UK Network, is now well documented. As an interim measure, a default correction factor of 1.3 has been applied to the TEOM results in order to account for these losses. However, this is unlikely to prove an acceptable approach beyond the short-term.

The EC Working Group on Equivalence has published a draft Guidance Document that sets out procedures to determine whether a candidate sampler (i.e. a non-reference sampler) is able to meet the Data Quality Objectives of the relevant Directive. The document sets out procedures for the field test programme, which requires:

- Duplicate candidate and reference samplers (in order to determine between-sampler uncertainty);
- At least four distinct field comparisons providing at least 40 days measurement at each;
- Adequate coverage of the full range of expected conditions in the field, including PM concentrations, PM composition, temperature, humidity and wind speed.



The field test programme, which is being co-ordinated by Casella Stanger, will operate at four sites in the UK over both winter and summer periods, and is expected to run until the end of 2005. A total of six instruments have been included in the programme, including the TEOM, FDMS, BAM (heated and unheated) and OPSIS automatic analysers, and the Partisol 2025 sampler. Additional PM<sub>2.5</sub> instruments have also been included. In order to accommodate all of the instruments, and to allow them to be moved to different sites, special mobile trailers have been constructed.

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## PM<sub>10</sub> equivalence tests under way

As a prelude to the programme, NPL were commissioned to undertake a detailed gravimetry study, which investigated the use of different filter types, weighing protocols, and methods of transport and storage. AEA Technology netcen are also involved, and will be conducting site audits both before and following each test period. The first winter test programme is currently under way at Birmingham University and NPL (Teddington), and will run until March 2005.

It's not only PM<sub>10</sub> that is the issue with equivalence however. Whilst the AURN uses reference methods for the measurement of gaseous pollutants, for consistency, a set of general procedures covering all pollutants including metals, PAHs and hydrocarbons has been prepared for the Commission as a Guidance Document. These procedures range from simple checks for small deviations from the reference method, to substantial sets of parallel measurements with specific statistical analysis. The document is likely to be agreed by the end of the year.

Further information on the current PM<sub>10</sub> equivalence and other guidance can be obtained from Jeff Booker (Tel: 020 7902 6156) and Paul Quincy (Tel: 020 8943 6788), respectively.

## Ozone occurrence

### Summer smog 2004

2004 was a disappointing summer in terms of the weather, but this did have the benefit of keeping pollution levels down well below those of the record-breaking heat wave experienced in the summer of 2003. Despite the unusually wet conditions, summer did arrive at the end of July for a while, and following predictions by netcen a Summer Smog press notice was issued by Defra. The notice warned of high ozone pollution expected in London, the southeast and East Anglia.

AURN monitoring sites subsequently recorded increased ozone concentrations over much of the UK during the period July 28th till August 10th 2004. Here, we see what influenced the episode and how it compared with the previous year.

The summer 2004 ozone episode was characterised by rising temperatures and air masses re-circulating over northern Europe and the UK. These conditions are typical of those that result in UK summer smog episodes – ozone precursor chemicals reacting in the presence of sunlight and high temperatures to form photochemical smog.

During the episode, daily maximum temperatures at London Heathrow reached circa 30°C. However, HIGH levels of ozone were not measured throughout the period. This is due to the unstable and changing pattern of air masses reaching the UK during the period. On days when mainly clean air from the northwest was influencing the UK, concentrations were lower than on those days when polluted continental air was coming in from the east, even though daily maximum temperatures may have been almost the same. The contrast is clearly illustrated in the plotted air mass back-trajectories shown in Figure 1 for July 29th 2004 (HIGH day) and in Figure 2 for July 30th 2004 (LOW day).

Figure 1: Forecast ozone concentrations (PPB) and associated back trajectories 29/07/2004 1200

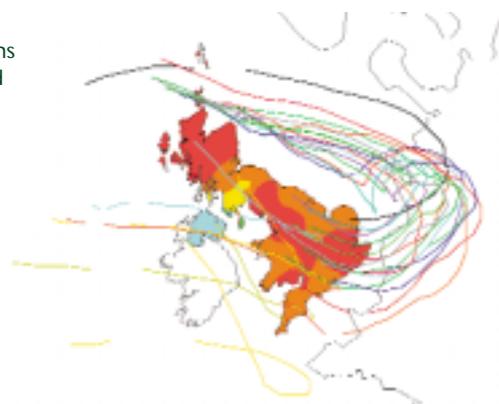
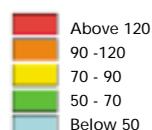
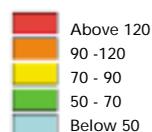


Figure 2: Forecast ozone concentrations (PPB) and associated back trajectories 30/07/2004 1200



Compared to the ozone episode in August 2003, this episode was not as persistent or as widespread. The changing air pattern has shown to have a role in this. Equally, maximum daily temperatures in 2004 did not reach more than 30°C (Figure 3).

The press notice and a full report of the event is available on the Air Quality Archive web site at <http://www.airquality.co.uk>

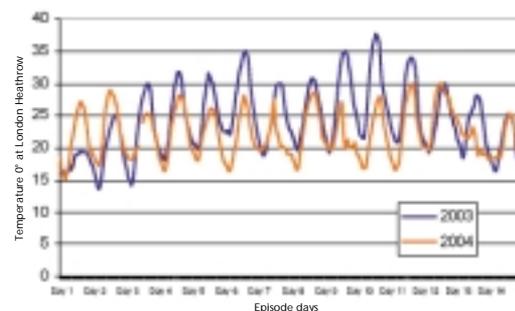


Figure 3

## European activities

# Other European developments

*There are several activities currently nearing their conclusions that will affect how National Networks are run in Europe. These include:*

### • CEN standards

To comply with the European Directives data reported to the Commission must be obtained using the appropriate reference method, or a method giving equivalent results. The reference methods, which cover instrument requirements, routine operation and QA/QC have been set out in detail by CEN committees as draft EN standards. The standards for NO<sub>x</sub> (EN 14211), SO<sub>2</sub> (EN 14212), ozone (EN 14625) and CO (EN 14626) are all likely to be published in Summer 2005. A further set of standards covering benzene (EN 14662 parts 1-5) is due to be published soon afterwards.

The draft standard for manual gravimetric measurements of PM<sub>2.5</sub> (prEN 14907) is at an earlier stage, with many comments from Member States being considered at a soon to be held meeting. The standard is designed to tighten up the procedures set out for PM<sub>10</sub> in EN 12341, which is likely to be revised to take on board comments received in light of the work on PM<sub>2.5</sub>. Again, the issue of equivalence is addressed for those Member States wishing to monitor using methods other than the reference method.

### • AQUILA

The European Network of National Air Quality Reference Laboratories (AQUILA), on which both NPL and AEA Technology netcen represent the UK, was brought into being as a result of a joint initiative by the Commission and the JRC Ispra. AQUILA act as a forum for providing technical expertise to the Commission, whilst additionally providing a means of exchange of technical expertise between all Member State Reference Laboratories, including those from countries that have recently joined the EU. It is currently providing technical advice to a revision of the Framework Directive and the first two Daughter Directives.

Can you believe that it's almost the end of 2004? Me neither. It seems like only yesterday that we were all hailing the arrival of the first challenging year for pollutant assessment – the 2004 PM<sub>10</sub> objective year! OK, I accept that for the majority of people this was not the first thing on their mind when the chimes rang at midnight on the 1 January, however, as we approach the end of the year we see that a lot of activity has taken place – both within the network and in terms of Defra's future proposals. These include a review of the 2000 Air Quality Strategy – with particular focus on the attainment of the objectives rather than the objectives themselves. This will invariably mean looking at seeking agreement (both nationally and internationally) on new additional measures or either upgrading existing measures. The current AQEG reports on NO<sub>x</sub>/NO<sub>2</sub> and PM<sub>10</sub> show where immediate focus of attention should be placed (in terms of pollutants) but, what about other pollutants? Will the review highlight further problems in respect of SO<sub>2</sub> or PAHs? Only time will tell. One thing is certain, the importance of the AURN can never be under-estimated so keep up the good work!

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Stephen Moorcroft, Paul Willis, Jane Vallance-Plews, Paul Quincey, Peter Woods.

### AQEG calls for increased monitoring of PM species

The recent consultation draft of the AQEG report on particulate matter has called for a significantly expanded programme of PM speciation monitoring in the UK. The Government Group of experts takes the view that unless mass closure can be achieved between the various PM components and the measured PM<sub>10</sub> and PM<sub>2.5</sub> mass, then it will prove extremely difficult to assess the causes of exceedence of the limit values and objectives, and therefore the most appropriate policy control measures that should be implemented

The 'shopping list' is quite extensive and includes additional monitoring for particulate nitrate, sulphate and elemental/organic carbon, together with increased monitoring of iron concentrations, which can be used to assess the contribution of non-exhaust emissions from road traffic (e.g due to re-suspension). *Further details available at: <http://www.defra.gov.uk/environment/airquality/aqeg/index.htm>*

### AURN Site Operator's Manual Now Available on CD

An electronic version of the Site Operator's Manual (Report Number AEAT/ENV/R1595, November 2003) has now been put onto disc (CD). This will be issued to all network participants at the annual LSO meeting in December 2004.

### Reminders to all participants

CMCU would like to remind LSOs of a few previously agreed working standards for the operation of the network.

- Remember to re-instate the out of service switch after calibrations.
- Do not conduct routine calibrations on a Friday.
- Always have available the previous calibration sheets.
- Complete all gas cylinder information and dispatch information to QA/QC as soon as possible.
- Send calibrations through to CMCU and QA/QC units as soon as possible after routine site visits.

### Who does what in the AURN?

The successful operation of the AURN is dependent on the commitment and dedication from a large number of organisations, and the individuals within them.

A brief reminder of who does what:

#### Central Management & Co-ordination Unit (CMCU):

Responsible for setting up new sites within the Network (including site selection and procurement of equipment); Network operation (appointment of ESUs and LSOs, co-ordination of equipment calibration and servicing); data collection and validation; data reporting.

#### Quality Assurance/Quality Control (QA/QC) Units:

Responsible for providing independent QA/QC checks on Network operations. This includes routine inter-calibration audits and data ratification. The QA/QC Units also provide advice on operation issues to the CMCU.

#### Equipment Service Units (ESUs):

Responsible for the routine and emergency servicing of analysers and ancillary equipment.

#### Local Site Operators (LSOs):

Responsible for undertaking routine site calibrations. The LSOs also provide invaluable information and feedback on site performance to both CMCU and QA/QC Units, and undertake initial investigations of site problems.

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