Network

The newsletter for the UK Air Quality Monitoring Network Issue 7

Sponsored by the Department for Environment, Food & Rural Affairs, The Scottish Executive, The National Assembly for Wales and the Department of the Environment (Northern Ireland)

CEN Standards and Measurement Methods

Particulates and Equivalence

The EU Daughter Directives say that official air quality measurements must be made using reference methods, which are set out in detail by the European Committee for Standardization (in CEN standards). Alternatively other methods may be used so long that a Member State "can demonstrate it gives results equivalent to" the reference method. This raises the question of what needs to be undertaken to demonstrate 'equivalence'.

The question is especially important for particulate measurements for two reasons:

1. the gravimetric reference method cannot supply data within the time-scales required by the Directive, so that networks need equivalent methods to operate, and,
2. commonly used alternative methods (such as TEOM and beta-attenuation) can give significantly different results to the gravimetric method.

Consequently there is a great deal of European activity in these areas over the last few years, much of which is ongoing such as comparisons between measurement methods at Marylebone Road (Figure1).

Figure 1
Low volume sampler (roof-top) and Partisol 2025 PM_{10} monitoring methods at Marylebone Road, London

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Particulates and Equivalence

An EU funded Working Group has just released a draft Guidance Document describing how equivalence is to be demonstrated for all types of air quality measurements – automatic gases, manual gases, particulates and metals/ PAHs. It distinguishes between small differences from the reference method, which can be tested separately, and more significant differences, which need extensive lab and field-tests. The procedure for particulates involves at least 160 measurement days, with criteria for duplicate repeatability and regression parameters that determine a pass or fail. These will be more stringent than the equivalence procedure for PM_{10} given in the CEN standard EN 12341. It remains to be seen whether standard TEOMs can be declared equivalent through this procedure, with or without a correction factor.

CEN is also close to completing a draft standard method for $PM_{2.5}$. The reference method will be similar to that for PM_{10}, but with more measures in place to reduce errors that can occur in gravimetric measurements due to loss of semi-volatile material and the effects of moisture. The standard will also include an equivalence procedure for non-reference methods, which will follow the Equivalence Guidance Document mentioned above. It is likely that the PM_{10} standard EN 12341 will soon be revised to be similar to the new $PM_{2.5}$ standard.

Alongside these activities, the Clean Air for Europe (CAFÉ) group has recently issued a draft position paper reviewing European policy requirements for particulate measurements. They recommend a move in emphasis from PM_{10} to $PM_{2.5}$ regulation, while still continuing some PM_{10} measurements. DEFRA has also instructed its Air Quality Expert Group to review the particulate situation from the UK perspective.

One of the results of the activity in particle research in recent years is that the problems with the measurements, which are large, are, at least, better understood than in previous years. The high quality of data from the UK Network has provided much useful information along the way and continues to be used by Government for input into European working.

Further information regarding the EU's guidance on equivalence can be obtained from: Dr Paul Quincey – National Physical Laboratory. Tel: 020 8943 6788

A polluted year

Summer smog episodes

As you may have noticed, it was a long, hot and dry summer. Good news for most people going on holiday, but not so good if you're sensitive to high concentrations of ozone or particulate pollution. As well as the highly publicized record-breaking temperatures, there were (provisionally) a number of notable records set for UK pollutant concentrations:

- Earliest summer exceedences of the ozone air quality standard in London for ten years (March 23 2003).
- Highest hourly peak concentrations of ozone recorded in London since 1990 (242µg/m^3 at Brent on Wednesday August 6 2003).
- The latest summer episode of HIGH ozone pollution since 1985 (September 17 2003).
- Many more exceedences of the daily gravimetric PM_{10} air quality standard per site than in 2001 or 2002.

Ozone and particulate pollution are usually highest in the summer months when it's hot and sunny and the air is drifting over to the UK from continental Europe. This is illustrated nicely in the ozone forecasting model output shown in Figure 2 for September 17 2003, where ozone concentrations above the EC information threshold of 180µg/m^3 were expected for areas of central and eastern England. During summer 2003 DEFRA issued a series of Smog Alerts based on the predictions issued by **netcen** and the Met Office.

On a positive note, peak UK ozone concentrations in 2003 were well below those recorded in the well-known heat wave of 1976. The highest temperature ever recorded in the UK was 38.5^{o}C at Brogdale, Faversham, in Kent on August 10 2003. Thus, temperatures similar to, or hotter than, the summer of 1976 were recorded during 2003 but maximum hourly ozone concentrations in 2003 were only 50-60% of those measured in 1976. This illustrates the impact of the significant reductions in emissions of ozone precursors between 1976 and 2003.

The UK was not alone in experiencing the problems of high pollution during the hot weather. A recent summary report (http://repository.eea.eu.int/reports/topic_report/2003_3/full_report/en/html/pdf) issued by the European Topic Centre for Air Quality concludes that:

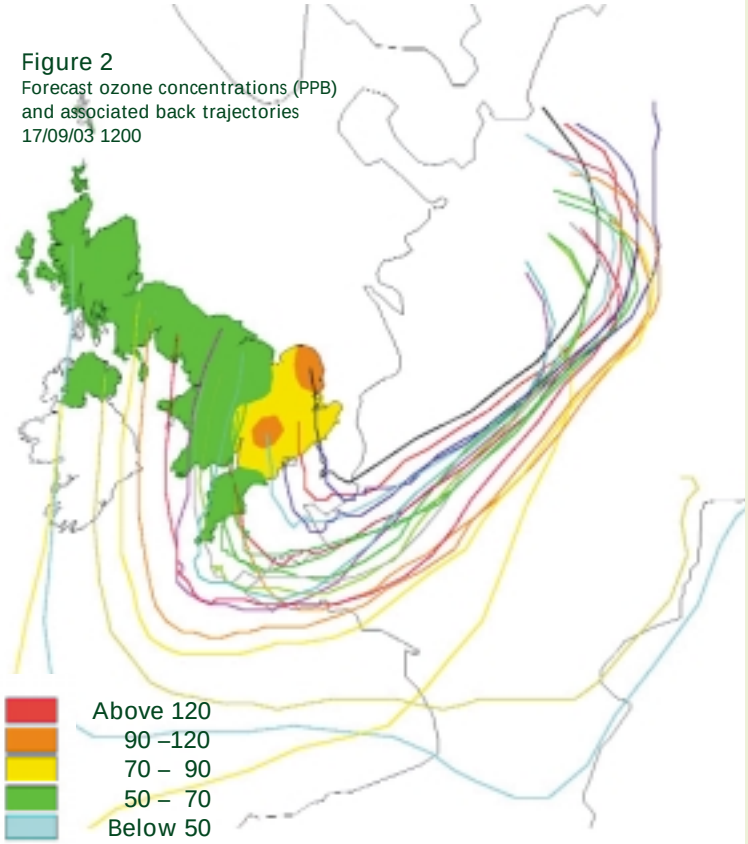
- Exceptionally long lasting and spatially extensive episodes of high ozone concentrations occurred, mainly in the first half of August. These episodes appear to be associated with the extraordinarily hot temperatures over wide areas of Europe.

- Analysis of trends over the past 12 years indicates that in the European Union the average number of hours per station when ozone concentration exceeded the information threshold of 180µg/m^3 was higher in summer 2003 than in all previous years.

These conclusions are at odds with declining trends in NOx and VOC emissions, which on this basis alone would be expected to lead to reduced numbers of ozone episodes in rural areas. However, the number of episodes seems to be more closely linked to temperature than emissions and this means that "if climate change would result in warmer summers in Europe, more frequent exceedences of the ozone information thresholds are to be expected at the current emission levels". In other words, this summer's "exceptional" conditions may in fact prove to be the norm for the next few years until pollutant emissions are significantly reduced.

Further information on the summer smog episodes can be found at: http://www.airquality.co.uk/archive/reports/reports.php?action=category&section_id=12

Figure 2
Forecast ozone concentrations (PPB) and associated back trajectories 17/09/03 1200



Well, it's been a while since *Network* was last produced and a lot has happened in the intervening period. The UK's response to the First Daughter Directive has now been in place for well over a year and the network continues to respond to the further requirements of the Second and Third Daughter Directives on carbon monoxide and benzene, and ozone, respectively. The next edition of *Network* will provide a fuller update in due course. However, in this edition, we continue our fascination with all things to do with particles covering recent guidance on 'equivalence' exercises and highlight the future prospect of moving to $PM_{2.5}$.

2003 may be recognized as the year in which the highest temperatures ever in the UK were recorded. However, with high temperatures came record-breaking levels of ozone and increased particulates: read the details of last year's summer smog occurrence across the UK.

As with previous editions of *Network* there are various reminders on network procedures and updates, whilst an additional plea from yours truly for wider contributions – it's your newsletter so any contributions are most welcome!

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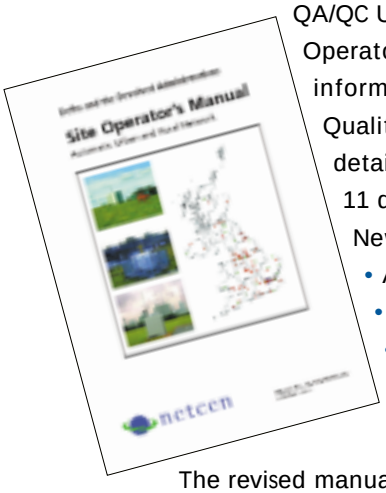
Acknowledgment:
Many thanks to the following people who have contributed to this edition of *Network*:
Jane Vallance-Plews, Steve Telling, Paul Willis, Paul Quincey

News update

Local Site Operator's manual updated



QA/QC Unit has revised and updated the Local Site Operator's manual. It contains general background information about the AURN and the London Air Quality Monitoring network (LAQN) as well as detailed "hands-on" operating instructions for 11 different instrument types used in the AURN. New features of the manual include:

- Air quality legislation
- UK zones and agglomerations
- The AURN project information Hub
- CEN and accreditation
- The electronic calibration sheet

The revised manual will be made available electronically on disc and via the Air Quality Archive and AURN Hub web sites.

*For further information contact: Steve Telling (**netcen**) 0870 190 6583*

Contributions welcomed!

Previously the *Network* Newsletter has focused on the operations of the AURN. However, recognizing that many of the participants of the AURN are also involved in the workings of other national networks, and their own assessments of air quality, we have decided that the remit of *Network* should be extended to cover other aspects of air quality. Whilst not wishing to cast our net too wide we are always grateful for contributions made by individuals and organizations involved in air quality. We can't guarantee to use all of them but if you would like to contribute then send your articles to Richard Maggs at Casella Stanger.

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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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