

PARTICLE MONITORING

Monitor shake up imminent

Failure of the Teom particle monitor to conform to EU equivalence standards will lead to a huge shake up of monitoring in the UK.

The UK has adopted the Teom monitor as its *de facto* standard as it is reliable and yields results in real time (although it is expensive). But European directives demand that particles are measured gravimetrically (ie collected on filter papers and weighed), whereas the Teom samples in a different way.

It has been an open secret that the Teom would fail the equivalence test – but the news is nonetheless important as it means that Teoms should now be replaced – and there are over 1,000 of them in use across the UK.

The national automatic network will be upgraded as a priority – Defra is advising local authorities that their monitors will need to be replaced sooner rather than later where concentrations hover around the objective limit. However many

local authorities have told *AQB* that they simply haven't got the money to upgrade their machines.

Equivalence testing was carried out in a £500,000 study by Defra which concluded last month. While it was no surprise that the basic Teom would fail – it has come as some surprise to find that cheaper instruments such as the Bam can be considered equivalent (albeit with a correction factor).

Teom supplier Jim Mills of Air Monitors welcomed the report – and its endorsement of the more expensive FDMS Teom that has passed equivalence with no factoring. FDMS can be fitted as an upgrade to most Teoms for £6,500.

Bam supplier Enviro Technology also welcomed the report, pointing out: "With two Bams for the price of a Teom, we are seeing a lot of interest. Local Authorities wanting to expand their particulate monitoring capabilities should seriously consider the

BAM1020."

In summary, the report found:

- Teom: Fails the equivalence criteria;
- Teom FDMS (PM₁₀): Meets the equivalence criteria;
- Teom FDMS (PM_{2.5}): Meets the equivalence criteria;
- Partisol 2025: Meets the equivalence criteria;
- Opsis SM200 Beta: Meets the equivalence criteria;
- Opsis SM200 Mass: Meets the equivalence criteria with correction for slope and intercept;
- Bam: Meets the equivalence criteria with correction for slope (More details – see page 8).

Defra explains: "The UK networks are largely founded on the use of the Teom, although some sites are equipped with Partisol 2025 samplers. A default correction factor of 1.3 is currently applied to the Teom data in order to provide a 'gravimetric-equivalent result' One outcome of the study is that the Teom analyser cannot be

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IN BRIEF

Webcheck warning

By popular demand, *Air Quality Bulletin* will be ranking air quality websites. We'll judge the sites in August – plenty of time to get your website spruced up!

Ships prompt AQMA

Dover council may have to declare an area of the port based on hourly nitrogen dioxide exceedences. Dover is unusual for having a problem with shipping emissions – first with 15 minute exceedences of sulphur dioxide objectives, and now with short term NO₂. Having declared a tourist spot on the cliffs above the port, Dover's Brian Gibson believes that exceedence will diminish as marine fuels are cleaned up under European directives.

In its review and assessment, Dover says: "Further consideration has been made to the contribution of the Eastern Docks area to NO_x emissions. Although in previous reports shipping and HGV vehicle movements have not been considered likely to lead to exceedences of the objectives, there has been some concern by the council regarding hourly NO₂ concentrations within the port area where there is relevant public exposure. King's College ERG has confirmed the risk.

"We believe there is an area within the port that exceeds the NO₂ hourly objective based on emissions related to ships alone and does not include any emissions from road transport in the port area."

The council has already declared an AQMA in relation to annual mean NO₂ from road transport outside the port along the road from the town centre – Gibson says that it is entirely possible that members of the public queue for ferries in the affected area for the hourly period.

IN THE COURTS

Cement protesters lose appeal against Rugby plant – Agency fails to rescind criticism

Both cement protesters and the Environment Agency lost in a high court appeal.

Protesters were appealing against a judicial review decision last year that confirmed Rugby Cement's permit was legal. Meanwhile the Environment Agency was trying to reverse a ruling that its consultation was flawed.

Protest group Rugby in Plume last year took the Environment Agency to court as regulator of the Rugby cement works. Protesters cited many arguments but tried to pick holes in the permitting consultation process. A key claim was that an early dispersion modelling report was

wrongly withheld from the public – on this the judge agreed with protesters.

The Agency Air Quality Monitoring and Assessment Unit (AQMAU) had produced a report that showed that proposed stack emissions would have negligible impact on concentrations – but that low level emissions (from ancillary

activities) may lead to a risk of a breach of air quality limits. The public were not allowed to see this report during consultation – leading to criticism by the judge. But the judge did not see that as sufficiently large an error to quash the permit.

A key point of the appeal was that the original judge thought it was the local authority, rather than the Agency, who regulated the plant. Also the judge thought that if the tyre burning permit were quashed – the whole plant would shut down. The appeal judge said that these errors did not materially affect the decision that the permit should stand.

Next month:

It's been a busy news month with many conferences and announcements. We've had to hold news breaking as *AQB* went to press from NSCA on biogas and dioxins from domestic burning.

- More next month.

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IN BRIEF

Three declare on NO₂

Three local authorities have declared air quality management areas recently.

The declarations are part of a pattern of declarations by local authorities who are finding new hotspots in busy town centre streets. Typically these were missed in earlier rounds as modelling underestimated NO₂ concentrations – or predicted falls in NO₂ over the years have not materialised.

Carlisle has declared an air quality management area for annual mean NO₂ for part of Currock Street, a heavily trafficked road with narrow pavements and housing close to the kerbside. Currock Street joins areas previously declared on the A7 route into Carlisle, the council's David Ingham told AQB.

Guy Sharp of **Bournemouth** said his authority was declaring areas with busy traffic: "As reviews and assessments progress, we are getting better at finding hotspots. The high levels seen in 2003 didn't go down, we've put in more diffusion tubes and these are showing high levels in the Wimborne Road area.

Chichester has also declared. Simon Ballard told AQB: "The proposed AQMA is at the roundabout junction of the A27 and the A286. The problem relates to queuing at the junction and, we presume, primary NO₂ emissions."

Waste incinerator for Belvedere

The waste incineration debate is set to ignite once again with news that the DTI has authorised a large waste incinerator in Belvedere, south east London.

The incinerator is opposed by green groups, local council Bexley and the Mayor of London. This decision will allow Riverside Resource Recovery Ltd to proceed with an energy from waste power station with a capacity of 72 MW following two public inquiries that looked into this application in 2003 and 2005.

POLLUTION EVENTS

2006 heading for another 2003?

2006 looks set to be heading towards another 2003 in terms of pollution and heat.

Informal indicators suggest that automatic monitoring sites were already approaching the number of ozone exceedence days in 2003 – and as AQB went to press, the current heatwave wasn't over. If 2006 does prove to be as polluted as 2003, this will lend strength to Defra warnings that the high pollution seen in 2003 cannot be considered exceptional, and must be included in weather inputs when forecasting future air quality concentrations.

For instance last week, Wicken Fen had seen 96 moderate ozone moderate events. This is just nudging the 2003 record number of moderates – 100 events at Lullington Heath.

Another informal measure might be the number of pollution events recorded on the ERG London network website – seven pollution events in 2006 compared to six in 2003.

A spate of warnings have been issued. Official warnings from Defra are based on the automatic network, and do not contain any detail. Warnings provided by the ERG network, which covers much of the south

east of England, are more helpful and explain what is happening during the events.

For the early July incident (the third 'high' event of the year), ERG said there was high ozone measured across London and south east England with concentrations remaining in the moderate band at some sites throughout the night. It described this as the worst ozone event since 2003: "Peak ozone concentrations on Monday and Sunday were below those measured on Saturday. Such day-of-the-week dependence for high ozone has been noted by ERG and by other researchers who say that the probability of high ozone is greatest on Saturdays and lowest on days at the start of the week.

"This is thought to be due to the time taken for the atmospheric reactions to form ground-level ozone; emissions of ozone precursors are lower at the weekends and thus the ground-level ozone concentrations that form one to three days later are lower than those that form from weekday precursor emissions.

"ERG has also observed additional day of week dependency for sites in inner

London due to reduced 'protective' NO_x emissions at weekends. For instance 'high' ozone was measured this weekend in inner and central London.

There have been groundings of plumes from industrial sources in the East Thames area. "Sites measuring elevated sulphur dioxide include Sevenoaks and Crystal Palace. To date there were six consecutive days of industrial plume grounding around London. In Kent further effects of SO₂ from shipping were measured in Dover where concentrations approached moderate. Elevated SO₂ was also measured in Folkestone, but this is most likely to be from industry in France rather than shipping."

The London plume grounding stretched as far as Richmond in West London. There were also three separate sulphur dioxide moderate incidents near the Stewartby Brickworks, near the Thames Estuary and Dover.

ERG noted high ozone on the 16th, 17th and 18th June – the second high ozone episode of the year. The first high ozone event of the year was between 9th and 10th of June.

● www.londonair.org.uk

EU ozone continues to breach limits

A report suggests that ozone levels across Europe breach objective limits.

The European Environment Agency says that although 2005 levels were not as high as 2003, they remained 'dangerously' high. The report says that Southern Europe was worst hit. Portugal experienced the

highest one-hour ozone concentration, and dangerous levels were also recorded in Greece, Italy, France, Romania and Spain. Northern and central Europe did not escape scot-free – unsafe levels of ozone were recorded in Belgium, the Netherlands and western Germany.

The EEA is shortly launching its Ozoneweb webpage to disseminate ozone levels on an hourly basis, and background information about ozone and its health impact will also be provided.

● *Air pollution by ozone in Europe in summer 2005*
www.eea.europa.eu

VEHICLE EMISSIONS

Clean transport grant cut leaves EIC fuming

Government abolition of four clean transport grant schemes has angered the Environmental Industries Commission.

In a letter to transport minister Stephen Ladyman, EIC expresses 'astonishment and dismay' over the decision: "The Transport Energy Programme was set up to address pollution from the fleet of existing commercial vehicles, built to

lower environmental standards than are in place today, which will continue to operate for many years in our urban areas. Its subsidiary programme, Cleanup, in particular, has been very successful and cost-effective at tackling emissions of particulates and NO_x through the subsidised application of exhaust aftertreatment (retrofit) systems.

"We have seen no analysis as to why the original reasoning behind the setting up of the CleanUp programme is no longer valid – nor have we been invited to input into DfT's review.

"A number of local authorities have had to put on hold plans to fund emission control technologies for buses in their areas given the lack of funding available.

A WORKSHOP HELD IN LONDON POLLED VIEWS ON THE AIR STRATEGY CONSULTATION REVIEW

UK strategy thoughts aired

Defra last month held a meeting to gather feedback on the recently released UK air quality strategy consultation.

Continuing with its highly regarded and inclusive strategy formation process, Defra and the devolved regions aim to consider responses to the strategy with a view to finalising it later this year – or early next.

Defra AEQ chief Martin Williams said: "What you're looking at is the most comprehensive, detailed and thorough policy review ever carried out by Whitehall." He was referring to the myriad of policy options that have been costed and assessed as part of the review (*AQB May p6*).

Williams explained the thinking behind adoption of the

exposure reduction approach to particles – one of the key new elements of the new strategy. This has been welcomed in principle as a means of reducing exposure to the general population (as opposed to the few living in air pollution hotspots) but been criticised for being set at a value too low.

"The advent of the PM_{2.5} objective meant we could start with a blank sheet of paper so we were able to develop the exposure reduction approach without any baggage. The idea is to have a less onerous backstop (of 25µg/m³ to be achieved everywhere, including roadside, by 2010) so that the focus is on exposure reduction (a PM_{2.5} reduction of 15% between 2010 and 2020 at urban background sites).

He explained that local authorities would not be expected to take action on PM_{2.5} exposure reduction. "Local authority action is not proposed at this stage because of the large number of monitoring sites needed, and because local authorities can only affect little of the PM_{2.5} they are exposed to."

The end of the consultation is the 11th of July, with the final strategy due to be published around the end of the year. Adoption of the new European air quality directive is due in 2007, along with Euro 5 vehicle limits, while the next review of the strategy is in 2009. Defra's John Rae added: "With so many things changing, we think we might need to do this all over again in 2010."

EUROPEAN POLICY

European air directive pushed and pulled

European legislators are changing Commission plans for a new all embracing air quality directive. There will be a tightening of targets – but more flexibility as to when they are met.

Both the Environment Council and the European Parliament Environment Committee have been looking at the Commission proposals for the directive. The Commission suggested superseding the current framework directive and the first, second and third daughter directive with a single directive. As is the case with the recently released UK domestic strategy, PM_{2.5} was proposed as the main metric for particles, and the idea of exposure reduction introduced.

But early more ambitious proposals were watered down by the industrial lobby keen to cut what it sees as unnecessary red tape. When the proposals finally emerged, the objective values were not very ambitious, and states were able to exempt themselves from many of the requirements if achieving them was too difficult.

Last week the environment committee adopted two draft reports on proposals by the European Commission, one on revised Community legislation

(the regulations) on ambient air quality, the other on the thematic strategy on air pollution.

The Environment Committee wants to reduce maximum concentration levels PM₁₀ – to 30µg/m³ on average per year from 2010. The Commission was proposing to keep the limit at 40µg/m³.

However, for fine particles PM_{2.5}, MEPs believe it is too soon to set limit values, given the current state of scientific knowledge. Instead they suggest initially setting a target figure, which is "less binding" and is tougher than that proposed by the Commission (20µg/m³ from 2010 instead of 25µg/m³), then awaiting the revision of the directive scheduled for 2015 in order to set 20µg/m³ as the limit value.

The report also calls for more flexibility over allowing five-year extensions to the deadline in zones or agglomerations which fail to meet the criteria for PM_{2.5}. And it demands flexibility over the goal of reducing the population's exposure to this type of pollution by 20% by 2020, by setting differing percentage reductions depending on concentration levels.

On the thematic strategy, the

Environment Committee agreed a compromise calling for more ambitious targets for reducing concentration levels of nitrogen oxides (NO_x), volatile organic compounds and PM_{2.5}.

MEPs also want to see more focus on the sources of pollution, including agriculture and shipping. As with the directive itself, the report calls for stricter limit values while envisaging longer deadlines for member states which have taken all possible steps but still have difficulty meeting the objective limits.

The next stage is for a first reading in Parliament in September, with the Environment Council voting on the proposals later this year.

"We are shocked at the Committee's proposals", says Stefan Scheuer, of the European Environment Bureau. "These exemptions with all their conditions are a bureaucratic nightmare. They're unworkable and will bring about an 'à la carte' Europe, with every region and country setting different health standards. We are about to lose one of Europe's greatest achievements, our citizens' universal right to a clean, safe environment. We hope Parliament's full assembly will reject the exemptions."

Strategy criticised

One criticism of the strategy is its shift from local authority ownership towards national policy measures.

UWE's **Tim Chatterton** said: "I am astonished to see what a low profile local authorities have given that there are over 190 local authorities with air quality problem. Councils don't even warrant a third order heading in the table of contents." **John Murlis** of University College London and **Sarah Legge**, GLA, also questioned whether enough was being done to encourage local action.

Martin Williams responded: "This consultation has focussed on national measures, it would have been overwhelmingly difficult to have gone into measures that could be adopted by local authorities."

Others were concerned at the lack of focus on agricultural emissions, for instance from **Alison Craig** of the Pesticides Action Network. There had been some expectation that ammonia would be included in regulation. Williams responded that for the first time, some suggestions had been made: "It is very difficult to tease out the direct effects of ammonia in order to justify action. While there are direct effects of ammonia gas on vegetation, it's not clearly apportioned except where there are very local effects. The biggest problem is deposition – and this is handled through transboundary action."

Mark Broomfield of Enviro suggested that there should be an objective on critical load exceedence. Defra once again said the best way was through transboundary efforts: "Just because it's not an objective doesn't mean we are not doing anything about it."

Concern was also expressed at the setting of new objectives that were going to be met in any case. Martin Williams responded: "Don't dismiss objectives even if it looks as though we are going to meet them anyway. The objective may act as a cap for the future."

IN BRIEF

Revamp for modelling and emissions desk

The Local Authority Air Quality Support Helpdesk has a new website aimed at providing monitoring, modelling and emissions advice to local authorities.

It complements other air quality helpdesk sites (the action planning helpdesk and review and assessment helpdesk).

The new site, provided on behalf of Defra and the devolved administrations, contains the following useful features:

- Downloadable tools and guidance;
- Latest updates to Defra's technical guidance;
- Guidance on use of NO₂ diffusion tubes, and a link to the NO₂ web-based data entry system, which provides local authorities with a convenient and reliable way of storing and sharing their diffusion tube data;
- Frequently asked questions;
- www.laqmsupport.org.uk.

Agency cautions on red tape review

The Environment Agency is adding its voice to fears that the ongoing red tape review might worsen environmental regulation.

The Agency believes there is scope for "better equipping judges and magistrates with the expertise required to deal with environmental offences in a proportionate way".

It adds: "For environmental offences, strict liability has stood the test of time and to remove it would make enforcement action difficult. We think criminal law is needed because it underlines the importance of protecting human health, the quality of life, our water, air and land which we and our wildlife depend on.

"We need it to deal with cases such as deliberate behaviour, gross negligence, risky behaviour, repeated offences, significant damage and we need it for the rogues and freeloaders who choose to operate outside of the law causing legitimate business to be at a competitive disadvantage."

THE NETCEN AIR QUALITY FORECASTING MEETING FOCUSED ON BUNCEFIELD

Buncefield response analysed

The annual air quality forecasting meeting run by Netcen devoted a whole day to discussing the air quality impacts of the Buncefield fire.

While the Health Protection Agency felt it handled the incident well, local authorities criticised the lack of communication during and after the event. Malcolm Webb of Sevenoaks said: "We weren't contacted until two days after the fire took place, and even then they didn't know what was happening. They seemed to be trawling for information rather than briefing us."

Alison King at Dacorum, the

local authority home to the blast, went further: "The whole communications thing was a major issue for us. We weren't kept informed at the time, and to this day have been given no information. We were being phoned up by local residents and others and it was very embarrassing for us to have to say we didn't know anything. Had it not been for the ERG network we could have been completely blind with the HPA being so restrictive on information given out."

HPA's Richard Mohan responded that local authorities 'would have been contacted had

local health protection units felt it necessary". At the time senior health advisors were claiming that the smoke was harmless.

He added: "Gold command had to make the decision whether to let the fire burn and risk air pollution impacts or put it out and risk groundwater impacts and a risk to firemen. It used ADMS, Aermot and Name models to help it make that decision.

He described Buncefield as a 'miracle' – "we were really lucky – because it was a Sunday and nearby offices weren't occupied, and because weather conditions were perfect."

AQ response delayed by bad communication

Air quality professionals appear to have responded to the Buncefield fire in an ad hoc, rather than organised manner, it emerged at the conference.

Janet Dixon said that Defra 'eventually' took the lead on the air quality aspects of Buncefield. Netcen said that off its own bat, it was on the case on the day of the fire (Sunday) but it wasn't until late morning on Monday that it was formerly asked by Defra to do anything.

"We then assembled what monitoring equipment was available, and went to the site on Monday evening having been told by Gold Command (in charge of the operation) that we had permission. However we

were refused entry at the security cordon and were only able to gain entry the on Tuesday." The team relied on personal protective equipment supplied by the emergency services while it was at work close to the fire.

Willis said the team monitored air near the fire with some Grimm analysers which gave low readings, even when placed at hotspots identified during 'plume chasing'.

Cambridge City Council asked why there was no response on Sunday: "We didn't have any formal response plan, so don't have equipment available, and weren't on call. We thought other agencies were

responsible," said Paul Willis of Netcen. He admitted that there is still nothing formal in place for Netcen. Defra's Dixon said that Defra is not expecting to take the lead in the future. The Environment Agency's Colin Powlesland questioned the need to set up a formal response system, as the Buncefield fire was unique and highly unlikely to repeat itself in a way that would need air monitoring.

Heather Cusack of Fareham said that it was in discussions with Hampshire County Council as it believed it was a really important issue to have an emergency air quality monitoring capability in response to disasters.

ERG insists peaks are due to Buncefield

Kings College ERG's Gary Fuller said that it had now carried out modelling of air quality during the Buncefield incident. He said the modelling backed up the theory that monitored particle peaks were caused by the Buncefield fire.

Official bodies are denying that Buncefield caused any significant impact, and explain away nearly all the monitored peaks with alternative explanations such as traffic fumes, paint fumes and building dust (*AQB June p1*).

Fuller explained that the ERG model used to prepare forecasts was run using weather conditions during the event and

background readings taken from east of London where he said the plume did not reach. Using this methodology he was able to estimate the uplift in concentrations caused by Buncefield. This was found to be 9µg/m³ for Barnet and Mole Valley and 8µg/m³ for Watford.

The Met Office's Helen Webster explained that it had run its Name model since the event to see what happened to the plume. In stark contradiction to ERG's modelling and monitoring results, it said that initial smoke went east at a low level and may have contributed to the Horsham and St Albans peak,

but couldn't have contributed elsewhere.

She also said luck was involved with the extreme heat of the fire and plume pushing the fumes away from the ground. Met Office observations taken by an aircraft suggested these were simply smoke particles with no toxic chemistry.

Webster has also run the Name model using worst case meteorology.

She says that even if there had been strong winds and mixing causing the smoke to remain on the ground, concentrations would not have become a problem.

NEWS FROM THE INVESTIGATION OF AIR POLLUTION STANDING CONFERENCE (IAPSC) MEETING

Croydon expands text warnings

The London Borough of Croydon has expanded its Airtext scheme to include automated landline telephone messages.

Croydon's Airtext service was intended to send mobile phone texts if pollution is expected to worsen. However elderly users do not use mobile phones, so an automated landline option has been added, Croydon's Clive Simmonds told the Iapsc conference held in London last month.

The two year pilot sees Croydon in a joint venture with the health protection authority and consultant Cerc, which provides the forecasts based on its Yourair system. "We want to send alerts to vulnerable individuals (or their carers), the information has been there but not targeted in what we believe is a world first. The information should allow sufferers to self manage their symptoms, improve their quality of life and save money for the NHS.

"The forecast is generated by Cerc's Yourair system, if a moderate or above forecast is expected, this automatically

generates sending of a text or automated phone call at 7.30 the evening before the event."

Simmonds said that on average 46 alerts are sent out a year, with up to a 1000 receiving the warnings. He is looking for more participants, but has found doctors' practices

are not very enthusiastic at providing patients' details for the trial.

"We carried out an evaluation and 59% found it useful and changed their habits because of the alerts. We are very pleased at this cheap but effective way of communicating with people."

... and tackles bus idling

Simmonds reported on Croydon's experience with using anti-idling powers.

He said the council was using the powers as a "deterrent rather than a fundraiser" – not least because while there has been 37 hours of enforcement, not a single ticket has been issued as no drivers have refused to turn off their engines. The work is carried out by environmental health officers as traffic wardens refused to do the job. "They said they suffered enough abuse as it was," Simmonds told the Iapsc audience.

"We use two environmental health officers, and while all drivers complied, some were more cooperative than others –

to date we have found that bus drivers are the stroppiest."

Of the 181 buses observed, 48 (25%) were seen to be idling, with a further 9% turning off their engines when approached. Of the 240 taxis observed, 7 (3%) were idling. 20 cars, 8 vans and one truck were also warned.

Simmonds commented that it was very easy to train people to be able to enforce the idling rules – so they could be easily carried out by street scene enforcement officers or neighbourhood wardens. "We are putting pressure on the DfT to make it an owner (rather than driver) offence which would get firms to take the issue more seriously."

Carslaw calls for nitrogen dioxide inventory

Direct emissions of NO₂ will worsen the ability of the UK to meet hourly as well as annual mean objectives, says David Carslaw of Leeds University.

Carslaw is leading calls for more action on direct NO₂ and is highlighting the problem of increased emissions of NO₂ from modern vehicles (*AQB May p1*). The Air Quality Expert Group is expected to rush out a report on it shortly.

Modern vehicles are using clean up technology that is

reducing total mass emissions of NO_x. The clean up technology increases direct emissions for NO₂ from about 5% to as much as 80%. It is NO₂, rather than NO_x, that is has ill health effects and is the subject of UK and European legislation, and the proportion of NO₂ is rising so fast that mass emissions of NO₂ are increasing despite the reductions in total NO_x.

Carslaw said: "We can see the phenomena at Marylebone

Road – but that site is not exceptional, there will be other road links in London which are worse. There will be many more locations where there will be hourly exceedences of the NO₂ objective.

"That's quite a change on what was previously thought and it will delay meeting the objective by ten years. Against this background, remember that heatstroke is an NO₂ problem – this is so important that we need to develop an NO₂ inventory."

'Doom and gloom' follows tunnel studies

TRL's Ian McCrae told the Iapsc conference about the 'doom and gloom' surrounding increases in emissions of primary nitrogen dioxide: "The actual mass of NO₂ is increasing with very high emissions from the latest Euro 4 vehicles – albeit with lower total NO_x emissions."

McCrae outlined experiments in UK road tunnels aimed at

comparing the fleet mix and pollutants found within the tunnels. Using the Hatfield A1 and M25 Bell Common tunnels, NO₂ was found to peak at 1,400ppb and 6,500 ppb respectively. "The current assumption of a 5% rate of primary NO₂ is a total underestimate. Our tunnel studies show that the real emissions are in between 8%

and 80%. For Euro 3 petrol vehicles, the range was 2-10%, and diesel 20-70%. For Euro 3 plus trap this was 45%."

TRL is proposing a default value of 20%, which tracks similar changes in the US where the Californian Air Resource Board is suggesting tailpipe direct NO₂ emission standards of 30% in 2007 and 20% in 2009.

Care4Air delivers

Mark Daly of Sheffield City Council updated Iapsc delegates on how the South Yorkshire Care4Air campaign was going.

The campaign was funded by Defra SCA money with celebrity endorsement from Bill Oddie who fronts billboard adverts and other publicity. Daly said: "The Care4air website is getting 4000-5000 hits per month, and we've had press coverage valued at £150,000. I realise this is a bit touchy feely for many people but publicity is something we need to get into.

"We are applying for Beacon status on the basis of our air quality record – there is no way we could do this if we hadn't had the Care4air campaign

Ian Trowson of Kent County Council said that it was a shame that the campaign could not be rolled out nationally. Daly agreed, but warned: "Our funding took a change of mindset at Defra – our bid was the first it funded that was outside the usual monitoring and modelling bids. The funding has continued at a reduced level, and we're going to have to go cap in hand to transport planners if we are to keep the campaign running."

In future, the campaign may broaden out to climate change issues.

Dutch limits raised

Some speed limits in Holland have been increased from 50mph to 60mph as emissions had been found to increase. Drivers were going too slowly to avoid getting a speeding ticket, says ecodriving expert Martin Kroon speaking at Iapsc.

Ecodriving involves driving more smoothly with less acceleration and by avoiding high revs. On some sections where the 50mph speed limits were installed to reduce air pollution and noise, emissions were modelled to rise – as drivers were switching to a higher gear and driving too slowly, perhaps to avoid being caught by the very strict speed cameras.

IN BRIEF

Air included in quality bus partnerships

Guidance has been issued by the DfT on how quality bus partnerships can work. Local authorities can use partnerships to include conditions on bus contracts to clean up emissions.

Local buses outside London are deregulated and local authorities have little control over bus standards – and can fall foul of EU competition law if they try to influence buying decisions too tightly.

The latest guidance spells out that conditions can be attached to bus services to reduce or limit traffic congestion, noise or air pollution under Transport Act 2000 powers. Bus operators and councils can together set up a Quality Partnership Scheme on particular bus routes. The powers can be used to be sure that both sides of the partnership will deliver specified ‘facilities’ (eg. quality bus shelters), by the local authority, and ‘standards of services’ (eg. quality buses), by operators.

- www.dft.gov.uk/stellent/groups/dft_localtrans/documents/page/dft_localtrans_611921.hcsp

Consultation on EIAs

Consultation is taking place on amendments to environmental impact assessment circular and guidelines.

The Government says: “Amendments are being made to Circular 02/99: Environmental Impact Assessment on screening guidance, recent case law and the incorporation of public participation requirements into EIA legislation. Text is being amended where necessary and old references updated.

There is a simultaneous consultation on good practice guidance aimed at developers.

- *Amended Circular on Environmental Impact Assessment: A consultation paper* can be viewed on www.odpm.gov.uk/index.asp?id=1500995

JACK PEASE REPORTS FROM THE ANTWERP AAMG PARTICLES CONFERENCE

Dixon reveals Teom failings

Defra’s top air quality scientist Janet Dixon unveiled to the AAMG particle conference in Antwerp new research that shows that Teom particle monitors have failed to meet European standards for particle measurement. Dixon was introducing the research that was concurrently released by Defra on its website (see p1&8).

It has long been known that the crude uplift factor used as an attempt to make Teoms ‘equivalent’ is flawed, but the ability of the Teom to give real time results meant Defra accepted these flaws. Now the standard Teom is considered unsatisfactory.

Dixon reminded Antwerp delegates that its earlier trial based on results from some of the 66 Teoms and 7 gravimetric

Partisol meters in its network showed an uncertainty of 30.5% – thus failing European equivalence criteria.

The latest study included 18 different samplers across four different locations. The trial was ‘very expensive’, costing some £280,000 for equipment and £240,000 for the study itself. “Even with a Teom correction factor of between 1 and 3, it still failed. On the annual mean, expanded uncertainty was between 32 and 68%, on the daily mean it was between 38-40%. Anything above 25% is a failure. FDMS Teom had an expanded uncertainty of 13% – so passed. However for PM_{2.5} this dropped to 24.45%, so only just passing.

“The policy implications are that the Teom 1.3 factor is

overly conservative and over predicts the number of exceedences. But although the Teom has been found to be non equivalent, our policy conclusions are the same – that there are elevated levels of particles and they pose a large risk to health,” she added.

“As a result of the conclusions, the UK is now checking its national modelling to see what will be affected. We are now making our network equivalent, initially with retrofitting. UK local authorities will be able to continue to use Teoms for reviews and assessments.

“There are also implications for health studies that rely on Teom data, especially epidemiological studies that are already underway.”

Commission ceases to listen to experts

Café steering group head Peter Bruckmann says that the European Commission is no longer taking advice on air quality policies as it used to in the past.

Speaking at the Antwerp particles conference, Bruckmann, who heads up the Clean Air for Europe (Café) policy steering group, blames a reorganisation at the Commission that splits responsibility for Café. Café responsibilities are now split between two units – clean air and transport, and energy and environment.

Bruckmann said: “At present

it is not clear whether the steering group will be used by both units. There is the danger that one of the principles of the Café process – the tight connection of air quality objectives on the one hand and community wide source related measures on the other – may be weakened.”

“Over the last decade, changes in the importance and role of the Café steering group have become apparent. Whereas the steering group is still used by the commission as the main information channel for stakeholders, the Commission has become more reluctant than

in the past to discuss preliminary drafts of pieces of new legislation. Also reports from the working groups are directly used (or discarded) by the commission without a thorough discussion (and consent) by the steering group.

“A third factor is that some scientific tools used by the Café process such as the integrated assessment modelling for European emission scenarios are so complex that they can only be managed by full time consultants. In a nutshell, there is more information and less discussion and participation than in the past.”

Gravimetric method flawed in any case as recommended filters prove inconsistent

European persistence in requiring use of the gravimetric system of measuring particles is flawed, say Belgian researchers.

Gravimetric is stipulated as the base method for monitoring particles as it is meant to be accurate. But the Belgian researchers found that choice of filters – stipulated by the directive – gave results that differed by as much as 25% when directly compared. They remarked that the gravimetric ended up so far out that it corresponded to Teom

measurements without the need for a correction factor.

They told the Antwerp particles conference: “Flanders has some of the highest concentrations of PM₁₀, we have to use correction factors of 1.47 for the Teom. We carried out winter and summer monitoring at two sites with different filters. The differences between the filters were quite large and statistically significant, QMA Whitman quartz filters were as much as 25% higher than Macherey-Nagel filters which

gave the lowest results.

“The study clearly indicates that the results of the ‘reference method’ and therefore the correction factors, annual averages and number of exceedences of the daily limit value depend on the filter used.”

He continued: “Therefore it is highly recommended that steps should be taken to resolve this issue on a European level. Also the fact that the new PM_{2.5} reference method allows different types of filters appears unwise.”

PARTICLES EQUIVALENCE AND MORE FROM THE ANTWERP AAMG PARTICLES CONFERENCE

Monitor turmoil (continued from page one)

considered equivalent to the European reference method within the UK, even if a 1.3 slope correction factor (or any other factor) is applied.

“Defra and the devolved administrations are currently considering options for the restructuring of the UK networks, which will need to be based on an instrument that meets the equivalence criteria (and hence is compliant with the Directive). The outcome is not yet decided, but the Teom analysers in the network will inevitably need to be replaced or upgraded.

“Despite the Teom’s non-equivalence with the first Daughter Directive reference method, the conclusions from its data corrected using the current 1.3 factor would be broadly the same as those from the

reference method. Any difference would not provide under-estimated readings but may actually over-estimate levels in some places.”

AQB contacted a number of local authorities to ask them what they intended to do as a result of the report.

Bob Lloyd of **Sandwell** said his authority used Teoms and would continue to use them.

“The financial implications of either retro fitting FDMS or replacing with four new Teom units would cost us over £100,000 and we simply do not have that resource available.”

Giles Hine of **Fenland** said his authority had long argued with Defra that it didn’t need a Teom, and uses Bams.

Mark Daly of **Sheffield** runs seven Teoms and another that is part of the automatic network.

He is undecided on what to do:

“But I think if we declare/undeclare based on Teom monitoring we would obviously be open to challenge.”

Leo Salter of **Cornwall** Air Quality Forum said funding was unlikely for any new modified Teoms: “We’ll use the Teom for ‘indicative’ monitoring like we use all our other continuous, small, cheap and very useful (but forbidden) monitoring devices. And we’ll move Partisols about if there’s an issue of a few $\mu\text{g}/\text{m}^3$.”

Bexley’s Jon Fox is already running FDMS Teoms alongside some existing Teoms, but is wary of jumping too fast so as to retain the historical dataset.

John Coates of **Richmond** said: “Given the cut back in SCA grant, I doubt we will be rushing out to buy anything.”

MORE FROM ANTWERP

Euro standard-setting frustrates delegates

There was barely concealed anger on standard setting at the European conference on particles held last month by the AAMG in Antwerp.

The European gravimetric particle standard for PM_{10} has been criticised for years but even so, European countries – with the exception of the UK – accepted a similar version for $\text{PM}_{2.5}$. Now it appears that gravimetric will feature for the revamped PM_{10} standard.

States send representatives of their standard setting bodies to the European standard setting

body CEN to agree standards. By agreeing to the use of the gravimetric standard for particle measurement, states were forced to use filter based particle monitors where results cannot be derived until the filters are sent off for weighing.

The UK claims it was the sole objector to this proposal and has led the way in encouraging use of the Teom device that samples particles electronically rather than collecting them on filter papers. The Teom, and other methods such as the Bam, allow

measurements to be taken in real time – a requirement of the European air quality directive.

But the use of the Teom is not without its problems. The Teom uses a heated inlet to drive off moisture so that measurements are of particles rather than water. This also drives off some volatile particles, and the UK and other countries have to show that the Teom is equivalent to the gravimetric method (see adjacent stories). It had been hoped that a standard 1.3 uplift factor for the Teom would allow equivalence, but this factor could hugely under or overestimate gravimetric concentrations.

The debate settled down to acceptance that both gravimetric and Teom methods were flawed – but that at least the Teom method fulfilled real time European data requirements.

In spite of this, the $\text{PM}_{2.5}$ standard was once again set based on gravimetric, and the current PM_{10} standard setting process will probably repeat its ‘mistake’ and opt for gravimetric again – even though gravimetric has its problems (see news, p6).

These issues were discussed by delegates at the Antwerp particle conference.

Gamekeeper turned poacher?

Don Munns is former chairman of CEN and his words were hardly reassuring

Don Munns said: “There are huge challenges in drawing up standards which can end up producing overly prescriptive legislation. For instance the framework method talks about use of diffusion tubes. Why does it have to be stipulated that diffusion tubes have to be a secondary method?”

“In 1996 we had the PM_{10} methodology that incorporated three standard methods and was wrong. In 2005 the $\text{PM}_{2.5}$

methodology was also wrong – it promoted two standard methods that don’t agree with each other. The ongoing update to the PM_{10} standard will hopefully come up with the right answer, however CEN is not keeping up with the science.”

The UK has been criticised in the past for delaying adoption of particle standards because it didn’t agree with them. Munns said: “The only way to stop a bad standard is to vote against it. The only country to vote against the PM_{10} standard was the UK.”

Kelly: diet and PM

Kings College ERG’s Frank Kelly updated the Antwerp particle conference about health effects of particles. He reiterated the benefits of a good diet in mitigating ill health effects of pollution.

“Despite considerable effort to date, it has not yet been possible to identify which components of particles are primarily responsible for the different effects on health although current evidence suggests that bio-available metals and organic species are likely candidates.

“This new research has clarified that oxidative stress is a unifying feature underlying the toxic actions of ambient particles. Fortunately the surface of the lung is covered with a thin layer of fluid containing a range of antioxidants that appear to provide the first line of defence against particles.

“As diet is the only source of some antioxidants, a plausible link now exists between sensitivity to air pollution and the quality of food we eat. The production of some of the other antioxidants in this compartment is under genetic control and this may help explain inter individual sensitivity to ambient air pollution.”

Kelly referred to the recently completed Hepmeap (Health effects of particles from motor engines exhaust and ambient air pollution) study that has linked epidemiological and toxicological observations: “By measuring the oxidative potential of ambient particles collected outside schools with varying traffic exposure, it was demonstrated that particle oxidative potential was a better surrogate of particle associated health effects than particle mass.”

The conference was run by the AAMG, part of the Royal Society of Chemistry. Contact Gail Rafferty, AAMG-RSC Administration email conference@aamg-rsc.org

Bye bye Teom – hello Teom FDMS

For a subject that might appear to be quite so boring, there's a lot of politics involved in pollution monitoring and standards.

Local authorities must decide what they are going to do about their Teoms now. Defra has confirmed they do not satisfy equivalence criteria (see news, page 1&7).

It has been an open secret for some time that the Teom particle monitor isn't really any good. Sure – its accurate, convenient and reliable (although a little expensive) – but it doesn't meet the letter of EU law that says particle monitors must either be gravimetric (filter based) or equivalent to gravimetric. Teom users have got round this with a 1.3 fudge factor in a bid to comply – but now Defra has ruled that this is not satisfactory.

Its report says that a £6,500 upgrade to the Teom will make it equivalent. And it has listed other (cheaper) equipment that is also equivalent – although with 1,000 Teom's in use across the UK, most users are expected to stick with the technology however pricey.

The equivalence debate is highly technical and given that the Teom does the job very well in every respect apart from this notional equivalence with a flawed gravimetric standard, it is ironic that money is being spent replacing it. All this against a background of Government obsession in cutting unnecessary red tape – there is some irony that ticking boxes on European equivalence will cost $1,000 \times £6,500 = £6.5m$ at a rough guess, money that will do nothing to improve air quality or improve our understanding what it does.

Teoms use a technique that samples the air rather than passing air through filters that are subsequently weighed. Teom technology is based on heating the inlet to drive off moisture that affects readings – but this heating drives off volatile particles leading to an under-read. In the north of the UK where particles tend to be natural coarse particles, the under-read is small. In the south of the UK, where there is a dominance of secondary sulphate and nitrate

particles, the under-reads can be as much as a factor of two.

However this 'under-read' is in comparison with a gravimetric sampling technique that is itself flawed. Weighing micrograms of particles on piece of blotting paper weighing grams has been likened to trying to weigh the captain of the ship by weighing the entire ship with and without the captain on board.

There are many inaccuracies inherent with handling filter papers. The papers absorb water which can affect readings, and there are even huge differences between filter media (see news, page 6).

And in the UK in particular, the Teom has served us well.

It is reliable and allows real time monitoring that can be interrogated via the web essentially in real time. Teom readings have been used to drive health studies, with health effects found to be directly related to the readings, whether or not those readings are 'equivalent'.

So any sensible onlooker might well question why anyone might contemplate getting rid of the Teom and replacing it with a device that is unproven, more expensive and likely to muck up the years of Teom data already collected. But European law is European law – UK monitors must be

equivalent, and therefore the Teom must go.

Defra came to this conclusion based on an exhaustive and expensive (£500k) study that pitted eight different types of monitor (pairs of monitors in fact) against each other. Two apparently Heath Robinson style trailers sharing some 20 sampling inlets were parked up for periods at Teddington, Bristol, Birmingham and East Kilbride and results compared with that from an EU



The plethora of monitor heads needed as part of the monitor trials

Picture courtesy of Metcen

approved filter machines or equivalent proved through testing.

Several 'candidate methods' were pitched against the benchmark gravimetric devices. European regulations stipulate that the candidates must jump through a number of hoops before they can be considered equivalent – the most important of which is that they have an accuracy of 25%. The candidate methods are also supposed to work for most of the time, in many cases they don't, and tests should be carried out in areas where concentrations are greater than 50% of the limit value. The UK study

ADVICE FOR LOCAL AUTHORITIES

Defra issued advice for local authorities in the form of a 'frequently asked question' on the air quality monitoring helpdesk website.

The outcome of the study means that Teom analysers cannot strictly be used to measure PM₁₀ concentrations for comparison with the air quality objectives (which are based on measurements using the European reference sampler). The issue will be most critical where PM₁₀ levels are slightly above or below the objectives.

However it is recognised that local authorities have invested considerable resources in Teom analysers, and it may not be practicable to replace these instruments in the short term. Defra and the Devolved Administrations consider that Teom analysers remain suitable for use for the purpose of local air quality

management (LAQM), using the current default correction factor of 1.3.

Wherever it is practicable, local authorities are encouraged to use instruments that meet the equivalence criteria. This should be an important consideration when purchasing new instruments, or replacing existing equipment. It is also possible to upgrade the Teom analyser to an FDMS instrument by a simple retrofit (at a cost of approximately £6.5-7.5K). Authorities are also encouraged to have particular regards to those locations where concentrations are expected to be close to the objectives. In such cases it may be possible to restructure local networks, for example by moving instruments around.

Correction factors derived for the various instruments are contained in the table (above right).

THE INTERCOMPARISON – A SUMMARY

| Candidate instrument | PM Size fraction | Manufacturer | Equivalence criteria met? | Correction required |
|----------------------|-------------------|-----------------------------|--|--|
| Partisol 2025 | PM ₁₀ | Thermo Electron Corporation | Meets equivalence criteria | No correction required |
| TEOM | PM ₁₀ | Thermo Electron Corporation | Does not meet equivalence criteria | Correction does not aid the adherence of equivalence criteria. |
| PM10 FDMS | PM ₁₀ | Thermo Electron Corporation | Meets equivalence criteria | No correction required |
| PM2.5 FDMS | PM _{2.5} | Thermo Electron Corporation | Meets equivalence criteria | No correction required |
| SM200 by Beta | PM ₁₀ | Opsis AB | Meets equivalence criteria | No correction required |
| SM200 by Mass | PM ₁₀ | Opsis AB | Meets equivalence criteria after application of slope and intercept correction factors | $SM200\ Mass_{corrected} = \frac{SM200\ Mass - 1.286}{0.819}$ |
| BAM | PM ₁₀ | Met-One | Meets equivalence criteria after application of a slope correction factor | If flow reported at standard conditions: $Bam_{corrected} = \frac{Bam}{1.211}$ |
| | | | | If flow reported at standard conditions: $Bam_{ambient\ corrected} = \frac{Bam_{ambient}}{1.273}$ |

exempted itself from some of these requirements, and similarly it ignored rules on what sort of filter paper to use on the basis that the required filters are known to have their problems.

If all this sounds as though EU regulations are ill-thought out and problematic it gets worse. It seems that EU standard sampling heads (the ‘chimneys’ that collect the air) leak! The study found that the heads ‘direct droplets of water onto the filter’. The moisture then blocks the filter, tripping the air pump, wrecking results for a few hours (see faults, right).

Jim Mills of Air Monitors explained the implications of the UK equivalence study for users of Teoms. “There are some 900 Teoms in the UK, and 75 or more within the automatic network. These measure PM₁₀ and it was originally the intention to retain about 10% of these to measure PM₁₀ to allow the decades-long dataset of PM₁₀ monitoring to continue. “It appears as though as many as half of these may be retained for PM₁₀ with the others being converted to PM_{2.5} in readiness for the new PM_{2.5} monitoring requirements coming from Europe.”

As well as switching many machines over to PM_{2.5} (relatively straightforward) there is also the issue of adapting or replacing the machines to comply with Defra’s decision that Teoms cannot be equivalent to gravimetric. All in all, there could be a need for up to 200 FDMS Teoms in the automatic network alone. A Teom might cost some £14,000, adding FDMS might cost £6,500 (fitted) while a new, fully dichotomous FDMS Teom costs about £23,000.

Mills said that the move towards FDMS will have some interesting consequences. The 1.3 factor has tended to overestimate concentrations in the North, for instance in Scotland, Edinburgh is allowed to use a 1.12 factor for its Teoms. One power station operator, reports Mills, has been running FDMS for a year now and found that it lowers results by 20% overnight. By contrast south east England users may find their results go up if they use the FDMS.

● The intercomparison report is available on the reports area of www.airquality.co.uk and on www.laqmsupport.org.uk

FAULTS NOTED IN MONITORS USED IN THE STUDY

PM₁₀ KFG reference sampler

The main problem with the PM₁₀ KFG was that the sampler would stop on occasions when there were high PM₁₀ concentrations, coupled with high humidity. Further, a number of filters were severely damaged by the design of PM₁₀ heads, which caused a significant reduction in the data capture. The report says: “In our opinion, the design of the reference inlet may have the effect of directing water droplets in the air, not just those smaller than 10µm, onto the filter.

Netcen’s audit also found leaks in the pipework of all eight heads that meant that 20% less air was flowing through the filters than imagined.

PM_{2.5} Leckel reference sampler

The four PM_{2.5} Leckel sampling heads used in this study were “highly reliable” although water once again was found to clog up the filters because of the badly designed sampling head.

Partisol 2025

The Partisol 2025 was found to be “highly reliable”, and the only problem encountered was that the filter cassettes jammed on one occasion.

Teom

The Teom was “highly reliable”, although sensitive to air conditioning. If that fails, by comparing the side-by-side instruments it can take up to 12 hours for the instruments to stabilise. Without the colocation, this settling down period would not have been noticed. “As such, we recommend that 12 hours should be routinely deleted for the Teom after a power or air conditioning failure.”

FDMS Teom

The FDMS Teom was developed by Thermo (formerly R&P) as an improvement to the Teom in order to correct for the loss of semi-volatile particles. The system operates at 30 °C rather than 50 °C to reduce particle

losses. In addition, the inlet air is dried to a relative humidity of 15 to 20 % using Nafion driers.

In the tests the FDMS was found to be very sensitive to the temperature of the enclosure as the efficiency of the Nafion drier drops considerably above 22 °C. Conversely, if it is too cold, water droplets will begin to form in the sample stream and so will not be removed by the drier.

SM200

The Opsis SM200 is a beta attenuation monitor. Researchers reported problems with filter quality, and also difficulties in matching the correct filters to the correct time periods.

Smart Bam

Tests were abandoned as each of the instruments were initially set up with either broken temperature or humidity sensors, which led to very low initial data capture. Occasionally an instrument would fail a leak or flow check. This was usually attributed to glass fibre being stuck on the tape holding nozzle.

It was shown that the external temperature of the sample inlet below the heater tape varied between 65 and 75 °C; much higher than the 45 °C recommended by the manufacturer. This discrepancy was traced to the 400 Watt US configuration (AC = 115 V; 60 Hz) heater tape supplied with the instruments as opposed to the 200 W European configuration (AC = 230 V; 50 Hz) heater tape that should have been supplied.

As the instrument regulated the heater to either 20 or 100 % of maximum as a function of relative humidity, the sample inlet was being heated to too high a temperature, and so semi-volatile species were lost.

As such the tests cannot be completed, and no conclusions for the Smart BAM instrument can be reached within the remit of the current programme.

SCIENCE SHORTS

Weak mental link

Japanese researchers have found only a weak link between photochemical oxidants and mental health.

In a nationwide study, 4,500 adults were studied and their health compared to air pollution estimates. Higher two month exposures to pollutants such as ozone tended to leave participants with lower vitality scores – and a slightly lower mental health score.

Association between exposure to ambient photochemical oxidants and the vitality or mental health domain of the health related quality of life, Shin Yamazaki et al, *Journal of Epidemiology and Community Health*, 2006, vol 60, pp173-179.

Hotspots threatened

A group of scientists has recently analysed the threat of nitrogen deposition to biodiversity on a global scale.

Using global chemistry transport models, they estimated the rate, extent, and distribution of recent and future (2050) nitrogen deposition within the newly defined 34 world biodiversity hotspots. These biodiversity hotspots cover just 2.1% of the Earth's land area but half of its plant species.

The results suggest that the average amount of nitrogen deposited across these biodiversity hotspots was 5.3 kg N ha⁻¹yr⁻¹, which is almost 50 % higher than the global terrestrial average (3.5 kg N/ha/yr) in the mid-1990s. By 2050, the average deposition to hotspots is projected to have more than doubled, to 11.8 kg N/ha/yr. By then, 17 out of the 34 hotspots could have between 10% and 100% of their area receiving greater than 15 kg N/ha/yr, the critical level known to cause damage to ecosystems.

Atmospheric nitrogen deposition in world biodiversity hotspots: the need for a greater global perspective in assessing N deposition impacts G Phoenix. et al. *Global Change Biology* (2006) 12: 470-476

RESPIRATORY

Infant deaths caused by PM_{2.5}

Californian researchers say that fine particle (PM_{2.5}) pollution is killing young infants.

Based on suggestions that infant respiratory deaths and sudden infant death syndrome (Sids) were linked to pollution, researchers looked at long term exposure to PM_{2.5} and postnatal infant mortality in California where mothers lived within five miles of a PM_{2.5} particle monitor.

“We matched each post neonatal infant death to four infants surviving to one year of

age, by birth weight category and date of birth (within two weeks). For each matched set, we calculated exposure as the average PM_{2.5} concentration over the period of life of the infant who died.” Some 788 deaths were included, and over 3,000 survivors.

“We found that a 10µg/m³ increase in PM_{2.5} led to a 7% increase in risk of all cause neonatal death, a 113% increase for respiratory death and a negative effect for SIDS and other causes.” Researchers concluded:

“This work shows an association between respiratory related post neonatal mortality and PM_{2.5} in California. This adds evidence to previous literature in the US and other countries that air pollution may be associated with some portion of infant mortality in the US.”

Fine particulate (PM_{2.5}) air pollution and selected causes of post neonatal infant mortality in California, Tracey Woodruff et al, *Environmental Health Perspectives*, May 2006, Vol. 114, No 5, pp786-789.

RESPIRATORY

Asthma incidence link to traffic?

Despite accepted wisdom that asthma incidence is not linked to pollution, Los Angeles researchers think they may have found a link.

Faced with inconsistent studies linking incidence of asthma (as opposed to severity of symptoms of existing asthma sufferers), the researchers looked deeper into the history of sub groups of asthma sufferers living near roads in southern California.

Lifetime history of asthmatic kids aged 5-7 and their prevalent asthma and wheeze was logged via questionnaire. Parental history of asthma, the child's history of allergic symptoms, sex and early life exposure were examined as susceptibility factors. Residential exposure was assessed against proximity to a

major road and by modelling exposure to traffic pollutants.

Residence within 75m of a major road was associated with an increased risk of lifetime asthma of 29%, 50% increased risk for prevalent asthma, 40% increased risk for wheeze. But susceptibility rose for those with no parental history of asthma (increased risks of 85%, 146%, 174% respectively).

The higher rate of incidence decreased to nothing at a distance of 150-200m from the road.

In children with a parental history of asthma and in children moving to the residence after two years of age, there was no increase in risk. Researchers concluded: “We conclude that living in a residence with more nearby traffic increases the risk of

childhood asthma. Children with no parental history of asthma who had long term residential exposure or early life exposure constituted a susceptible population (59% of asthma attributable to the road), and the risk was larger for girls than boys.

“Because a substantial number of southern California children live near a major road, this exposure is potentially an important public health problem that could be remediable by transportation and residential development policy and by more effective control of vehicle emissions, researchers added.”

Traffic, susceptibility and childhood asthma, Rob McConnell et al, *Environmental Health Perspectives*, Vol 114, no 5, May 2006 pp766-771.

CARDIOVASCULAR

Spanish suggest heart attack link

Air pollution is linked to heart attacks, Spanish researchers suggest.

Valencia researchers looked at daily admissions to hospitals for cardiovascular and heart diseases between 1995 and 1999 and compared them to daily levels of particles, so₂, NO₂, carbon monoxide and ozone.

A 10µg/m³ increase in PM₁₀ led to a same day increase in cardiovascular admissions of 0.9% and 1.6% for heart disease. For ozone effects with

a three day lag, the corresponding increases are both 0.7%. An increase in 1mgm of carbon monoxide increased cardiovascular admissions by 2.1% and heard disease admissions by 4.2%.

Researchers say: “This is the first multicentre study evaluating the short term effect of air pollution in cardiovascular morbidity in Spain. Risks are higher for heart disease than cardiovascular disease, and the effect of ozone on cardiovascular admissions

seems to be independent of other pollutants.

“Air pollution, even at current levels beneath recommended objective limits, may represent a risk for cardiovascular health among the urban population.”

Air pollution and cardiovascular admissions association in Spain, results within the EMECAS project, F Ballester et al, *Journal of Epidemiological and Community Health*, 2006, Vol. 60, pp328-336.

NITROGEN DIOXIDE

Low levels of NO₂ in death link

Nitrogen dioxide is blamed for causing increased deaths in European cities.

The short-term effects of nitrogen dioxide on total, cardiovascular and respiratory mortality in 30 European cities participating in the Air Pollution on Health: a European Approach (APHEA) project were investigated.

The association was studied in two stages. In the first stage, data from each city were analysed separately, whereas in the second stage, the city-specific air pollution estimates were compared to obtain overall estimates and analyse for

associations.

A significant association of NO₂ with total, cardiovascular and respiratory mortality was found, with stronger effects on cause-specific mortality. There was evidence of confounding in respiratory mortality with black smoke and sulphur dioxide.

The effect of NO₂ on total and cardiovascular mortality was observed mainly in western and southern European cities, and was larger when smoking prevalence was lower and household gas consumption was higher. The effect of NO₂ on respiratory mortality was higher in cities with a larger proportion

of elderly persons in the population and higher levels of particulate matter with a 50% cut-off aerodynamic diameter of 10µg/m³.

Researchers said: "The results of this large study are consistent with an independent effect of nitrogen dioxide on mortality, but the role of nitrogen dioxide as a surrogate of other unmeasured pollutants cannot be completely ruled out."

Short-term effects of nitrogen dioxide on mortality: an analysis within the APHEA project. E Samoli et al, *European Respiratory Journal* 2006 Jun;27(6):1129-38

NITROGEN DIOXIDE

Below-objective pollution affects kids' lungs

Air pollution at levels less than European limits affects the lung capacity of children, Austrian researchers suggest.

163 children aged 7-10 from a Vienna school were recruited for a study involving lung function tests. Repeated tests were taken at the same time of day over a one year period yielding some 11-12 tests per child. Results were compared with ambient measurements of NO₂ and PM₁₀ taken at nearby fixed site monitors.

For every 10µg/m³ reduction in NO₂ and PM₁₀, reductions in lung function of about 1% was seen in most parameters – the most sensitive of which tended to be maximum expiratory flow

in small airways.

The reduction in lung function was highest for NO₂, followed by PM₁, PM_{2.5} and PM₁₀, while exposure to coarse particulate (PM_{2.5-10}) had no effect on expiratory flow.

Researchers concluded: "All acute effects of urban air pollution found on the lung function of health pupils were evident at levels below current European limit values for nitrogen dioxide.

"Thus planned reduction of nitrogen dioxide emissions (Euro 5) of 20% would seem to be insufficient." They made this claim based on the improvement in emission standards to date and the recent

increases seen in NO₂ levels in Austrian cities.

They added: "PM_{2.5} and NO₂ predict early decrements of lung function in children better than PM₁₀. The study also calls into question the cap of 25µg/m³ on PM_{2.5} currently proposed by the Commission. In the absence of an apparent threshold, adverse effects of urban air pollution should be reduced as much as possible by cutting primary and secondary particles from combustion."

Low levels of air pollution induce changes of lung function in a panel of school children, H Moshhammer et al, *European Respiratory Journal*, 2006, vol 27, pp1138-1143.

VEHICLE POLLUTION

Lifestyle choices affect pollutant exposure

A study by the EC Joint Research Centre, under the EU-funded PEOPLE (Population Exposure to Air Pollutants in Europe) project, has assessed and compared outdoor, indoor and personal exposure to pollutant levels in six cities.

Benzene was selected for the study as it is the first known carcinogen to be controlled by a European air quality directive, and it also an indicator for traffic emissions. For the monitoring of human exposure, as well as a number of representative environments, benzene was measured using a portable exposure sampler

device during a one-day campaign.

For each city, 125 samplers were placed in different environments, and 150 samplers were used for human exposure. The main findings were:

- Human exposure to benzene was higher than concentrations reported at urban background sites, i.e. parks or large squares. Human exposure in non-smoking commuters was 1.5 times the level of background and 0.6 times the maximum outdoor values at hotspots.
- In all the six cities that participated in the study, the major benzene source was

traffic emissions;

- For all the commuting groups that participated in the study, the car users were the group that presented the highest exposure levels;

Overall, this study demonstrates that, in the absence of smoking or other indoor pollution, transport is the most important factor determining population exposure to urban air pollutants.

Population exposure to benzene: one day cross-sections in six European cities, P Ballesta et al. (2006) *Atmospheric Environment* 40(18): 3355-3366.

SCIENCE SHORTS

Dutch note less asthma

Dutch researchers have noted that asthma incidence appears to be going down from its peak in 2000.

The five fold increase in asthma incidence seen in the 1980s and 1990s has sometimes been blamed on pollution, although most believe pollution worsens asthma symptoms rather than causing it in the first place. But since 2000 incidence is decreasing – there is no obvious explanation for the fall.

The prevalence of asthma in children: a reversing trend, C van Schayck et al, *European Respiratory Journal*, 2005, pp647-650.

Traffic blamed for ill health

Toronto researchers say that traffic fumes affect the health of the elderly living near busy roads and the effect is not due to socioeconomic reasons.

A number of studies have shown that those that live closer to busy roads are more likely to suffer from pollution symptoms – but these studies are countered by those that say that poorer people tend to live closer to busy roads – as poorer people tend to be less healthy, this confounds the results.

For this Canadian study, elderly folk who had been admitted to casualty as a result of respiratory symptoms were studied, and notes taken on their proximity to a busy road and the value of their house as an indicator of their socioeconomic status.

Elderly residents living near busy roads were found to be 18% more likely to be hospitalised for respiratory diseases than those living near a quieter country road.

Traffic intensity, dwelling value and hospital admissions for respiratory disease among the elderly in Montreal: a case control analysis, Audrey Smargiassi et al, *Journal of Epidemiological and Community Health*, 2006, Vol. 60, pp507-512.

The affable John Rae of Defra was explaining the health impacts of pollution to the strategy review workshop.

All too often we are told of the billions of this and that caused by poor pollution. Billions are of course incomprehensible and very difficult to empathise with – witness Defra economist Paro Konar's talk that contained oodles of big numbers, none of which had any personal impact.

But Rae was able to put it simply: "The health impact in the UK is valued at £9.1-£21.4bn a year. These are scary numbers – well they scare me anyway."

Now that's the sort of analysis we can all comprehend.

NSCA noted the irony that the strategy meeting took place on a hot smoggy day.

It commented: "For future events, Defra may wish to consult the weather gods. Certainly, the irony that the workshop coincided with the first ozone warning of the summer was widely noted. This mirrors last year, when the previous meeting took place on the same day that Marylebone Road recorded its 36th exceedance of the daily PM₁₀ limit value, putting the UK in breach of European air quality law."

The Buncefield air quality forecasting meeting was intended to provide a forum to swap information and consider how to improve the air quality response should a Buncefield ever happen again.

The curious thing was that there were very good questions and issues being thrown up – and Defra, the Health Protection Agency and the Environment Agency weren't answering them very well. And if they won't answer them, who on earth will?

HPA says another report is due out, but based on current evidence, it won't be very thoughtful. Let's do our own mini analysis: 1/ A whole load of people were asked to model the plume with varying degrees of urgency. The plume crossed the coast before any sensible output emerged;

2/ The Met Office seem unconcerned that it predicted that the plume would ground east of London, whereas it grounded south;

3/ The HPA hasn't a clue about ambient air pollution, describing the burning oil smoke as 'harmless';

4/ Local authorities in the path of the plume were kept in the dark during the incident, and after the incident;

5/ The unofficial and thorough response of the ERG monitoring network rendered the

official Defra/Netcen network pointless; 6/ Emergency planners seem entirely happy to base operational decisions on the automatic monitoring network (that didn't notice anything amiss);

6/ It's best if fires don't happen at the weekend because there'll be no one to deal with the air impacts until Monday morning;

8/ If air quality experts are eventually tasked with monitoring, then there'll be further day's delay because they will not be given access to the security cordon (and have to blag personal protective equipment off the authorities);

9/ Authorities will say their response was adequate, make no changes, and express genuine surprise when there is no confidence in their response next time.

Q: How to make Defra chief Martin Williams happy? Answer: Accuse him of doing too much monitoring!

TRL's Peter Fleming, a bit of monitoring buff, asked whether exposure reduction was just an excuse for more monitoring?

Williams retorted that such criticism was "music to my ears". "Ten years ago I was hauled in front of the commission for not doing enough monitoring, so to be accused of doing too much is wonderful."

AIR QUALITY EVENTS 2006

July 11th

Biogas as a Fuel for Transport

NSCA conference to be held in Greenwich. Contact Sally May, NSCA, 01273 878770

September 6-8th

Air Pollution and Environmental Health

From science to action: the challenge of particle matter, IUAPPA regional conference to be held in Lille, France, website www.IUAPPA-lille2006.org

September 12th-14th

4th CIWEM Annual Conference

Emerging environmental issues and future challenges, including session on odour, to be held in Newcastle on Tyne, contact CIWEM 01924 257891

September 21st

A Cleaner Future

Good practice in air quality national conference 2006, Care4Air conference to be held in Sheffield, website www.care4air.org

October 3rd

Dispersion Modellers User Group (DMUG)

22nd meeting to be held in London, Contact Sally May, NSCA, 01273 878770

October 26th

Environmental and Public Health training day

Advanced update to include Integrated Pollution Prevention and Control, Sherman Education Centre, Guy's Hospital, London Karen Hogan, 0207 771 5384 email chemicals.training@hpa.org.uk

October 16-18th

NERAM V

Strategic policy directions for air quality risk management, conference to be held in Ontario, Canada. www.irr-neram.ca

November 7th

Air quality update

NSCA conference to be held at the NEC Birmingham, Contact Sally May, NSCA, 01273 878770

2007: July 2nd-5th

11th International Conference on Harmonisation

within Atmospheric Dispersion Modelling for Regulatory Purposes conference to be held at Queen's College Cambridge, website www.cerc.co.uk/HARMO11/index.htm

AIR QUALITY BULLETIN



Welcome to *Air Quality Bulletin*, a monthly newsletter covering air pollution, its management and its consequences.

We welcome your comments and contributions and hope you enjoy reading it.

Jack Pease

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