AIR QUALITY BULLETIN
January 2009 Issue 33

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COURTS

Legal threat mounts

The Knightsbridge Association is warning the Government that it may launch a legal challenge on poor air quality. A similar challenge mounted by a German resident against Munich City succeeded in European courts.

The Knightsbridge Association (KA), which is linked to the Campaign for Clean Air in London, has written to the Government demanding that it complies with air quality objectives within its area: "The KA is concerned about serious breaches of air quality laws in this part of London (and elsewhere).

"Local air pollution levels in 2008 were close to record levels. Annual mean levels of NO_2 were well over twice the maximum level recommended by the WHO and peak levels occurred more than 420 times compared to the WHO's maximum recommended frequency of 18 times. The KA estimates that annual average levels of PM_{10} in this area exceeded 40µg/m^3 and may have approached 50µg/m^3."

Essentially what the Association is doing – driven by Simon Birkett of the Campaign for Clean Air in London – is putting down a formal marker that it may mount a legal challenge as was successfully mounted in Germany. One argument it cites is that as well as failing to improve air quality, Defra is not intervening to prevent a deterioration in air quality as will be seen with the London Mayor's scrapping of the western extension to the congestion charge zone.

The European Court of Justice judgement involved a Munich citizen who lived near the city ring road. PM_{10} measurements were above objective limits, an action plan existed but the citizen (Dieter Janecek) applied for a court order forcing the authorities to adopt a more ambitious plan.

European law expert Professor Jan Jans explained: "The local court dismissed that action as unfounded. On appeal, the higher court held that the residents concerned may require the competent authorities to draw up an action plan, but that they are not entitled to insist that it must include the specific measures that would guarantee compliance with limit values in the short-term. The higher court said that national authorities are required only to ensure that such a plan pursues that objective to the extent to which it is possible and proportionate."

Janecek appealed to the European Court of Justice, which confirmed that individuals have the right to demand authorities produce an action plan.

But the European Court confirmed that member states are not required to deal with exceedences in the short term or ensure that exceedences never happen: The judgement states: "States are obliged only to take such measures – in the context of an action plan and in the short term – as are capable of reducing to a minimum the risk that limit values or alert thresholds may be exceeded and of ensuring a gradual return to a level below those thresholds."

● Google: Dieter Janecek v Freistaat Bayern Case C-237/07

COURTS

Infringement proceedings being prepared

The European Commission is preparing infringement proceedings against the UK.

Prompted by Simon Birkett of the Campaign for Clean Air in London, EU commissioner Stavros Dimas told MP Edward Davey: "In view of the serious consequences to public health of high concentrations of PM_{10}, the Commission expects the UK to take ambitious measures to ensure a speedy reduction of concentrations. The UK authorities have outlined some of these measures in the reply to the Commission's letter of June 2008 but that notification will only be submitted in the summer of 2009.

"Based on continuous high PM_{10} levels and with no notification demonstrating that the conditions for an exemption are met, the Commission is now preparing the launch of infringement proceedings against the UK."

Dimas highlighted the Janacek judgement (see above). He warned: "It is expected that this ruling will provide a further incentive at all levels of governance to take appropriate measures to comply with air quality legislation."

Defra admits slippage

For the first time Defra has admitted slippage on tackling air quality.

In its annual reports, Defra is required to report on progress towards its official Public Service Agreements, one of which covers air quality. In the previous year's 2007 annual report, Defra said it was "on course" to meet the target. In the most recent 2008 annual report, it now says there is "currently slippage against some indicators".

It says: "Objectives for benzene, 1,3-butadiene, carbon monoxide and lead were met throughout the UK in 2007, and Defra is meeting current objectives for all air pollutants in PSA8 across 95% of the UK. However, more needs to be done to meet our objectives for nitrogen dioxide and particles where there is slippage in all parts of the country."

It also admits that it will have to take more action than is proposed in last year's air quality strategy which was widely criticised at the time for being too weak: "The new EU Directive on air quality introduces compliance flexibilities for PM_{10} and NO_2, extending the deadline for compliance with these limit values to 2011 and 2015 respectively.

"This is subject to putting forward detailed plans on how these limit values will be met. Analysis carried out for the strategy suggests that additional measures over and above those set out will be needed to fully meet the limit values set out in the directive by the due dates."

"We are currently considering other measures set out in the strategy, such as the incentivisation of early uptake of new European vehicle emissions standards (Euro-standards) and the increased uptake of low emission vehicles."

Defra will be mindful that the European Commission is poised to launch legal proceedings against it (see news, left).

INSIDE THIS ISSUE ...

IN BRIEF

California hits trucks

The Californian Air Resources has adopted two regulations directly aimed at cleaning up emissions from the estimated one million heavy-duty diesel trucks that operate in the state.

From 2011, big rigs will need diesel exhaust filters with nearly all vehicles upgraded by 2014. Owners must also replace engines older than the 2010 model year according to a staggered implementation schedule that extends from 2012 to 2022.

New rules also require fitting of streamlining kits and low energy tyres.

$1bn in funding is being made available and the measures are estimated to save 9,400 premature deaths.

● www.arb.ca.gov/regact/2008/truckbus08/truckbus08.htm

European cuts too

European Parliament has agreed Euro VI limits for new lorries and buses sold in Europe from 2012-13.

The new standards set limits for new heavy-duty vehicles for PM, NO_x, hydrocarbons, CO and ammonia. Emission standards in the adopted proposal are identical to those in the earlier versions (NO_x = 0.4 g/kWh, PM = 0.01 g/kWh), but the implementation dates have been advanced.

Jos Dings, director of T&E said: "The EU has done the right thing by getting these long-overdue standards agreed. But lorries have a nasty habit of looking a lot cleaner in the testing laboratory than in the real world. Close monitoring will be needed to ensure NO_x and other harmful emissions really go down."

The European Environment Bureau added: "The Euro standards alone will not be enough to meet urban air quality targets. Local authorities will need to go beyond the minimum requirements for compliance with emission standards and support wider mobility management practices, such as low emission zones."

NEWS FROM THE AAMG PARTICLES MEETING HELD IN LONDON

Kobe justifies slow progress

European Commission air quality chief Andrej Kobe has admitted progress on air quality in Europe has not been as fast as hoped.

Speaking to the Royal Society of Chemistry AAMG particle measurement conference held in London last month, Kobe said: "Looking at annual average concentrations recently, we are not making much progress. Why is it not going down? We don't know."

He explained that member states' plans were "late or very late", and many plans and programmes received were not ambitious: "Often not all measures are explored in plans and programmes and limited action chosen. But if countries are too relaxed, for instance with IPPC, then at a national level they may be missing the most cost effective measures and have to do something else more expensive instead."

Kobe said that during the two years that air quality directive revisions were going ahead, there was no enforcement of air quality objectives: "If you have too many exceedences, the stick does not work any more."

The aim of the Article 22 time extensions, which let member states have extensions provided they promise to meet the extended limits, is to get back on track. To date 11 member states have notified Europe. UK is expected to report in summer, Holland was the first and its submission will be the first to be vetted by the Commission in March.

The Commission is using consultants to scrutinise the plans put forward by member states. Kobe assured the AAMG audience that, with the help of consultants, it was capable of firmly assessing plans and programmes and would be able to spot weaknesses or lack of action.

He suggested that modelling would take a far greater role in the future – to date just UK and Holland relied heavily on modelling to back up its air quality plans and programmes.

MORE FROM AAMG

Way forward sought for mercury monitoring

Richard Brown of NPL described actions in Europe to try and agree monitoring of mercury concentrations.

He told the AAMG conference that the UK was not expecting any exceedences of mercury objectives. But there is some argument over measurement procedures for total gaseous mercury for which there is clear toxicity and health effects.

Standardisation trials are underway at the moment, but have become bogged down in discussions about the lack of good practice guidelines, and disagreement on calibration. Brown said that current techniques are not SI traceable, whereas a new dynamic vapour generator (used for calibration) gives traceability.

MODELLING

Fairmode modelling thinktank kicks off

Fairmode, a pan European modelling grouping, has had its first meeting in Croatia.

The Fairmode network aims to meet the requirements of the new air quality Directive with a particular focus on the promotion of modelling as necessary tool for air quality assessment and management.

Two working groups have been set up to provide guidance to model users and another on the quality assurance of models in relation to the air quality directive led by the European Joint Research Centre.

Andrej Kobe, head of air quality at the Commission, told the AAMG meeting the group aimed to produce guidance on model use by the end of 2009. "The aim is not to support a single model, but to establish criteria for air quality model use and quality assurance. It is expected that the guidance developed and the best practices promoted will be helpful for member states with only limited monitoring experience."

● Fairmode website http://fairmode.ew.eea.europa.eu

VOCS

PVR2 sees VOC recovery at the pumps

The European Commission renewed efforts to clamp down on harmful volatile organic compound (VOC) leakage from petrol retail forecourts.

It wants petrol pumps at many service stations across the EU to be fitted with equipment that can recover 85% or more of petrol vapour that escapes from the car's fuel tank during refuelling.

A proposed directive will require Stage II petrol vapour recovery (PVR) technologies to be fitted to petrol pumps at all service stations with an annual petrol throughput greater than 500 cubic metres per year when they are newly constructed or substantially refurbished. All service stations situated underneath residential accommodation will also need to install this equipment irrespective of their size.

The proposal now goes to the Council and European Parliament for their consideration under the co-decision procedure.

● http://ec.europa.eu/environment/air/transport/petrol.htm

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

Data lost: correction expected

Total loss of two years worth of EU-equivalent data will be patched up through 'data correction', it has emerged.

Speaking at last month's Iapsc meeting held in Birmingham, Defra's air quality science officer Janet Dixon denied that mistakes had been made or that contractors (Bureau Veritas) or quality control procedures had gone wrong.

The problem emerged last year (*AQB July p1*) when Defra released a draft of what it intended to do about dodgy data from seven Partisols across the UK. Partisols were put in place specifically to provide benchmark measurements against which the remainder of Defra's monitors – Teoms – could be adjusted to comply with European standards. Losing two years of reference data jeopardises those corrections between 2004 and 2006 and Dixon now says "significant data correction" is needed. Such correction is viewed with suspicion by some experts.

The problem arose due to late discovery of the problem whereby filters were gaining moisture in the field. The moisture was mistaken for particle mass.

Readings turned out to be 3.8µg/m³ too high, solving the riddle which had been obsessing inventory specialists who insisted that particle emission reductions should be leading to concentration reductions.

Dixon said: "We were conscious of the fact that emissions were going down while concentrations were flat. We were getting quite worried – was it the inventories or the monitoring that was wrong? Measurements at Auchencorth comparing a Partisol and FDMS led us down the path that there was something seriously wrong with the Partisol measurements."

Dixon said that there was no significant non-compliance by contractor Bureau Veritas either against reference methods or with its contract with Defra. The problem was unforeseen and is being experienced in other European states.

She told the conference: "It is really important that we get these measurements right. The new directive allows member states to apply for time extensions and for PM_{10}, the extended deadline is June 2011 with 2005 as a base year. The only equivalent data we have for 2005 are Partisol measurements (affected by the problem)."

If Defra's chosen correction factor is accepted, this will mean some 4µg/m³ can be knocked off reference concentrations against which Defra has to reduce concentrations.

Without correction in 2011 there will be 13 statutory zones that exceed the 24hour PM_{10} limit value. Using the suggested Partisol adjustment and the newly-allowed sea salt correction, the UK can say it only has one exceedence zone.

Defra denied this was a fiddle – Dixon says this will make the eventual task harder, not easier.

As of this month, Defra is switching to new style Enfab filters for the Partisols which should eliminate the problem.

Local authorities that use Partisols also have to decide what to do with their flawed data but without the luxury of being able to change the rules.

Iapsc speakers were asked what advice they had for councils that had used Partisols to back up their review and assessment data (ironically they used Partisols because they were advised that Teom data was unsuitable). The problem particularly affects Scottish authorities which have lower background particle concentrations than the south. Such authorities are advised to 'be careful' with data.

MORE FROM IAPSC

Manchester monitors establish road fall-off

Manchester postgrad Anna Leavey told the Iapsc audience of work using handheld particle monitors to establish the fall off of particles beside busy roads.

Ultrafine samples were taken at various distances from the kerbside to see real world exposures of pedestrians and residents living near busy roads. Particle levels were found to fall off quickly, confirming work carried out by Duncan Laxen and others that suggests that exposure can drop significantly in 10-20m.

Researchers used P-Trak real time ultrafine particle counters and held them for fixed periods near busy roads south of Manchester. Ultrafine particle counts were compared with a number of variables: "The most important determinants of UFP concentrations at kerbside are NO_x, wind speed and local car counts."

Concentrations v. distance from the road is a key output of the research, and the bulk of the decay was found to take place within 20m of the kerb. At 80m the roadside signal is lost. Over the first 20m, the drop off was exponential and obvious advice is where possible, to keep away from traffic.

To test this theory, researchers took their monitors to bus stops and measured exposure at a bus stop set near the kerb, and one set back from the kerb. Likewise exposures were measured while walking near the kerb, and while walking alongside the building line away from the kerb.

Particle counts waiting at a bus stop near the kerb were 28,172 particles per cu cm, and 24,530 along the building line, said Leavey. She added that walking along the pavement near the traffic, particle counts were 26,525 particles/cc as compared to walking along the building line where the particle count was 24,793. Walking on the downwind side of the pavement led to mean exposures of 27,996 particles/cc while on the upwind side it was 23,935 particles/cc.

She concluded: "Where a commuter waits for a bus, or how a pedestrian walks along a pavement may significantly alter their exposure to ultrafine particles."

More detail emerges on flexibility

Defra air quality expert Robert Vaughan confirmed to the Iapsc audience the latest thinking on how the UK will apply for 'compliance flexibility' on air quality deadlines (see also news, page one).

The UK, along with other EU member states, were given the option of applying for extensions to deadlines provided they submitted a viable action plan to the Commission. The UK will need to do this for PM_{10}, NO_2 and benzene.

Most urgently, said Vaughan, because of the earlier deadlines, is the need to sort out plans for PM_{10}. Extensions may be sought for up to eight zones. For NO_2, some 850km of roads will exceed objectives in 2015 and a plan to develop more national and local measures will be issued for consultation in 2009/2010 with the application for flexibility in 2010.

"Flexibilities are conditional on demonstrating that the new deadlines can be achieved," said Vaughan.

Modelling resources

The European Environment Agency has reviewed modelling tools able to simulate future change at a European scale.

● *Technical report No 11/2008* can be viewed on http://reports.eea.europa.eu/technical_report_2008_11/en

Boost for Birmingham

Professor Jon Ayres, chairman of Comeap, has become Professor of Environmental and Respiratory Medicine in the University of Birmingham. He was previously at Aberdeen.

The University of Birmingham is recruiting candidates for posts in environmental health sciences with a proven research track record in air pollution and health.

● For further information, see www.vacancies.bham.ac.uk/vacancies

IN BRIEF

Inventory consultation

The Environment Agency is consulting on the shape of its emissions inventory.

The pollution inventory was set up in 1998 and firms must report emissions of certain substances to allow the agency to report annual pollutant emissions data from individual activities. Some substances are proposed to be removed from the inventory, and some added.

● *Consultation on England and Wales Pollution Invent ory 2009 to 2011* can be viewed on www.environ ment-agency.gov.uk/static/ documents/Pollution_Invento ry_Consultation_v9.pdf

Biomass bung

The Government has set aside £12 million to help expand biomass heating in England

Grants are being made available for industry, businesses and community organisations to help towards the cost of buying and installing biomass-fuelled heating and combined heat & power projects. In the latest round of the bio-energy capital grants scheme, grants of up to £500,000 are on offer to pay for up to 40% of the difference in cost between a biomass boiler and its fossil fuel alternative.

● More details www.bio energycapitalgrants.org.uk

New research centre

A new centre has been set up to help the Government understand natural and environmental risk.

The Centre of Excellence in Understanding and Managing Natural and Environmental Risk is based at Cranfield University and will provide evidence and expertise on environmental risks. The centre will work closely with Defra to assess the probabilities and impacts of these risks and feed this into policy development.

It will also develop and communicate best practice across organisations involved in environmental risk management.

● www.cranfield.ac.uk

TRENDS

European performance compared

A paper has compared air quality reporting progress across member states.

Based on reporting by member states of air quality in 2007 (submitted in late 2008), the European Topic Centre note that compared to the reporting on 2006, the number of air quality management zones has reduced significantly, mostly due to Poland halving the number of zones.

"Exceedences of the daily limit value for PM_{10} remain a problem across the EU in 2007: it has been exceeded in 40% of the zones. Exceedence of the annual limit value plus margin of tolerance for NO_2 has been reported by 18 of the 25 member states who have submitted information; the hourly limit value of NO_2 is less stringent but still nine member states report exceedences in one or more of their zones.

"Exceedences of the target values of ozone have been reported by 18 member states; the health related target value is exceeded in 45% of the zones.

"Voluntary information on the pollutants of the 4th DD has been provided by 14 member states. For the heavy metals (arsenic, cadmium, nickel) a limited number of non-complying zones has been reported. The largest problems have been observed for benzo (a) pyrene: non-compliance areas are found in seven member states (including the UK with one zone).

● *Reporting on ambient air quality assessment: Preliminary results for 2007 ETC/ACC technical paper 2008/4 December 2008* can be viewed on http://air-climate.eionet.europa.eu/reports/ETCACC_TP2008_2_AQQ2006

EEA indicators update

The European Environment Agency has updated four key air pollution indicators including emissions of:

● Ozone precursors;
● Acidifying pollutants;
● Primary particulate matter and secondary particulate matter precursors.

● *Concentrations of air pollutants in urban areas* http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20080701123452/IAssessment1219309276318/view_content

QUALIFICATIONS

Epuk ponders chartered body role

Epuk is seeking views on whether there is demand for members to become chartered environmentalists.

The idea was suggested during recent membership surveys, said Epuk. "We are currently exploring the possibility of becoming an awarding body for the chartered environmentalist (CEnv) qualification, which is the highest level of professional qualification available to environmental practitioners.

There would be a number of benefits:

● A nationally recognised qualification similar to CEng;
● Recognition beyond the specific sector, which demonstrates commitment to environmentalism as a profession;
● Reassurance for employers or potential employers of competence and professional standards;
● Access to *Society for the Environment's* newsletter, seminars and conferences.

"We are currently in discussion with the Society for the Environment (the chartering body for the CEnv qualification) regarding the possibility of our members being able to qualify as chartered environmentalists through Environmental Protection UK. We are keen to assess the potential demand from our members for such a qualification."

● Feedback to Samantha.Stille@environmental-protection.org.uk

MONITORING

Carbon minimonitor

At the recent AAMG particles meeting held in London last month, Air Monitors' Steven Hoskins demonstrated the latest in miniaturised black carbon monitors.

The MicroAethTM Model AE51 weighs 250g and is less than 12cm long and is claimed to be able to take real time personal black carbon exposures with accuracies similar to those of larger instruments.

● www.airmonitors.co.uk

Thermo filters recall

Thermo has contacted customers and UK monitoring network managers telling them of problems with Teom filters.

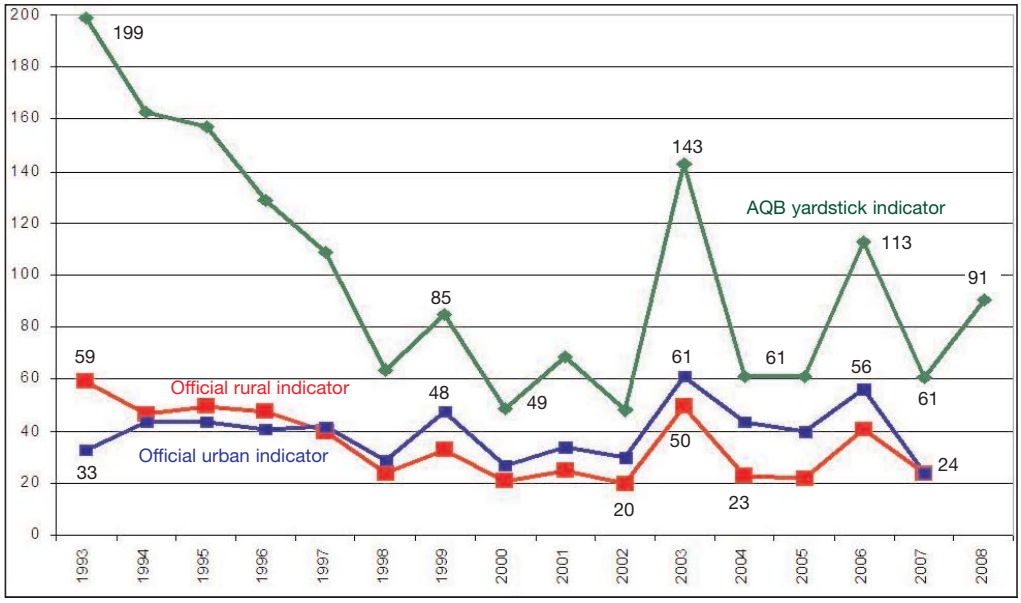
Batch numbers 57-007225-0010 (10/box) and 57-007225-0020 (20/box) may contain the fault and were produced in the second and third quarters of 2008.

Thermo Fisher Scientific-Air Quality Instruments has apologised to customers and offered them replacements under warranty if they had affected products.

● Colin Craggs, Thermo, tel 07778 234173

AIR QUALITY TRENDS

AQB yardstick: slight worsening



The *Air Quality Bulletin* 'yardstick' (the green line) is a rough and ready measure aimed at providing a quick summary of national air pollution soon after the New Year and some weeks before official figures can be produced.

It shows that pollution slightly worsened in 2008 compared to 2007 because of increased ozone exceedences (nearly twice as many).

Paul Willis of AEA is producing Defra's official indicator which will be available soon, and commented on our results: "I think this is just an indication that 2008 wasn't quite as bad weather-wise as 2007 across the whole year. There were more moderate ozone days in March-May 2008 than in 2007, and even a brief near-heatwave in early May!

"There were also some periods in July, August and September 2008 where the sun appeared briefly for a few days to generate moderate ozone levels. This didn't happen in 2007."

How we've calculated it: *Our yardstick is derived from the number of moderate exceedences of each pollutant divided by the number of monitoring stations where that pollutant is recorded as moderate, the whole lot divided by five (there are five pollutants) to make it vaguely compatible with Defra's official indicators. We're not saying it's particularly scientific, but it does give an early indication.*

TRENDS

Cold weather brings on moderate episode

Between 2nd and 5th January ERG's London air quality network reported a moderate air pollution incident.

The pattern was repeated at Rother's monitor in Sussex. Elevated evening/night time levels on both Saturday and Sunday at Lewes 2, possibly as a consequence of domestic wood burning, resulted in a period of moderate PM_{10}.

Moderate nitrogen dioxide was recorded at Camden (Swiss Cottage), Lambeth (Brixton Road) and Kensington & Chelsea on Saturday 3rd January.

The elevated and moderate pollution levels have been caused by very still, calm and cold conditions giving poor dispersion of local emissions.

● www.londonair.org.uk

INDUSTRIAL EMISSIONS

Cement industry pleased with emissions

The UK cement industry says it has met its designated emissions target three years ahead of schedule.

The British Cement Association (BCA) published its 2007 annual performance report which showed the industry beating its 2010 Environment Agency sector plan targets for emissions to air of particles, NO_x and sulphur dioxide three years ahead of schedule. BCA says this reflects £240m of investment in plants.

Against 2010 targets of 0.15 kg/tonne for dust emissions to air, 2.50 kg/tonne NO_x emissions to air, and 1.10 kg/tonne SO_2 emissions to air, the industry achieved actual emissions of 0.11 kg/tonne for dust, 2.20 kg/tonne for NO_x and 0.91 kg/tonne for SO_2.

● The report is available from the BCA or can be downloaded from www.cementindustry.co.uk

IN BRIEF

LTP3 guidance

The Government has released a consultation on draft guidance for Local Transport Plans (LTPs) – so called LTP3.

The first and second round of Local Transport Plans covers 2001-06 and 2006-11. This guidance applies to all LTPs after these rounds and has effect until further guidance is produced.

The recent Local Transport Act 2008 introduced many changes, including that LTPs need no longer to be marked by the Government; no longer need to be five years long and exemplary authorities have lost their exemption from having to produce plans.

There is little change for air quality within the LTP: "We advise that, where air quality is a transport issue, the integration of Air Quality Action Plans with Local Transport Plans will continue to provide a systematic way of joining up air quality management and transport planning.

"The LTP could examine and report on options on addressing air quality problems and any risks that policies might have on achieving targets."

● www.dft.gov.uk/ltp

Wales consults

Wales is consulting on the shape of guidance for local air quality management guidance for reviews and assessments.

The consultation follows much the same structure as that seen in England but reflecting the slightly different responsibilities and organisations found in Wales.

The Welsh Assembly says: "After the consultation, the final guidance will be issued by the Welsh Ministers under section 88(1) of the Environment Act 1995. Local authorities will have to consider this guidance when carrying out their local air quality management duties under section 88(2) of the 1995 Act."

● http://new.wales.gov.uk/consultations/environment/localairmanagement/?lang=en

Yet more Teom turmoil

If you thought the Teom FDMS had solved long running concerns over particle measurement, think again, suggests Jack Pease

If you know what a Teom is and how it works you are doing well. But if you know the difference between Teom models this is bordering on nerdiness.

Sadly new developments now mean you may need to get on top of Teom FDMS nomenclature. Not all Teom FDMS's are the same, and not all are suitable.

This all comes after years of hand-wringing about the 'failure' of the Teom to properly monitor volatiles which are driven off by the Teom's heated intake head. EU-preferred gravimetric instruments may have a pointless habit of including moisture in its measurements, but EU law is EU law and measurement is supposed to be gravimetric or equivalent however rotten the standard.

With Teom's providing real time data, the UK relies predominantly on them for its particle measurement and it was keen to find a way of complying with common sense and Brussels red tape. So it set up UK intercomparison trials which established that the Teom FDMS was equivalent to the EU reference method (as indeed were other systems such as the BAM with a correction factor).

Many hoped that was that, and along with the clever KCL volatile correction method, the UK Teom-using community could now move ahead by buying Teom FDMS's and correcting their older Teom data using the volatile correction method.

But there is trouble brewing. The model of the Teom FDMS that was considered equivalent (the B version) is no longer made – its replacement (the C) does not appear to be performing very well and in any case has yet to be considered as 'equivalent'. Defra has got round that by ordering the newer Teom FDMS C's off Air Monitors which then fiddles with them to make them similar to the Bs. Its calls these CBs (*AQB November p1*).

Potential monitor buyers may think all that sounds quite absurd and decide to buy something else, for instance a Partisol. But Partisols have their own troubles with Defra having to junk two years of measurements because field blanks weren't being sent out to pick up moisture effects (*AQB July p1*). Monitor supplier Enviro Technology can be forgiven for wondering why people don't cut their losses and go for a Bam instead.

So what is going wrong with the Teom FDMS?

The well known feature of Teom's has been the loss of volatiles, so the Teom's original maker R&P developed the FDMS system. This reduces the temperature of the heated inlet (previously set at 50 deg C to drive off the water vapour which mucks up the measurements). Instead of the high temperature, water is now driven off with a dryer. The Teom FDMS B dryer was approved as a job lot in the recent intercomparison trials.

Thermo no longer sells the B, and the C includes a different dryer design so technically, the Teom FDMS C is not equivalent. Worse – there is a body of thought that the FDMS C dryer is causing inconsistent readings.

European particle measurement experts, meeting under the Joint Research Centre's Aquila grouping, have noted the problem and written to Thermo highlighting their concerns about inconsistent measurement.

Experts at Aquila declined to let us see a copy of the letter, however published minutes of a recent meeting state: "With reference to the results obtained from parallel measurements of the Teom FDMS version C and later versions with the PM reference method, it is recommended that the steering committee of Aquila draft a letter to Thermo Europe, indicating Aquila's severe dissatisfaction with the results obtained up to now, and requesting that the problem be dealt with as soon as possible."

To be fair to Thermo, the FDMS C version at the heart of the problem was developed by R&P before Thermo took it over, but Thermo is left with the problem that UK local authorities are being advised to buy an equivalent machine and the FDMS C is not equivalent.

To get round this, Air Monitors has stepped into the breech. Air Monitors is run by Teom-evangelist Jim Mills who found himself out of a limb when Thermo (who already had a UK sales operation) took over R&P.

Mills has been involved with Teom's so long that he has the expertise to buy bog standard Teom FDMS C's off Thermo, commission a dryer that is near-identical to the Teom FDMS B drier and put them together to produce an equivalent machine (dubbed the CB). Thermo's UK operation has clearly tacitly endorsed this approach as its customers can now get Teom FDMS CB versions using driers sourced through Air Monitors.

Confused? Well local authorities clearly are. Neath Port Talbot is a good example – it needs six Teom FDMS's, the four C versions it ordered recently are now hurriedly being converted to CBs.

Other local authorities that have just bought or are buying Teom FDMS's may well have a closer look as to exactly what they are getting to avoid getting caught out.

The monitoring helpdesk says: "This is something which we have been making clear on the helpdesk for a while now. The FDMS Type C has not been shown to be equivalent for PM_{10}, and local authorities should ask for reference method equivalent equipment where possible when they are considering purchases.

Suppliers can 'upgrade' the drier to a CB if required. The drier needs replacing after about a year anyway as it wears out, so by natural wastage the Type Cs should eventually be replaced during routine servicing."

Jim Mills of Air Monitors told *AQB*: "We offer the CB dryer upgrade as a service either at our workshop or in the field. It's about one or two hours work for one of our engineers to change and test.

"The Teom FDMS B based dryer and our dryer are actually almost identical. The dryer bundle is the same as we have it made exclusively for us by Permapure, the manufacturer of the original B type drier that R&P used to use. The only difference is that we have changed outer casing to make it less costly and easier to fit into the old B or the new C type FDMS systems. It also has fewer joints so leaks are less of an issue. However the actual dryer part is the same as the B which is deemed equivalent.

"We have a lot of data to prove that the B and the CB give the same results and that the CB and the reference samplers also agree for both PM_{10} and $PM_{2.5}$. As the driers are so similar in design there is no need to perform a full equivalence test, but rather to use the 'variation on a theme method' which is accepted in many EU certification schemes such as MCERTS and TUV. This allows one to accept relatively minor changes to a design as long as you can show that the changes do not substantially affect the performance of the system. This data should be out in the new year."

Biomass bluster

A freedom of information request has revealed the intense pressure put on Scottish Government, local authorities and consultant AEA to gloss over air quality problems with biomass.

Last month the Scottish Government released a report commissioned from AEA on air quality impacts of biomass (*AQB December p1*). This report painted a far more favourable picture of impacts than a previous one commissioned by London Councils.

There were allegations that the Scottish Government and AEA had been pressurised by the biomass lobby to water down negative findings. It was certainly clear that AEA's executive summary did not fully reflect findings within the body of the report, this was because the study had been set up with a steering group. Once AEA produced the draft, some of the conclusions appeared to frighten the forestry interests which wanted things changed. *AQB* was keen to see just who was doing the arm-twisting, and submitted the freedom of information request to find out who said what to whom.

A lot of pressure was brought to bear on the Scottish Government project steering coordinator (Geeta Puri) by the Scottish Government Renewables Policy Unit. They described the report as giving a 'mixed message' and 'dangerous': This led to the conclusion: "There is a danger that the unqualified messages in the body of the report could be misused to apply to the development of biomass across the board – and this could harm the sector in its infancy" It then adds: "As it stands, the recommendation could damage the growth of the pellet market in Scotland which the Scottish Government is directly supporting."

They then tell AEA what the report should conclude: "The main tenor we should be aiming for in the AEA report is: 'Biomass has a minor impact on air quality; this can however be an issue for some urban local authorities which are near their air quality limits; therefore there are recommendations on abatement measures'."

The Scottish Renewables Forum also demanded that the tone of the executive summary be more positive and "give the green light to other local authorities more categorically".

The Forestry Commission and Forestry Research wanted the high boiler emissions result (355 g/GJ) to be dismissed as it was too high.

Dundee City Council expressed concern that forestry interests on the steering group were subsequently trying to distance themselves from the group. The council declined to elaborate when we compiled our report in December *AQB*, however Dundee's fears are contained within the freedom of information papers: "It is very concerning that the promotion of biomass combustion has been advanced so far without any obvious consideration of the impact on air quality and public health.

"It appears that policy makers assume that SEPA and local authorities can adequately control and mitigate any potential air quality and health concerns through PPC, Clean Air Act and the planning regime. This is a false assumption and the inadequacies of the CAA are highly relevant to this study especially with relation to chimney height determinations and the ability to require abatement options. Comments relating to the CAA's shortcomings should not be deleted from the conclusions and recommendations.

"In addition planning policies which promote the use of renewable (chiefly biomass) and focus solely on CO_2 targets without adequately addressing air quality pollutants and other climate active pollutants create a 'playing field' where public health and air quality concerns are side-lined. There appears to be little appreciation by policy makers in Scottish Government of the difficulties faced by local authorities in endeavouring to maintain (never mind improve) air quality and protect public health."

Editor's comment: *This Freedom of Information request has unveiled some of the background pressures that local and national government air quality specialists are under. Faced with intense pressure from the biomass lobbyists internally and externally, Scottish Government has done well to get the report published at all.*

Spare a thought for the report's author, AEA. It has a professional reputation to protect and will no doubt cringe at forestry interests describing parts of the report as 'unqualified' and 'opinion'. The final exchange (see right) shows quite how pedantic with wording the forestry interests were prepared to be with wording to ensure there was a positive spin.

WHO SAID WHAT: EXTRACTS FROM EMAILS

This is a sample of comments during finalisation of the Scottish Government biomass report (obtained under Freedom of Information legislation). They give a flavour of the heated debate that took place behind closed doors during the creation of the report:

From Rebecca Carr, Forestry Commission Scotland
To: Geeta Puri, Scottish Government biomass and pollution report project coordinator
"Overall, there needs to be a great deal more context, qualification and evidence based statement, rather than opinion in the report.

"Unless it is made clear that Forestry Commission Scotland was not involved at 'all stages' and that many of the 'key decisions' were taken independently by AEA or in discussions with selected people and not the steering group as a whole, we would be unable to agree to the inclusion of Forestry Commission Scotland in this report."

From: Geeta Puri
To: Rebecca Carr, Forestry Commission Scotland
"I have tried very hard throughout this project to involve the steering group at all stages and also held an additional meeting to specifically discuss the modelling aspects before the contractor undertook this part of the work. On several occasions I invited you to speak directly with the contractor on the range of boilers to be included in the study and extended the cost and timescale of the project in response to concerns from the steering group on the number and range of boilers to be tested."

From Sue Kearns, Scottish Government Renewables Policy
To: Geeta Puri
"I am very surprised that you are happy to let Forestry Commission Scotland disappear from the attributed membership of the steering group so lightly."

From: Geeta Puri
To: Sue Kearns
"It was not a decision taken lightly, I can assure you, but given the comments I have received from Forestry Commission Scotland and the effort taken to discuss the range and type of boilers to be included in this study with them I am left with little choice."

From: Dr James Pendlebury, chief executive, Forest Research
To: Geeta Puri
"As you know, I have been and continue to be seriously concerned about how this report is being presented and the quality of the science and hence evidence it is purported to contain. I have raised these concerns and others relating to its policy coherence with my senior staff colleagues in Forestry Commission Scotland and they will be pursuing these matters.

From: Ken Stevenson, AEA report author
To: Geeta Puri
"How we refer to the $PM_{2.5}$ exposure reduction target is clearly a difficult point to agree on in the report. Our preference is to stick to "will hinder the achievement..."

He then noted that he was being asked to consider alternative wordings, namely:

- "Combined impact as modelled in this study does have a negative impact";
- "Is likely to be a secondary factor in hindering achievement of this target";
- "Could increase the difficulty in achieving";
- "Is likely to hinder the achievement of this objective to an extent".

NO_2 fails to fall

NOx emissions may be falling, but NO_2 concentrations at the roadside are not

Nitrogen dioxide concentrations are at the heart of a number of high level policy issues at the moment.

NO_2 exceedences near Heathrow are perhaps the single biggest impediment to a go ahead for airport expansion. European directives – and indeed a Government pledge in the 2002 aviation white paper – will make it hard for expansion to go ahead if there are exceedences. At the time of the White Paper pledge, NO_2 concentrations were going down nicely and the pledge probably seemed a good idea. But since then, improvements have not been maintained, and in some areas, especially at the roadside, concentrations have gone up.

This trend is not proving particularly helpful for the Government's obligations towards Europe. The UK (along with most other member states) is unlikely to meet 2010 NO_2 objectives and can apply for a derogation – provided it explain how it will meet the objective at the end of the derogation.

This explanation has to be credible, so the weak pledges of the 2007 air quality strategy are unlikely to suffice.

Despite the two years worth of exhaustive policy input that was used to justify that strategy, it came up with just three policy options – relying on others to legislate on shipping, relying on others to legislate on vehicle emissions and offering incentives for cleaner vehicles (a policy which had already been abandoned before the strategy emerged). Over the next year, Defra will have to go back to the drawing board to think of other options that might make a real difference to air quality to satisfy Brussels.

How widespread is the trend for increasing roadside NO_2? Local authorities around the country have found over the past year or two that congested canyon streets where they might have expected to see NO_2 improvements have not materialised. This has resulted in a spate of declarations of town centre-type roads.

The apparent contradiction between falling NO_x emissions and static or rising NO_2 concentrations is due to a number of factors including the increased primary NO_2 emissions of modern diesel engines, and the general trend for modern vehicles not to be quite as clean as the Euro-standard engine improvements might suggest.

David Carslaw of Leeds University has been explaining this point for a number of years, most recently at the Dispersion Modellers User Group meeting held in last month in London. A graph of rising primary NO_2 (dubbed fNO_2) has been rising in recent years but that rise appears to have stalled after years of sustained growth. The hope is that finally, having cracked the particle problem with traps, engine makers may have started to focus on nitrogen dioxide.

Likewise the rise in roadside NO_2 has stalled in the last couple of years. But whether this is due to real improvements in emissions or exceptionally wet summers and mild winters that have prevented pollution build up is not known.

Analysis of data by Carslaw at Heathrow will not reassure – his analysis of primary NO_2 near the airport shows worsening of primary NO_2 in 2008. Here, while NO_x emissions from road vehicles have decreased by a factor of two since the early 1990s, there has been no decrease in airport/aircraft derived NO_x – indeed emissions appeared to rise sharply in recent years. "Overall, there is no evidence of a change in NO_2 since the early 1990s." Bear in mind that the Government expects to use improvements in NO_2 concentrations from the road sector to allow expansion of the airport itself.

Recent academic papers have underlined these concerns.

Greek researchers used pan-European emissions models to see whether traffic pollution is likely to improve. They found that improvements were by no means assured (*AQB November p11*).

Modelling was used to estimate the exhaust emissions of NO_x, NO_2 and $PM_{2.5}$. Non-exhaust (tyre and break wear) $PM_{2.5}$ and PM_{10} were also calculated. Emissions were projected following current legislation measures and a scenario representing maximum feasible technical reductions (MFR).

Projections to 2020 showed that current legislation will bring 89, 25 and 50% reductions in NO_x from petrol cars, diesel cars and heavy goods vehicles, respectively, over 2000 levels, when comparing average emissions on a per vehicle-km basis. The corresponding reductions in the maximum feasible reductions scenario were 91, 53 and 67%, respectively.

Researchers say: "Despite these significant reductions, NO_2 emissions do not seem to be effectively controlled for diesel cars due to the increased NO_2/NO_x ratio of new and expected after treatment systems. The increasing share of non-exhaust sources to the total particle emissions may hamper the effectiveness of exhaust control measures in meeting future urban air-quality standards."

It adds: "The European Commission is projecting transport growth by 40% for passenger cars and 67% for freight between 2005 and 2030. Hence, the effective control of vehicle emissions is a prerequisite for sustainable development."

With increasing dieselisation of the car fleet, emissions from these vehicles are disproportionally important – and yet, note the authors "The real-world NO_x emission levels of diesel cars appear much higher than what the emission standards would call for." Even Euro 4 diesel passenger cars may emit as much as two times higher NO_x in real-world rather than type-approval conditions. This is an outcome of the different engine tuning depending on operation mode and becomes an issue that seems to significantly compromise the effectiveness of emission standards.

In another paper looking towards the future, Austrian researchers led by Martin Rexeis reflect a similar theme. They put actual vehicle emission measurements into its Network Emission Model and looked forward to 2020 and find that real world emissions are considerably higher than standards suggest they should be.

The NO_x emission levels of recent modern diesel vehicle generations observed in several real world driving conditions were observed to be clearly higher than demanded in the type approval procedure. Due to the growing number of modern diesel engine concepts equipped with coated catalytic exhaust aftertreatment, the fraction of NO_2 of the total tailpipe NO_x emissions is predicted to continue to increase in the next few years.

"Particularly for passenger cars and light commercial vehicles, the actual driving cycle in the European type approval (NEDC) doesn't appear appropriate for an effective regulation of real world emissions. As a consequence, also for future Euro-5 and Euro-6 vehicle generations, a significant divergence between type approval values and real world behaviour has to be expected."

It is now thought that the recent rises in primary NO_2 emission in new vehicles has been reversed. This year or next, concentrations should reveal whether that is really the case. If NO_2 does *not* fall, it will become even more difficult than ever to avoid tackling peoples' 'right' to drive as much as they like.

● *Road transport emission projections to 2020 in European urban environments*, Marina Kousoulidou et al, Atmospheric Environment Vol. 42 (2008) pp7465-7475.

Passing on the problem

Pollution may cause genetic damage – but what if it can be passed on to our children, asks Jack Pease

It is well known (well at least in environmental health circles) that air pollution causes respiratory health problems.

It is less certain that pollution causes heart problems – and the jury is definitely out on cancer. One emerging area of concern is the issue of impact on genes on the 'germline' – in other words, whether pollution will not just affect ourselves but also any children we have.

Comeap (the Committee on Medical Effects of Air Pollution) has recently carried out a review of health impacts of air pollution on children – no mention is made of this area. We asked Comeap chairman Jon Ayres whether this was an omission or whether heritable impacts had already been discounted. He told *Air Quality Bulletin* that as yet there was insufficient evidence to decide one way or another.

Now Comeap is a particularly cautious body and the trickle of studies that have come in on genetic impacts of air pollution will need to become a flood before it is likely to take much notice. Given the difficulties experienced by researchers in proving impacts of pollution on respiratory, circulatory and cancer endpoints, genetic researchers have the added problem that effects are likely to be even more difficult to uncover than for other symptoms.

It has taken epidemiological studies spanning decades for leading US researchers to really begin to pin down who is impacted by what type of pollution, and even then, we appear to be little closer to knowing what component – and what metric is to blame. Is it particles, if so what metric? Is it gases like NO_2 Or metals? Or a mixture of these?

Time is not on the side of the researchers. In developed areas such as North America and Europe, pollution is – give or take the odd blackspot – now well below levels set by the World Health Organisation as being unlikely to cause problems. Long term studies, for instance, may be picking up signals from previously heavily polluted industries that have since been cleaned up.

A good example of this is UK incinerators – in the 1960s incinerators operated with little or no abatement, and unsurprisingly clusters of health impacts such as birth defects and cancers formed and are frequently cited by incinerator objectors. But modern incinerators (if operated properly) emit insignificant quantities of pollutant from the main stack and it is almost inconceivable that any signal could be detected around a modern facility.

Added to the problem for researchers is the type of health impact. For acute respiratory problems it is relatively easy to pick up signals – ozone, particles and NO_2 episodes can cause impacts within hours, it can be as simple as counting excess respiratory admissions to hospitals or visits to GPs. Likewise, acute impacts on the heart can obviously be counted in terms of deaths, heart attacks or the setting off of implantable defibulators.

Longer terms health impacts such as cancer can be a nightmare to pick up, even with massive long running cohort studies such as the American Cancer Study. Air pollution insults taking place today could take decades to manifest themselves – and in any case at such low concentrations, any results are highly susceptible to confounding.

For instance there are currently many studies reporting health impacts based on distance to busy roads. It is very hard indeed to tease out issues such as poverty – rich people with good diets and health tend *not* to live near busy roads which are one of the few remaining significant pollution sources in Western Europe.

All this is to say that genetic researchers are going to have their work cut out trying to convince the likes of Comeap of any significant effect, but that is not stopping them trying.

Given the difficulty in proving long term health effects in humans, mice are always a good starting point. But in the end proving that mice do or don't suffer from a particular pollutant does not prove either way whether a human will. But mice can still give very strong suggestions that there may be impacts.

A comprehensive review of the effect of pollution on genes and DNA published this month (reference below) summarises the evidence to date.

It says: "Genotoxic air pollution is ubiquitous in urban and industrial areas. A variety of studies have linked human exposure to air pollution with a number of different somatic (non genetic) cell endpoints including cancer. However the potential for inducing mutations in the human germline remains unclear."

It continues: "Nevertheless several recent studies have linked air pollution to DNA damage in human sperm indicating that our germ cells are not impervious to the genotoxic effects of air pollution." They list research areas that require 'immediate' consideration.

One researcher that has tracked the story for some time is Carole Yauk. She released a paper in 1996 showing that herring gulls living near a highly polluted Canadian steel mill had an excess of germline mutations. She repeated the study in 2000 and included urban sites away from industry – and even here detected a 40% increase in markers of genetic damage. But in the end, with these studies, there was no way of knowing whether the gulls picked up their genetic damage through respiratory exposure or from what they ate or drank.

More recently another Canadian researcher, Chris Somers, studied genetic mutations in lab mice exposed to ambient air from a polluted industrial area (and a control group in a rural area was set up).

Total suspended particulate levels had a daily range of 23.6-240 $\mu g/m^3$ – PAHs, a likely suspect, ranged from 2.7-27.9 ng/m^3, about ten times that typically found in the UK.

Mice from the exposed site had 50-100% more mutations in the chosen genetic markers than those from the rural area. This experiment was repeated in 2004 splitting the mice into two groups at each site and exposing them to ambient and filtered air. The filtered air made no difference to mutations in mice in the rural sample, but filtering the air halved the increase in mutation rate in the industrially-exposed sample, confirming that air was indeed the exposure pathway for the impacts.

The work was repeated once again in 2008 – yielding even stronger evidence of the effects of the industrial pollution (*AQB February 2008 p11*).

Taken together with recent evidence that exposure to tobacco smoke can cause heritable mutations in mice, researchers say that there is cause for concern.

Joint author of the review Cardiff genetics professor David Cooper, told *AQB*: "These initial animal studies raise the possibility that air pollution might also give rise to mutations in humans that could, at least in principle, be handed down the generations. There is therefore an urgent need for both genetic and epidemiological studies to address the question of whether human beings could be at risk".

● *Air pollution and mutations in the germline: are humans at risk?* Christopher M. Somers and David N. Cooper was published online last month in Mutation Research www.elsevier.com

SCIENCE SHORTS

PM & ozone effect

Combined exposure to ozone and particles can increase heart rate variability.

Five asthmatic adults were exposed for four hours to filtered air, carbon and ammonium nitrate particles, and particles and ozone. Electrocardiograms were obtained before and after exposure.

Heart rate variability increased with particle and ozone exposure compared to filtered air exposure, no such change was found with particle-only exposure.

Controlled exposure to combined particles and ozone decreases heart rate variability, Karron Power et al, *Journal of Occupational and Environmental Medicine*, Vol 50, No.11, November 2008.

PM affects arteries

French researchers have studied the impact of urban ultrafine particles and 'clean' particles to compare their effect.

Standard reference urban particle samples, and manufactured particles such as carbon black and titanium dioxide ultrafine particles were tested on cells in vitro and on animals with cells removed for later analysis.

Researchers said: "The study shows, for the first time, that urban particulate impairs … arteries, not only after in vitro exposure, but also after in vivo (in the body) intra-tracheal instillation. Manufactured particles did not exhibit this effect."

The researchers said that urban particles caused an oxidative stress-independent inflammatory response resulting in less NO-activation. "Such impairment of the NO pathway in pulmonary circulation may favour vasoconstriction, remodelling and thrombosis, arterial resistance and an impact on cardiac function."

Impairment of NO-dependent relaxation in intralobar pulmonary arteries: comparison of urban particulate matter and manufactured nanoparticles, Arnaud Courtois et al, *Environmental Health Perspectives*, Vol. 116, No10, October 2008 pp1294-1299.

RESPIRATORY EFFECTS

Black carbon affects women

Researchers in Boston USA have used a maternal smoking study to see whether black carbon disproportionately affects women.

272 women aged between 18 and 42 were studied and split into smokers (18%) and ethnicity (57% Hispanic). Black carbon levels were modelled using ambient and indoor monitoring data and levels were compared against lung function.

Mean black carbon levels were 0.62µg/m³, an interquartile rise in black carbon led to a 1.1% worsening of FEV lung flow function, a 0.6% worsening of FVC lung function and a 3% decrease in forced mid expiratory flow rate. Current smokers were not affected but former smokers were.

Researchers concluded: "Exposure to traffic related black carbon, a component of particulate matter, independently predicted decreased lung function in urban women."

Researchers noted a stronger impact in summer rather than winter when most could be expected to have their windows open.

"The evidence suggests that there is an association between black carbon, a marker of traffic pollution, and lung function among women. Lung function is important to the development of COPD (breathing difficulties) later in life.

"The public health implications are substantial because COPD is projected to be the fourth leading cause of death worldwide by 2020."

Association between traffic related black carbon exposure and lung function among urban women, Shakira Franco Suglia et al, *Environmental Health Perspectives* Vol. 116, No 10, pp1333-1337.

NITROGEN DIOXIDE

Long term NO_2 affects the heart

While it is fairly established that long term particle exposure can affect the heart – a team of international researchers say that long term nitrogen dioxide exposure can increase heart rate variability.

Heart rate variability is a sign that the heart is not working properly and can be fairly easily measured.

Researchers used the long running Sapaldia cohort (Swiss cohort study on Air Pollution and Lung Diseases in Adults) to study 24 hour cardiograms, blood pressure and other measures and compared outputs to modelled annual NO_2 exposure. Data was compiled for 1,408 subjects.

Researchers found that for women, but not for men, each 10µg/m³ increment in one-year averaged NO_2 level was associated with a decrement of 3-6% in heart variability measures. They explained: "This is the first study to describe effects of long term exposure to NO_2 on heart rate variability in a general population sample of middle age to elderly persons."

The difference between sexes may be because women spend more time at home at the address where the NO_2 was calculated. Researchers confirm they believe they have found a long term effect – no association was found between heart rate variability and short term NO_2 exposures, unlike in other studies. Gas cooking and indoor smoking has been controlled for, they add.

Differences in heart rate variability associated with long term exposure to NO_2, Denise Felber Dietrich et al, *Environmental Health Perspectives*, Vol. 116 No 10 2008 pp1357-1361.

TRAFFIC POLLUTION

Watch out for pneumonia

Instances of pneumonia could be caused by traffic pollution, a researcher claims.

Professor E Knox has long argued that roads and oil combustion have caused excess deaths, he has analysed death rates across all 352 English local authorities to compare death rates with pollution levels.

Death rates, emissions and social confounders were compared over the period 1996-2004.

He found: "Standardised mortality rates for one group of diseases (including upper alimentary and respiratory cancers, ischaemic heart disease, peptic ulcer, pneumonia) were related to a range of combustion emissions and to multiple social deprivation, cigarette smoking, binge drinking and a northern location.

"Additional standardisation of all death rates for these social hazards left a small subgroup independently related to atmospheric pollution, mainly from oil combustion. Correlations with pneumonia deaths were exceptional.

"High mortality rates were observed in areas with elevated ambient pollution levels. The strongest single effect was an increase in pneumonia deaths. Cases of pneumonia in high pollution zones and at high pollution periods should be suspected and if necessary treated as acute lung injury."

He also proposes better mapping of pneumonia deaths in order to identify the high risk zones.

Atmospheric pollutants and mortalities in English local authority areas, E G Knox, et al *Journal of Epidemiology and Community Health* 2008 Vol. 62: 377.

DUST

Coarse PM blamed in France

French researchers say that coarse particles continue to have a significant impact on respiratory health. Coarse fractions particularly affect children.

The focus on health effects in recent times has switched to the ultrafine fraction and there are some who believe that the coarse fraction ($PM_{10-2.5}$) is relatively benign. For instance the recent European directive on air quality will allow member states to subtract 'natural' particles (such as Saharan dust or sea salt) from reported concentrations.

The French researchers noted daily hospitalisation figures for respiratory, cardiovascular, cardiac and ischemic heart disease and compared to fine and coarse particle concentrations.

Researchers say: "We found positive associations between indicators of particulate pollution and hospitalisations for respiratory infection, with an risk ratio of 4.4% for $PM_{10-2.5}$ and 2.5% for $PM_{2.5}$.

"Concerning respiratory diseases, no association was observed with $PM_{2.5}$, whereas positive trends were found with $PM_{10-2.5}$, with a significant association for the 0–14-year-old age group (risk ratio 6.2%). Concerning cardiovascular diseases, positive associations were observed between $PM_{2.5}$ levels and each indicator, although some did not reach significance; trends with $PM_{10-2.5}$ were weaker and non-significant except for ischemic heart disease in the elderly (risk ratio 6.4%).

They added: "Both fine and coarse particle fractions seem to be able to elicit adverse health effects. Both fractions should be considered as relevant air quality indicators and the effects of the coarse fraction should not be overlooked. There is sufficient concern about the health of coarse particles to suggest that they should be taken into account in the various plans and actions aimed at reducing air pollution health effects."

Short-term associations between fine and coarse particles and hospital admissions for cardiorespiratory diseases in six French cities S Host et al, *Occupational and Environmental Medicine* 2008;65:pp544-551

METRICS

Particle effects compared in Denmark

Danish researchers have tried to pin down which particle metrics most affect the vulnerable in Copenhagen.

Particle number, mass, PM_{10}, $PM_{2.5}$ and gases were compared to hospital admissions due to cardiovascular and respiratory disease among children and the elderly.

Researchers say: "Particulate matter has been associated with short term morbidity and mortality, but there is limited evidence concerning ultrafine particles. This study found that particulate matter related cardiovascular and respiratory admissions in the elderly were not prompted by ultrafine particles but rather by the mass of larger fractions.

"For paediatric asthma admissions, results indicated the relevance of accumulation mode (this is a term used to describe aerosol particles in the size range 0.5–2µm in diameter) particles as well as ultrafine particles and traffic related nitrogen oxides (NO_X)."

Size distribution and total number concentration of ultrafine and accumulation mode particles and hospital admissions in children and the elderly in Copenhagen, Denmark, Z Andersen et al, *Occupational and Environmental Medicine*, 2008, Vol. 65 pp458-466.

HEART EFFECTS

Diesel found to cause clotting

Edinburgh researchers have found that diesel exhaust increases clotting and platelet activation which increases the risk of heart attacks.

In a double-blind randomised crossover study, 20 healthy volunteers were exposed to dilute diesel exhaust (350 µg/m³) and filtered air. Thrombus formation, coagulation, platelet activation, and inflammatory markers were measured at two and six hours following exposure.

Compared with filtered air, diesel exhaust inhalation increased thrombus formation under low- and high-shear conditions by 24% and 19% respectively. Diesel exhaust also increased platelet–neutrophil and platelet–monocyte aggregates by 52% and 30% respectively, at two hours following exposure compared with filtered air.

Researchers added: "This is the first study to demonstrate that inhalation of diesel exhaust, a common urban air pollutant, causes platelet activation and enhances thrombus formation in men.

"This provides a plausible mechanism linking exposure to particulate air pollution with acute cardiovascular events including myocardial infarction (heart attacks)."

Diesel exhaust inhalation increases thrombus formation in man, Andrew Lucking et al, *European Heart Journal* (2008) 29, 3043–3051.

SCIENCE SHORTS

Industrial miscount?

Studies of birth defects near industrial facilities may be confounded by differences in housing location.

Texas researchers found that manual industrial workers were far more likely to live near the industrial facility they work in, and then subsequently set up home there and have children.

Thus any studies that find – for instance – birth defect clusters near industrial facilities need to be careful that the findings take into account the fact that there may be a higher proportion of local residents working at the facility and receiving occupational exposures there.

Are maternal occupation and residential proximity of industrial sources of pollution related? Jean Brender et al, *Journal of Occupational and Environmental Medicine*, 2008, Vol. 50, pp834-839.

Exposure compared

Modelling and monitoring estimation of exposure has been compared by Canadians.

They studied the activity and personal exposure of 62 pregnant women and compared it with modelled and fixed site monitor readings.

The study found moderate agreement between short term personal measurements and estimates of ambient air pollution at home based on interpolation of ambient monitors and land use regression models."

From measures to models: an evaluation of air pollution exposure assessment for epidemiological studies of pregnant women, E Nethery et al, *Occupational and Environmental Medicine*, 2008, Vol. 65, pp579-586.

Bam blooper

In our report of research work in Japan last month (AQB December 2008) which compared results with gravimetric measurements, we have been asked to point out that there are different types of Bams.

The Japanese Bam tested was a DKK DUB-32 SPM and is different to the BAM1020 PM_{10} analyser sold in the UK by Enviro Technology.

HOT AIR

How ironic that a Teom (albeit with FDMS trickery) was used to identify problems with so-called equivalent Partisol particle monitors.

At the recent Iapsc meeting, Defra's air quality science expert Janet Dixon explained how problems with gravimetric method Partisols were finally nailed. It wasn't the increasingly heated warnings from emissions experts that cracked the problem, rather a co-located Teom FDMS that 'proved' the Partisol was over reading.

The irony here is that the reason Partisols are used is to 'correct' the Teoms! Now 'incorrect' Teoms will be used to correct the Partisols. Ha, European particle monitoring policy is a complete joke!

Local authorities who have been pushed into buying Partisols because Teoms were not equivalent may not find it so funny. At Iapsc, Duncan Laxen, part of the air helpdesk team advising local authorities on monitoring and such like, asked Defra what councils should do with the Partisol data. Defra replied: "Be careful with the data – and ask the helpdesk for advice."

Ehhhh?

We've often treated NO_x eating materials as a bit of a joke but we think Dundee have come up with an appropriate use for them.

Environmental artists Dalziel and Scullion have produced a full size sculpture of a car covered by a cloth – in concrete. The concrete is formed with a catalytic NO_x eating layer.

Catalyst, weighing in at 14 tonnes, is now plonked outside a Dundee car park in a bid to make statement on sustainability. The artists explain that the sculpture points the way how cities can deal with air quality problems.

Hmmm, we think the sculpture (pictured) is great but we suspect that it would take an eyewateringly large number of these 14 tonne concrete sculptures to make any serious dent on NO_x concentrations.


www.dalzielscullion.com

"Do turkeys vote for Christmas?" is the phrase that sums up the situation in Manchester with the congestion charge.

That the majority didn't vote to pay £5 a day to drive into the centre in rush hour isn't particularly surprising, but the level of opposition – 90% – is a big surprise given that roughly a third of people do not have access to a car.

For those of us in the business of persuading people to do something, however little, about the environment, this is a bit of a blow. It suggests that even when presented with a well reasoned scheme with both stick and carrot, people will not pay to improve the environment even if they are the eventual winners.

The result should make sobering reading for those of you that are charged with producing air quality plans that are based on appealing to people's better nature. Manchester surely shows us that any action plan based solely on winning over hearts and minds is not going anywhere.

AIR QUALITY EVENTS 2009

21st January
Action on Traffic Pollution
Epuk's south east and south west Divisions will be holding a joint meeting at Transport Research Laboratory in Crowthorne. Email carry.keay@environmental-protection.org.uk

13th February
Local Air Quality Management Training Day
Scottish Government-hosted even run by the University of the West of England and Air Quality Consultants. More details on website www.scottishairquality.co.uk

18th February
Local Environmental Quality in a Low Carbon Age
Epuk event to be held in London, speakers include environment minister Hilary Benn www.environmental-protection.org.uk tel Carry Keay 01273 878776

26th February
Indicators: where next?
UWE/Epuk south western division conference to be held in Bristol. Contact David Muir david_muir@bristol.gov.uk

24th-27th March
7th International Conference on Air Quality
Science and Application (Air Quality 2009) (formerly known as the Urban Air Quality Conference) to be held in Istanbul. For more information, visit the website www.airqualityconference.org

2nd-3rd April
Air Quality Spring Workshop
Epuk air quality spring workshop to be held in Highgate House, Northampton. www.environmental-protection.org.uk Carry Keay 01273 878776

20th-21st April
2009 Indoor and Outdoor Air Pollution Research
Meeting to be held at Cranfield, www.le.ac.uk/ieh

29th-30th April
MCERTS 2009
MCERTS conference, exhibition and workshops, air & emission

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