

DISASTER IMPACTS

Buncefield: no significant air quality impacts, claims report

A new Defra report says there were no significant air quality impacts resulting from the explosion last December at the Buncefield oil depot in Hertfordshire.

It says that favourable weather meant the plume rose high and did not ground in significant quantities either near the fire, or further downwind. However in the final paragraph of the report, it warns that had it been summer, the picture could have been "very different".

The fire raged for over four days in December, Defra's report, prepared by Netcen's, estimated that the smoke amounted to 6% of UK annual emissions. At the time of the explosion this was described as relatively harmless by the Health Protection Agency that

coordinated the public health aspects of the fire and its aftermath. The report downplays suggestions that the plume grounded in any significant way, stating that effects were not seen on Defra's automatic air quality monitoring network.

But King's College London ERG says that its monitoring for south east England local authorities suggests the plume did ground (see table, foot of page three).

During the incident many air quality professionals were called in. Netcen was involved through the national monitoring network and through local monitoring at St Albans. The Met Office was called in to do modelling with its NAME model and the Environment Agency Air Quality Modelling

Unit was called in to model local fallout, a contribution welcomed by the HPA as "splendid support in this difficult period".

Report author Jon Bower of Netcen told *AQB*: "The report started life as one of a series of 'ad hoc' reports on episodes and other events of air quality interest that we produce for Defra. As such, it was originally intended to provide a comprehensive review of what we could see from the automatic network and other networked data, together with the rapid response measurements that we made for Defra on-site during the incident.

"Given we were working so closely with the Met Office, it was later felt that the modelling

● continued on page 3

MODELLING

Defra-commissioned report shows that official modelling underestimates future concentrations

Defra's preferred means of predicting future nitrogen dioxide concentrations seriously underestimates exposures, according to a new modelling study.

Defra commissioned consultant Cerc to use its ADMS dispersion modelling programme to model pollutant concentrations both now and up to 2020. The ADMS model predicted three times the level of exposure to nitrogen dioxide than the Government-favoured Netcen methodology used to predict exposure.

The ADMS model was run based on 2001 meteorology. Results compared well with existing monitored levels, and results were produced for 2010 and 2020. For NO₂, concentrations were considerably higher than official

predictions used to inform Government policy.

This worsened when translated into areas of exceedence. ADMS calculated that in 2010 some 10% of London would be above NO₂ limits as compared to the official figure of 3%. In terms of population exposed above 40µg/m³, ADMS suggested 18%, and official estimates 4%.

The report suggests: "The comparison of the ADMS-Urban and national model calculations shows projected future concentrations calculated using the national model are consistently lower than those calculated using ADMS-Urban and this is reflected in the projected areas of exceedence in 2010 and 2020."

For particles, the results swing the other way – ADMS

presents a more favourable picture than the official national model, with far fewer exceedences and population exposed.

Ozone predictions show a worsening compared to now: "In 2001 annual average ozone concentrations range from 40µg/m³ in the outskirts of London to less than 20µg/m³ in central London. In future years, concentrations in London are predicted to increase. By 2020 concentrations are predicted to rise to more than 52µg/m³ in the outskirts of London and are at a minimum of approximately 20µg/m³ along major roads in central London."

● *Modelling of current and future concentrations of PM, NO_x and ozone London using ADMS-Urban (draft report)* can be viewed on the reports section of www.airquality.co.uk

IN BRIEF

No winter gas relief

The Environment Agency is warning that gas supplies will be tight next year and given the advance notice – emergency permit waivers are unlikely.

Last year the shortage of gas led to the Agency being instructed by the Government to treat favourably any applications from industry to burn dirty fuels rather than gas.

The Agency says: "Last winter we made fast track administrative arrangements to allow operators to switch to backup fuels. We issued 33 letters for last winter only. We set these exceptional administrative arrangements in place because some operators had not foreseen the difficulties and we wanted to help remove unnecessary barriers to saving gas.

"We do not plan to make such arrangements next winter." It says that if operators need additional fuel flexibility for future winters, they must apply using the normal arrangements.

● www.environment-agency.gov.uk/business/444217/444663/298441/1248174/?version=1&lang=_e

Glasgow road panned

Friends of the Earth Scotland welcomed the publication of a letter, signed by over 20 health experts and local GPs, calling for Britain's biggest motorway project – the Glasgow M74 motorway – to be scrapped.

The letter referred to evidence that those who would most benefit from the build are non-resident car owners while the risks and adverse effects would be most felt by residents. The road cuts through areas with poor air quality and health, claims the letter, and the road will make these considerably worse.

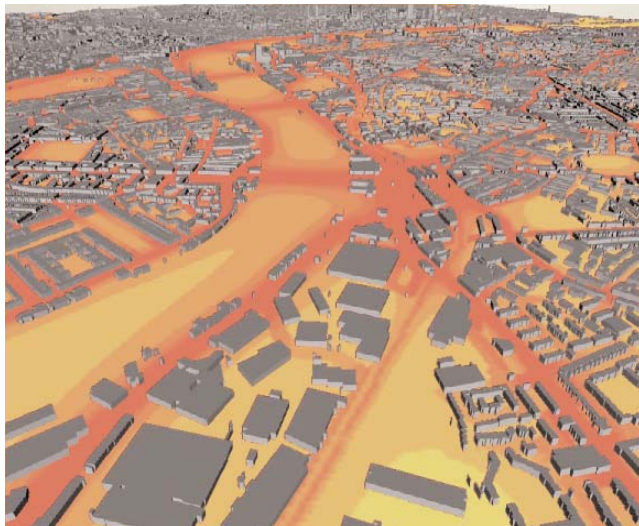
CONTENTS

AN EXCITING INTERACTIVE MAP OF AIR QUALITY IS LAUNCHED BY ERG

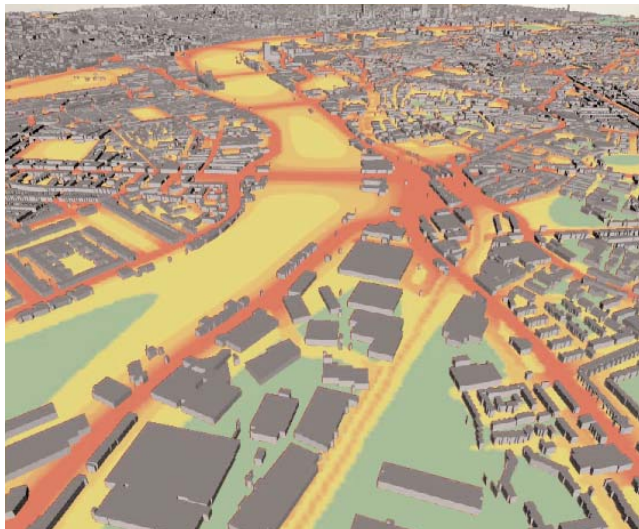
Zoom in and fly over London air quality



Maps are based on this remarkable 3-D representation.....



...onto which air quality can be superimposed, here is 2003 ...



... move the slider a bit more to get air quality in 2006 ...

London academics, with the support of the BOC Foundation, have produced a web-based interactive air quality map.

The eye-catching and user friendly website superimposes air quality levels on to 3-D imagery of London's streets and buildings. Air quality in previous years and future years (up to 2010) can be superimposed on the maps. ERG at King's College provided the air quality data, University College provided the 3-D mapping expertise.

There are other air quality maps that look good on the web – for instance Cerc's 'Yourair' sites showing current day and next day air quality forecasts on a street by street basis. But in what is described as the 'best in the world', it is thought that this is the first time air quality concentrations have been superimposed on a city in what looks like a 'fly above London' experience.

The site developers say: "For the first time, air pollution for a whole city has been related to the three dimensional built environment. The 3D effect brings the data alive for users who are now able to 'fly' above London and to see where pollution hot-spots occur.

"Transport planners can identify the most polluted parts of London. Urban planners can see how building density affects pollution concentrations in the City and other high density areas. The facilities can be used by students to understand pollution

sources and dispersion characteristics."

The maps were launched by ERG at a conference in London. "These are maps that can be used by people without an MSc in GIS," they promised.

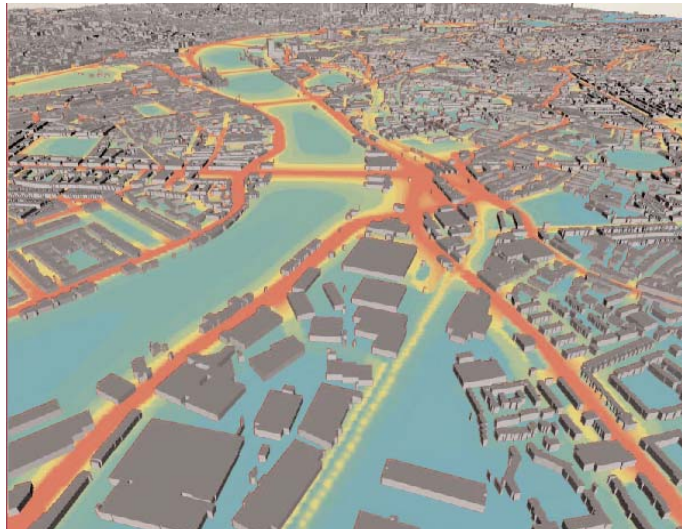
The maps do not yet cover ozone. Cerc's Iarla Kilbane, responsible for the 'rival' Yourair web based maps, pointed out that inclusion of ozone could provide



Bad air at Westminster

a graphic illustration of ozone pollution: "With the contra-intuitive nature of ozone chemistry, the maps might be very useful to show how ozone exposure might be worse in the middle of a park rather than in a busy street." Busy streets tend to have a lot of NO_x, which scavenges ozone so keeping levels down.

● For more information contact stephen.evans@ucl.ac.uk www.londonair.org.uk/london/asp



... and 2009. These maps show NO₂ – other pollutants are available

DOMESTIC EMISSIONS

Boilers could breach NO₂ limits

Gas heating boilers could breach objective limits, an AEA Technology report suggests.

Gas boilers are covered by the Chimney Height Memorandum which if followed should prevent potential exceedences of hourly and annual mean NO₂ objectives. But only just – and in some cases, there might be breaches.

For vents above roof level, there is not really an air quality issue. For vents below roof level, fan assisted boilers should

not cause problems for the hourly mean NO₂ objective (albeit by a tight margin) but might jeopardise the annual mean objective. Local authority technical guidance TG (03) should be used to calculate such examples in more detail. Condensing boilers leave an even smaller margin of error.

Where a series of smaller boilers are used in tandem, it is possible to have a large aggregate capacity but made up of small boilers that do not

come under Clean Air Act provisions for chimney heights.

Such arrays can lead to localised high concentrations of NO₂ on the face of buildings close to the discharge points, and exceedences of the annual mean, but only a ‘very small’ risk of exceeding the hourly NO₂ objective.

● *Review of the Clean Air Act provisions for dispersion from small gas boilers* can be viewed on the reports section of www.airquality.co.uk

VEHICLE EMISSIONS

London venue for roadside testing demo

Enviro Technology is holding a demonstration of its remote roadside vehicle testing equipment in London next week.

The firm has an Accuscan 4600 remote sensing device which will be used on vehicles passing by London Wall, City of London. Remote sensing technology has in the past been rather hit and miss but Enviro hopes the latest equipment is accurate enough to pre-screen gross polluters, perhaps for further enforcement (*AQB May p6*).

ET says: “This will be the first time that environmental

professionals from London borough councils will be able to actively see the device in action. The Accuscan 4600 can test up to 4,000 vehicles per hour and will be operational from 11am – 3pm on Tuesday 20th June.”

The device works by measuring tailpipe emissions as motor vehicles pass through ultraviolet and infrared beams stationed at either side of the road. It can measure NO_x, carbon monoxide, carbon dioxide, hydrocarbons and smoke as an indicator for diesel particulate. The system also records the speed and acceleration of the vehicle and

its number plate.

“Several major UK cities are interested in setting up low emissions zones and this kind of technology simplifies the screening of clean and grossly polluting vehicles without having to stop the vehicles to conduct the test – or having to involve third parties such as the police,” adds ET.

Representatives from ESP and Enviro Technology will be on hand during the day, as will the inventor of the remote sensing vehicle emissions monitoring systems – Dr Donald Stedman – who can explain the technology. ● www.et.co.uk

DISASTERS

Buncefield: did the plume ground?

● continued from page 1

provided a key part of the overall picture, not least in helping to explain the real-

world observations. In consequence, information on the operation of the Met Office’s Name model was

included. Later on, HPA also contributed material on their observations during the event (mainly in an Appendix), thereby making the whole report much more comprehensive and inclusive in terms of its coverage.”

Bower continued: “As the report was very much to do with what happened, we were not intending to cover ‘what might have been’ – that sort of scenario evaluation is still ongoing.” Defra confirmed that the report was only to analyse exposure assessment and not into who did what and why.

HPA has carried out public health monitoring near the blast, establishing that those under the plume were more worried than those not in its path.

● More details see feature, p8

BUNCEFIELD PLUME PEAKS

Maximum 15 minute PM₁₀ concentrations during the Buncefield incident thought by ERG to be due to plume grounding

Date	Time	Area	Site	Max 15min conc µg/m ³
11-Dec	16:15	Surrey/Sussex	Dorking	156
11-Dec	17:45	Surrey/Sussex	Horley	133
11-Dec	19:15	Surrey/Sussex	Lewes	217
11-Dec	22:45	Surrey/Sussex	Horsham	290
11-Dec	20:30	Hertfordshire	St Albans	133
11-Dec	18:30	North London	Haringey	102
11-Dec	18:45	North London	Haringey	122
11-Dec	19:15	North London	Islington	137
12-Dec	02:30	North London	Brent	130
14-Dec	03:00	North London	Barnet	98
14-Dec	07:30	Hertfordshire	Watford	114

IN BRIEF

Cross Channel schools on ozone watch

Ten schools across Sussex (and 10 in France) are examining the effects of ozone pollution on sensitive nicotiana plants.

During June and July children in Sussex will regularly measure and record any pollution damage to leaves. The project will give the children a hands-on opportunity to see the damage that ozone pollution, predicted to increase, can do. The work is coordinated by NSCA.

● Phil Gervat 01273 878785

Manchester College wins aero-funding

Manchester Metropolitan University is to lead a £5m international aviation project

MMU is leading Project Omega to assess known and newly-emerging environmental challenges that the air transport and aeronautical industries must overcome during the next 50 years. Air quality and noise are included in the project which includes eight other universities in the UK – Cambridge, Oxford, Reading, Southampton, Sheffield, Leeds, Cranfield and Loughborough, and six in North America and commercial organisations including Manchester Airport, British Airways, Rolls-Royce, Airbus and the Manchester Museum of Science and Industry.

● www.mmu.ac.uk/international/news/news_item.php?id=432

Emissions update

DfT is consulting on an update to the booklet, *In-service exhaust emission standards for road vehicles*.

The booklet details emissions limits for petrol cars equipped with advanced emissions control systems and light commercial vehicles during MoT and roadside testing.

● *Consultation with motor vehicle stakeholders annual update of emissions standards for MOT testing* can be viewed on www.dft.gov.uk/stellent/groups/dft_roads/documents/divisionhomepage/611654.hcsp

IN BRIEF

NSCA promotes biogas

NSCA is organising a conference on biogas on 11th July in Greenwich, east London. Biogas is produced from the anaerobic digestion of wet organic waste, such as cattle and pig slurries, food wastes and grown wet biomass.

Biogas can be upgraded and burned in vehicles designed to run on compressed natural gas. This promises environmental benefits all round. The NSCA conference presents the conclusions from a study commissioned by the NSCA in January 2006, and undertaken by the Guy Hitchcock of Sustainable Transport Solutions.

In addition, there will be talks from those who have had practical experience of producing biogas, and using it (and natural gas) as a vehicle fuel, both in the UK and Sweden.

● Contact Sally May, NSCA, 01273 878770

Review for biofuels

Three years following introduction of the biofuels directive, the European Commission is reviewing its progress.

The directive aims to promote the renewable fuels which have carbon dioxide and local pollution benefits. The directive required midterm consultation which may lead to amendments.

The Commission is asking:

- Is the objective of promoting biofuels still valid?
- The directive sets a reference value of 5.75% for the market share of biofuels in 2010. Will this share be achieved with existing policies and measures? If not, why not?
- Looking towards 2010, does the EU system of targets for biofuels need to be adapted? If so, how?
- Should a certification system be introduced to avoid using "poor performing" biofuels or give more support to "better performing" ones?
- http://europa.eu.int/energy/res/legislation/biofuels_en.htm

ENVIRONMENTAL REGULATION

Lobby to fight red tape cuts

Environmental interests have set up a lobby group to counteract pressure on the government to cut environmental regulation.

Cuts to 'red tape' are high on the agenda, and red tape is being interpreted to include not just unnecessary form filling, but environmental regulation. For instance many of the smaller LAPC part B regulated activities are expected to be taken out of regulation (see below).

The Aldersgate Group – a new grouping of industry and pressure groups, say: "The 'environment versus competitiveness' debate raging in Whitehall has become distorted and urgently needs refocusing to recognise that environmental protection is fundamentally in the public interest."

"It must avoid being misled by the efforts of the growing, and politically powerful, de-regulation lobby to undermine environmental protection, particularly in the three current major policy reviews" says chairman Adrian Wilkes.

The Aldersgate Group is made up of the Environmental Industries Commission, Environment Agency, SEPA, Institute for European Environmental Policy, Dinah Nichols (ex Defra), Green Alliance, New Economics Foundation, United Utilities, English Nature, SITA UK, BT, Lord Whitty (ex Defra Minister), Enviros, Atkins, James Brathwaite (SEEDA), IPPR and the RSPB.

Sir John Harman, chairman, Environment Agency said:

"This is a call to action for policy-makers, and a sane reminder that high environmental standards, far from being a luxury, are both a necessity and a spur for "wealth creation".

Sir Ken Collins, chairman, Scottish Environment Protection Agency added: "I support initiatives that help to reduce unnecessary burdens on industry. It is not about de-regulation, it is about re-regulation and enabling business to seize the opportunities that the environment presents.

It bases its claims on research carried out by the Institute for European Environmental Policy in a report *Green foundations: better regulation and a healthy environment for growth and jobs*.

ENVIRONMENTAL REGULATION

... as EIC objects to Part B dilution

The Environmental Industries Commission (EIC) has criticised plans to remove some Part B permitting activities from the local authority pollution control regime.

The Government is working up proposals to cut red tape from regulation under the Hampton Review. Smaller Part B activities are set to be taken out of regulation, and enforcement procedures revamped to make savings.

EIC says: "The LAPP regime is part of the landmark system to control industrial pollution established in the 1990 Environmental Protection Act after long debate. It controls air pollution from over 17,000 installations. Many of these are based in heavily populated areas

and they are predominantly in poorer areas that suffer disproportionately from poor local environmental quality.

"Elements of the current consultation are worryingly focused on de-regulatory proposals which can only result in further damage to public health from emissions. We would like to see these elements removed and more focus in the criterion on how measurable improvements in protection of public health can be achieved.

EIC comments include:

- To remove Part B processes which create particulate from Part B regulation would inevitably result in an increase in particulate matter, running completely counter to the direction required by the EU

and UK strategies to control air pollution;

- Many of the Part B processes under review also produce highly toxic emissions such as heavy metals and dioxins. It cannot be acceptable to remove from Part B regulation any process putting toxic emissions into the local environment;
- Reliance on the statutory nuisance regime puts the onus on the individual to prove a company has created a statutory nuisance rather than the company to control their emissions responsibly. It has proved extremely difficult in practice to use statutory nuisance to control pollution and using this approach would be a major step backwards.
- www.eic-uk.co.uk

VEHICLE POLLUTION

Glasgow continues roadside testing

Glasgow is continuing its campaign of roadside emissions testing in 2006/07 with the help of a £260,000 grant from the Scottish Executive.

Roadside testing has all but ceased in England since the withdrawal of DfT money to

fund the activities. Glasgow continues the testing – and fining of vehicles idling unnecessarily.

70 fines have been issued since the beginning of the year. The failure rate (among the 2,321 vehicles stopped) was

1.42%. Car and van failure rates were 1%, while taxis were 15%. 3% of diesels failed compared to 0.74% of petrol vehicles.

Glasgow City Council is currently consulting on extending its city centre air quality management area.

DISPERSION MODELLING

New guidelines aimed to help dispersion modellers ...

New guidelines have been agreed to help dispersion modelling of short term releases.

The updated guidance has been put together by the Atmospheric Dispersion Modelling Liaison Committee, replacing guidelines 11 years old. The revision reflects the ADMLC's view that some applications of atmospheric dispersion models are "inadequate", and that this may reflect a lack of appropriate guidance/training in modelling.

ADMLC says the Royal Meteorological Society (RMetS) guidelines produced in 1995 set down general principles of good practice for the design, execution and communication of modelling studies, focussing on broad principles which apply across a wide range of environmental modelling situations.

"They did not try to give

situation-specific technical advice, e.g. how to model a dense gas spill, or which plume rise formula to use. Instead, they tried to identify and expound certain principles of good practice which apply to many modelling situations."

It follows the same structure as the original RMetS guidance including topics on:

- The scope of the assessment;
- The importance of a site visit;
- Choice of modelling procedure;
- Modelling procedures;
- Input data;
- Sensitivity, uncertainty and variability;
- Uncertainty, verification and validation.

On the issue of comparison with other models, the guidance accepts there is scope to use more than one proprietary model: "The majority of the input data are similar and in the same format, and the model run

times are in the order of hours. Although this adds to the time and effort required, comparison with a second model might demonstrate robustness of the results – or if there is a large difference, flag up potential problems.

The guidelines were prepared by Matthew Ireland of Mott MacDonald, Arthur Jones of the Health Protection Agency radiological protection division (now retired), Richard Griffiths of the University of Manchester, Betty Ng of the Environment Agency Air Quality Modelling Unit) and Noel Nelson of Met Office/Defra.

● *Guidelines for the preparation of dispersion modelling assessments for compliance with regulatory requirements – an update to the 1995 Royal Meteorological Society guidance* can be viewed on http://admlc.org.uk/model_guidelines/index.htm

PLANNING

...as planning guidance nears completion

NSCA is in the closing stages of updating its planning and development control guidance.

This guidance is intended for use by local authorities and consultants and focuses on the planning system, how planning applications should be processed and provides advice on dealing with some complex planning situations.

The original NSCA guidance introduced a flowchart system for assessing the importance of air quality in the decision making process. By answering a series of yes/no questions, a ranking is produced ranging from overriding to low priority. This is retained in the current draft but also proposed is a system for assessing the significance of an air quality change for use in environmental assessment. The significance is assessed based on the current air quality (i.e. whether the existing air quality is above or below objectives).

Meanwhile Association of London Government is also updating its guidance on air

quality and planning. These are aimed at local authorities and developers in the London area (although the previous guidance was widely cited by other local authorities outside of London).

The guidance includes details on when an assessment is required, how the assessment should be carried out, choice of method, model validation and significance. They also propose a flowchart but also proposals for determining whether residential use would be acceptable depending on the air quality in the area (this will be very controversial as at present

the draft says to refuse if you're 5% above the objectives – that will block a lot in London).

GLA also has its guidance, which was issued this year, and appears to supersede previous APPLE guidance on construction site impacts.

This provides details of good practice methods for dust control and uses a scoring system based on the nature of the surrounding environment, the type of development and the proposed construction activities.

Particular mitigation is proposed for high and medium risk sites.

IN BRIEF

Defra tinkers with IPPC regs

Defra is consulting on sundry technical changes to integrated pollution prevention and control (IPPC) regulations.

These include:

- Implementation of petrol vapour recovery "Stage 2" controls which increase fines as flagged up in Section 105 of the Clean Neighbourhoods and Environment Act;
- To waive the need to apply for a permit for coin operated dry cleaning machines that will become obsolete from October 2007 under the Solvents Emissions Directive;
- Minor technical amendment to regulations concerning burning of landfill gas containing halogens (clarifying that the process is not deemed to be waste incineration).
- Further details on www.defra.gov.uk/corporate/consult/ppc-amendregs-2006/index.htm

Heathrow move

The Town and Country Planning Association says that Heathrow should move to an artificial island to free land, and reduce air and noise pollution in West London.

The vacated land could provide space for more than 30,000 homes, according to the *Heathrow: a retirement plan* report.

● website www.tcpa.org.uk

AQ v CC

The European Environment Agency has produced a briefing on air quality and climate change policy interactions.

It says that action to combat climate change will deliver considerable ancillary benefits in air pollution abatement by 2030. Many concepts mirror the thoughts of the UK Air Quality Expert Group which recently produced a report on air quality and climate change synergies.

● *Air quality and ancillary benefits of climate change policies*, www.eea.europa.eu/main_html

Statistics snapshot: Defra spending plans

Air quality item:	2005-06 (£ millions)	2006-07 £ millions	2007-08 £ millions
Programme:	5.35	5.35	5.35
Monitoring network	4.80	4.80	4.80
NAEI	0.30	0.30	0.30
General support	0.25	0.25	0.25
SCE	2.409	2.365	2.365

Source: Defra Departmental report 2006/07
www.defra.gov.uk/corporate/deprep/default.htm

IN BRIEF

Grimm push

Environmental monitoring firm Quantitech has increased its stock of Grimm particle monitors available for loan.

Quantitech offers both portable and fixed instruments that can measure particles from 30 micrometers down to 1 nanometer, including PM₁₀, PM_{2.5} and PM₁. Quantitech has now invested in extra service support and new demonstration units that prospective customers can evaluate free of charge.

● Chris Tyrrell
01908 22 77 22 or by email
ct@quantitech.co.uk

Green red buses

39 British-built Alexander Dennis double-decker buses are being delivered to London General bus company creating the first UK fleet that meets higher Euro 4 standards of emissions.

The new buses are almost twenty per cent more fuel efficient than their fore-runners, generating eighteen per cent fewer carbon dioxide emissions and reducing NO_x pollutants by more than 46%.

Mayor Ken Livingstone said: "These new London buses are the first in the UK that meet even tougher pollution targets. They will help to cut transport emissions and so contribute to tackling climate change whilst improving the Capital's air quality."

Emissions derogation

DfT is consulting on regulations intended to pave the way for new, cleaner commercial vehicles.

The consultation centres on new standards due to come into force this autumn and covers issues such as the customary derogation period that manufacturers are allowed to get rid of old stock that doesn't conform to regulations.

● Consultation on a proposal to amend the Road Vehicles (Construction and Use) Regulations 1986 to introduce revised emission requirements www.dft.gov.uk

POLLUTION EPISODES

Russian fires and Danish pollen affect UK air quality

Defra had to rush out an air quality alert due to seasonal agricultural fires across Russia which were thought to be responsible for an increase in the levels of particles (PM₁₀) which have been recorded at sites in Scotland and the North of England early in May. May usually sees ozone alerts.

Easterly air mass flows brought the particles to the UK amid reports of unusual dust deposits on cars – the Met

Office received calls about a mysterious yellow dust appearing on cars and windows across various parts of the UK, especially along the east coast.

The Met Office offered further analysis: "It would appear that the smoke from Russia has a part to play, but Sunday 7 May 2006 was a dreadful day for people in Denmark allergic to birch pollen. Record high counts were recorded at both of the country's

reporting stations, beating the existing high count recorded in 1993.

"The explosion of birch pollen in Denmark this year has been caused by near-perfect weather conditions over the last few weeks. A late start to the pollen season, a wet April, followed by a warm, sunny early May have combined to see birch catkins releasing an enormous amount of pollen grain."

RESEARCH

Genetic defects linked to poor air quality

New York researchers say that poor air quality can cause genetic abnormalities.

While huge numbers of studies confirm direct impacts on health of poor air quality, very few have suggested that parental exposure can be passed on through genes to their children. Suggesting that air pollution can affect DNA in this way is controversial.

The study of newborns in New York City reveals that prenatal exposure to combustion-related urban air pollutants alters the structure of chromosomes (the carriers of genes) of babies in the womb. Researchers say: "This is the first study to show that environmental exposure during pregnancy to such pollutants can cause a modest but significant increase in chromosomal abnormalities in fetal tissues. Such genetic

alterations have been linked in other studies to increased risk of cancer in children and adults."

The research involved a sample of 60 newborns and their non-smoking mothers in low-income neighbourhoods of New York City (Harlem, Washington Heights and the South Bronx). The mothers' exposure during pregnancy to varying levels of airborne combustion-derived PAHs (which can cross into the placenta) was measured by personal air monitoring of the mothers during pregnancy.

"We have previously learned that air pollutants significantly reduce fetal growth, which may affect cognitive development during childhood, but this is the first evidence that they can alter chromosomes in utero," said Frederica Perera, director of the Columbia centre and principal author of the study. "This is

troubling since this type of genetic alteration has been linked in other studies to increased risk of cancer. While we can't estimate the precise increase in cancer risk, these findings underscore the need for policymakers at the federal, state and local levels to take appropriate steps to protect children from these avoidable exposures."

The study, released last year, is part of a broader, multiyear research project *The Mothers & Children Study in New York City* begun in 1998, which examines the health effects of exposure of pregnant women and babies to air pollutants from vehicle exhaust, the commercial burning of fuels, and tobacco smoking, as well as from residential use of pesticides and allergens.

● More details: www.columbia.edu/cu/news/05/02/pollution_pregnancy.html

INDUSTRY REGULATION

Air quality blamed for end to brickmaking

Air quality permit requirements are being blamed for closure of a brickworks in Bedfordshire.

Hanson Building Products has told the Environment Agency that it will stop brick making at its Stewartby works at the end of 2008 unless it meets tougher air quality permit conditions.

London bricks are manufactured in a unique

process whereby carbon contained within the clay allows kilns to be self-firing – but emitting sulphur dioxide as a byproduct. Hanson is using management and technological tweaks to try and remove short term SO₂ peaks that affect nearby houses, but if these don't work, then the works will close.

The PPC permit for Stewartby, and a second

brickworks at Whittlesey, included a requirement to comply with the UK 15minute SO₂ objective.

This is not contained in mandatory European objectives – and the firm had hoped that it wouldn't be required to comply. It has taken its case to appeal, which is currently 'in obeyance' subject to continued negotiations.

VEHICLE EMISSIONS

Rise in vehicle weight threatens pollution and global warming

A leading air quality expert has warned that the trend for increasing vehicle weight is likely to affect ground level pollution as well as carbon dioxide emissions.

Vehicle weight has been rising over the years due to pollution, safety and luxury equipment. The fuel consumption penalty associated with this weight gain has been masked by continuing improvements in engine efficiency (and complicated by performance improvements).

Leeds University's David Carslaw made the claim in a recent *Atmospheric Environment* journal – Carslaw's views have extra weight as he is a leading member of the Air Quality Expert Group (Aqeg). He has led the snap Aqeg probe into

direct NO₂ emissions from vehicles which threaten air quality improvements across the UK (*AQB May p1*).

Carslaw says: "A 10% decrease in vehicle weight leads to a 5-7% decrease in fuel consumption. But in Europe, passenger car weights have increased by 30% in the last 30 years. The US EPA estimates that had the 2005 light duty vehicle fleet had the same distribution of performance and weight as in 1987, it could have achieved about 24% better fuel economy.

Carslaw says that along with high carbon dioxide emissions, so there are higher locally polluting emissions. Additionally non exhaust particle (eg tyre and brake dust) emissions tend to increase with

increasing vehicle weight. He cites research suggesting there is a linear relationship between vehicle weight and particle resuspension emission rates.

"As exhaust particle emission are increasingly controlled through new engine technologies and after treatment devices such as particle filters, more attention will be focused on the non exhaust fraction of emissions.

The benefits in reducing vehicle weight could therefore be much wider than reducing CO₂ emissions alone. Reductions in vehicle weight should be seen as a useful way in which to protect the urban and global environment at the same time.

● David Carslaw, Leeds University, email d.c.carslaw@its.leeds.ac.uk

CLEANER VEHICLES

More bad news for cleaner transport grant schemes as Government opts for education

NSCA expressed its disappointment at transport minister Stephen Ladyman's plans to scrap four clean transport grant programmes.

The long awaited schemes were intended to help drive the market for cleaner vehicles. In his statement, Ladyman argued that the money would be better spent elsewhere. He proposes shifting the emphasis to initiatives providing eco-driver

training and green consumer advice.

NSCA policy officer Rob Pilling said: "Manufacturers need strong signals to develop cleaner and more efficient vehicles. They also need confidence that these signals are for real. The Transportenergy programme has been beset with delays and uncertainty, to have the remaining schemes pulled at such a late stage is very

disappointing."

Pilling continued: "The proposals for eco-driving and consumer advice are exactly what is needed, but this should be as well as, not instead of the grant schemes. Claims that the schemes' benefits are insignificant are misleading. Its all about pushing innovation and encouraging early adoption. Get this right and the rest will follow. For example, few if anybody currently drives 'A-band cars', if the scheme encouraged just a few thousand onto our road, then that would be significant."

Two of the programmes were intended to increase fuel efficiency, two were to reduce air quality pollutants.

Pilling warned: "The alternatives proposed seem to focus much more on climate change. It is important that concerns over air quality do not get pushed out of the picture."

The announcement will further jeopardise demand for alternative fuel vehicles such as LPG and hybrid.

VEHICLE TECHNOLOGY

Hybrid savings prove elusive

A US energy research firm says hybrids use up more energy on a life cycle basis than conventional vehicles.

CNW Marketing Research says its two year study on the energy necessary to plan, build, sell, drive and dispose of a vehicle from initial concept to scrappage shows hybrids more expensive in terms of cost per lifetime mile.

Thus a huge-engined

Maybach vehicle costs \$11.58 per mile and a small Scion \$0.48 a mile. The Honda Accord Hybrid has an energy cost per mile of \$3.29 while the conventional Honda Accord is \$2.18. "Put simply, over the 'dust to dust' lifetime of the Accord Hybrid, it will require about 50% more energy than the non-hybrid version."

● CNW Marketing Research email Mailroom@cnwמר.com

IN BRIEF

Ricardo delivers diesel hybrid

Vehicle research firms Ricardo and Qinetiq have worked with Peugeot Citroen to create a diesel electric hybrid vehicle.

Hybrids such as the Toyota Prius tend to be based on petrol which leads to criticism that the end product is no more efficient than the best diesels. The new diesel hybrid incorporates the inherent efficiency of a diesel, plus the added efficiency of the hybrid electric booster system.

The hybrid Berlingo car successfully met the UK Department for Transport's Ultra Low Carbon Car Challenge. The two year Efficient-C programme has culminated in the delivery of a full-hybrid diesel demonstrator vehicle emitting just 99 g/km CO₂ (equivalent to 3.75 litres per 100km or over 75mpg) based on a fully featured Citroën Berlingo Multispace family car. The 5 door Euro IV compliant Efficient-C demonstrator is 30% more efficient than the standard diesel.

Manufacturers are now striving to bring costs down to make the demonstrator affordable.

Pigs on notice

Pig and poultry farmers are being targeted by the Environment Agency to remind them they will shortly be covered by Pollution Prevention Control (PPC) requirements.

The PPC Regulations have been brought in to control the impact that pig and poultry farms can have on the environment through various pollutants such as ammonia and nutrients.

Each farm will initially pay an application fee of £3,331. Once the permit is issued they will also have to pay an annual subsistence charge of £2,229 for small farms or £2,794 for large farms. This annual subsistence charge is then paid each year for as long the farmer holds the permit.

Buncefield: all's well that burns well

In a report produced by Netcen, The Met Office and Netcen pat themselves on the back for a job well done after the Buncefield fire.

The word 'lucky' doesn't appear in a report rushed out on the air quality industry's response to the enormous Buncefield fire last December.

Of course it was incredibly lucky that the explosion happened on a Sunday morning when there were few workers in office buildings razed to the ground by the blast. And it was lucky that atmospheric conditions allowed the enormous plume to punch through the inversion layer and (largely) stay there.

Only in the last paragraph of the last page of the 90 page report is this hinted at – otherwise the report is consumed with reassurance that there were no significant health effects. This is no great surprise given the near-perfect weather conditions for taking smoke away from the ground.

Indeed, for air quality professionals reading this report, it is stating the obvious that if the smoke went high and generally stayed high, there would be little significant exposure. Of more interest might be how the systems in place would have coped in turbulent conditions – or typical summer conditions. And here the report is strangely silent (apart from that one line mention in the final paragraphs).

Buncefield was a staggeringly large fire – the explosion could be heard hundreds of miles away. Said to be the largest in Europe since the war, the smoke could be seen wafting over most of the south east of England and could be easily seen by satellite. Petrol, diesel and kerosene tanks blew up at 6am on the winter Sunday morning near the town of Hemel Hempstead in Herts and burned for over four days.

At the time of the fire, the focus was on fighting the fire and protecting the health of local residents. They were quickly told to get in, stay in and tune in – the well accepted advice for dealing with incidents with high pollution. The firefighters' instinct to evacuate has to be balanced against the exposure that residents incur while leaving their home. Homes provide a surprisingly amount of protection if windows and doors are kept shut.

At major incidents, firefighters have at their disposal a simple tool – a sort of sawn-off ADMS dispersion model – that can be used by non-specialists to predict local air quality effects. This was used at Buncefield, but given the scale of the fire, the strategic 'gold' disaster command team also called on the Met Office to run its Name dispersion model.

Gold command is a grouping that consists of a myriad of agencies, and many of those agencies were seeking air quality advice. Netcen was involved as it runs the

automatic air quality monitoring network, Bureau Veritas (ex Stanger) was advising the Health and Safety Executive, the Environment Agency's air quality modelling unit was helping the Health Protection Agency (HPA), local authorities were being helped by Netcen and eventually contact was made with King's College ERG which runs the very detailed London and Home Counties network of monitors.

The report notes that during the fire, Netcen carried out targeted monitoring of particulate matter and VOCs both inside and outside of the oil depot. Measurements between 12th and 14th December included:

- Particulate matter using a Grimm particulate sampler;
- Grab sampling for VOCs; and
- Monitoring by the Fire Brigade's scientific advisors (Bureau Veritas).

Despite the amount of help mobilised, it appears that the plume moved at a faster rate than the ability of the modellers and disaster team's ability to deal with the information. There were no specific warnings to those in the wider south east region that a plume was coming and may ground. Only those near the fire were told to stay indoors, those further away, for instance, weren't warned against taking their Sunday afternoon stroll or going for a jog.

Generalised moderate air quality warnings were posted on the day following the incident, well after the plume had crossed London (and in places grounded).

The first email from air quality experts took over 30 hours to produce. Netcen said: "The national air quality monitoring network has not recorded any high levels of air pollution in Southern England following yesterday's fire at the Buncefield oil depot. A plume is heading towards Southampton and Weymouth with no risk of grounding. All the pollution from the plume is still trapped above the boundary layer."

These early categorical assurances that the plume would not ground remain at the heart of the issue. At the time of the incident, the HPA denied there was any possibility of grounding. On being confronted with evidence that there may be some grounding, it admitted that 'a few wisps of smoke' might have dropped, but it insisted the smoke was harmless.

Indeed had there only been Defra's automatic monitoring network, this might have appeared true. It was left to ERG's more detailed local authority run network to pick up the spikes (see box, right) – and even some of these are discounted.

The new report was released by Defra as part of the wider Buncefield investigation

which is fulfilling its pledge to get detailed information out to the public quickly. The report focuses on the work done at the time of the incident, and also analysis since the incident.

Netcen introduced the report: "Despite the unprecedented scale of the Buncefield explosion and fire, a wide range of air pollution monitoring undertaken before, during and after the event showed that ground-level concentrations of a range of pollutants remained low to moderate over local, regional and national scales. It appears that the high plume buoyancy and favourable meteorological conditions resulted in the plume being trapped aloft, with minimal mixing to the ground. As a result, there are unlikely to have been widespread air quality impacts at ground level due to the pollutants emitted from the Buncefield fires."

Emissions

Netcen has estimated that 8,000 tonnes of PM₁₀ particles may have been released during the fire; this is equivalent to approximately 6% of the total annual emissions of this pollutant in the UK (based on 2003 figures from the UK National Atmospheric Emissions Inventory).

The emission estimates indicate that PM₁₀, PM_{2.5} and B[a]P emissions represented the greatest relative proportion of corresponding national emissions. Estimated PM₁₀ and PM_{2.5} emissions were between 4 to 8.5% of total UK annual emissions, while B[a]P emissions were between 5 and 10%. The emissions for other pollutants like NO₂ and dioxins would be around 40 tonnes and 1.5 WHO_{TEQ} g, (0.003% and 0.6% of total UK annual emissions, respectively).

Monitoring

Hourly automatic air quality monitoring in the UK's national Automatic Urban and Rural Network (AURN) continued as usual and without interruption during the period of the incident. AURN measurements did not show any instance during the Buncefield incident with PM₁₀ levels of moderate or above that were attributable to the fire.

Netcen drew this conclusion based on hourly PM₁₀/NO₂ concentration ratios – these ratios provide a 'signature' for the source of the pollution, smoke from the plume would have a different signature than normal traffic fumes.

"None of the ratios appear to have changed during the time period; this suggests that these relatively small peaks were not linked to the Buncefield event. In conclusion, there was no evidence of plume

“Smoke from the fire was detected at monitoring sites in parts of east Surrey and Sussex”

ERG

“No evidence of plume grounding”

Netcen

grounding from AURN air quality measurements. Pollutant levels were all within normal ranges. Moreover, air origin maps from NAME modelling did not support the view that small localised peaks in AURN PM₁₀ levels had originated from the Buncefield oil depot.

This contrasts with ERG’s conclusion that peaks were the result of the plume. Netcen tries to downplay such suggestions, saying measured peaks at St Albans and Rickmansworth “are not particularly high”. On the more pronounced Surrey and Sussex peaks: “It should be emphasised that these levels are the highest measured across these networks during the incident. Nevertheless they were not particularly high in absolute terms, resulting in an air quality index of moderate for a very short time only. In fact, pollution levels were within normal ranges for the time of year and prevailing meteorology.”

The report continued: “Examining the measured PM₁₀/NO₂ ratios at the Horsham Roadside site, it appears that the peak in PM₁₀ concentrations on the 11th is not directly related to the traffic emissions and may therefore be of a different origin.

“Assuming that the data are not faulty, it would appear that the elevated peak is related to another source. This could, of course, include grounding of the plume from the Buncefield fires. This may also be the case for Lewes Roadside, but the evidence here is less clear.

“NAME back-map analyses carried out by the Met Office to determine the origin of the air contributing to Horsham’s 15-minute PM₁₀ peak demonstrate that the Buncefield oil depot plume could have contributed to the peak in PM₁₀ concentrations at Horsham Roadside.”

The apparent struggle to find explanations for the peaks other than Buncefield spills into analysis of peaks in North London. Increases – albeit modest – at sites such as Camden were discounted even though the timing was right (and even though ERG believed that Buncefield was to blame for these).

And the search for culprits other than Buncefield is repeated for measurements of hydrocarbons at a monitor in Marylebone Road.

The report notes elevated toluene, xylenes and trimethylbenzenes. “Benzene, all other VOCs, PM and inorganic data did not rise at this time, however. This is the only unusual measurement noted in the hydrocarbon network during the event.

“The elevated compounds are the same as those also observed in grab samples taken near the Buncefield depot, this may indicate

a relationship. However, there are a number of alternative and more local sources of such short-term changes in the VOC profile, such as fuel evaporation or paint fumes.”

It added: “Smoke from the Buncefield fire may have increased concentrations of PAHs and dioxins at the four South East England PAH network sites, this increase was no greater than the ongoing variability in PAH concentrations.”

Although the Buncefield fire was a regional event, the report compares it to national events such as Bonfire Night.

“It is clear that the Buncefield event was associated with PM₁₀ concentrations similar to those observed during Bonfire Night 2005. However, as the result of favourable meteorological factors, the 2005 event did not exhibit any significant increase in particle levels above background.”

Defra explained this comparison: “Although bonfire night is a national event, the effects are very often very local in nature, for example Leeds in 1995 and south London in 2002. Both Buncefield and Bonfire Night are examples of open uncontrolled burning. We felt it was important to put the possible risks from Buncefield into perspective.”

Netcen summarised: “Overall, we see a wide range of measurements that confirm that the Buncefield event did not appear to result in large ground-level air quality impacts over local, regional or national scales. Elevated pollution levels across a number of monitoring networks in Southern

England were within normal ranges measured throughout the year.

“Whilst it cannot be ruled out that the plume may have grounded in areas not currently covered by the monitoring networks, any resulting peaks were likely to have been localised and of a transient nature.”

“Why did such a major explosion and fires not result in greater air pollution impacts? Both the monitoring and modelling suggest that the high buoyancy of the plume resulted in the bulk of the emissions being trapped aloft, above cold, stable layers of the lower atmosphere. Because of this, the emitted pollutants came only sporadically into contact with the ground.

“It is likely that corresponding ground level air pollution impacts would, however, have been far higher had this event occurred in the summer months, when the lower atmosphere is more turbulent and well-mixed.

Defra adds that the report was externally reviewed by two independent air quality experts, both members of the Air Quality Expert Group. There were no major comments received. And it says that the aim of the report was “purely and simply to set out the air quality exposure assessment rather than to conduct an inquiry into operational issues”.

● For a full copy of the report visit: www.defra.gov.uk/environment/airquality/buncefield/index.htm

Kings College London’s ERG runs the London and Home Counties air quality monitoring network for local authorities.

It issued a summary of how it saw the incident (this was not included within the Netcen report) that concluded there were no widespread high pollution concentrations but some plume grounding.

It said: “On the evening of the explosion (Sunday 11th December) and early in the morning of Monday 12th, the smoke from the fire was detected at monitoring sites in parts of east Surrey and Sussex causing PM₁₀ particulate concentrations to reach moderate levels in Horsham and Lewes. The plume was also detected at monitoring sites in north London and St Albans but concentrations here remained low.

“On the evening of Tuesday 13th, PM₁₀ particulate from the fire was

detected at the Barnet background sites and on the morning of Wednesday 14th, PM₁₀ particulate from the fire was detected at the Watford site. In both cases concentrations remained ‘low’.

Throughout the period of the fire moderate PM₁₀ particulate was measured at several roadside sites in London. This was due to road transport sources and was not directly related to the smoke from the oil depot fire

Visitors to the HertBedsAir web site increased by a factor of 20 in the week following the fire and visitors to the LondonAir and KentAir web sites increased by a factor of three.

“In response to the incident, data collection frequencies were increased for PM₁₀ particulate monitoring sites to maximise the real-time information available to the public and to health professionals. The additional cost for this data collection was borne by ERG.

● www.londonair.org.uk

SCIENCE SHORTS

Bioaerosols studied in Cincinnati

Air quality was studied in Cincinnati with a view to working out the relationship between PM₁₀, PM_{2.5}, ozone, organic carbon, trace metals, temperature, humidity, season and inhalable fungi and pollen.

Researchers say the synergistic effect of all these pollutants may cause increased incidence of respiratory health symptoms. **Correlation of ambient inhalable bioaerosols with particulate matter and ozone: a two year study.** Atin Adhikari et al, *Environmental Pollution* Vol. 140 (2006) pp16-28.

Rats on PM_{2.5}

47 healthy rats were wired up to heart monitors and instilled with mixtures of PM_{2.5} and saline as a control by Brazilian researchers.

Heart rate was then monitored, as well as the regularity of the intervals between heartbeats – the heart rate variability that can cause heart attacks.

Researchers found that while there was little effect on heartbeat over time, there was a significant effect on heart rate variability one hour after instillation of a concentration less than 100mg.

PM_{2.5} induces acute electrocardiographic alterations in health rats, Dolores Rivero et al, *Environmental Research* Vol. 99 (2005) pp262-266.

LPG beats unleaded

Tests on standard specification American Ford Falcon Forte cars – some powered by unleaded petrol, some powered by liquefied petroleum gas – show that LPG cars always outperform petrol cars in terms of elemental emissions.

A comparative study of the elemental composition of the exhaust emissions of cars powered by liquefied petroleum gas and unleaded petrol, McKenzie Lim et al, *Atmospheric Environment* Vol 40 (2006) pp3111-3122.

TRAFFIC MANAGEMENT

Road pricing yields fairer air

A study of the air quality impacts of road pricing suggests that outcomes can improve social equity.

The paper admits that it might be counter-intuitive to think that charging money for using roads could give benefits to the poor – but Leeds University researcher Gordon Mitchell says the benefits for the poor outweigh the disbenefits.

Mitchell says that the current

position is that poor air quality in Leeds disproportionately affects the poor leading to an above average respiratory disease burden in deprived communities. But even with no road pricing intervention, this inequity is in decline as cars are replaced with newer, cleaner vehicles resulting in lower total emissions.

But any per-mile charge for use of the roads in Leeds will

lead to reduced vehicle mileage and improved air quality, and any traffic management measure that improves air quality is likely to be beneficial in social equity terms.

Forecasting environmental equity: air quality responses to road user charging in Leeds, Gordon Mitchell, *Journal of Environmental Management*, Vol. 77 (2005) pp212-226.

RESPIRATORY IMPACTS

French confirm allergic pollution link

French researchers say that background air pollution is linked to respiratory and allergic health in schoolchildren.

Nearly seven thousand kids aged 9-11 were recruited from 108 randomly picked schools in six French cities. They took a skin prick allergen test, respiratory tests and their medical history was taken. These findings were then compared to three year averaged concentrations of air pollutants (NO₂, SO₂, PM₁₀ and ozone) based on background

monitoring results.

Exercise induced breathlessness, lifetime asthma and allergic rhinitis was found to be positively related to an increase in SO₂, PM₁₀ and ozone. For a 5µg/m³ increase in SO₂, there was a 39% increased risk of having exercise induced bronchial reactivity, and 19% increased risk of having lifetime asthma. For a 10µg/m³ increase in PM₁₀, there was a 32% increased risk of having allergic rhinitis. Skin prick tests were 34% more likely to be positive

with increases in ozone.

Researchers concluded: “A moderate increase in long term exposure to background ambient air pollution was associated with an increased prevalence of respiratory and atopic indicators in children”.

Long term exposure to background air pollution related to respiratory and allergic health in schoolchildren, C Penard-Morand et al, *Clinical and Experimental Allergy*, 2005, Vol 35, pp1279-1287.

FUELS

MTBE and ethanol benefits compared

The emissions effects of differing fuel additives have been investigated by Chinese researchers.

Results showed that adding ethanol to petrol generally led to a reduction in regulated engine emissions compared to MTBE. The impact on unregulated emissions was different – benzene emissions with the ethanol blend were worse than those for MTBE, the

opposite was true for formaldehyde. Acetaldehyde emissions varied depending on engine load.

Catalytic conversion efficiencies for the ethanol blend were lower than MTBE, especially at low and high engine speeds. Researchers concluded: “Although ethanol and MTBE have both advantages and disadvantages in the unregulated emissions, the

additive ethanol has a better effect than MTBE on regulated emissions and given the effect of MTBE pollution on the aquatic environment, ethanol is better than MTBE as a petrol oxygenate additive.”

Comparative effects of MTBE and ethanol additions into gasoline on exhaust emissions, Chong-Lin Song et al, *Atmospheric Environment* Vol. 40 (2006) pp1957-1970.

COARSE PARTICLES

Demolition prompts street dust warning

Demolition can lead to huge increases in lead (Pb) contained in street dust, Baltimore researchers claim.

They studied samples of particles near a demolition site where older houses were being dismantled. Samples were collected before, immediately after and one month after demolition took place.

Researchers concluded: “We

found acute increases in lead loadings and dust loadings after demolition and debris removal that are of public health concern. Streets and alleys had the highest loadings with lead increasing by 200% to 8080mg per sq foot.

They concluded: “Our findings highlight the need to control demolition related lead deposition and to educate

planners, contractors and health and housing agencies especially given the large number of aging dwellings scheduled for redevelopment.”

A study of urban housing demolition as a source of lead in ambient dust on sidewalks, streets and alleys, Mark Farfel et al, *Environmental Research* Vol 99 (2005) pp204-213.

MEASUREMENT

Teom, FDMS and Bam compared

US researchers have compared the benefits of new style Teoms against older Teoms and Bams.

FDMS Teoms (filter dynamic measurement systems) use a split head to separate particle streams so that mass and volatile components can be separately measured. By separating the two out, the intention is to get a closer match to the US and European standard reference methods which are based on gravimetric (filter weighing).

Teoms are preferred over gravimetric as they can give real time results – but the loss of volatiles is problematic for regulators. Teom maker R&P has produced the FDMS to get round this problem, and results from UK trials are due to be released shortly.

In the New York study, the

three methods were run side by side for two years with results analysed for bias and seasonality. Volatile components vary according to temperature and humidity.

Researchers found that Bam and FDMS measurements at the Queens site were ‘highly correlated’ with each other and the federal reference method: “The Bam and the FDMS are very similar to each other in magnitude, and both are about 25% higher than the FRM filter measurements. The FDMS at the Addison site measures 9% more mass than the FRM.

“The FDMS Teom monitor has the attractive feature that the same instrument reports measurements of the non-volatile and volatile mass concentrations. Although we have experienced numerous

operational difficulties with the FDMS instruments, the added value of this partitioning of the total fine particle mass offers important insight into the character of particle pollution.”

As the standard Bam instrument measures the sum of the volatile and semi volatile PM_{2.5} mass, it is useful for building up a full picture of PM_{2.5}. UK practitioners will find it interesting that the standard Bam performed as well against the new style FDMS Teom – albeit in a different environment.

New York State urban and rural measurements of continuous PM_{2.5} mass by FDMS, Teom and Bam, James Schwab et al, *Journal of the Air and Waste Management Association*, Vol. 56, pp372-383.

INDOOR AIR QUALITY

Coarse particles are brought into classrooms by pupils, say Czech team

Czech researchers have studied how much outdoor air penetrates into school classrooms.

Mass concentrations of PM₁₀, PM_{2.5} and PM₁ were measured in a classroom with three Harvard impactors. Measurements were taken over 12 hour periods spanning from morning to evening to assess the affects of the classrooms being occupied.

Average indoor workday daytime concentrations were 42.3, 21.9 and 13.7µg/m³ while at night the concentrations

dropped to 20.9, 19.1 and 15.2µg/m³ for PM₁₀, PM_{2.5} and PM₁ respectively. The highest 12 hr mean, median and maximum PM₁₀ were recorded in daytime workdays, indicating that the presence of people is an important source of coarse particles indoors. Smoking was not allowed in the classroom.

“With the exception of the calculated coarse fraction (PM_{10-2.5}), all the measured indoor particulate matter fractions were significantly highly correlated with outdoor

PM₁₀ and negatively correlated with wind velocity, showing that outdoor levels of particles influence their indoor concentrations.”

Researchers added that the coarse particles have the potential to adversely influence human health.

The effect of outdoor air and indoor human activity on mass concentrations of PM₁₀, PM_{2.5} and PM₁ in a classroom, Martin Branis et al, *Environmental Research* Vol. 99 (2005) pp143-149.

VEHICLE POLLUTION

Models underestimate low speed emissions

US researchers believe that emission inventory models underestimate pollution from trucks travelling at low speeds as found in congested conditions.

California researchers carried out on-road tests of eleven trucks and emission rates were found to be highly dependent on operating conditions. Per mile NO_x emission rates for vehicle operation at low speeds, in simulated congested traffic,

were three times higher than per mile emissions rates of driving on an uncongested rural motorway.

They added: “The emission rates of regulated species from on road heavy duty diesel vehicles have been demonstrated to differ from those previously published. The differences in emission rates during congested conditions (creep) indicate that models that attempt to examine emission

inventories in small microscale environments should examine vehicle activity to determine the importance of emissions due to congestion.”

Actual NO_x emission rates were higher than official factors suggested – while PM₁₀ emission rates were lower. **Emission rates of regulated pollutants from on-road heavy duty vehicles, Sandip Shah et al, *Atmospheric Environment*, Vol 40 (2006) pp147-153.**

SCIENCE SHORTS

Genotoxic ‘hot spots’ studied by Germans

German researchers have attempted to find the genotoxic hotspots caused by poor air quality.

Urban air contains mixtures including mutagenic and carcinogenic substances such as benzene, diesel soot, heavy metals and PAH.

Cuttings of bioindicator plants (tradescantia) were exposed to ambient air at 65 monitoring sites in ten urban areas. Monitoring sites with the highest traffic emissions showed an elevated genotoxic potential.

Researchers concluded: “This bioassay proved to be a useful tool to detect local ‘hot spots’ of mutagenic air pollution in urban areas.” **Tradescantia micronucleus test indicates genotoxic potential of traffic emissions in European cities, Andreas Klump et al, *Environmental Pollution* Vol. 139 (2006), pp515-522.**

Moss aids tracking of roadside elements

Element deposition can be traced using mosses, according to Austrian researchers.

Sixty moss samples were taken along transects of nine roads in Austria and then analysed for concentrations of metals and other elements. There was a high correlation between proximity to traffic and elements such as copper, antimony, nickel, cobalt, chromium and vanadium.

Concentrations dropped off as distance from the road increased, and samples from roads with different heavy and light duty vehicle patterns was different.

At very busy roads, researchers found raised deposition of some elements at distances of up to one kilometre.

Estimation of element deposition derived from road traffic sources by using mosses, H Zechmeister et al, *Environmental Pollution* Vol 138 (2005) pp238-249.

Buncefield Whitewash

Defra's report on Buncefield is breathtakingly complacent and cosy. How on earth it got past Defra's usually rigorous science standards is a mystery.

The entire report reads like a wartime propaganda report – keep calm – nothing to worry about. Defra and Netcen would argue that the report started life as a routine update on the event – but was expanded and then released. That explains the poor science – but we bet Government will use the report to conclude 'no problem – no further action required'.

So if black smoke from a fire burning diesel and petrol is so harmless, then why do we worry about vehicle fumes at all? The starting point for the report is that the plume didn't ground – and 'evidence' then marshalled to back up that view. The report clutches at straws to explain away suspicious peaks – and even finds a peak elsewhere (Bradford) to suggest that Buncefield is not to blame.

Take the Sussex pollution spikes picked up by ERG. These took place just as the plume went over and had a similar chemistry to measurements taken in the plume. Faced with this evidence, the

report mumbles that particles 'appear' not to be from traffic, and 'may' be of a different origin. 'Assuming the data is not faulty', the peak 'may' be from another source which 'could' be from Buncefield.

And faced with a ginormous spike in hydrocarbons – at exactly the time the plume was passing over – and evidence that the elevated compounds are the same as those also observed in grab samples taken near the depot – Netcen says there 'may' be a relationship to Buncefield – but quickly says it could be local "fuel evaporation or paint fumes."

The latter bizarre excuse didn't escape one air quality expert who had read the report: "And how many painters are working on a Sunday afternoon?"

Going local

So Environment Agency chief Baroness Young thinks the recent Buncefield explosion "demonstrated that managing air quality on a local authority basis is not sufficient when we have a big incident that spans a number of local authorities".

Funny that it was the local authority network, not the national network that picked up the spikes!

More bad science

The Chartered Society of Physiotherapy is also misinterpreting air quality data.

Every few months, it interrogates the airquality.co.uk website and finds where there are NO₂ exceedences. Then out comes a press release with words such as dangerous, toxic, fumes etc and of course the press lap it up and it makes big headlines.

Meanwhile local authorities try hard to reassure those in air quality management areas that just because NO₂ is high, it does not mean they are about to die!

Bye bye baa

With airport group BAA going to the Spanish, pressure group Stop Standed Expansion (SSE) was quick to express its delight at the passing of BAA.

Mind you it's a bit of the devil you know. There's BAA – monopolistic, arrogant and operating almost as an agency of the Government. Then there's the Spanish – operating entirely for profit but presumably no longer given special treatment by the Government. Maybe the Government will now be less keen to seek exemption from EU air quality rules at Heathrow to feather the nest for BAA?

AIR QUALITY EVENTS 2006

June 9th

Air quality strategy review consultation:

Multi-Stakeholder Workshop organised by NSCA to discuss the strategy consultation, to be held in London, Contact Sally May, NSCA, 01273 878770

June 13th-14th

Particles in Europe

RSC Automation and Analytical Management Group conference to be held in Antwerp www.aamg-rsc.org

June 14th

Emission Control for Part A2 and Part B Processes

EMAP conference to be held at The Beeches, Bristol. Contact Sue Powditch on 0870 190 6551 or sue.powditch@aeat.co.uk

June 21st

IAPSC

Investigation of Air Pollution Standing Conference to be held at SOAS, Russell Square, London. Alison Loader 0870 190 6518

June 22nd

Air quality impact of the Buncefield oil depot explosion

Fifth Air Quality Forecasting Seminar to be held at Culham Science Centre, near Abingdon, Oxfordshire, Sue Powditch 0870 190 6551 or at sue.powditch@aeat.co.uk

July 4th

IAQM on the Air Quality Strategy

consultation meeting on the air quality strategy to be held in central London followed by IAQM committee meeting www.iaqm.co.uk

July 11th

Biogas as a fuel for transport

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

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

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

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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