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News

Legislation

Chemicals reforms pushed out of Reach

Landmark reforms to the EU's chemicals policy are unlikely to be finalised before the end of the year, at the earliest, after the European Parliament decided to delay discussion of the issue.

The controversial proposals – known as Reach - were due to be discussed by the Parliament's Environment Committee in early January but were delayed due to concerns that MEPs had not had time to consider proposed amendments. The legislation is now unlikely to receive a first-reading before the Parliament breaks for this summer's European elections, meaning a conclusion could not be reached before the autumn. This would delay the whole process of finalising Reach and introduce further uncertainty, since MEPs from the EU's ten accession states would then join in shaping the final legislation.

The Parliament's debates are being guided by MEP Guido Sacconi, an Italian socialist, who has been appointed as the "rapporteur" (lead) for this particular legislation. Given the heated nature of the Reach debate so far [*JEM*, 2003, **5**, 86N; 114N], Mr Sacconi is treading carefully and is on record as saying that the Commission's proposals provide a "satisfactory balance" between environment and industrial competitiveness. His initial report proposes 98 amendments – relatively few given the scale of the legislation – and is broadly neutral between industry and environmental demands.

Meanwhile, national interests continue to lobby against the Reach reforms. Implementing Reach without further changes would cause Belgium's industry "serious and irreparable damage", according to an economic impact study by national trade body Fedichem. Prepared by consultants Idea, the study predicts that testing substances to meet chemical registration requirements under Reach could cost Belgian firms almost 1% of turnover – equivalent to 40% of net profit. Fedichem says up to 30% of existing substances would be withdrawn from the market without being substituted, which would impact particularly on small and medium sized businesses.

"Our prosperity and jobs are at stake while European markets will be flooded with finished products from other continents without a real improvement in our health or environment," said Jean-Marie Biot of Fedichem. Relative to both population size and GDP, Belgium's chemicals industry is the biggest in Europe. Belgium also relies on the chemicals sector for export income more heavily than any other EU country, with over 80% of production being sold abroad.

The results follow similar strongly critical assessments of Reach by the German, French and Italian chemicals industries [*JEM*, 2003, **5**, 22N; 86N].

European Parliament: Environment Committee, www.europarl.eu.int/committees/envi_home.htm; Fedichem: www.fedichem.be

Emission trading plans hit home

The European Commission has issued guidance on how Member States should distribute the initial allocation of emission allowances to businesses under Europe's imminent greenhouse gas trading scheme. The guidelines are crucial to the trading scheme's development because the Commission will use them as a benchmark when scrutinising national plans.

The EU's trading scheme for greenhouse gases comes into effect in April and as part of this Member States are required to draw up national allocation plans (NAPs) by the end of March [*JEM*, 2003, **5**, 87N]. These will state the total volume of greenhouse gas emissions that industrial plants will be allowed to emit annually – giving sectors covered by the scheme a first indication of how tough emission caps will be.

The Commission has two main concerns in overseeing the plans. Firstly it must ensure governments do not hand out so many emission allowances that they cannot meet national gas reduction obligations contained in the Kyoto Protocol. Secondly, NAPs must not distort competition by industry sectors in one country receiving significantly more or fewer allowances than competitors in others.

The guidance sets out two basic steps for arriving at the allocation. Authorities must decide what proportion of total national emissions the sectors covered currently generate, and use this to calculate the volume of emissions they should be emitting under Kyoto Protocol targets. Secondly they must decide on the "path" of reductions leading from current emission levels to Kyoto-compliant ones. Within this scheme EU countries have quite a degree of freedom to vary both the proportion and the path taken, providing they give good reasons for doing so.

The guidelines also cover procedures for granting allowances to individual plants. These include how to determine which have the most and least potential for reductions, and thus how many allowances they should get, plus rules for plants which have already taken action to cut emissions and those built after the trading scheme has begun.

Germany, the Netherlands, Spain and the UK are among the countries that have already unveiled their NAPs. The German discussions have been particularly heated, with industry claiming that the government's draft proposals gave too little credit for the reductions already achieved. Matters reached a head in January when industry, represented by BDI, suddenly withdrew from talks aimed at finalising the NAP.

UK Environment Minister Margaret Beckett described its plan as "challenging but achievable". The scheme will cover some 1500 industrial

installations in Britain, accounting for about half of national carbon dioxide emissions in 1990. The emissions cap during the scheme's first phase will be "consistent with an overall reduction in UK carbon dioxide (CO_2) emissions of 16.3% by 2010" against 1990 levels, the government said. For the second phase of the scheme, 2008–12, the UK will aim for emission cuts consistent with a national 20% CO_2 reduction, it added. The implications for individual sectors have yet to be released, but the electricity sector appears likely to be hit hardest.

UK business representatives voiced grave concerns. The Chemical Industries Association said rising costs resulting from the emissions cap might disadvantage British business against competitors, while the Association of Electricity Producers warned that electricity prices would increase if a strict cap was set. The Confederation of British Industry claimed that the government might be "risking the sacrifice of UK jobs on the altar of green credentials". Friends of the Earth, on the other hand, welcomed the plan, saying it would "set a standard for other countries across the EU to follow".

Meanwhile, power generators are urging EU policy-makers not to limit the amount of greenhouse gas reduction credits they can buy abroad to comply with the climate trading scheme. The European Commission is proposing an 8% limit on Kyoto Protocol "flexibility" credits. But industry body Eurelectric said this would be "artificial" and add no extra environmental integrity to the scheme.

European Commission; http://europa.eu.int/comm/environment/climat/home_en.htm; BDI: www.bdi-online.de; UK Environment Ministry: www.defra.gov.uk/corporate/consult/eu-etsnap/index.htm; Eurelectric: www.eurelectric.org

Commission moves to break GM ban

The European Commission has upped the stakes in the GM debate by asking EU ministers to approve commercialisation of a genetically modified crop. By referring the decision to their political masters, the Commission hopes to overcome the log-jam that has dogged the EU's policy on GM crops. This will be the first time in five years that the EU has sought a GM approval and the Council of Ministers has until April to decide.

The product concerned is a Syngenta sweetcorn variety containing the Bt insecticide gene. The product has been declared safe by EU scientists but national experts failed to reach a decision on the approval at a meeting in December [*JEM*, 2004, **6**, 7N]. Under EU decision-making rules the council must either adopt or reject the application by a qualified majority. If, as happened last month, it fails to muster the necessary majority either way, the Commission says it will end the moratorium by using its power to unilaterally approve the product.

In a policy paper the Commission warns that some parts of the EU have begun imposing restrictions on growing GM crops that "might contradict EU legislation and could require infringement procedures". But it admits that "from a political point of view itcould be difficult to reject these attempts at establishing GM-free zones" due to "strong public local concern and economic considerations".

Meanwhile in the UK, ACRE, the government's GM crop science advisory body, has upheld the results of the field trials released last autumn [*JEM*, 2003, **5**, 114N]. These concluded that cultivating GM maize would not negatively impact the environment but growing oilseed rape and beet would. ACRE said that GM maize should only be grown under specified crop management conditions, adding that further work should be conducted on the effects of the imminent phase-out of the herbicide atrazine. It stopped short of recommending that GM oilseed rape and beet be ruled out.

Belgium's biosafety council has also waded into the debate, voicing serious concerns over the safety of GM oilseed rape. Drawing on the UK trials, the Council concludes that commercial growing of the rape (or canola) would be harmful to the environment. Whereas the UK trials focused on environmental implications stemming from how herbicide tolerant crops are grown, the Belgian experts are also worried over possible gene flow to wild relatives. The findings could strike a potentially fatal blow to the chances of the crop achieving EU approval.

In Germany, the government has issued proposals to transpose EU regulations on traceability and labelling of GM products into national law. According to the consumer protection ministry, the law will govern the approval process for GM products and require clear labelling of modified foods. It will also set out rules on buffer zones to enable coexistence between GM and conventional or organic crops as well as on liability and compensation in the case of accidental contamination. Consumer Protection Minister Renate Künast said she expected GM maize to reach German stores by this autumn.

European Commission: GM policy: http://europa.eu.int/comm/food/food/biotechnology/gmfood/index_en.htm

New push for great lakes clean-up

EPA is proposing a major new $45 million fund for the cleanup of contaminated sediments in the Great Lakes system. The announcement is the flagship in the EPA's spending plans for the next financial year, which were presented to Congress as part of President Bush's 2005 budget proposal.

The $45 million will be used to start or further the cleanup of four to six "Areas of Concern", where sediments are heavily contaminated with PCBs, heavy metals and polycyclic aromatic hydrocarbons (PAHs). The request is a $35 million increase over the 2004 funding under the Great Lakes Legacy Act. The budget also seeks an additional $3 million for the Great Lakes Program for restoration projects and an additional $1 million for research into the control of invasive species such as the zebra mussel and Asian carp which plague the Great Lakes.

Making the announcement during a visit to Belle Isle, an island park in the Detroit River, EPA Administrator Mike Leavitt said: "Accelerating the cleanup of these contaminated areas will help keep the pollution from moving out into the lakes where cleanup becomes dramatically more difficult."

Other highlights of the EPA's $7.76 billion budget request include $65 million for the Clean School Bus USA Program, $25 million for the Targeted Watersheds Program to fund community grants for watershed protection, and $20 million for a new water quality monitoring initiative. However, these special programs are dwarfed by the EPA's core regulatory, research and enforcement activities ($4.4 billion) and the $1.25 billion requested to support states' environmental programs. A further $1.8 billion is earmarked for the Superfund hazardous waste initiative and for Brownfields cleanup.

EPA: Great Lakes National Program Office: www.epa.gov/glnpo/index.html

Environmental quality

Sound science key to saving the planet

Links between global warming and heavy metal pollution, soil microbes and bumper crop yields, and the degree to which a degraded environment can trigger political instability, are all key areas for future research, according to the United Nations Environment Programme (UNEP).

In January leading experts gathered at UNEP's Nairobi headquarters to assess how best to boost UNEP's science base. They tried to pin-point "knowledge gaps" in a bid to better forecast the impact of human-kind's actions on the environment of the 21st century.

UNEP's Executive Director, Klaus Toepfer, said: "Sound science is vital. Governments cannot be expected to change industrial, agricultural and other practices without accurate and authoritative evidence that these are not only cost-effective but will genuinely make a difference, that they will help deliver sustainable development. So we need to plug the remaining gaps and better understand what is known in the jargon as 'inter-linkages'; in essence the consequences of our actions, across a wide range of issues".

The meeting identified areas such as the health effects of chemical hazards, the impacts of urbanization and megacities on the wider world and improved understanding of the planet's biodiversity. Scientists are also keen to address how actions taken to solve one environmental crisis might impact on other areas of environmental, economic and social concerns.

United Nation's Environment Programme: www.unep.org

US under attack on climate change

In a rare break from diplomatic niceties, the UK Government's Chief Scientist has launched an unprecedented attack on the American government's approach on global warming. Professor David King said climate change is the most severe threat facing the world – greater than terrorism – and the American government is "failing to take up the challenge".

Writing in the US journal *Science*, Prof. King lists a series of inadequacies in current US global warming policy and insists that action is needed now to control greenhouse gas emissions. "We already know enough about the problem to agree on the urgent need to address it", he says.

He rejects US assertions that curbing greenhouse gas emissions will be unreasonably costly. The Intergovernmental Panel on Climate Change suggests that stabilising atmospheric carbon dioxide at 550 parts per million should cut industrialised countries' GDP only 1% by 2050, he notes. This figure should be more than offset by reduction in risks from climate change, he adds. Moreover, action to curb emissions can create economic opportunities.

Likewise, Prof. King attacks the US government's decision to base its policy largely on market-based incentives and voluntary actions. "The market cannot decide that mitigation is necessary, nor can it establish the basic international framework... That requires a political decision... and the UK government firmly believes the time to make that decision is now."

Acknowledging that the US is unlikely to rejoin the Kyoto Protocol, Prof. King urges it instead to focus on the post-Kyoto period (beyond 2012) where talks are due to begin soon. Future agreements "do not need to follow the exact pattern" of the Kyoto accord, he writes. But "We in the rest of the world are now looking to the USA to play its leading part", he concludes.

Prof. King's criticisms came in the same week as a well-publicised paper in *Nature* claiming that climate change could lead to over a third of the Earth's species becoming extinct. Applying climate change scenarios to over a thousand flora and fauna samples across several regions, researchers estimate that between 15% and 37% of species could become extinct by 2050. While urging caution on precise predictions, they conclude that global warming "is likely to be the greatest threat" to biodiversity and urge "rapid implementation" of measures to decrease greenhouse gas emissions and to develop carbon sequestration.

Science: www.sciencemag.org; Nature: www.nature.com/nature/links/040108/040108-1.html

Good progress on clean air

The National Academy of Sciences (NAS) has issued an in-depth study of EPA's air quality management under the Clean Air Act.

The report acknowledges the progress EPA has made in the implementation of the Act and the substantial air quality improvements since the early 1970s. In particular NAS highlights the reductions that have resulted from the control of industrial facilities and cars and trucks, and the effectiveness of "cap and trade programs" in achieving emission reductions.

The Academy makes a broad range of recommendations for improving the US's air quality system in the face of anticipated challenges. Many of these reinforce the direction that EPA has been taking in recent years. For example, developing integrated multi-pollutant approaches to control pollutant emissions, and applying "cap and trade" programs to control airpollution.

While the report provides a number of specific proposals for improving the air quality management system, it points out that much of the system is good and warrants retaining. In particular, the NAS supports the gradual evolution of EPA's program and encourages on-going air quality management activities. Decisions to protect public health and welfare should continue despite scientific uncertainties, the Academy says.

EPA says it will evaluate the NAS recommendations as part of continuing efforts to improve the effectiveness of its air pollution programs.

National Academy of Sciences: www.nationalacademies.org/environment

Baltic gets a bonus

The European Commission is backing a €3 m programme for joint planning of environmental and related research projects in the Baltic Sea. Known as Bonus, the project will "substantially improve the effectiveness of environmental and sustainable development policies for the entire Baltic," the Commission said.

To date, the nine countries bordering the Baltic have never had joint planning of research. The Bonus programme will address this gap by creating a forum for oversight of national or international research programmes.

Guidance on research models

EPA has issued new draft guidance on the use of research models and a web-accessible database, the Models Knowledge Base. The Agency says these new products are designed to increase public understanding of the science behind EPA policy.

An environmental model is a representation of the real environment, which is used for studying the current environmental status or for predicting

future conditions. At EPA, models are used to show the transport of pollutants through the atmosphere, estimate pollution's impacts on human health and the environment, and to evaluate the costs and benefits of alternative policies for environmental protection.

The draft guidance recommends best practices to determine when a model can best be employed to inform environmental decision making. The Models Knowledge Base is a web-accessible database containing the Agency's frequently used models, and information on each model's use, development, validation and assessment. The database also has three tools for model selection (complete listing, keyword search, and browse by environmental indicators) and a web-based chat room for the user community.

"These complementary products will work in tandem to describe and document good modelling practices. By providing access to our tools and methods, we can improve the public's understanding of how sound science is used to make environmental decisions," said Steve Johnson, EPA's Acting Deputy Administrator.

EPA will issue final versions of both products following review by independent experts.

EPA: Council for Regulatory Environmental Modeling (CREM), "Draft Guidance on the Development, Evaluation, and Application of Regulatory Environmental Models", http://cfpub.epa.gov/crem/

Chemical hazards

EU scientists back phthalate

EU experts have come down on the side of industry in the long-running debate over the phthalate DEHP.

In their latest report the EU's scientific toxicology committee (CSTEE) says the chemical does not pose a risk to adults through environmental pollution, although uncertainties remain over the risks to breast-feeding babies. DEHP is a major industrial chemical and is used principally as a plasticizer in PVC for applications such as blood bags and soft flooring.

CSTEE's opinion amounts to an effective reprieve from further action against DEHP, which has been the subject of a heated dispute between the chemical industry and the Swedish Chemicals Agency [*JEM*, 2003, **5**, 13N]. The Committee said the Swedish authorities' estimates of adult exposure to DEHP "may be somewhat too high". New scientific data show there is an "acceptable safety margin" in the consumption of DEHP through tainted food, the Committee argued. However, it added that more research was needed to ensure there was no danger to babies through the contamination of breast milk. The safety margin "may be adequate", the opinion states, but "considerable uncertainty exists".

CSTEE: DEHP Opinion http://europa.eu.int/comm/health/ph_risk/committees/sct/documents/out214_en.pdf

Accident throws spotlight on shipping controls

Environmentalists are demanding new controls on container ships following an accident in the North Sea which resulted in the loss of hundreds of litres of a toxic wood preservative. The Dutch government has banned fishing over 600 square miles while a navy minesweeper attempts to locate 63 missing 100-litre steel drums of the chemical, arsenic pentoxide.

The drums were lost from an Ethiopian cargo ship, Andinet, during a storm on 21 December, plus three containers holding another 628 drums in total. Each of the containers is thought to be lying intact on the seabed. Another 50 drums were found empty, meaning that at least 5000 litres of arsenic pentoxide has probably polluted the North Sea. The vessel had to be decontaminated on arrival at the German port of Bremen.

The North Sea Foundation, an NGO, has called for action to increase safety of container shipping, which accounts for a large proportion of world trade. Steps should be taken to ensure better securing of containers, the group said. The Foundation wants all containers containing hazardous substances to be fitted with transmitters to enable location if they are lost overboard. It also criticised the common practice of charging port dues based on ships' hold space, which it says encourages shippers to stack containers above deck.

Arsenic pentoxide is a category one carcinogen and has been increasingly restricted over the last decade. Most recently an EU directive passed in early 2003 bans most uses of arsenic wood preservatives in Europe, effective from 30 June this year.

North Sea Foundation: www.noordzee.nl

Success for NPE deal

UK manufacturers of phenol-based compounds – nonylphenol, octylphenol and their ethoxylates (NPEs and OPEs) – have fulfilled their part of a voluntary agreement with the government on reducing risks from the chemicals, which are persistent, toxic and bioaccumulative (PBT).

The replacement of NPEs in downstream applications such as detergents and fragrances anticipates EU marketing restrictions due to take effect in January 2005. In October the government put the extra costs of bringing action forward at under £200 000.

UK Environment Ministry: NPE voluntary agreement www.defra.gov.uk/corporate/consult/phenols-risk/index.htm

Public and occupational health

Registry to track environmental disease

Scientists at the National Institute of Environmental Health Sciences (NIEHS) and the University of North Carolina (UNC) are collaborating on a registry that should shed new light on the relationship between environmental exposures, genetic susceptibility and human disease. The Environmental Polymorphism Registry will eventually track 20 000 patients at various UNC medical facilities to study how the

environmental sensitivity of their genes affects their health.

A pilot study requested consent from 600 patients at UNC outpatient clinics. About 80% of those asked agreed to allow a portion of blood drawn for other medical purposes to be used for the isolation of DNA that was placed in the registry depository. The samples are coded to protect the identity of donors and then made available for researchers to screen for the presence of genetic variants, called polymorphisms, in a category of genes known as "environmentally sensitive" genes. These genes control how our bodies handle substances from the environment, encoding proteins that regulate a wide variety of cell functions.

Dr. Perry Blackshear, NIEHS's Director of Clinical Research, said that the registry will be unusual in that patient identifiers will be maintained in coded form, giving scientists the ability to re-contact participants at a later date for follow-up studies. "There were no resources such as this available to researchers before, although there are many available anonymous DNA repositories," Dr. Blackshear said.

Data from the follow-up studies will allow scientists to identify groups of individuals with genetic polymorphisms in environmentally-sensitive genes and possibly to correlate their genetic variants with patients' clinical histories and current health status. "The data collected from these studies may be used to define environmental risk factors and develop preventative strategies to reduce the incidence of disease," Dr. Blackshear added.

National Institute of Environmental Health Science: www.niehs.nih.gov

Poor most at risk

Theassertion that social deprivation is associated with environmental health problems is given further weight by a new UK study which shows that the poor suffer the worst environment. The findings, by the Environment Agency, will contribute to an emerging UK government policy on "environmental equity".

Focusing on air quality, industrial pollution and flood risk, the research found that deprived areas of England tended to have higher air pollution levels. Residents of these areas were also more likely to live near an industrial site or a tidal floodplain.

The Agency's head, Barbara Young, said that no conclusions on health risks had been reached. She called for more research and urged "a joined-up approach to addressing environmental inequalities alongside social and economic problems in deprived areas".

In a related development, green group Friends of the Earth has reported that half of English municipal waste incinerators are located in the poorest 10% of the country. FoE, which claims that incinerators produce harmful emissions and create extra traffic, has long campaigned for "environmental justice".

Environment Agency: www.environment-agency.gov.uk and www.eareports.com; FoE press release www.foe.co.uk/resource/press_releases/incinerators_hit_poorest_h.html

Home testing for radon

January was Radon Action Month in the United States, when millions of Americans were encouraged to test for radon in their homes.

Exposure to radon is the second leading cause of lung cancer in the US and EPA estimates that approximately 21 000 lung cancer deaths each year are radon-related. Radon comes from the decay of naturally occurring uranium in the earth's soil and can accumulate indoors to dangerous levels. EPA recommends that houses with radon levels of 4 picocuries or more should be fixed to prevent accumulation of the gas indoors. It is working with state and local partners to educate the public about the dangers of radon.

Do-it-yourself radon test kits are available in the US for around $25. Most homes found to have high levels of radon can be mitigated to reduce the gas from their homes at a modest cost. Further information, including a state-by-state map of radon levels, is available at the following website:

EPA: SOS Radon, www.epa.gov/radon

Funding for fine particulates research

EPA has awarded research grants totalling $6.5 million to 16 universities to improve measurement of the carbon composition of fine particulate matter (PM2.5). Organic and elemental carbon are believed to comprise 20–70% of PM2.5 mass and may be a factor in PM2.5 concentrations being higher in urban than rural areas. The research, under EPA's Science to Achieve Results (STAR) program, will help improve understanding of the role of PM2.5 in serious respiratory and cardiovascular health problems.

EPA: National Centre for Environmental Research: http://cfpub.epa.gov/ncer_abstracts/

Sperm counts cause concern

British researchers have reported a big fall in men's sperm count in just 13 years, adding to concerns over the trend, which some groups blame in part on exposure to endocrine-disrupting chemicals.

Tests on 7 500 men attending a fertility centre in Aberdeen showed a 29% drop in sperm concentration between 1989 and 2002. Preliminary analysis suggests that the trend is independent of age and period of abstinence, the scientists added.

British Fertility Society: www.fertility.org.uk

Research activities

DEFRA appoints science advisors

The UK Department for Environment, Food and Rural Affairs (DEFRA) has appointed a new body to provide it with expert and independent advice on science policy and strategy. The 12-strong Science Advisory Council will help guide DEFRA's scientific priorities and work, including horizon-scanning and long-range planning as well as dealing with immediate risks and opportunities.

DEFRA spends more than £300 million a year on science and research underpinning a broad range of policies including environmental protection, farming and food, animal and plant health, and sustainable energy.

The Science Advisory Council will be chaired by Professor Roy Anderson FRS, Head of Infectious Disease Epidemiology at Imperial College, London. Professor Sir John Marsh CBE, Governor of the Scottish Crop Research Institute and the Royal Agricultural

College, and President of the British Institute of Agricultural Consultants, will be Vice-Chair.

DEFRA: www.defra.gov.uk/science

New centre studies air quality

A new institute that aims to "refine the art and science of predicting air quality" has opened in the UK. The Distributed Institute for Atmospheric Composition (DIAC) will probe the relationship between air quality and climate change. Funded by the NERC Centres for Atmospheric Sciences, the £2.3 million collaborative centre includes universities across the UK, led by Professor Mike Pilling of the University of Leeds.

Speaking at the launch, Prof. Pilling said: "Increases in temperature associated with climate change could have serious implications for our future air quality. DIAC is a great opportunity for the UK atmospheric science community to build on its excellence in observations and modelling, and to focus on the complex linkages that exist between the air that we breathe and the impact it has on our Earth system."

Experts at the launch discussed the deteriorating air quality over London during last summer's heatwave when levels of ozone and fine particles in the air rose, exceeding EU limits designed to protect human health. They also considered how air quality itself affects climate change: How ice clouds form from dust and aerosols and subsequently absorb or reflect the sun's radiation to heat or cool our atmosphere (one of the biggest unknowns in our climate change predictions); how soot from vehicle emissions absorbs the sun's energy causing warming (a vigorous new debate) and how the production of new gases from industry may act as greenhouse gases.

DIAC: http://diac.nerc.ac.uk

Probing the polar clouds

Scientists have discovered why icy clouds found at the edge of space are higher at the South Pole than at the North. The answer to this puzzle is that the intensity of solar radiation at the South Pole is six percent higher than at the North Pole during the austral summer, as the Earth comes closer to the sun. This research, by the British Antarctic Survey and University of Illinois, helps understand the role of these clouds as indicators of climate change.

Polar mesospheric clouds form at an altitude of 52 miles at the summertime polar caps when temperatures in the mesosphere fall below −125 °C. Scientists were puzzled why clouds at the South Pole were on average consistently two miles higher than those found in the North. To confirm these geographic differences, measurements were taken at British Antarctic Survey's Rothera Research Station, 1500 miles from the South Pole, at the same latitude as measurements made in the northern hemisphere (68°). Using a laser radar (LIDAR) to bounce light pulses off the clouds and measure their distance from earth, the researchers demonstrated that even though the clouds were slightly lower at Rothera than at the South Pole, they were considerably higher than at similar latitudes in the northern hemisphere.

Since the Earth's orbit is not exactly circular, solar radiation at the South Pole is six percent higher than at the North as the Earth orbits the Sun. Using a model to explore temperature and vertical wind distribution, the researchers concluded that this increased solar input heats the polar ozone and creates a vertical upwelling that forces the clouds up higher than in the north.

Polar mesospheric clouds have brightened by approximately 15% over the last twenty years demonstrating a cooling of the mesosphere. This cooling intensifies as the atmosphere near the Earth's surface warms, so polar mesospheric clouds may be an indicator of long-term global climate change.

Geophysical Research Letters, *Vol 32, January 2004: "Lidar Observations of Polar Mesospheric Clouds at Rothera, Antarctica" by Xinzhao Chu, Graeme Nott, Patrick Espy, Chester Gardner, Jan Dietrich, Mark Clilverd and Martin Jarvis.*

Publications

Potency of pesticide mixtures

EPA has released a report on the biological concepts and statistical procedures for improving applications of the Relative Potency Factor (RPF) in relation to pesticide mixtures. The RPF approach is a general methodology for applying dose addition to mixtures of chemicals that produce toxicity by the same mode of action. This research explores the basic tenets of dose addition, *i.e.*, the fundamental assumption thatthe mixture components share common toxic modes of action and a second methodological assumption that the mixture components exhibit similarly-shaped dose–response curves. It also develops mixture risk assessment methods for application when these basic tenets are not met. Three different risk characterisation approaches are proposed that enrich the available library of mixture risk assessment methods beyond what is currently published in EPA guidance.

EPA, National Center for Environmental Assessment: "Developing Relative Potency Factors for Pesticide Mixtures: Biostatistical Analyses of Joint Dose-Response", 600/R-32/052, 2003. www.epa.gov/ncea

Risk assessment of disinfection by-products

EPA conducted research to examine the feasibility of performing a cumulative risk assessment for disinfection by-products (DBPs) mixtures by combining exposure modelling and physiologically-based pharmacokinetic modelling results with a new mixtures risk assessment method, the Cumulative Relative Potency Factors (CRPF) approach. Internal doses were estimated for an adult female and an adult male, each of reproductive age, and for a child (age 6) inclusive of oral, dermal and inhalation exposures. Exposure estimates were developed for 13 major DBPs, accounting for physicochemical properties of the DBPs (inhalation rates, skin permeability rates, blood : air partition coefficients, *etc.*) and activity patterns that affect the amount of human contact time with drinking water (*e.g.*, tap water consumed, time spent showering, building characteristics). A novel cumulative risk assessment method, the CRPF approach, is advanced that integrates the principles of dose addition and response addition to produce multiple-route, chemical mixture risk estimates using total absorbed doses.

National Center for Environmental Assessment: "The Feasibility of Performing Cumulative Risk Assessments for Mixtures of Disinfection By-Products in Drinking Water", EPA/600/R-03/051. www.epa.gov/ncea

Dichlorobenzenes and toluene

EPA has issued for scientific review draft Toxicological Reviews and draft IRIS

Summaries for dichlorobenzenes and for toluene. The goal of these assessments is to evaluate both carcinogenic and non-cancer toxicity based on the proposed July 1999 Cancer Guidelines and other relevant guidance. This approach will provide a better understanding of the toxicity and will aid in making informed risk-based decisions for protection of human health.

National Center for Environmental Assessment: ''Toxicological Review of Dichlorobenzenes [and IRIS Summary] (External Review Draft)'', EPA/635/R-03/015; and ''Toxicological Review of Toluene [and IRIS Summary] (Second External Review Draft), NCEA-S-1264. www.epa.gov/ncea

Toxic effects of manganese

HEI has published a study on the health effects of manganese, a component of the fuel additive MMT. Manganese is an essential nutrient and part of the daily diet, but also causes neurotoxic symptoms in workers that inhale high concentrations. The investigators studied the mechanism by which manganese may enter and leave the brain of laboratory rats across its protective blood–brain barrier to try to understand whether there are mechanisms that would allow or, alternatively, prevent accumulation of manganese in the brain with prolonged exposure to low levels in the environment.

Health Effects Institute: ''Manganese Toxicokinetics at the Blood-Brain Barrier'', HEI Research Report 119. www.healtheffects.org