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WHO COLLABORATING CENTRE FOR AIR QUALITY MANAGEMENT AND AIR POLLUTION CONTROL

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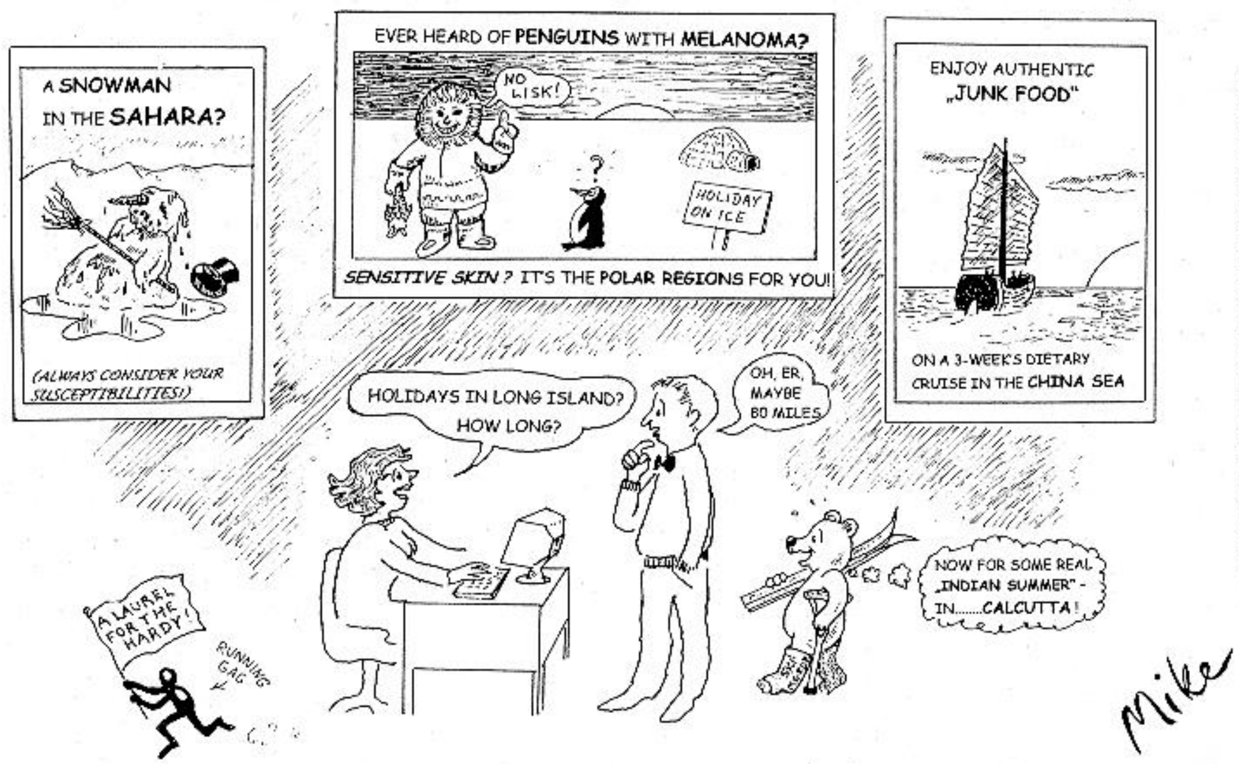
„MEDICAL GEOGRAPHY" TRAVEL AGENCY



GISIPH*: ENJOY CAREFREE VACATIONS IN REGIONS WITH LOW HEALTH RISKS

GISIPH*: GEOGRAPHIC INFORMATION SCIENCES IN PUBLIC HEALTH

AUSTRIAN PROJECT ON HEALTH EFFECTS OF PARTICLES: FIRST RESULTS ON LUNG FUNCTION CHANGES IN CHILDREN

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Introduction

In Vienna, the capital of Austria, winter smog episodes during the 70s were related to increased daily mortality from all, cardiovascular and respiratory disease at age >70 years. These increases related to SO_2 were found independent of increases related to influenza and/or low temperature (Neuberger et al., 1987). During the 80s, SO_2 was reduced in Austria and relations to excess mortality disappeared. However, respiratory symptoms in children were still found increased by outdoor air pollution in Vienna, independent of increases by indoor air pollution (Neuberger et al., 1986). Small airways dysfunction showed closer relations to outdoor urban NO_2 than to SO_2 and TSP (Neuberger et al., 1995). In urban districts where only SO_2 but not NO_2 decreased, no improvement of lung function growth could be demonstrated (Neuberger et al., 1998). Recent epidemiological results showed health effects of fine particles (WHO, 2000) which have not been routinely monitored up to now. In order to find better health related indicators for surveillance of urban air quality, the Clean Air Commission of the Austrian Academy of Science set up the interdisciplinary **AU**strian **P**roject on **H**ealth **E**ffects of **P**articulates (AUPHEP), which combines epidemiological studies on mortality, morbidity, child health and lung function with research on aerosols and gaseous pollutants in the three largest Austrian towns (Vienna, Graz, Linz) and a rural control area in Lower Austria. The following first results focus on child health and lung function monitored in 1999/2000 together with air quality in Vienna.

Methods and Persons

In addition to routine ambient air monitoring for TSP, SO_2, NO, NO_2, O_3, CO and meteorological parameters (wind speed and direction, temperature, relative humidity, precipitation) a special surveillance started, after intercalibration exercises, on 1 June 1999 at one urban station in Vienna and one rural station in Lower Austria. Mass concentrations were measured continuously by TEOM (R&P) and ß-gauge (Eberline) for $PM_{1.0}$, $PM_{2.5}$ and PM_{10}. Gravimetric monitoring of $PM_{2.5}$ and PM_{10} was also performed by high volume sampling (Digitel) on quartz filters analyzed daily for ions (Na, NH_4, K, Ca, Mg, Cl, NO_3, NO_2, SO_4, oxalate), total carbon (TC), elemental carbon (EC), and organic carbon (OC). Thirty-two different organic compounds and the heavy metals As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, V and Zn were analyzed from monthly filter extracts. Samples for the analysis of 20 PAHs were taken on a randomized basis. Monthly benzene and 2-weekly ammonia was collected by passive samplers. Particle numbers were counted continuously by condensation particle counters (CPC-TSI). Over a winter and a summer month period, cascade impactor campaigns were conducted on a daily basis for more detailed investigation of the size distribution of particles and their chemical composition.
Time series studies are performed on daily mortality (death certificates) and daily morbidity (hospital diagnoses) of the general population; on respiratory symptoms and signs of >1000 elementary school children living in the vicinity of the air monitoring station; on lung function of 232 elementary school children and of 61 kindergarten children living in the close vicinity of the air monitoring station. The following results on the children from five kindergartens around the air monitoring station in Vienna have been observed between September 1999 and April 2000. The lung function test used in these children was time to peak tidal expiratory flow/expiration time (tPTEF/tE) measured by

induction plethysmography (Respitrace) which has been proven to be an early indicator of airways obstruction in young children (Stick et al., 1996; Horak et al., 2001).
Personal exposures from indoor sources were assessed by standardized questionnaires and analyses of cotinine in hair.
Starting with the half-hour mean outdoor concentrations of air pollutants 24 hours / 7 days before each individual child's lung function testings, person-related exposures were calculated. The resulting daily / weekly means were used for a time series study assuming autoregressive correlation of repeated measurements of tPTEF/tE.

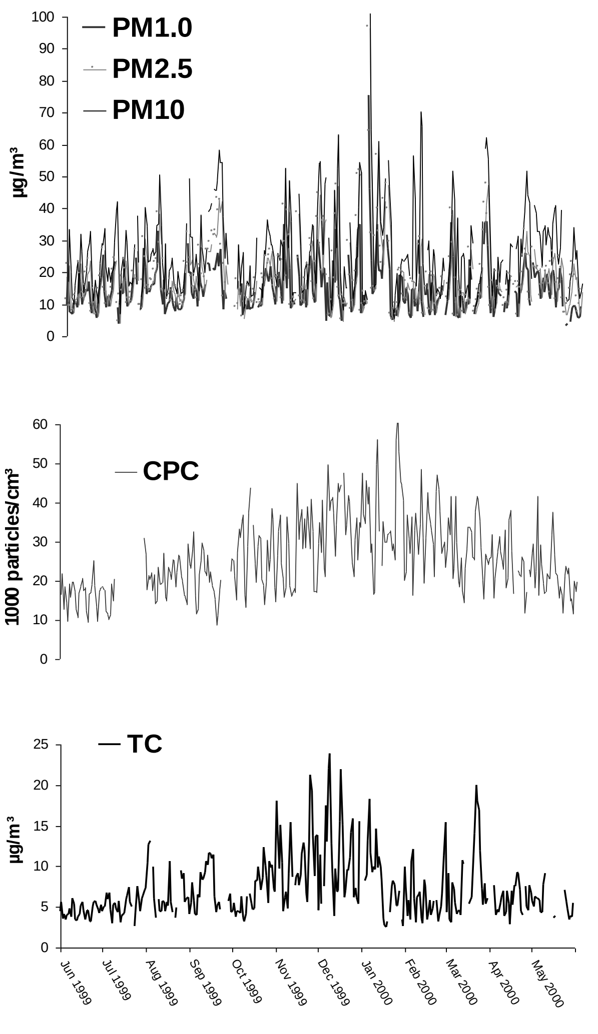

Figure 1: Mass ($PM_{1.0}$, $PM_{2.5}$, PM_{10}) and number (CPC) concentration of particles and total carbon (TC).

Results and Discussion

The following means (±SD) were found in continuous monitoring over 366 days for particle numbers/cm³; $PM_{1.0}$; $PM_{2.5}$; PM_{10}; SO_2 (µg/cm³); NO_2 and O_3 (ppb) in Vienna: 26 217 ±9 686; 14.8 ±7.7; 18.5 ±10.7; 26.4 ±13.3; 2.5 ±1.6; 16.9 ±6.5 and 24.7 ±11.6.
In the rural control area the corresponding numbers were: 10 320 ±4 358; 12.8 ±6.7; 14.6 ±8.5; 20.7 ±10.7; 4.0 ±3.0; 5.1 ±3.5 and 26.1 ±10.6. Particle number concentrations showed patterns different from those of particle mass and correlated with NO_2 (r =0.6) significantly in all four seasons. In the rural control area, this correlation was found in winter only.
For Vienna fig.1 shows daily means of $PM_{1.0}$, $PM_{2.5}$ and PM_{10} which peaked on 25 December with 75, 96 and 105 µg/m³. Even more pronounced was the increase of particle numbers (CPC) in winter which peaked on 18 January with 62 835/cm³. No seasonal pattern was observed in the rural control area (data not shown). Also the carbon content of the $PM_{2.5}$ fraction was higher in Vienna (32.1%) than in the rural area (25.6%) and the TC and OC in the $PM_{2.5}$ fraction reached highest values in Vienna in winter and peaked on 10 December with 23.7 and 19.5 µg/m³ (fig.1).
Examined children from Viennese kindergartens were 3.0 – 5.9 years of age (mean 4.8), and 55.6% boys. 54 children had at least three examinations (mean 12.9 examinations). Parents reported on respiratory symptoms of their children in 43% and of allergic symptoms in 13%. 44% of parents had higher education. 56% used single-story heating systems, 83% gas for energy supply and 53% used a gas stove. 68% of children lived with at least one smoker and were exposed to environmental tobacco smoke of 0 - 40 (mean 8.8) cigarettes/day in the household. Cotinine ranged from 0.01 to 34.2 (mean 10.6) ng/mg hair. In 62% of children, a level of 2 ng cotinine/mg was exceeded. In 80% children also attended a kindergarten with smoking personnel, but the numbers of cigarettes smoked there (0 - 40, mean 22) did not show a positive correlation with children's hair cotinine so that no important ETS

contribution from this source (seperate rooms for smokers in kindergartens) can be assumed. Diaries kept by kindergarten personnel showed a mean absence rate of 17% (20 of 117 registered days) which was highest for children whose parents had reported to live in roads with very heavy traffic (20.3%) compared to heavy (19.3%), medium (15.7%) and low traffic (11.2%). This might indicate an influence of motor traffic exhaust on sick leave from kindergarten. Some differences in mean absence rates were also related to the heating system (indicating air pollution from indoor sources): single-room heating 18.4%, single-story heating 16.7%, central/remote heating 13.5%. Diaries further showed a mean incidence of 18% days with colds while attending kindergarten. In 19 children with respiratory infection at a day of examination, 27 of 120 nasal smears proved a virus infection (mainly Rhinoviruses). Virology was positive more frequently in children from lower social class. No Influenza, Parainfluenza or Respiratory Syncytial Virus was found during kindergarten attendance. Therefore, no severe confounding of our results from virus infections can be assumed.
Tables 1 - 3 show effects on the lung function parameter tPTEF/tE estimated after exclusion of children with positive virology on the day of examination.

Table 1: Effects on tPTEF/tE (ß) and levels of significance (p)

	β	**P**
sex (male)	0.85	0.544
age	0.49	0.615
social status (low)	-1.66	0.338
temperature	-0.12	0.141
breathing frequency	0.11	0.403
phase shift of breathing	0.11	<0.001
$PM_{1.0}$ (TEOM, 24h)	-0.10	0.060

After adjusting for sex, age, social status, temperature, breathing frequency, phase shift and kindergarten (fixed errors) and observer (random error), the mixed model showed most pronounced negative effects for increase of $PM_{1.0}$ (table 1, 2). For total carbon (measured in $PM_{2.5}$) the negative influence on lung function was significant (table 2).

Table 2: Effects of an increase in number (CPC) / mass of particulates / carbon on tPTEF/tE (β) and levels of significants (p)

24h	**CPC**	**$PM_{1.0}$**	**$PM_{2.5}$**	**PM_{10}**	**TC**
ß	-0.07	-0.1	-0.07	-0.03	-0.21
P	0.160	0.060	0.091	0.241	0.03

The negative effects of $PM_{1.0}$ seem to be acute effects of peaks, because they were less pronounced after averaging concentrations over the last 7 days before the lung function test (table 3).

Table 3: Effects of an increase in number (CPC) / mass of particulates averaged over 7 days and levels of significants (p)

7d	**CPC**	**$PM_{1.0}$**	**$PM_{2.5}$**	**PM_{10}**
ß	-0.13	-0.8	-0.0017	-0.0093
P	0.098	0.415	0.979	0.840

The only air pollution indicator which showed a more pronounced negative effect after averaging concentrations over 7 days was particle number concentration (CPC). This may indicate a trend ($p < 0.1$), but did not reach significance in our small sample of children. No other air pollutant monitored (SO_2, NO_2, O_3, NH_4, SO_4, Ca, etc.) showed a trend of a correlation with airway obstruction, neither for 24 hour nor for 7 day averages.

Studies on health effects of particles have been criticized because of their conclusions on groups of very heterogeneous particles (Dab et al., 2001). The results of this study suggest to look more thoroughly into the carbon fraction of fine particles when analysing acute respiratory effects on children and to include surveillance of particle numbers in monitoring of air quality.

Summary

In time series studies on Austrian children we attempt to detect early health effects of PM and to find better indicators for surveillance of urban air quality. Kindergarten children (aged 3.0 – 5.9 years) living near an air monitoring station in Vienna were examined by questionnaires, interviews, diary, 13 lung function tests (calibrated respiratory inductance plethysmography), hair analyses for cotinine and nasal smears for virus infection. After adjustments for confounders, a significant influence of total carbon ($PM_{2.5}$) on lung function was found. There was also a trend for total particulate mass to impair lung function, more pronounced for particles <1 µm than for particles <2.5 µm. These impairments were detected when mass particles was averaged over 24 hours before lung function testing. The only air pollution indicator which showed a trend for negative effect after averaging concentrations over 7 days was particle number.

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AIR QUALITY CONTROL SYSTEM IN PARIS AND ITS SUBURBS

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Problem

In the 90s, the Parisians' main environmental concern was the improvement of air quality. This concern responds to the public awareness to various pollution issues met at the end of the 80s, including the impact of increasing road traffic.

Objectives

In order to improve air quality, on top of the measures taken at the national level, the administrative Parisian authorities have been developing a policy to reduce air emissions since 1964 - at first from fixed sources and later from mobile sources. In 1978, a first regulation aimed at prohibiting the use of high-level sulphur fuels with the creation of two special protection areas (S.P.A.). This version considered fixed sources only and prohibited the use of poor quality fuels, set standards of dust emissions and standards of oil burner smokes (Bacharach method). Then regulations improved and were structured with two approaches: one long term approach with reinforcement of regulatory measures (Special Protection Area), and one short term approach with the implementation of an information and alert system in case of peak pollution. Contracts signed with the operators of large thermal power plants may supplement the plan. In these contracts they accept to stop or to reduce their activities in case of a pollution episode. The fixed and mobile sources together are "targets" laid down in the Act on Air and Rational Use of Energy of 30 December 1996 pursuant to European recommendations.

Methods

The regional monitoring network of AIRPARIF - a registered association, carries out the measuring and control of air quality in Paris and its suburbs.

The Special Protection Area (S.P.A.)

Provisions applicable to fixed sources

The new Special Protection Area ordinance sets the objectives to reach the emission standards in due time, which may be achieved either by the use of appropriate fuels or by the development of new techniques to reduce air pollution. The regulations apply to two areas of the Ile de France region. The first highly urbanised area includes Paris and three surrounding departments, the second area includes the greater Paris departments.

Table 1: Emission threshold for the plants with power over 100 kW

Areas	*Fuel oil (DFO) excluded*	*DFO (Domestic Fuel Oil)*	*Solid fuels*	*Gaseous fuels*
A1	900 mg/m^3 or content in sulphur 0,55% in mass	350 mg/m^3	1.100 mg/m^3	35 mg/m^3
A2	Existing plants			
	1.700 mg/m^3 or content in sulphur 1% in mass	350 mg/m^3	2.000 mg/m^3	35 mg/m^3
A2	New plants			
	1.700 mg/m^3 or content in sulphur <1% in mass	350 mg/m^3	1.700 mg/m^3	35 mg/m^3

- Prohibition of using fuel with a sulphur content over 1% in mass in plants with power > 20 MW.
- Transitional provisions are made for the plants with power > 200 MW with a possibility to clean the smoke.

Table 2: Limits of emissions in dusts for the plants with power over 100 kW

Areas	*Fuel oil (DFO excluded) and solids fuels*	*DFO (Domestic fuel Oil)*	*Gaseous fuels*
A1 and A2	Power over 20 MW : 50 mg/m^3 Power between 4 and 20 MW :100 mg/m^3 Power below 4 MW : 150 mg/m^3	50 mg/m^3	5 mg/m^3

The plan provides among other regulations:

- Smoke darkness index < 4 for all plants.
- Dry wood may be used as fuel in some cases.

The ordinance provides the following methods of control and operation:

- Control every two years of the plants with a power > 2 MW (sulphur dioxide, particulate matter, oxygen)
- Continuous control of the plants with a power > 50 MW (sulphur dioxide, particulate matter)
- Heating booklet for the plants with a power > 350 kW.

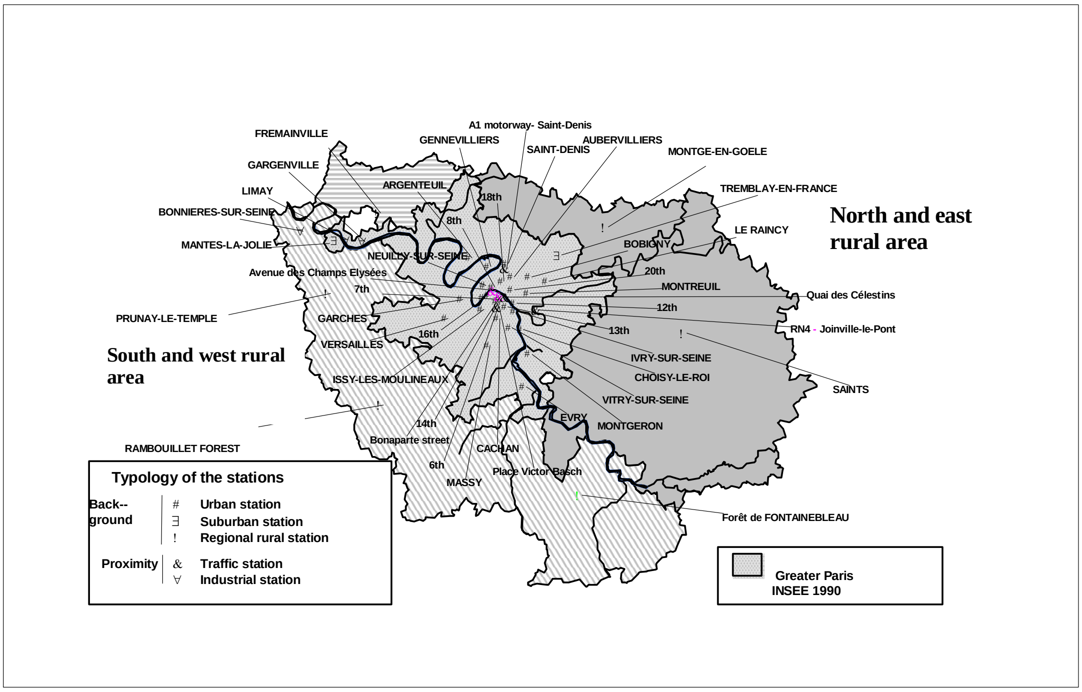
Incineration plants are excluded.
The use of generators is regulated, they cannot be used in replacement of EDF (French Electricity Agency) power network except for security reasons or for trials.

<u>Provisions applicable to mobile sources</u>

- Reinforcement of pollution controls of small lorries (< 3.5 tons).
- Introduction of an Air Quality Label for the operators of vehicles fleet. 20% of new vehicles will have to be operated by electricity, VNG (Natural Gas for Vehicles) or LPG (Liquid Petroleum Gas).

Information and Alert Procedure

An information procedure to the public in case of an atmospheric pollution peak in the Ile de France region was created by an ordinance of 25 April 1994. This ordinance was updated on 24 June 1999. It refers to three pollutants (NO_2, SO_2 and O_3) and includes two thresholds: the information and recommendation threshold and the alert threshold.
These short term actions limit the emissions of road traffic and industrial activities, by keeping down background pollution. The implementation of alternate traffic was taken for the first time during the pollution episode that occurred on 30 September 1997.
In order to take into account the specificity of ozone pollution peaks, the region has been divided into three areas, the urban area, the north and east rural areas, and the south west and west rural area (map 1).



Map 1: Stations and Areas for the Information and Alert Procedure

Table 3: Threshold of the procedure (averaging period 1 hour)

POLLUTANTS	*nitrogen dioxide (NO_2)*	*sulphur dioxide (SO_2)*	*ozone (O_3)*
Information threshold	200 µg/m^3	300 µg/m^3	180 µg/m^3
Alert threshold	400 µg/m^3	600 µg/m^3	360 µg/m^3

For nitrogen dioxide and sulphur dioxide, the threshold must be exceeded simultaneously at three measuring sites, including at least one background site. For ozone, it is the same in the urban area while in the rural areas, the excess at only one measuring station is enough to activate the information or alert procedure (see above).

Besides, in order to assist the observations and the administrative action, AIRPARIF has established a pollution episode forecast system.

Thus, when **the information threshold is reached** for one of the three pollutants:

- AIRPARIF informs the public of the pollution situation and broadcasts health recommendations.
- The Police Prefect broadcasts recommendations and incitements to reduce the emissions coming from mobile and fixed sources (limitation of room temperature in buildings to 18°C, use of low sulphur fuel, reduction of emissions from plants which the episode comes from). When the pollutant is nitrogen dioxide or ozone, on certain roads a reduction of the speed limit by 20 km/h is enforced, recommendations are broadcast to drivers to postpone their trip and to lorry drivers to bypass the urban area. Residential parking becomes free. Vehicles pollution checks are reinforced.

If the information threshold persists over a period of 48 hours and the forecasts suggest a prolongation of the pollution peak, the Prefects of the Ile de France Departments and the Police Prefect take a certain number of measures and inform the mayors:

- For sulphur dioxide : limitation of emissions for the fixed sources by the use of low sulphur fuels. For ozone and nitrogen dioxide: further reduction of speed limit for motor vehicles on certain roads.

When the **alert thresholds are reached** or likely to be reached**,** the implementation of emergency measures falls within the competence of the Police Prefect and the Prefects of the departments will inform the mayor and the public.

These emergency measures are:

- Sulphur dioxide : use of low sulphur fuels only and stopping work of all certain listed plants or parts of them;
- For fixed sources when the pollutant is nitrogen dioxide :
  - Stopping of the generators working on clearing of peak day;
  - Stopping of the electricity production by cogeneration as provided in the specific orders for these plants ;
  - Stopping or operation limitation of certain fixed plants (EDF French Electricity Agency);
- For mobile sources when the pollutant is nitrogen dioxide or ozone:
  - Reduction of speed for motor vehicles on certain roads;
  - Prohibition of transit traffic for lorries;
  - Immobilisation of at least 10% of administrative vehicles;
  - Implementation of alternate traffic the next day from 5.30 p.m. till midnight. Only “non polluting” vehicles equipped with a green sticker, the vehicles practising car sharing and vehicles with the plate number’s parity corresponding to the day’s parity (The last number will have the same parity as the date of the day: for example on 12 January

only the car with a pair plate number can be used). Dispensations are provided for vehicles ensuring a public service or deliveries;

- Free public transport on the regional network.

The improvement of environmental procedure

Protocols may be signed between the state and the people in charge of the main industries in order to find out quick solutions in case of predictable risks of a pollution peak as soon as the atmospheric conditions are unfavourable.

The regulation is then supplemented by contractual procedures; thus industrials can be incited to get involved into certification steps (ISO 14 000 for example).

Thus the draft agreement signed between EDF (French Electricity Agency), the Police Prefect of Paris, and the Prefect of Val de Marne is an example of constructive co-operation between industry and the state for an operation as less polluting as possible of the power plant of Vitry:

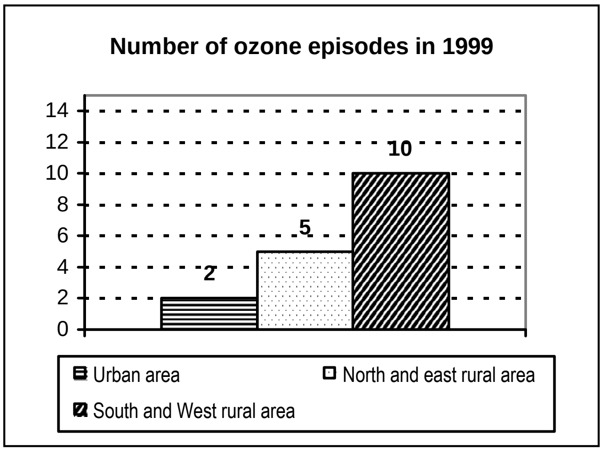
Table 4: Provision of the draft agreement with EDF

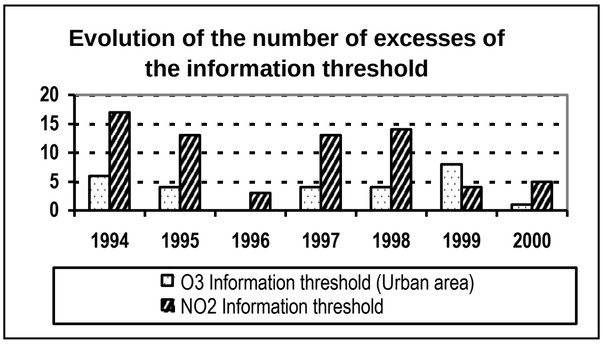
Pollutant SO_2	***Normal operation of the unit of power***	***Operation of the unit of power for the safety of the network***
Persistent information threshold reached	Turning of the unit to technical minimum*	No reduction of power without common analysis of the situation and of the various hazards
Risk of reaching alert threshold	Total stop of the unit	Turning of the unit to technical minimum*
Alerts threshold reached	Total stop of the unit	Turning of the unit to technical minimum*
Pollutant NO_2		
Persisting information threshold reached	Turning of the unit to technical minimum*	No reduction of power
Risk of reaching alert threshold	Total stop of the unit	No reduction of power without common analysis of the situation and of the various risks
Alerts threshold reached	Total stop of the unit	turn off the unit to the technical minimum *

* Technical minimum of a unit of the power station: 130 MW for a nominal power of 250 MW.

Results - Alert Procedure Assessment

The two following graphs show an example of the geographical distribution of ozone episodes in the region and the evolution of the implementation of the alert procedure.





This set of measures and the evolution of the cars fleet quality have allowed, for example, for NO_2 to reduce the number of excesses of the information threshold of 200 µg/m^3 from 17 in 1994 to 4 in 1999. In the neighbourhood of road traffic, the yearly average NO_X levels have dropped by approximately 30% between 1994 and 2000. For sulphur dioxide, the measured levels did not reach the information level.

For ozone, the results seem to be less convincing and show that the rural areas are more touched. During the less warm and rainy summer in 2000, only one episode occurred.

Nevertheless, these provisions and the modernisation of the car fleet had a real positive effect on air quality in general, and in particular for other pollutants like carbon monoxide, benzene, and particles.

- The threshold of 400 µg/m^3 was exceeded at two urban area measuring stations on 30 September 1997, and alternate traffic was implemented for the first time on 1 October 1997. These measures were well accepted by the Parisians and resulted in a reduction of road traffic of about 20% on the main roads with an equivalent use of public transport and a reduction of the average speed. At that time the fraction of catalysed vehicles of the cars fleet was below 30%. The modelling of this episode carried out by AIRPARIF showed that these measures resulted in a reduction of the emissions of NO_X coming from road traffic by 15%, while the emissions were reduced by 20%.

Discussion

After six years of implementation it can be concluded that the alert procedure has become a very good measure of information and education of the public. This tool mainly allows to improve air quality during these episodes and reduces the exposure of the Paris region inhabitants. Sulphur-related pollution is not only a problem for the region. The public authorities' action, in implementation of the Air Quality Regional Plan, focuses on better mastering NO_X emissions from mobile sources (65% of the total emissions) and from fixed sources. These recommendations are already taken into account for the establishment of plants licensing applications. In spite of the favourable evolution of the primary emissions of VOC (volatile organic compounds) and NO_X in relation with a more modern car fleet, the problem of ozone peaks is more difficult to deal with. The regulations are evolving with the creation of an Atmosphere Protection Plan and the modification of the alert procedure in order to incorporate PM_{10} in the plan of action. Information to the public must be improved on preventive actions to be taken in order to reduce the VOC emissions, which are playing a major role in the atmospheric photochemistry.

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NOTES AND NEWS

The Clean Air Initiative for Cities of Eastern Europe and Central Asia
- Terms of Reference: Rapid Assessment of Air Pollution Problems -

1. Background

Air pollution has consistently been identified as the environmental priority in the World Bank´s Europe and Central Asia Region since 1989. At the first ‘Environment for Europe’ Ministerial Conference in 1993, ministers endorsed the principles and general priorities contained in the ‘Environmental Action Program for Central and Eastern Europe (EAP)’. Subsequently, most countries in the region went on to prepare their own ‘National Environmental Action Plans (NEAPs)’. Both the region-wide EAP and the country specific NEAPs confirmed that, in general, air pollution is the major environmental problem. With increasing motorization, some air pollution problems are supposed to get worse.

Since 1993, several initiatives addressing air pollution have been undertaken in the region. These include investment projects, legal and institutional upgrades, improved dialogue and partnerships between public and private sectors, inventories and data gathering, and estimates of the health and other costs. A number of investment projects are targeted at reducing air pollution. At the 4th Conference of Environmental Ministers in Aarhus in 1998, the regional programme to phase lead out of gasoline was agreed. Despite these initiatives, however, the air pollution problem remains acute.

2. The Clean Air Initiative

The Initiative will work closely with the European Commission, in EU accession countries, where cities with a population over 200,000 will soon have to meet the requirements of the Air Quality Framework Directive and in the NIS through the TACIS Joint Environmental Programme (JEP). The Air Quality Framework Directive requires the preparation and implementation of a Clean Air Action Plan for cities which are not in compliance with EU standards.

The initiative will begin with a network of 25 cities to:

- develop participatory and technically sound action plans, identifying cost effective priorities;
- for action depending on the primary sources of pollution, such as transport, power generation, industry, public and commercial sector, and households. These may include the introduction of a “Policy Mix” for the implementation with regard to fuels (including domestic), vehicles, power plants, production processes, electric motor drives, technical equipment, buildings and appliances. The “Policy Mix” should include instruments and regulatory interventions, e.g. traffic management, monitoring and enforcement, training of operators, educating private households, standards and labelling, introduction of performance contracting, procurements, voluntary agreements etc., and the development of major investment projects in specific sectors. In EU accession countries, particular emphasis would be given to the implementation of the requirements of the Air Quality Framework Directive and its daughter directives as they come into force;
- implement those action plans through the development of capacity building or investment projects where appropriate;
- improve the quality of data collected in the city and integrate the data into the strategic management of air pollution issues;
- increase the availability of more general information relating to air pollution management;

- develop priorities for least-cost programmes to reduce air pollution;
- assist municipalities to obtain access to funds, technical assistance and knowledge necessary to reduce air pollution.

Within that network, the Clean Air Initiative will work specifically with a limited number of cities to develop Clean Air Action Plans and will work with the identified city administrations to host city-specific workshops.

3. Objectives

In order to identify those cities on which the Clean Air Initiative should focus in the first years of the programme, it is necessary to gain a better understanding of the current air quality problems, the ongoing environmental protection activities, the institutional setting of main actors, and data bases in a number of cities, and their capacity to address these problems in an integrated manner.

4. Scope of work

Rapid city assessments will be undertaken in six cities which have been identified through previous discussions – Rostov on Don, Sofia, Istanbul, Krakow, Ostrava, Almaty. These assessments should be largely based on published work and currently available data from city and national authorities as well as international organizations such as the European Commission and its various associated bodies, OECD, US AID, US EPA, The World Bank etc.

The assessments should provide a broad indication of the city´s current air quality problem, ability to address the identified issues, as well as the willingness to participate in such an Initiative and to provide the necessary data to the investigators. For this reason, experts of the host countries should collaborate with the experts of the World Bank mission.

Typical information that should be provided may include, but not be limited to the following:

- Background information on the cities: size, geography, population, pollution sources, current investment projects, commercial and employment structures, number, type and age of private and public buildings, scientific facilities related to air quality and energy supply/transportation (universities, technical institutes, energy service companies etc.), etc.
- Detailed data, as they are available, on current and – if possible – on projected pollution sources in the transportation sector (e.g. modal split, number of cars, goods and personal traffic), for power generation (number, type, age, fuel, efficiency, emission factors, capacity, power production of power plants and imported electricity), for industrial, commercial and household sector (heat and electricity), for private and public buildings.
- Regulatory issues – air quality standards, emission standards, pollution regulation systems, economic incentives etc. Regulatory structure of the local/regional company/ies providing electricity, natural gas, district heating, water and/or transportation.
- Governance – details of the city government and budgets, examples of intersectoral working (environment, energy, transport, planning etc.), membership of other networks (air quality related or otherwise), current city plans, private sector participation (e.g. industrial lobbies or chambers of commerce), NGOs etc.
- Technical information for each sector (transport, energy, industry etc.) – emission inventories, air quality monitoring systems, air quality modelling capacity, traffic management systems, training, available technologies etc.
- Public participation – environmental education, e.g. in schools and universities, public awareness activities and measures, NGOs and citizens activities for environmental protection.

More information: http://www.worldbank.org/

WHO Project on Environmental Health Indicators in the European Region

How do countries know how well they are doing this year compared to last year or compared to other countries ? How do governments know what to prioritise if information and data shift every year and are not compatible with other data? Indicators have long existed for the environment, and are constantly in the process of refinement. Now environmental health (EH) indicators are being pilot tested to evaluate their relevance for wide-scale implementation. A study has been initiated in fourteen Member States to assess the core EH indicators feasibility and a progress meeting was held in July 2001 in Bonn. The Czech Republic, Latvia, Romania and Switzerland have already completed the feasibility study.

It has always been considered a challenge to set up a multi-agency network for making easily available and integrating the information on environment and health. Better interagency co-ordination is needed to prevent unnecessary duplication, minimise the burden of reporting and promote co-operation at national level. An evaluation meeting will be held in November 2001 to review the results in all the fourteen countries, select the best candidate indicators, identify the needs for capacity building in evidence-based assessment of the EH, and start the pilot implementation of the indicators system.

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Climate Change and Ozone Depletion: Double Trouble for Health

Changes in the global system and in the stratospheric ozone layer caused by humans pose a range of health risks. Considered separately, climate change has direct and indirect effects, from increased mortality due to heat or air pollution, or injuries caused by extreme weather events such as floods or hurricanes, to changes in the distribution of disease, and increased threats to food supply and security. Exposure to ultraviolet (UV) radiation, which may be increased by ozone depletion, causes skin cancer and cataracts, and affect the immune system and reduce resistance to infection. Stratospheric ozone depletion also contributes to photochemical smog, acting as a respiratory irritant and possibly enhancing airway inflammation.

Proposed plans whereby countries might address threats to health include:

- Strengthening measures to reduce air pollution;
- Developing, testing, implementing and evaluating weather watch warning systems;
- Enforcing monitoring and surveillance programmes;
- Promoting adequate disaster preparedness programmes, and adequate land-use planning; and
- Promoting "healthy buildings" at the technical engineering level.

But, people can also take some steps themselves, such as protecting from the sun and avoiding dehydration in the heat.

For the first time, scientists across Europe came together to examine the combined health effects of climate change and stratospheric ozone depletion at a meeting to be held in Orvieto, Italy, in October 2001. For further information, contact:

Bettina Menne,
WHO European Centre for Environment and Health,
Rome Division, Via Franseco Crispi 10,
00187 Rome, Italy

(or http://www.who.it/ht/global_change.htm).

MEETINGS AND CONFERENCES

12th World Clean Air and Environment Congress 26 to 31 August 2001 in Seoul, South Korea

The 12th World Clean Air and Environment Congress was organized by the Korean Society for Atmospheric Environment (KOSAE) and sponsored by the Korean Ministry of Environment and Seoul City. Hosted by the International Union of Air Pollution Prevention and Environmental Protection Association (IUAPPA), the international environmental conference aimed to find solutions for ever-increasing air pollution and other environmental problems that the global community faces. The “Greening the New Millennium” conference hosted around 300 experts from 37 countries, including the executive director of the United Nations Environment Programme (UNEP), Dr Klaus Töpfer, and the two chemistry Nobel laureates Prof. Yuan Tseh Lee and Prof. Mario Molina. During the conference, more than 400 papers were presented on topics such as Emissions and Control Technologies, Monitoring and Measurements and Air Quality Studies, Transboundary Transport as well as Impact Assessment and Management. The contributions were predominantly focused on problems of Northeast Asia, and particularly considered cross-border air pollution, which recently surfaced as a pressing environmental issue in this Region, but also around Europe and North America. Due to the fact that the World Clean Air Congress was held the first time in Asia, the conference stressed high attendance in the whole Region, especially in South Korea, China and Japan. Besides, Northeast Asia covers 1.5 billion people, which is 40% of the Asian and 25% of the World population. In Korea and Japan around 80% of the population live in urban areas, and Tokio, Shanghai, Seoul and Beijing are ranking on the top twenty biggest Megacities of the World.

For example, since 1970s atmospheric quality in South Korea has quickly deteriorated with the development of heavy and chemical industries. The high number of car-ownership since beginning 1980s and the increased use of chemical materials owing to changes in the basic industrial structures in 1990s have compounded the problem. The ground-level ozone formation rate and the number of ozone warnings issued have steadily risen nationwide. Twenty-four warnings were issued in 1997 whereas 52 were given in 2000. Since 1997, the government has designated 30 cities, including Seoul, Incheon and Pusan as areas subject to enhanced air pollution management, particularly involving VOC emissions. The South Korean government will have local governments set and operate their own regional environmental standards within the national limits in order to correspond to actual regional conditions. With the number of registered vehicles in Korea reaching over 12 million, cars have emerged as the main source of urban air pollution. According to official statistics, 85 percent of air pollutants are emitted from vehicles. The Korean government pushes systematic steps for clean air including promotion of natural gas vehicles. Special efforts will be made to replace diesel-run intra-city busses with compressed natural gas (CNG) busses, considered one of the best means to improve the urban environment. In 2001, a total of 58 CNG busses are in operation, 43 of them in the metropolitan area of Seoul and 11 in greater Pusan area. Officials expects the number of CNG busses in service to increase to 5.000 by 2002 when the construction of 100 refueling stations is completed. Besides, the government is offering financial support and incentives to promote this replacement, including subsidies for purchase of CNG busses and cuts on value-added tax and acquisition tax.

The 13th World Clean Air Congress is set to be held 2004 in Israel. For more information, visit: www.iuappa2001.org

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Geographic Information Sciences meet Public Health, 19 to 20 September 2001, Sheffield, UK

Geographic Information Sciences in Public Health – this was the title of the first European conference in this field held in Sheffield, UK, from 19 to 20 September 2001. The meeting which was supported by the European Commission was attended by approximately 250 experts mainly from the UK and continental Europe, including several WHO and WHO CC representatives. Germany was represented by six delegates with a geographical background, reflecting the fact that the GIS Public Health interface is predominantly covered by the Working Group on Medical Geography within the German Society of Geography. During two days, 70 scientific papers were presented in a very dense programme of 22 sessions. Additionally, 34 papers were presented as posters. But: Geographic Information Sciences? In Public Health? What does it mean?

Robert Haining, Cambridge, stressed in his keynote that Geographic Information Sciences comprise Geographical Information Systems, geographical concepts as well as methods of spatial analysis. Geographic Information Sciences in Public Health implicate, as was pointed out widely in the opening lecture by Ravi Maheswaran, Chair of the Conference Scientific Committee, Sheffield, much more than just the use of Geographic Information Systems in Public Health. It includes first of all public health questions with spatio-temporal contexts, then mostly an epidemiological study design, the use of the GIS (Geographic Information Softwaresystems) itself to visualise the public health problem spatially and to carry out spatial analyses, and finally it includes the development of methods to solve public health problems.

As visible in the conference programme, Geographic Information Sciences in Public Health is a large scientific area with many facets. Following this, the keynote lectures dealt with "Mobile devices and GIS in health – new opportunities and threats" (Markku Löytönen, Helsinki) and "Geographic Information Science and Public Health Services" (Robert Haining). The sessions filling the two days programme had the headings "Communicable Disease and Environmental Health", "Methods and applications in spatial analysis", "Planning and policy", "Geography, politics and health", "Health needs and health impact assessment", "Geographic variations in health", and "GIS in the National Health Service", reflecting the great variety of topics and characterising the wide range of geographical studies in Public Health.

Throughout sessions, theoretical reflections and practical examples from the local level up to the nationwide and the international level were given. The involvement of geographical information into the international context, especially for the surveillance of communicable and environmental diseases, reflects the importance of the spatial component for public health. The added value was shown, to harmonise data collection on all administrative levels, and to get facilities to carry out epidemiological studies using the same statistical methods (including GIS).

The use of sophisticated and adequate spatial methods to investigate spatial relationships between the environment and human health, as was demonstrated inter alia by David Briggs, London, with several examples of GIS-based exposure-modelling in small area health statistics units (SASHU), should achieve greater impact in understanding spatial influences on falling ill or stay healthy and to derive further public health policies. The findings of Peter Fryers, Sheffield, supported the results of several previous studies that chronic outdoor air pollution has a harvesting effect with respect to chronic heart disease and stroke, and chronic respiratory disease patterns are affected as well.

The first European Conference on Geographic Information Sciences widened the horizon for hopefully all participants who mostly deal with spatial data as public health professionals all over the world. It is to hope that results of this conference can be transferred to advance GIS-applications, to improve possibilities of health systems, and to reduce inequalities in health, especially concerning infectious and environmental diseases.

During pre- and post-conference meetings, the scientific commitee (Ravi Maheswaran, Sheffield; Christina Reuterwall, Stockholm; Marco Martuzzi, Rome; Massimo Craglia, Sheffield; Jean-François Viel, Besançon; Thomas Kistemann, Bonn) broadly discussed perspectives of a future research agenda, of harmonised training programmes, of European networking and both national and international follow-up events.
The geographic perspective is a key aspect of public health. This was highlighted by Sir Donald Acheson´s remarkable contribution on geographic variations in multiple sclerosis. And through his review, he clearly outlined the potential strength of the geographical approach: ‘And if anywhere, the geographical approach will be able to contribute to the understanding of MS distribution and aetiology.’ The Sheffield conference turned out to be a landmark on the way ahead.

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53105 Bonn, Germany

Conference Week on Environmental and Genetic Influences on Human Health, 19 to 20 September 2001, Garmisch-Partenkirchen, Germany

This Conference Week, hosted by the Institute of Epidemiology of the GSF Research Center for Environment and Health, Neuherberg, Germany, and co-chaired by H.-Erich Wichmann and Ivan Ciznar, combined several conferences:

- Conference of the International Society for Environmental Epidemiology (ISEE), organised together with the Central and Eastern European (CEE) Chapter of ISEE,
- Tenth Conference of the International Genetic Epidemiology Society (IGES),
- Ninth Conference of the Gesellschaft für Hygiene und Umweltmedizin (GHU) and Fifth Conference of the International Society of Environmental Medicine (ISEM),
- Ninth Annual Meeting of the Deutsche Arbeitsgemeinschaft für Epidemiologie (DAE).

A total of more than thousand participants had the opportunity to get recent information in their own field of work as well as from other more or less adjacent fields, to exchange views with colleagues from all over the world and perhaps also to enjoy the beautiful Bavarian surroundings with Germany`s highest mountain, the Zugspitze.

During the Opening Cerenomy, Wieslaw Jedrychowski (Chair of Epidemiology and Preventive Medicine, Jagiellonian University, Krakow, Poland) received the John Goldsmith Award for his outstanding contributions to epidemiology.
Among the main topics of the ISEE conference were the health effects of outdoor and indoor air pollution, mainly particulate matter, with symposia on the ULTRA Study and APHEA 2 (Air Pollution and Health: a European Approach). The sessions and symposia were either structured with respect to sources and causes like traffic, pesticides, electromagnetic fields, metals, arsenic, or health endpoints and targets like allergy, immune system, mortality, cancer, reproduction. Two sessions were focussed on statistical methods.
Health effects of particles play, and will continue to play, an important role in air pollution epidemiology. Despite research work on ultrafine particles (UF), our knowledge on the health effects of UF is still very limited. A currently discussed hypothesis is that UF mainly affect the cardiovascular system, whereas fine and coarse particles would primarily affect the respiratory system. This might support the hypothesis that fine and coarse particles on the one hand and UF on the other are two classes of air pollutants different in sources and effects.

With respect to measurement, this would mean that particle **mass** continues to be the adequate metric for coarse and fine particles, and in addition, particle **number** should be counted in order to assess UF. Under methodological aspects, studies on the lag structure (lag = time between exposure and observed health effect) seem to be an interesting approach to source apportionment and, indirectly, to find out which are the health relevant compounds or properties of particles.

The GHU/ISEM programme covered themes like risk assessment and management, biomarkers, and MCS. A trinational study (Austria, France, Switzerland) was presented by N. Künzli (Basel) as an example of health impact assessment of air pollution. A paper by N. Englert (Berlin) discussed the adequate way to present mortality data (number of premature deaths vs reduction of life expectancy).

Among the Satellite Workshops that completed the programme of the Conference Week, the US-European Workshop "Gene-Environment Research at the Interface of Toxicology and Epidiology" and the RIVM Workshop "Health Risks of Small Particles in Ambient Air, a Dutch Perspective" should be mentioned. In the latter, Dutch work preparing the revision of the 1st EC Daughter Directive on Ambient Air scheduled for 2003 was discussed.

This short report gives some of the conference week. Although the programme of this conference week was far to extensive to be followed by one individual in all its aspects, it offered an excellent opportunity to get information from many different fields and to meet colleagues from neighbouring fields. For those who are interested in more details: the abstracts of the presentations are available on the web:

http://www.gsf.de/epi/gap2001/general_info/index.htm

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PUBLICATIONS

WHO

The World Health Report 2001. Mental Health: New Understanding, New Hope

WHO Geneva 2001, 178 pages, ISBN 92-4-156201-3. Copies of this publication could be ordered from: mailto:bookorders@who.int

The World Health Organization`s (WHO) premier publication will be the highlight of a year-long campaign on mental health.

WHO – UN/ECE Synthesis Report: Overview of Instruments Relevant to Transport, Environmental and Health and Recommendations for Further Steps

(English, French, German, Russian)
UN Economic Commission for Europe,
Geneva, Switzerland, 2001. ECE/AC.21/2001/1 – EUR/00/5026094/1

OTHERS

Aerosol Chemical Processes in the Environment

K. R. Spurny. CRCPress, London 2000, ISBN 0873718291, 640 pages, £ 59.99

A compilation of the most important aerosol chemical processes involved in known scientific and technological disciplines, Aerosol Chemical Processes in the Environment serves as a handbook for aerosol chemistry. Aerosol science is interdisciplinary, interfacing with many environmental, biological and technological research fields. Aerosols and aerosol research play an important role in both basic and applied scientific and technological fields. Interdisciplinary cooperation is useful and necessary. Aerosol Chemical Processes in the Environment uses several examples to show the impact of aerosol chemistry in several different fields, mainly in basic and atmospheric research. The book describes the most important chemical processes involved in the various scientific and technological disciplines.

Indoor Air Quality: Sampling Methodologies

Hess-Kosa, Kathleen OMEGA Southwest Environmental Consulting, Texas, USA, 2001, 320 pages, ISBN: 1566705398, £ 59.99

Indoor Air Quality: Sampling Methodologies provides environmental professionals and industrial hygienists with the latest information available in “indoor air quality sampling.” In most instances, there are no established government protocols. In this book, the author presents prominent contributions and discusses the practical concerns that determine which sampling approach is best for a given situation.
The author defines and clarifies indoor air quality and its historic background. She presents a diagnostic approach to addressing health concerns, brief overview of air handling systems, observations to be made regarding indoor activities, information regarding air emissions from other buildings, and a discussion of individual susceptibilities to various substances. The book covers sampling strategies, sampling/analytical protocols, suggested uses for these protocols, and a means for interpreting results.
A one-of-a-kind, practical guide for assessing indoor air quality, this book gives you step-by-step instructions for all sampling tasks and includes background information, occurrence and uses of contaminants, exposure and diagnostic sampling and analytical protocols, and helpful hints based on the authors observations and experience. It shows you how to develop a theory and follow it through to identification of unknown air contaminants. The book contains more than 150 charts, tables photographs, and drawings and includes an extensive glossary and symptoms index. No other book offers you the concise, in-depth, and practical coverage you will find in Indoor Air Quality: Sampling Methodologies.

The Chemistry of Environmental Tobacco Smoke: Composition and Measurements, Second Edition

Guerin, Michael R et al., Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA, 2000, 480 pages, ISBN/ISSN: 1566705096, £ 53.99

Written by experts in the field. The Chemistry of Environmental Tobacco Smoke:
Composition and Measurement, Second Edition compiles data on the properties of Environmental Tobacco Smoke (ETS) and on concentrations of its constituents in indoor air. The authors focus on common natural indoor environments associated with chronic exposure. They stress measurement methods and competing sources of indoor air contaminants commonly attributed to ETS.

COMING EVENTS

2002

January 2002

Third International Symposium on Non-CO_2 Greenhouse Gases (NCGG-3) Scientific understanding, control options and policy aspects
21-23 January, Maastricht, The Netherlands.
For information, contact: VVM/MILCON, Symposium Secretariat, P.O. Box 2195, 5202 CD Den Bosch, The Netherlands, phone: +31-73-621 5985, fax: +31-73-621 6985, e-mail: mailto:vvm@wxs.nl

May 2002

IFEH
7th World Congress of the International Federation of Environmental Health
18-24 May, San Diego, California, USA.
For information, contact: International Federation of Environmental Health, Directory Editor, 26 Grebe Close Stockport SK12 1HU, UK
Congress website: http://www.ifeh2002.org/

June 2002

Neuere Entwicklungen bei der Messung und Beurteilung der Luftqualität (New Developments in Measuring and Assessing Air Quality)
11-13 June, Schwäbisch Gmünd, Germany.
Hosted by: VDI – Verein Deutscher Ingenieure, Kommission Reinhaltung der Luft.
For information, contact:
http://www.vdi.de/vdi/tsv/t_kongresse_details/index.php

Molecular Epidemiology in Preventive Medicine - Achievements and New Challenges
20-22 June, Krakow, Poland.
For information, contact: Jagiellonian University Collegium Medicum, Chair of Epidemiology and Preventive Medicine, ul. Kopernika 7, 31-034 Krakow, Poland, phone: (4812) 423 10 04, fax: (4812) 422 87 95,
e-mail: mailto:myjedryc@cyf-kr.edu.pl

HUMOGE
Human Monitoring for Genetic Effects
23-28 June, Krakow, Poland.
For information, contact: Jagiellonian University Collegium Medicum, Chair of Epidemiology and Preventive Medicine, ul. Kopernika 7, 31-034 Krakow, Poland, phone: (4812) 423 10 04, fax: (4812) 422 87 95,
e-mail: mailto:myjedryc@cyf-kr.edu.pl

The Third Annual Workshop in Evidence Based Preventive Medicine
24-28 June, Krakow, Poland.
For information, contact: Jagiellonian University Collegium Medicum, Chair of Epidemiology and Preventive Medicine, ul. Kopernika 7, 31-034 Krakow, Poland, phone: (4812) 423 10 04, fax: (4812) 422 87 95,
e-mail: mailto:myjedryc@cyf-kr.edu.pl

9th International Conference on Indoor Air Quality and Climate - Indoor Air 2002
30 June - 5 July, Monterey, California, USA.
For information, contact: Hal Levin, President, Indoor Air 2002, 323 Soquel Ave. PMB 312, Santa Cruz CA 95062, USA, phone: +1-831-426-0148, fax: +1-831-426-6522.
See also: http://www.indoorair2002.org/

July 2002

Air Pollution 2002
10th International Conference on Modelling, Monitoring and Management of Air Pollution
1-3 July, Segovia, Spain.
For information, contact: AIR02, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO407AA, UK, phone: +44 238 029-3223, fax: -2853,
e-mail: mailto:Isouthcott@wessex.ac.uk,
http://www.wessex.ac.uk/conference/2002/air02

October 2002

16th International Congress of Biometeorology
28 October – 1 November, Kansas City, Missouri, USA.
Hosted by: International Society of Biometeorology.
For information, see:
http://www.mcc.missouri.edu/icb2002/

2003

March 2003

PM 2003
4th International Colloquium on Particulate Air Pollution and Human Health Conference
31 March - 4 April, Pittsburgh, USA.
For more information, contact: American Association for Aerosol Research (AAAR), 1330 Kemper Meadow Dr, Cincinnati, OH 45240, USA, fax: +1-513-742-3355,
e-mail: mailto:mail@aaar.org

EDITORS' NOTE

We appreciate submissions to NOTES AND NEWS regarding programmes and projects within the field. Notes (100-500 words) should be sent directly to the WHO Collaborating Centre for Air Quality Management and Air Pollution Control.

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http://www.umweltbundesamt.de/whocc/titel/titel21.htm