Particulate Matter: Properties related to health effects

Working Group 1 (Air Quality and Instrumentation) meeting

Brussels, November 19, 2004

Minutes

The WG1 meeting was chaired by J.P Putaud (EC-JRC) and A. Berner (U.-Vienna, AT), and attended by representatives from Austria, Czech Republic, Finland, France, Greece, Hungary, Italy, Lithuania, Norway, Portugal, Slovenia, United Kingdom, + P. Rombout and R. Hitzenberger (part time).

Comment: Countries please in alphabetic order.

J.P. Putaud thanked the attendees for participating to the WG1 meeting and highlighted the need of active participation to the discussion. The WG1 meeting agenda was presented and accepted by the audience without modification.

COST633 WG1 objectives

As new National Representatives or substitutes were present, J.P. Putaud reminded and commented the goals of WG1, expressing his wish of focusing on achievable targets. Within the overall objectives of COST 633, the specific objectives of WG 1 are:

1) To provide an overview of the information available in Europe on data (Task 1) and measurement techniques (Task 2) relative to particulate matter (PM)

This information should be provided in a suitable form to researchers, national and international organizations, and policy makers dealing with the health effects of atmospheric pollution.

It should specifically include:

Task 1- the existing information on the particulate matter (PM) characteristics throughout Europe, beyond what is already reported through the main networks (EuroAirnet, EMEP, …) on PM chemical composition, particle number size distribution and particle formation processes as a function of geographical and climatologic conditions. To achieve this, we are aiming at collecting the existing data in different countries to highlight regional differences in aerosol over Europe with special emphasis on the organic fraction. This means that we will also include data gathered in the frame of research (and not only monitoring) activities.

During the plenary discussions, it appears that gaseous pollutants can modify the health effect of particles. Collected data sets may therefore also include the main gaseous pollutants (NOx, SO_2, O_3), which was not planned initially.

Task 2- the current feasibility and accuracy of measurements of the possibly health related PM parameters. Indeed, research on the PM health effects would need specific data such as the aerosol surface area after the soluble part of the particles have been removed, the red-ox potential of PM with respect to living tissues. These parameters are currently not measured because of a lack of suitable methods. On the other hand, many of the PM parameters currently measured in the frame monitoring networks and

research programs are affected by uncertainties and artifacts, generally well known by WG1 members. Task 2 includes the assessment of the available measurement techniques with respect to the needs of the health-related aerosol research, including:

- sampling techniques (filter artifacts, impactor efficiencies, etc, …)
- analytical methods (organic carbon (OC), elemental carbon (EC), OC speciation, heavy metals (?), black smoke).

2) To give input to WG2 and WG3 on measurement aspects

The information on available PM data and on the development and accuracy of new or existing methods for PM characterization has also to be synthesized and provided to WG2 and WG3 members in a suitable form.

To proceed efficiently, WG1 needs inputs and feedbacks from other WGs, and should foster requests from WG2 and WG3

The results of COST633 WG1 are expected to:

- complement the existing data sets containing just PM (AIRNET) or inorganic aerosol components (EMEP)
- provide thus a basis for linking regional differences in PM effects on health to regional differences in PM composition and size distribution
- suggest cost-effective abatement strategies for mass, surface and number aerosol concentrations on a regional basis
- contribute in defining normalized methods for future aerosol legal indicators.

The research gaps highlighted by COST633 WG1 may also:

- motivate sound aerosol measurement programs at Member States level
- trigger the preparation of future EU projects or so for issues that cannot be tackled at national levels.

These objectives and targets were generally agreed upon by the attendees.

Carlos Borrego (Portugal) was asked to specify his view regarding the means for collecting aerosol data sets. He expressed his opinion that it would have been more efficient to contact the relevant Ministry of each participating counties.

J.P. Putaud answered that it might have been difficult and longer to identify the right person to be contacted in each Ministry, and recalled the statement by W. Kreyling during the MC meeting that Ministries might well not be aware of projects funded by other sources (e.g. the EU).

Following a question of A. Berner, it was asked to the audience if someone had an expertise on heavy metal analyses, and nobody answered yes.

Black smoke (BS) has been monitored for decades in many sites. There was no expert on BS measurement among WG1. However, P. Rombout stated that revising archived BS data would be helpful for the PM health effect community. He mentioned articles dealing with historical black smoke data (e.g. Novakov and Hansen, Atmospheric Environment 38 (2004) 4155–4163) and advised to contact H. ten Brink (NL) regarding this argument.

COST 633 WG1 work progress

Task 1: aerosol data compilation

J.P Putaud made a summary of the activity carried out regarding the aerosol data compilation:

- during the last Management Committee meeting in Ispra (13-15 May 2004), all the National Representatives attending the WG meeting agree to help in collecting the aerosol data sets regarding their country.
- at the Steering Group meeting in Munich on 23-24 Sept. 2004, a tentative list of data selection criteria was agreed upon
- on 11 Oct., an email was sent to NRs of 16 countries (CH, NO, GR, SI, UK, FR, DE, IT, LT, CZ, AT, HU, FI, ES, NL, PT) asking for identifying all the aerosol data sets, whether published or not, from past or currently on-going monitoring activities fulfilling the requirements. Deadline was set to 10 Nov.
- on 16 Nov 2004, among the 16 contacted participating countries, just GR, SI, UK, DE, CZ, AT, FI, ES, and PT (i.e. 9 countries) reacted, among which 6 provided a comprehensive picture.

JPP underlined that no request was sent to Belgium (no current NR) and Turkey (withdrawn). He asked for comments from the NRs of countries which did not react to get elements in order to find solution for fostering the participation to this activity, such as involving more experts. All the NRs sitting around the table were given the opportunity of expressing themselves. The result of this "tour de table" was that there are no real problems for providing the Action with the requested information, and that it should be achieved by the new deadline fixed to **15 Dec. 2004.** It should be noticed however that no representative from CH, DE, and NL was attending the WG1 meeting. NRs who just provided links to existing data bases were invited to provide more elaborated information.
JPP briefly went through the information regarding the aerosol data received at the time of the meeting. More than 100 data sets were already identified. There are (expectedly) many more PM mass concentration data than chemistry or particle number data. If the selection criteria decided upon at the SC meeting in Munich are applied, 43 data sets only should be considered. The questions of softening the selection criteria and/or archiving all the data which are not already in an international and "eternal" data base have to be envisaged. It appears also that very few data sets include OC or specific organic species. This may constrain the revision of one of our major objective of "emphasizing on organics".

Task 2: aerosol measurements review

A. Berner listed a number of points to be addressed in this field.
Carbonaceous matter -including elemental carbon- in PM, the accuracy of PM_{10} and $PM_{2.5}$ data, and the effects of instruments are in the scope of WG1. Special attention should be paid to two major topics: the occurence of sampling artifacts and the accuracy of data. Sample artifacts formed on filters and in instruments represent serious drawbacks. The work must be concentrated on questions as to how to avoid and to minimize sampling artifacts by optimizing current sampling techniques and by developing sampling techniques with less potential for the formation of artifacts.

Except reduction of pressure drops in sampling instruments, the electric mobility technique offers good chances to minimize sampling artifacts. This technique should be used for reference at least. A lack of accuracy of PM data can cause problems. It is known that the PM_{coarse} fraction resulting from the difference of simultaneous PM_{10} and $PM_{2.5}$ data sampled at a site may yield significantly negative values. This points out an uncontrolled failure of either sampling train. (Comment: The relation of relative humidity to PM should exist, but it is only indicated in one out of two long-term PM data sets. The reason is probably a lack of accuracy of the relative humidity signals in one data set. The example will be explained at the next meeting.) This leads to a general problem as to how the accuracy of the data and on the true fluctuations influence the efficiency of the models. There is certainly an urge to re-address the accuracy problem of PM signals, and the fluctuations of these signals, in behalf of modeling.
Christian Dye (Norway) agreed already to review the existing methods for OC speciation. It is expected that he will focus on the species which can play an important role in health effects.
A draft document on aerosol measurement issues will be produced by A.Berner by the end of March 2005, and serve as a basis for further work.

Planning future work within WG1 (Milestones and deliverables)

Task 1:

- Information regarding the data sets in the participating countries which did not yet provided the Action with this information should be delivered by **December 15th**, 2004.
- Information on the aerosol data existing for the various participating countries is made available on the Action web site by the end of February
- Official request is made to the National Institutions for submitting their data to the restricted access COST633 data bank. A common format will be recommended.
- Uploaded data are processed in order to be presented at the MC meeting on April 25th – 26th.

Task 2:

- Axel Berner delivers to the Action web site by March 30th a draft document on aerosol measurement issues, which serves as a basis for discussion at the next MC meeting
- Experts in heavy metals and black smoke measurements to be identified.