

## Particles in Europe – 13th & 14th June 2006 Antwerp

### Summary of the Final Discussion: Outstanding Issues – the way forward

Paul Quincey set out the main context for the issues discussed at the conference, namely the need to define actions that would reduce the effects of airborne particles on humans in Europe. On the purely scientific side, the causes of the health effects are not clear, and this needs to be addressed by better particle characterization techniques and health effects studies. In parallel, the causes of human exposure need to be clarified, in terms of sources (both particles and particle precursors) and atmospheric modeling. From a practical viewpoint, monitoring networks and legislation are already in place, and we need to address how these can be best adapted in the light of improved scientific knowledge, making best use of organizations such as the EU, CEN, JRC Ispra, CAFÉ and AQUILA.

Points arising from the Conference were summarized by the Session Chairmen Edward Roekens, Andrej Kobe, Emile de Saeger and Peter Woods.

By way of background, limit values for PM<sub>10</sub> were exceeded in one third of zones in Europe in 2004, while the limit values for 2006 had already been exceeded in several countries. The cost of implementing proposed new Legislation would be high (7.5 billion Euros), but the benefits (42-135 billion Euros) would be much higher. The new legislation puts forward a concentration for PM<sub>2.5</sub> of 25 µg/m<sup>3</sup> in 2010, and an exposure reduction target of 20% in the period 2010-2020. It allows for flexibility of the attainment date by a delay of 3 to 5 years, and the possibility of deducting natural contributions from the measured concentration.

In the US the limit value is lower, namely 15 µg/m<sup>3</sup> as an annual average, but the measuring strategy is different from that of Europe. In the US, measurements are done in residential areas, comparable with urban background in Europe, but in the US there are no measurements on “hot spot” areas.

A coarse particle standard (PM<sub>10-2.5</sub>) is under discussion, with the 98<sup>th</sup> percentile of daily averages being 70µg/m<sup>3</sup> over a three year period. CAFE provided major technical support for the legislation, for example providing the PM position paper and the assessment of WHO guide values. It gave guidance on PM<sub>10</sub>, VOC monitoring, NEC reporting and the demonstration of equivalence. In the near future it would work on the implementation and revision of the NEC directive. Its role could change from participation to information.

AQUILA brings together the competent authorities and the technical people dealing with Air Quality monitoring from member states, together with the relevant international institutes and the Commission. It also harmonises monitoring methods and gives technical support in this field.

The adverse health effects of PM have been clearly demonstrated, by EU as well as US studies, but the specific cause of toxicity is not known. One leading candidate is the free radical theory of PM toxicity. There are also indications that the ultrafine or nanoparticle component is important.

Sources and source apportionment is an important area of research. Both local and regional sources need to be included. Several parameters need to be monitored for any proper assessment, so it is vital to make use of the large quantities of data now available from around Europe.

Monitoring strategies need to be closely linked to the requirements of health studies, with emphasis on harmonised techniques for common parameters such as PM<sub>10</sub>, and for other metrics such as ultrafines that may prove important. The concept of superregions with coherent Air Quality and health effects monitoring strategies was mentioned, and the APHEIS network was considered a useful model. Superstations with a large number of measured metrics were necessary to support assessment and modelling.

An overview of the standardisation activities and procedures supporting the EU air quality policy within CEN was presented. CEN standards, in comparison to other standards, offer performance based standards, relying on validated methods tested in laboratory and field conditions and including the assessment of measurement uncertainty. In discussions, concern from the audience was raised on the long time needed for the development of the standards, their revision, and the financial aspects of funding of the validation work.

The work of CEN TC 264 Working Group 15 covers the standardisation of PM<sub>2.5</sub> measurements and the revision of the PM<sub>10</sub> standard method. The measurement of the PM<sub>2.5</sub> and PM<sub>10</sub> fractions by gravimetry suffer from a number of artefacts due to sampling heads, filter material and manufacturer, and filter transport and conditioning. The revision of the PM<sub>10</sub> standard will be based on the PM<sub>2.5</sub> standard EN 14907. The main modifications to be considered involve the selection of only one PM<sub>10</sub> inlet, the selection of one only filter type, and filter conditioning at a RH lower than 50%. The revision of the PM<sub>10</sub> standard may further lead to a combined PM<sub>2.5/10</sub> standard.

Amongst the concerns of the audience, the need for a standard for automated monitors was discussed. One possibility is that the gravimetric reference method combined with the equivalence testing procedure provides an adequate solution.

The practical issues of making automated PM measurements that are equivalent, within the meaning of the Air Quality Directives, were discussed. The EU Equivalence Guidance document was explained, and the results of a major Equivalence trial in the United Kingdom were announced. Results from Germany were also presented.

The QA/QC activities organised by JRC Ispra, in collaboration with AQUILA, were described, for example interlaboratory exercises, the development of a combined Certified Reference Material for heavy metals and PAHs, and the quality control of PM measurements in the EU monitoring networks. The results of the first field comparisons between the EC gravimetric standard method, the national reference method and the method used in the monitoring station were presented. The first result showed a 15% underestimation of the national reference method with respect to the EC gravimetric method, illustrating the difficulty of harmonising PM<sub>10</sub> measurements.

The effects of ozone on the sampling of PAHs can lead to the possible depletion (up to 50%) of the collected PAH during sampling. This can be solved by using an ozone scrubber installed in the sampler prior to the collection on the filter, without significantly affecting the amount of particles collected.

A “state of the art” review was given of deposition measurements of mercury, PAHs and Heavy Metals, mainly addressing the validation work that is currently going on in CEN TC 264. This validation work includes measurements in industrial, urban and remote areas, different deposition gauges and interference effects from ozone and light.

The experience in assessing heavy metals in Flanders, both in ambient air and deposition, was presented. This was followed by a review of heavy metal levels measured in the EU, in the light of the target values imposed by the 4<sup>th</sup> Daughter Directive. The need for improved

modelling tools for HM assessments, and the difficulty of developing action plans in areas with high historical HM loads or in industrial regions already applying BAT technologies, were highlighted, together with the desirability of integrated assessment of air, soil and water pollution in industrial areas, and an extension toward biomonitoring.