

# Airborne Particulate Pollutants: Physicochemistry and Toxicity

## Objectives

- to collect and provide detailed physicochemical analysis of PM10 (defined as particulate matter which has an aerodynamic diameter of less than 10 $\mu$ m) from four sites (industrial, densely populated urban, open cast mining and rural) in the South Wales conurbation
- to examine the ability of the characterised samples of PM10 to produce lung inflammation, increase lung permeability or initiate epithelial damage
- to determine if the effects are transient or progressive.

## Location

South Wales

## Approach

This project has a multi-disciplinary approach to collect, quantify, physicochemically characterise and determine the respiratory toxicology of different samples of airborne particles. The research is especially timely because of the increasing concerns by government, medical and environmental professionals about possible adverse health effects of particulate pollution. In addition, there is growing public concern, particularly amongst asthmatics and the healthy population, who live near traffic or other particle-generating sources, that airborne pollutants may be detrimental to health.

## Start date/duration

August 1998      Three years

## Lead Organisation

Cardiff University

## Progress and Achievements

Airborne particulate matter has been collected using the 30 lt/min air pumps, Negretti heads and polycarbonate filters. Particles have been physicochemically characterised. The particles have been subjected to toxicological assays.

## Deliverables

The studies will provide information on heterogeneity of PM10 at the four sites, link mass of particles collected to their size distribution, and from chemical analyses, help with source apportionment (traffic, industrial, mining, agriculture etc). A comparison of the results of these studies with previous findings from other environmental (eg diesel) and occupational (eg Cabosil) fine particles for which safety limits have already been set, will permit the end user organisation(s) to provide risk assessment and supply public advice.

## Presentations and Publications

### Papers submitted and in press:

**Microscopy and chemistry of particles collected on TEOM filters: Swansea, south Wales, 1998-99.** T.P.

Jones, B.J. Williamson, K.A. BéruBé, R.J. Richards. - (*in press*) *atmospheric Environment*.

**Characterisation of airborne particles collected within and proximal to an opencast coalmine: south Wales, UK.** Tim Jones, Pete Blackmore, Matt Leach, Kelly BéruBé, Keith Sexton, Roy Richards. - *submitted to Environmental Monitoring and Assessment*.

### Abstracts:

**A Comparison of Indoor and Outdoor PM10 Mass and Related particles.** BéruBé, K.A., Jones, T.P., Sexton, K. and Richards, R.J. *Experimental Lung Biology*, (in press).

Jones, T.P., BéruBé, K.A., Reynolds, L.R. and Richards, R.J. (2000). **Physicochemical Characterisation of Some South Wales Airborne Particles: Park Slip West Coal Open-cast.** *In: Proceedings of Natural Environment Research Council Urban Regeneration and Environment (URGENT) Programme Annual Meeting*, Swindon.

Jones, T.P., BéruBé, K.A., Reynolds, L.R. and Richards, R.J. (2000). **Physicochemical Characterisation of Some South Wales Airborne Particles: Port Talbot.** *In: Proceedings of Natural Environment Research Council Urban Regeneration and Environment (URGENT) Programme Annual Meeting*, Swindon

BéruBé, K.A., Jones, T.P. and Richards, R.J. (2000). **Physicochemical Identification and Comparative Bioperistence of Indoor and Outdoor Airborne Particulate Matter.** *Proc. Microsc. Microanal.*, 6 (Suppl. 2), 914-915.

Jones, T.P., BéruBé, K.A., Reynolds, L.R. and Richards, R.J. (2000). **Microscopy of Airborne Particulates from Open-cast Coal Pits.** *Proc. Microsc. Microanal.*, 6 (Suppl. 2), 414-415.

Reynolds, L.R., BéruBé, K.A., Jones, T.P. and Richards, R.J. (2000). **Gene Expression profiling Following Instillation of Diesel Exhaust particles in the Lung: a first study.** *Proc. Microsc. Microanal.*, 6 (Suppl. 2), 910-911.

## Users

Welsh Office

Research community

Regional community

## Further Details

Further information is available from the following contacts:

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