

Report

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**A Review of the UK urban network for measurement of Black
Smoke, SO₂ and NO₂: Summary report**

**Fowler, D., Cape, J. N., Derwent, R., Hayman, G., Harrison, R.,
Laxen, D., Loader, A., Moorcroft, S., Stedman, J., Sutton, M.,
Targa, J. (2006)**

Background

In 2005, Defra commissioned an independent review of the UK urban network for measurement of Black Smoke, SO₂ and NO₂. The objectives of the review were:

1. To examine the value of the non-automatic networks of urban measurements of black smoke, SO₂ (by wet acidity) and NO₂ (by diffusion tube).
2. To provide recommendations to Defra and the devolved administrations on ways of restructuring the networks to match current monitoring and research priorities.

Review group

The Review was carried out by a small group of experts:

Professor D. Fowler (Centre for Ecology and Hydrology) Chair;

Professor J. N. Cape (Centre for Ecology and Hydrology);

Professor R. Derwent (rdsscientific);

Dr G. Hayman (Netcen);

Professor R. Harrison (University of Birmingham);

Professor D. Laxen (Air Quality Consultants Ltd.);

Ms A. Loader (Netcen);

Mr S. Moorcroft (Air Quality Consultants Ltd.);

Mr J. Stedman (Netcen);

Dr M. Sutton (Centre for Ecology and Hydrology);

Mr J. Targa (Netcen);

With input from officials from Defra and the devolved administrations.

The review group considered a range of background documents including reports from the networks (AEAT/ENV/R/1559,0848,0662,1911,1926) and an earlier review by Air Quality Consultants. The group met to consider the purpose for current monitoring of these pollutants, the methods in use within these networks and their suitability to address current air quality issues. The outcome of these discussions forms the basis of the conclusions and recommendations put forward by the review and are summarised below.

NO₂ diffusion tube Network

Diffusion tube measurements are not necessary to define the spatial pattern in NO₂ concentration. However, the method is widely used by local authorities and, for them, there is value in diffusion tube measurements for review and assessment. The major problem with the method is the lack of intercomparability between the different laboratories.

An option of providing a NO₂ calibration club was considered: self funded, part funded or full funded by Defra and devolved administrations. The consensus on this option was that it does not address the central issue of providing NO₂ measurements which can be demonstrated to be equivalent to the standard method.

Consideration was given to the central collation of the diffusion tube data, but again, in the absence of evidence showing the equivalence of the method, the value of the data collated is limited and this is not therefore a high priority. The adoption of a standard protocol with traceability to a reference method would make the central collation of data useful for trend analysis and wider application of the data for assessment.

The Review Group recommend:

1. Using Defra and devolved administrations resources to encourage a common protocol in NO₂ measurement using diffusion tubes. For these measurements to be valuable, it is necessary to establish a standard operating method and demonstrate equivalence with a standard method.
2. The adoption of a standard protocol with traceability to a reference method would make the central collation of data useful for trend analysis and wider application of the data for assessment.

SO₂ measurements by net acidity using bubbler methods

The group concluded that the net acidity method for SO₂ was no longer providing useful data. Ambient SO₂ concentrations are smaller than the detection limit of the method and SO₂ is no longer a serious air quality issue in UK urban areas.

The Review Group recommend:

1. Stopping these measurements in almost all areas of the UK as concentrations are very small and unsuitable for the method.
2. There are exceptions, notably in some parts of Northern Ireland and Northern England where some sites need to be maintained until ambient concentrations are no longer considered to be an issue. The monitoring at these sites is not considered to require central support from Defra and devolved administrations.

Black Smoke measurements

The consensus of the group was that Black Smoke measurements remained valuable, particularly for health assessment, and that higher quality measurements, improved temporal resolution and some continuation of sites with long term records were all necessary.

The Review Group recommend:

1. That up to 20 sites be retained using existing methods, as the method still has sufficient sensitivity for black smoke measurements. These sites should primarily be in the coal burning areas of the UK.
2. As many existing Black Smoke measurement sites are not ideally located for epidemiological studies, some of the sites should be relocated to AURN locations, which are located to represent general urban background exposure.
3. To equip some AURN sites with higher quality Black Smoke measurement systems (e.g. aethalometers) and as an option, to consider the use of two channel instruments to provide an indication of the contribution of local diesel contributions to the black smoke concentrations.