

# PRELIMINARY EVALUATION OF THE UPDATING AND SCREENING ASSESSMENT FOR AIR QUALITY MANAGEMENT IN THE BRITISH LOCAL AUTHORITIES

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## ABSTRACT

Local air quality management (LAQM) is the process by which air quality control is being carried out in Great Britain. In 2003 the Government suggested a new two stage prescriptive approach to local air quality review and assessment substituting a three stage approach used in 1999-2001. This approach comprises an Updating and Screening Assessment (USA) and a Detailed Assessment (DA) stage. This paper evaluates the technical and managerial practices of the local authorities across Great Britain during the USA phase of assessment. It explores issues and concerns raised by the local authorities in the second round of review and assessment. Results are presented from a questionnaire survey of environmental health professionals of the 407 local authorities in Britain conducted in August 2003. A 43% response rate was achieved during this survey. From the local authorities that responded to the questionnaire, it appears that 53% are proceeding to DAs for combinations of pollutants; nitrogen dioxide, PM<sub>10</sub>, sulphur dioxide and benzene.

## INTRODUCTION

Part IV of the Environment Act 1995, Part IV [1] provides the legal underpinning for the Local Air Quality Management framework in the UK. Section 80 obliged the Secretary of State to publish a National Air Quality Strategy. This was published in March 1997 [2]. The Strategy outlined the methods and targets to be pursued by the Government based on health effects standards for eight pollutants. The Air Quality Regulations 1997 [3] subsequently gave legal weight for standards and objectives for seven pollutants: benzene, 1,3 butadiene, carbon monoxide, lead, nitrogen dioxide (NO<sub>2</sub>), particles (PM<sub>10</sub>) and sulphur dioxide (SO<sub>2</sub>).

Subsequent sections of the 1995 Act required local authorities to review air quality and to assess whether the air quality objectives are being achieved. Where predictions indicate potential exceedences of specific pollutant objectives, local authorities are required to designate an Air Quality Management Area (AQMA) and prepare Air Quality Action Plans to deliver improved air quality.

The process of Review and Assessment is a risk management approach designed to identify those areas where poor air quality coincides with public exposure. For the first round of review and assessment (1998-2001), the Government recommended a three-stage approach whereby each stage increased in detail and complexity. The second round of review and assessment (2003-2004) comprises two steps. The first is an Updating and Screening Assessment (USA) in which each local authority identifies changes to circumstances since the first round and completes a risk assessment to identify areas where air quality objectives

are likely to be exceeded. Where a risk is identified, the local authority must proceed to the second step, a Detailed Assessment (DA).

In 2000, the Government and Devolved Administrations published guidance documents to assist local authorities in carrying out their reviews and assessments. In 2003, a revised form of these guidance documents were published [4] & [5]. The old versions of guidance were discretionary and local authorities had to make their own decisions about policy and technical aspects of review and assessment of their Local Air Quality. The new guidance is more prescriptive and disciplined. It contains updating and screening checklists that describe the information that authorities should collate for review and assessment against the 2003 and 2010 objectives. The new guidance is required not only as the approach to LAQM has changed, but also to incorporate the most up to date understanding of pollutant concentrations and sources, and methods of predicting future concentrations.

This paper evaluates the technical and managerial practices of the local authorities across Great Britain during the USA stage of the air quality review and assessment process. Also, it explores issues and concerns about the new review and assessment process raised by the local authorities. Evidence will be provided from a questionnaire survey of environmental health professionals across Great Britain conducted in August 2003.

## **SURVEY METHODS**

A questionnaire was used to survey the environmental health professionals in all the local authorities in England, Wales and Scotland (407 local authorities in total). The questionnaire aims to survey local authorities on aspects of the new USA process to assess their technical capabilities (such as monitoring and modelling of air pollution) and their managerial capabilities (in terms of their collaboration with other departments, neighbouring authorities and external organisation).

The questionnaire was sent by mail and it consisted of seven sections as follows: updating and screening assessment process; guidance documents and support for review and assessment; LAQM personnel; monitoring and modelling of air pollutants; air quality management practices (within the local authority); collaboration with other authorities and external agencies; and consultation on USA.

The total responses received were 175 which correspond to 43% of the British local authorities. The Statistical Package for the Social Sciences (SPSS) was used for analysis of questionnaire results. SPSS is the most widely used suite of software programs for statistical analysis in the social sciences [6]. The first step for using SPSS was to code all the answers in the questionnaires into numbers which are easier to analyse. Coding of the questionnaire resulted in 194 variables being created. Then frequencies were calculated for each variable.

## **RESULTS**

45% of respondents found carrying out the USA process easier than stage 1 in the first round of review and assessment, whilst 11% found it more difficult and 17% found it the same. From the local authorities that responded to the questionnaire, it appears that 53% are proceeding to a DA for a variety of reasons. This figure was very close to the actual figure of the total authorities proceeding to DA (52%). The main reason for progression to DA was identification of new exceedences as a result of updated monitoring or modelling data. Table

1 illustrates the reasons for proceeding to DA. The pollutants that prompted the DAs were NO<sub>2</sub>, PM<sub>10</sub>, SO<sub>2</sub> and benzene. The main source of these pollutants was traffic (Figure 1).

Reasons for proceeding to DA	% of local authorities (n=83)
Updated monitoring or modelling data	61
Sources not previously identified	24
Changes in air quality objectives	20
Changes in pollutants emissions	17
Changes in relative public exposure	9
New air pollution sources	6
Emissions from neighbouring authority	2
Other	14

Table 1: Reasons that prompted air quality Detailed Assessment in the second round of local air quality management.

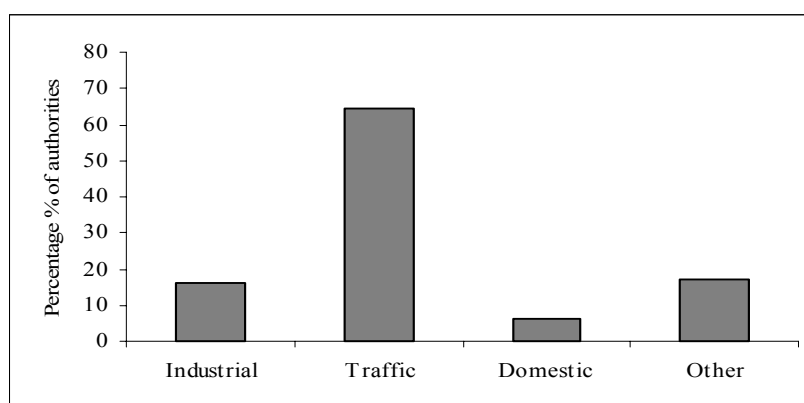


Figure 1: Sources of pollutants that prompted air quality Detailed Assessment in the second round of local air quality management.

In order to measure the respondents' satisfaction with the new guidance documents, they were asked to assess the extent to which the new Policy Guidance and the new Technical Guidance had met their needs for information regarding the USA process. 59% responded with 'satisfactory'. As the Technical Guidance contained a detailed prescriptive USA checklist for each of the seven pollutants, it was necessary to gather the local authorities' views about this approach; 59% thought that it was clear and easy to follow, 26% found it sufficiently prescriptive, 11% felt that it was overly prescriptive and 4% believed that it was ambiguous.

Monitoring fulfils a central role in the review and assessment process [5]. Passive samplers (diffusion tubes) are low cost and they give a general indication of average pollution concentrations. Real-time (automatic) analysers produce high-resolution measurements. From the survey, it was found that 89% of the local authorities have NO<sub>2</sub> diffusion tubes and

65% are conducting real-time PM<sub>10</sub> monitoring. The least monitored pollutants were 1,3 butadiene, carbon monoxide and lead (Table 2).

<b>Pollutant</b>	<b>Real-time</b>	<b>Passive</b>
Benzene	7	34
1,3 butadiene	4	0
Carbon monoxide	31	0
Lead	2	6
NO <sub>2</sub>	67	89
PM <sub>10</sub>	65	7
SO <sub>2</sub>	48	22

Table 2: The percentages of authorities monitoring air pollutants included in the Air Quality strategy (n=163)

With regard to modelling, it appears that 94% of local authorities have used screening models (e.g. DMRB, ADMS-Screen) and 18% have used advanced models (e.g. ADMS-Urban, AAQUIRE). 71% of the screening models were used in house whilst 55% of the advanced models were used by consultants.

In order to assess the AQM practices within the local authorities, environmental health professionals were asked whether their local authorities have formal groups to address air quality issues. Only 21% had such groups and 18% said that they had informal group discussions with other authority officers. 97% of these groups include environmental health officers, 81% transport planners, 62% local planning officers and 54% traffic management officers. Other functions represented in these groups include: economic development officers, Local Agenda 21 officers and Highways Agency officers.

Regarding participation of local authorities with neighbouring authorities and external organisations; 55% participate in one group, 25% in two groups and 10% participate in three groups. Some of these groups were regional environmental protection groups and they address air quality issues as an aspect of environment protection. In these regional groups, 98% included environmental health officers, 45% Environment Agency officers, 32% transport planners and 18% Highways Agency officers. Other functions represented in these groups include: traffic management offices, higher education institutes, scientific services representatives and local planning officers.

## **DISCUSSION**

The majority of environmental health professionals surveyed found carrying out the USA easier than or at least the same as stage 1 in the first round of air quality review and assessment. This was due to the prescriptive nature of the new review and assessment approach introduced by the Government. This positive reception of the new process was again reflected by their satisfaction with the contents of the new guidance documents. Moreover, the USA checklists in the new technical guidance were found to be clear, easy to follow and sufficiently prescriptive. The greater degree of prescription in the review and

assessment process represented by the USA checklists has led to a more streamlined assessment work for the local authorities' professionals.

From the survey results, it appears that the main reason that prompted the DAs was new air pollution monitoring or modelling data. The reason for this is that the new guidance recommended examination of hotspot locations rather than taking an unfocussed look at a large geographical area. Such locations include busy roads, junctions and petrol stations where air quality objective are more likely to be exceeded. This approach has focused the monitoring and modelling effort on these locations that were not specifically identified in the previous round of review and assessment. In addition, the guidance included results of validation work for some models enabling correction factors to be provided; thereby avoiding underestimating some pollutants. For example, the old version of DMRB significantly underpredicted concentrations of nitrogen dioxide in street canyons where dispersion is poor. The new guidance provided a correction factor to remedy this.

No local authorities are proceeding to DAs for carbon monoxide, lead, or 1,3 butadiene. There have been no AQMAs declared from the first round of review and assessment in respect of these pollutants. Although a more stringent objective was introduced for carbon monoxide prior to the second round of review and assessment, no DAs have been prompted by this pollutant and the majority of respondents think that the stringent objectives have had no impact on the assessment process. It can be deduced that these three pollutants are unlikely to require DAs in future rounds. Also, the survey conducted showed that these three pollutants were the least monitored (Table 2).

From the survey conducted, it is apparent that NO<sub>2</sub> and PM<sub>10</sub> objectives are continuing to be the most exceeded or at risk of being exceeded. In the first round of review and assessment, the vast majority of the AQMAs were related to road traffic emissions, where attaining of the NO<sub>2</sub> annual mean objective is unlikely. Also, more than 50% of the AQMAs declared in Great Britain have included exceedences of the 2004 24-hour mean PM<sub>10</sub> objective which were associated with traffic [5]. These facts highlight the significance of road traffic as a major contributor to air pollution in Great Britain. There was evidence from the survey that NO<sub>2</sub> and PM<sub>10</sub> are the most monitored pollutants with the largest number of real-time monitoring devices across the local authorities (Table 2).

The other two pollutants for which some local authorities are progressing for a DA are SO<sub>2</sub> and benzene. Industrial and domestic emissions are the main sources of SO<sub>2</sub> and industrial and petrol station emissions are the sources of benzene. There have been no AQMAs declared from the first round of review and assessment for the 2003 objective for benzene. However, in this round, some potential exceedences have been reported. These exceedences are due to the introduction of the new stringent 2010 objectives for benzene.

This survey has shown that only 22% of local authorities have formal groups to discuss air quality issues. Also, the majority (62%) of the respondents inform other departments about air quality activities upon the latter's request rather than on regular basis. These facts indicate that more collaboration between departments within the local authorities is required. However, there is an evidence of extensive regional collaboration in air quality management between the authorities and some external organisations. 90% of local authorities were found

to be participating in at least one regional group addressing air quality issues, although some of these groups were regional environmental protection groups and they address air quality issues as an aspect of environment protection. This high level of collaboration between local authorities and external organisations suggests more advanced degree of air quality management practices within a local authority [7].

## CONCLUSION

This preliminary evaluation of the outcomes of the USA for local air quality management in Great Britain indicates that the local authorities, in the main, have responded positively to the process. The new air quality review and assessment approach was welcomed by the local authorities across Great Britain. Local authorities which are proceeding to DAs are focusing on the air quality objectives of nitrogen dioxide, PM<sub>10</sub>, sulphur dioxide, and benzene. Regarding managerial capacities of the local authorities, there are signs of good collaborations between the local authorities and between them and external organisation. On the other hand, more collaboration between the different departments within local authorities is required.

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