

## **2. Interpretation of Legal Requirements under Part IV, Environment Act 1995**

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The purpose of this Chapter is to detail the main requirements of Part IV of the Environment Act 1995 with particular reference to the implications for local authorities to develop air quality management plans. The Chapter will expand on the details of the Act and provide further guidance on practical issues relating to assessing achievement of standards.

### **EC and UK Legislation on Air Quality**

The EC Council of ministers has recently adopted a number of directives central to European air and pollution policy.

*The Ambient Air Quality Assessment and Management Directive* establishes a framework under which the community will agree air quality limit or guide values for specified pollutants in a series of “daughter directives”. These will supersede existing air quality legislation. Under this framework directive, Member States will have to monitor levels of these pollutants and draw up and implement reduction plans for those areas in which the limit values are being or are likely to be breached.

The Environment Act 1995 Part IV and the UK National Air Quality Strategy provide the principal means of carrying out the UK’s commitments under this Directive.

*The Integrated Pollution Prevention and Control Directive* requires Member States to ensure that major industrial installations receive permits based on the Best Available Techniques for pollution control subject to technical and economic feasibility. The Integrated Pollution Control strategy in the Environmental Protection Act 1990 will form the basis of the UK implementation of this Directive.

### **Part IV of the Environment Act 1995**

Part IV of the Environment Act 1995 contains the following sections relevant to the management of air quality by local authorities:

- National Air Quality Strategy (section 80)
- Local Authority Functions and Duties (sections 82-84)
- Reserve Powers of Secretary of State (section 84)
- County Council Functions (section 86)
- Regulations (section 87)

## The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Part IV section 80 of the Act required the preparation of a national air quality strategy document. This was published as “The United Kingdom National Air Quality Strategy” in 1997 and was updated as “The Air Quality Strategy for England, Scotland, Wales and Northern Ireland” in January 2000.

The Strategy includes health-based objectives for pollutants of most concern - nitrogen dioxide, particles, ozone, sulphur dioxide, carbon monoxide, lead, benzene, and 1,3-butadiene. The objectives included in the Regulations are shown in Table 2.1.

Table 2.1 AIR QUALITY OBJECTIVES

Substance	Air Quality Objective levels
Benzene	16.25 $\mu\text{g m}^{-3}$ (5 ppb) or less, when expressed as a running annual mean to be achieved by 31 December 2003
1,3-Butadiene	2.25 $\mu\text{g m}^{-3}$ (1 ppb) or less, when expressed as a running annual mean to be achieved by 31 December 2003
Carbon Monoxide	11.6 $\mu\text{g m}^{-3}$ (10 ppm) or less, when expressed as a running 8 hour mean to be achieved by 31 December 2003
Lead	0.5 $\mu\text{g m}^{-3}$ or less, when expressed as an annual mean to be achieved by 31 December 2004; 0.25 $\mu\text{g m}^{-3}$ or less, when expressed as an annual mean to be achieved by 31 December 2008
Nitrogen Dioxide	200 $\mu\text{g m}^{-3}$ (105 ppb) or less, when expressed as an hourly mean not to be exceeded more than 18 times a year to be achieved by 31 December 2005; 40 $\mu\text{g m}^{-3}$ (21 ppb) or less, when expressed as an annual mean to be achieved by 31 December 2005
PM <sub>10</sub>	50 $\mu\text{g m}^{-3}$ or less, when expressed as a 24 hour average not to be exceeded more than 35 times a year to be achieved by 31 December 2004
Sulphur Dioxide	350 $\mu\text{g m}^{-3}$ (132 ppb) or less, when expressed as a 1 hour mean not to be exceeded more than 24 times a year to be achieved by 31 December 2004; 266 $\mu\text{g m}^{-3}$ (100 ppb) or less, when expressed as the 15 minute mean not to be exceeded more than 35 times a year to be achieved by 31 December 2005; 125 $\mu\text{g m}^{-3}$ (47 ppb) or less, when expressed as a 24 hour mean not to be exceeded more than 3 times a year to be achieved by December 2004

*Terms used in this table are explained in Section 3 of this manual.*

## **Local Authority Functions and Duties**

All district and unitary authorities have a duty to review air quality in their area; This should include the likely future air quality within the relevant period (by 2003 to 2008) and an assessment of whether air quality standards and objectives are being achieved or likely to be achieved measured against the National Air Quality strategy. Any part of the authority's area in which standards or objectives will not be met by the prescribed date should be designated an Air Quality Management Area (AQMA). The authority will then be required to develop a local action plan which sets out measures to reduce pollution levels.

### **Reserve Powers of Secretary of State (section 84)**

The Environment Agency and the Scottish Environment Protection Agency (SEPA) are required to take account of the Strategy in carrying out their pollution control functions (section 81). The Environment Act also places the same obligation on local authorities. If it appears to the Secretary of State that a local authority is not meeting its obligations under sections 82-84 of the Act, the Secretary of State may direct the local authority to:

- arrange for air quality reviews to be carried out as specified
- arrange for a new air quality review to be carried out
- revoke or modify an Order made under section 81 of the Act
- prepare or modify its action plan or to implement any of the measures in its action plan.

The Secretary of State may also direct local authorities to take account of European or international commitments in their action plan.

### **County Council Functions**

This applies to those districts in England covered by a district council which are also in an area comprising a county council.

The relevant county council may make recommendations to the district council with regard to the district council's obligations under this part of the Act.

Where the district council is preparing an action plan, the county council should also submit proposals, together with a statement outlining the timescale, for meeting air quality standards and objectives within the designated area.

## **Regulations**

This section provides for regulations covering all aspects of Part IV of the Act.

These include:

- air quality standards
- objectives for restricting levels of particular substances in air
- prohibiting or restricting specific activities
- providing air quality information to the public
- vehicle emission spot checks
- restricting vehicle access

### **The Air Quality Regulations 2000**

The Air Quality Regulations 2000 apply to England only. The Air Quality Regulations of 1997 were revoked in so far as they extend to England. They define “relevant periods” for the preparation of an action plan and the achievement of the objectives. These apply to all pollutants in Table 2.1.

The relevant period for the purposes of section 86(3) of the 1995 Act, which requires the preparation of an action plan, is the period of 9 months beginning with the date on which the district council preparing the action plan first consults the relevant county council in relation to the plan.

The relevant period for the purposes of the other provisions of Part IV of the 1995 Act is the period beginning with the date on which the Regulations came into force (6 April 2000) and ending on the date set out in Table 2.1 above.

The air quality objective for each substance listed in the first column of Table 2.1 (excluding ozone) is to restrict, by no later than the date set out in the second column of Table 2.1, the level at which that substance is present in the air to the level set out in the second column of Table 2.1.

The achievement or likely achievement of an air quality objective will be determined by reference to the quality of air at non-occupational near-ground level locations where a person might reasonably be expected to be exposed over the relevant averaging period.

## **Information Sources**

The Department of the Environment, Transport and the Regions (DETR) will be providing guidance manuals for local authorities on reviews and assessments of air quality. These will provide detailed advice on monitoring, emissions inventories and modelling.

References to a wide range of publication on air quality management topics are given in the Bibliography (Chapter 4 of this guidance manual).

## **Air Quality Management Strategies**

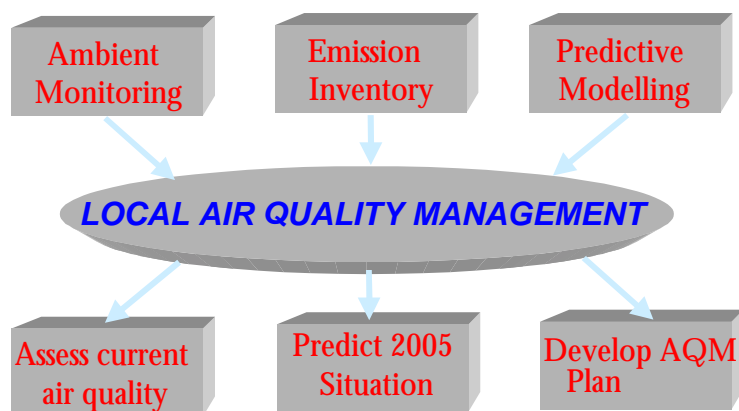
Air quality management (AQM) covers the entire process of assessing and tackling air quality problems, from identification of poor air quality through to formulation and execution of a remediation strategy. Assessment of the problem will include identification of significant sources of air pollution - such as traffic, industry, households, commerce or agricultural - together with 'hotspots' or areas of elevated pollutant concentrations.

Once hotspots are identified, along with the contributing sources, it is possible to evaluate the options for controlling the emissions in such a way so as to improve air quality to an acceptable level.

## **Review and Assessment of Air Quality**

Section 82(3) of the Act requires local authorities to review air quality in its area and identify those parts of an area where it appears that standards and objectives are not being achieved or are not likely to be achieved. The Government recommends a phased approach to making reviews and assessments of local air quality. Local authorities should undertake an initial screening process reviewing sources of pollution in the area followed, if necessary, by a more detailed survey using simple monitoring and modelling techniques. If these surveys indicate the prescribed objectives are likely to be exceeded by the year 2005, then a detailed assessment using accurate monitoring, modelling and other techniques should be undertaken and an AQMA declared if necessary.

## Local Review and Assessment involves a number of activities..



### Air Quality Management Areas

Assessing whether objectives are likely to be achieved, and defining AQMAs is a major task which needs to be carried out a local level and is, therefore, a vital role for local authorities. Acting with assistance from central Government, local authorities need to assess how far any recorded exceedences of standards are significant in exposure terms and require remedial action. The requirements on individual local authorities will depend on the amount of monitoring currently carried out and other available data which will enable local air quality to be assessed against the objectives. The designation of AQMAs will not be an exact science but local authorities will need to be able to defend their judgements as reasonable in local circumstances. Geographical limits, such as the natural boundaries of a city, may be acceptable to define AQMAs but it will not be acceptable for a local authority to blanket designate the whole of its area as an AQMA on the basis of air quality standards not being achieved one part.

### Duties in an Air Quality Management Area

If an AQMA is designated, local authorities will also be required to carry out a further assessment of air quality in AQMAs to supplement information already obtained.

Where AQMAs have been designated, local authorities will also be required under section 84(2) of the Act to prepare a report on the assessment of air quality within AQMAs within 12 months of designation.

Where a local air quality problem crosses local authority boundaries it will be necessary for the authorities involved to ensure a consistent approach to the designation of AQMAs.

## **Action Plans**

Where AQMAs have been designated, local authorities will be required to prepare a written action plan to achieve air quality standards and objectives in the designated area. This should include a statement of the timescales in which local authorities propose to implement the provisions of the plan.

## **Implications for Transport Policy**

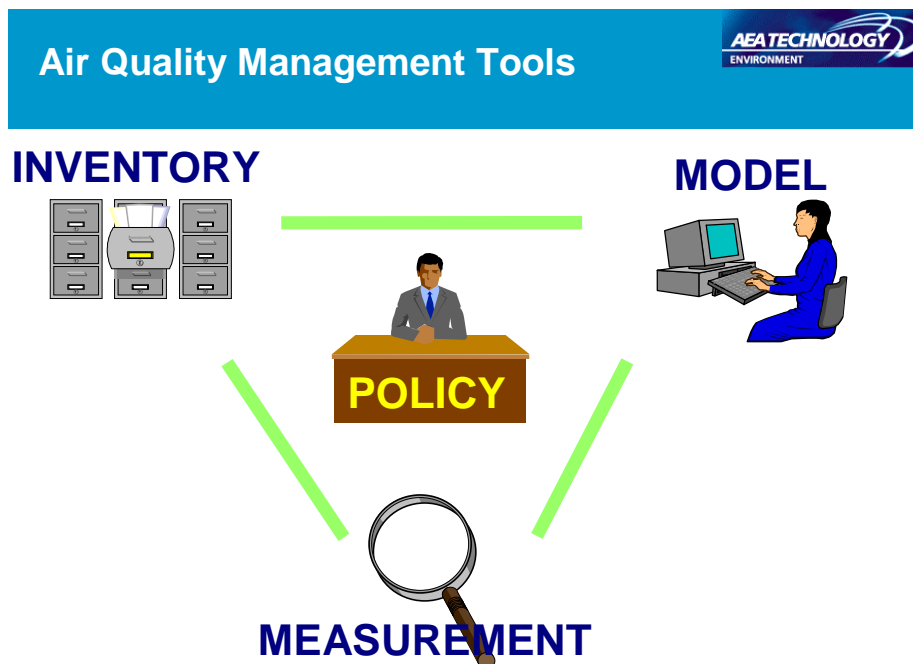
Major reductions in levels for pollutants listed in the Strategy document will result from national measures such as tougher vehicle and fuel standards; new EC proposals for revised vehicle and fuel standards, to take effect from 2000, will achieve overall emissions reductions of around 50% on 1995 levels by the year 2005.

These measures are reinforced by the use of fiscal incentives; lower duty on alternative fuels, and a commitment to an increase of at least 6% above inflation each year on road fuel duties. However, in some areas these will not be sufficient for the objectives to be achieved. Clearly, local authorities will need to ensure that any traffic reduction targets and measures designed to achieve them are fully integrated with their strategy on air quality.

## **Air Quality Management and Assessment Tools**

Four principal technical tools exist for assessing and reviewing air quality:

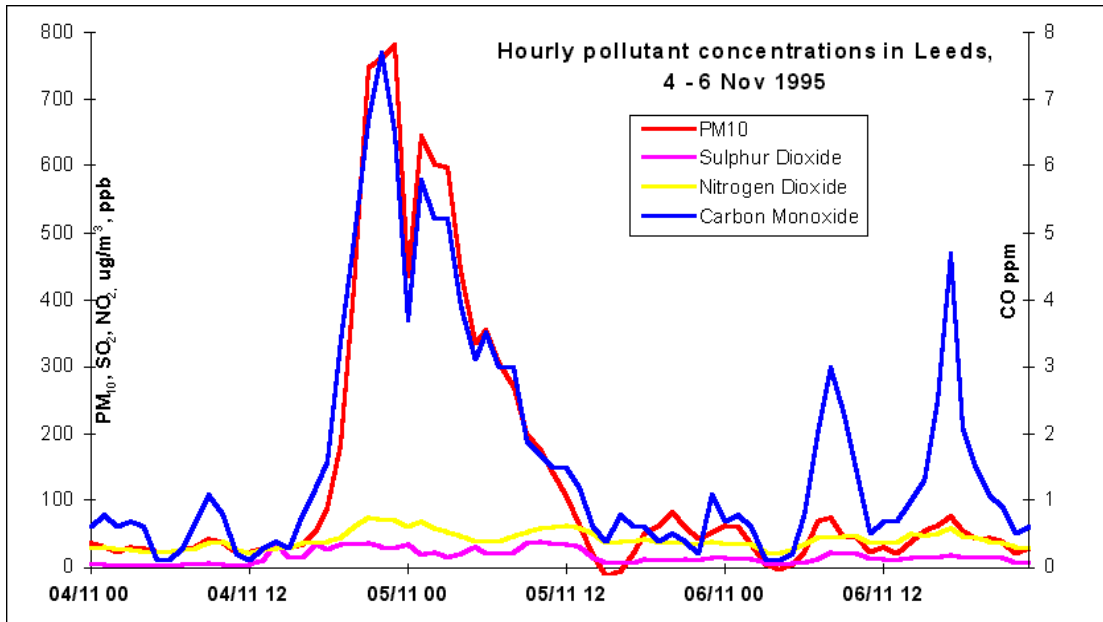
- Monitoring Studies
- Emissions Inventories Studies
- Modelling Studies
- Desk-top Studies using pre-existing data from the above



These activities are briefly introduced below.

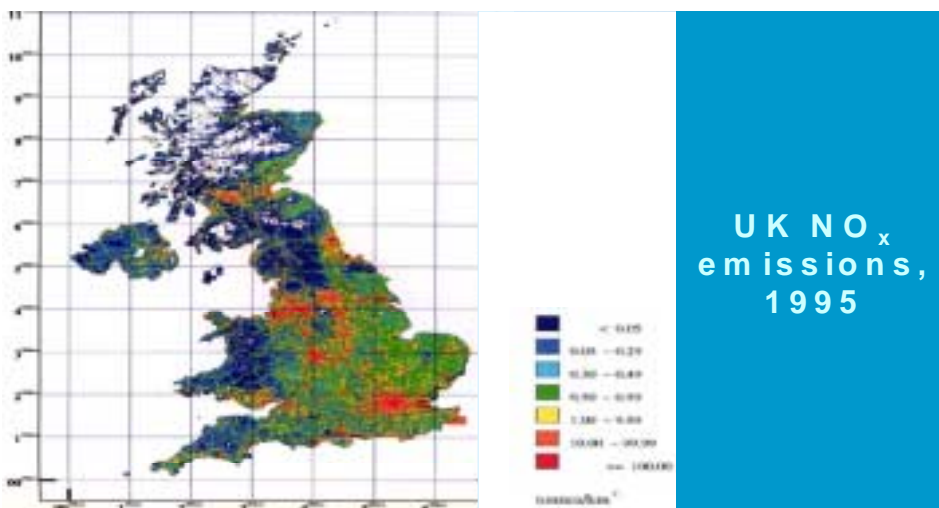
## Monitoring

Air quality monitoring involves measuring the ambient concentrations of pollutants in air at a given place and point in time. The measurements produced are always average values over a defined period of time, which may range from a month to a few seconds. A variety of techniques, of varying sophistication, exist for measuring concentrations of pollutants in air. In order to ensure a cost-effective monitoring strategy, appropriate techniques should be utilised. However, the limitations of monitoring should also be recognised. In many circumstances measurements alone may be insufficient for the purpose of AQM. Monitoring therefore often needs to be used in conjunction with other objective assessment techniques including modelling and emission measurement and inventories, interpolation, mapping and interpretation.



## Emission Inventories

Fundamental to any air quality management or review process is an inventory of pollutant sources and a quantification of resulting emissions, in the area of interest. Inventory inputs may be derived by measurement or, more usually, by estimation. Measurements are usually only available for large industrial point sources or from representative motor vehicle types under specified driving conditions. Emissions are therefore, for the most part, estimated using emission factors appropriate to the various sources (verified by measurement), used in conjunction with surrogate statistics such as fuel use, population, vehicle kilometres measured or industrial production.

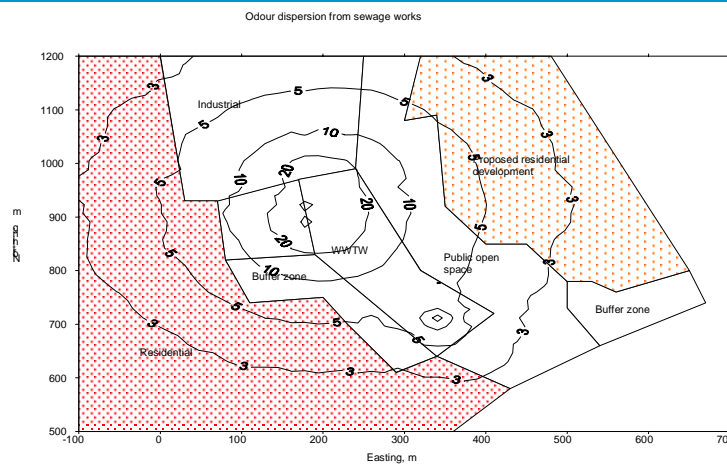


## Modelling

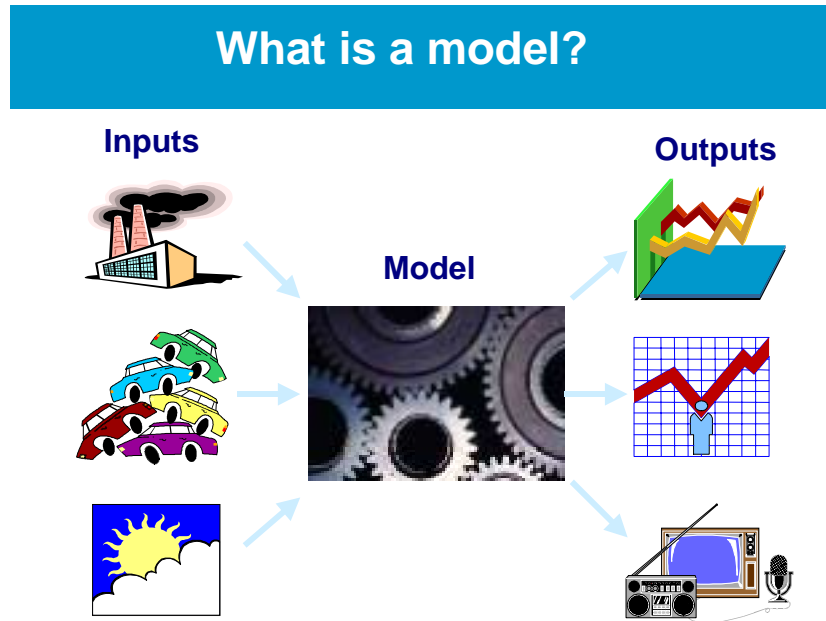
Given information on the sources of air pollutants in an area, dispersion modelling enables their impact at receptor points of interest to be estimated. Models require input data including:

- emissions inventory estimates of source inputs and their variation with time
- meteorological data describing typical weather conditions in the area
- information on local topography
- monitoring data for model validation/calibration

### Contour plot- odour modelling



Modelling may be used to forecast ambient air quality and predict episodes of high pollution.



## Desk-based studies

Greater benefit can be derived from studies such as the above if, beforehand, any relevant pre-existing environmental data are carefully examined and analysed. Such a preliminary review should form an essential part of planning any air quality study. Desk-based studies typically make use of:

- emissions data from authorisations of industrial processes in the area of interest
- emissions data from national or regional inventories
- monitoring data from pre-existing or historic monitoring sites in the area of interest

A full assessment of existing datasets and information can frequently substantially reduce or even eliminate the need for further resource-intensive investigation.

## Monitoring Objectives - Why monitor?

Every monitoring survey will be influenced by the unique mix of local/national issues and objectives. These may include:

- **Establishing a sound scientific basis for policy development:** Often little is known about the location and nature of air pollution problems. Monitoring to obtain information on the existing air quality situation helps to determine whether problems

exist, together with their extent and magnitude. Policy development and regulating implementation can then be appropriately targeted.

- **Determining compliance with air quality standards and guidance.** Reference to statutory or non-statutory standards and guidelines provides an indication of whether air quality levels are acceptable in terms of potential impacts on human health or the environment.
- **Exposure Assessment.** Information required to assess the health effects and environmental impacts of air pollution on target populations and ecosystems may be determined by quantifying exposure levels and duration.
- **Assessing air quality trends.** Air pollution levels will change over time; such long-term trends can be monitored to ensure pollution problems are not developing. Identifying temporal and seasonal variations in pollutant concentrations also helps establish links between air quality and other factors, such as traffic levels, land use and weather conditions.
- **Assessing the effectiveness of control policies.** Monitoring may determine whether current policy in relation to traffic planning, urban development or emissions controls are effective at controlling air pollution. This information can help the relevant authorities to assess the impacts of local sources and determine what further action, if any, is required to improve air quality.
- **Public information.** There may be a need to provide information to the public on the quality of the air they breathe or to answer specific concerns about air quality in a local area. As well as providing up-to-date information, real-time measurement data can be used to alert the public in the event of high pollution episodes.

## Monitoring Strategy

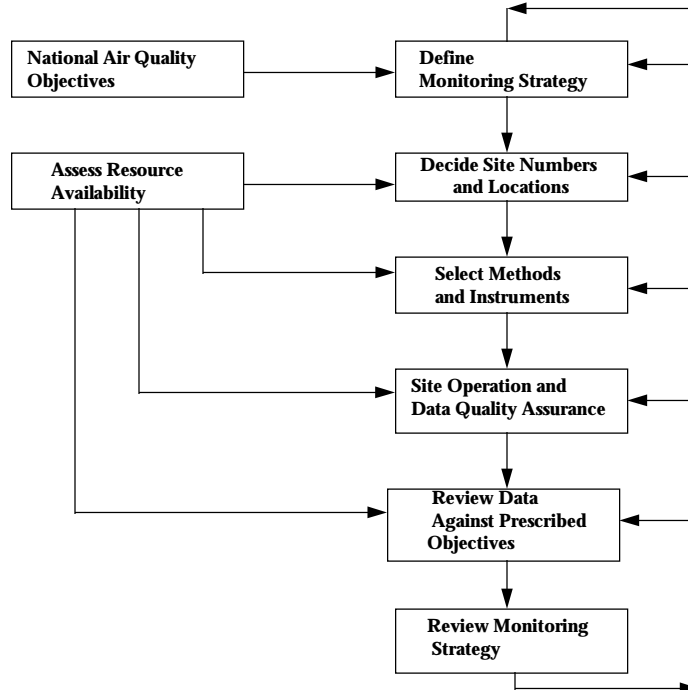
It is vital that clear, realistic and achievable monitoring objectives be set. In turn, this requires a targeted and cost-effective Quality Assurance Programme (QAP) to be developed, priority pollutants and measurement methods selected, and data management/reporting requirements identified

Before embarking on a monitoring programme, it is important to draw up a plan of action covering key aspects of system design, operation, quality assurance and control. Fundamental considerations include:

- pollutants identified as being of priority for monitoring
- data quality requirements (averaging times, accuracy and precision)
- monitoring methods and equipment

- providing appropriate data for the purposes of air quality reviews and assessments
- resource availability (money, time, staff)

Steps in defining a monitoring strategy are shown in Figure 1



**Figure 1 Monitoring Scheme for Reviews and Assessments**

## Data Quality

Proper QA/QC practice is necessary to ensure data integrity and guarantee the data quality required for meeting the overall monitoring objectives. Fundamental data requirements are:

- accuracy
- precision
- data capture rate
- traceability to national/international metrology standards
- long-term consistency

Data should, therefore, be more thoroughly checked at 3 or 6-month intervals to ensure that they are reliable and consistent. This process is usually referred to as data ratification.

## Data ratification..

## a high-skill exercise

- A periodic, often 3-monthly review
- Final stage of data acceptance before archival
- Many inputs !



## Reporting Air Quality Information

When the data-set has been finally ratified, a report which presents a definitive statistical summary of the year's findings can be produced.

The format of reports required by Government under section 84(2) of the Act has yet to be finalised, but the following type of information is likely to be required.

- site details and locations
- pollutants measured & monitoring techniques used
- pollutant concentration and averaging times
- quality control procedures
  - calibration standards
  - equipment service
  - site maintenance
- data processing and ratification methods

In addition such reports could include:

- simple annual statistics such as data capture, arithmetic and geometric mean of hourly values, maximum hour, maximum 8-hour and 24-hour
- 50<sup>th</sup>, 90<sup>th</sup> and 98<sup>th</sup> percentiles of the annual hourly data set

- comparison of annual results with relevant guidelines and standards set by the EC, or UK Government
- monthly, diurnal and long-term trend statistics

It may also be useful to show graphical representations of the annual hourly data set in terms of its time-series, its frequency distribution, diurnal variations and any trend analysis which has been carried out.

## **Public Information**

A major aim of monitoring programmes is to provide the public with up-to-date information on air quality. Schedule 11 of the 1995 Act requires that local authorities make the findings of their reviews and assessments of air quality available to the public free of charge.

For public information purposes, the following reporting techniques may be considered:

- paper reports
- bulletins to the media (press, radio, television)
- public display boards in central squares, railway stations etc.
- public access terminals in public buildings and offices such as libraries (also screen-based interrogation systems)
- Internet pages
- telephone lines with recorded messages