Ambient Air Monitoring

(Extract from Gov.uk website)

There is a wide range of possible objectives for carrying out an ambient air quality survey, and a variety of sampling schemes may be adopted for monitoring the pollutants. For example, the monitoring of traffic pollution may be focused towards roadside air sampling, whereas the monitoring of ozone is often carried out at rural sites. There are also different scales to the monitoring survey: the scheme may be a national network of air quality monitoring stations; it may be a smaller network designed to monitor regional or local air quality; or the monitoring may be conducted to assess air quality around a specific site or source. In order to ensure the sampling programme is both technically valid and cost-effective, the objectives of the proposed study should be clearly defined at the design stage. The aims of different studies may vary considerably but often include one or more of those listed in below.

Possible aims of ambient air quality monitoring programmes

- Comparison of ambient air-quality levels with standards, objectives or EALs
- Establishment of baseline levels before development, or after commissioning of a new pollution source
- Site-boundary monitoring for compliance with EPR permit conditions
- Monitoring of nuisance effects, e.g. odour, dust
- Resolving the contribution of one plant / emission source to the background
- Assessment of ambient air quality as part of the Local Air Quality Management system or to aid spatial planning

- Assessing the effectiveness of any abatement measures or control measure
- Verification of predicted ambient air quality levels e.g. from modelling or chimney height calculations
- Monitoring for research purposes, such as investigation of health effects, atmospheric chemistry or atmospheric pollution dispersion
- For reconnaissance purposes, using simple methods, in order to decide if the cost of installing automatic monitors is warranted, and if so where they should be placed

The precise aims of the study will determine the monitoring strategy that needs to be adopted. The main stages in developing the monitoring strategy are shown as a flow diagram in Figure 1.

Summary of fundamental monitoring strategy considerations

Which species to monitor? In many cases this may be obvious, but in others it merits careful consideration. Once the target pollutant has been identified, in what form should it be monitored? For example, total hydrocarbons or individual (speciated) hydrocarbons? Total particulate matter or a specific size fraction? Is further analysis required?

When to sample and for how long? Should sampling be continuous or intermittent? Consider the averaging period of the relevant air quality standard or objective with which the data will be compared; or whether the impact is acute or chronic and the temporal resolution required, e.g. short peaks averaged over three minutes, one-hour averages, daily averages, etc. Short sampling programmes are unlikely to give data representative of general conditions as meteorological conditions and source variations have significant

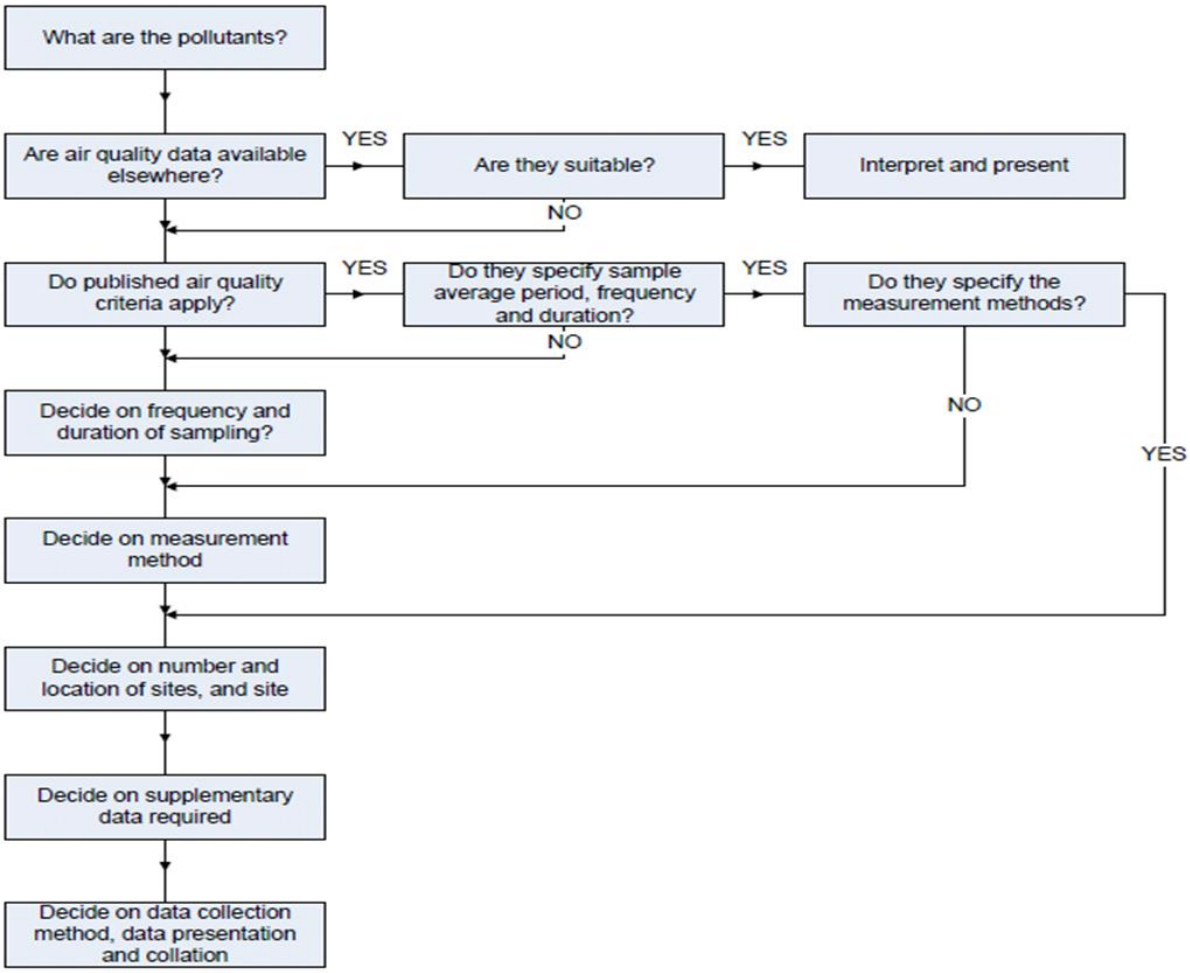

Figure 1: Simplified decision flow chart for determining monitoring strategy.

effects on pollutant concentrations. Also, where short-term peaks are of interest, these may be unusual events occurring for only a few days each year. Hence short-term monitoring campaigns are of very limited value for characterising air pollution episodes, except for perimeter-fence monitoring of fugitive releases. Consider both the source and receptor when determining when to sample, e.g. during growing season for pollutant-affected crops; during

summer for photochemical episodes; during high-wind-speed events for wind-raised dusts.

How to sample? Both the type of sampling and analytical end method need to be considered. Sampling may be unidirectional or omnidirectional; *in-situ*, mobile or open path. Method selection involves an appraisal of cost versus performance; the latter including limits of detection, sensitivity, speed of instrument response, susceptibility to interfering species and the overall uncertainty of the measurement.

Supplementary data collection. Other information may be relevant to the study, for example meteorological conditions, process data and traffic flows. Meteorological conditions are obviously important in assessing the impact of a source on its surroundings since they dictate the transport and dispersion of pollutants in ambient air. Many chemical transformations between reactive species in the atmosphere are also influenced by different conditions.

Where to sample? Spatial considerations encompass both the location of monitoring positions relative to study area or emission source, and individual sampling site criteria, e.g. position relative to local emission sources and any interfering effects. Sampling can be close to source (e.g. fence line) or distant (e.g. for estimating background).

Data handling and data analysis Is the speed of results generation important? For example, results may be required in real time for public health warnings, whereas several weeks turnaround may be adequate for supplying routine results for EPR permit compliance monitoring.

Reference:

ENVIRONMENT AGENCY (2011) *Technical Guidance Document M8 Monitoring Ambient Air*. Version 2. May 2011 [On-line] Accessed on 7th May 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/301188/TGN_M8_Monitoring_Ambient_Air.pdf

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