Ambient Monitoring – Which species to monitor for.

(Extract from Gov.uk website)

Targeting the Pollutant

For a single local source, emitting non-reactive pollutants, the monitoring of the concentration of one pollutant may be sufficient to quantify the behaviour of others from the same source, if their ratios in the source emission are known. However, this situation is rarely encountered in practice and it is usually necessary to consider monitoring for a number of pollutants. Usually, the target pollutants will be those strongly associated with the suspected emission source, e.g. nitrogen oxides from road traffic, fluoride from brickworks, or dust from a mineral extraction process. However, there are some instances where the pollutant must first be identified before thought can be given to quantifying it, e.g. when nuisance odours are investigated. In the case of emissions from EPR permitted installations, the list of prescribed substances for release to air provides potential targets. It may be appropriate to prioritise the species emitted by comparing expected ground-level concentrations with accepted air quality standards or objectives.

For many air quality monitoring surveys, the aims and objectives will effectively define the pollutants that need to be measured: examples are monitoring for comparison with published air quality criteria, or monitoring of the impact of releases under EPR. However, even when the pollutant species have been specified, it may still be necessary to consider what precise form of the pollutant should be measured.

Different Phases

Some pollutants are partitioned between gaseous and particulate phases. There are examples of both organic pollutants, e.g. PAHs, and inorganic pollutants, e.g. mercury. The monitoring method needs to be able to sample the selected phase or both phases, as appropriate.

Total and speciated measurements

For certain pollutants it is common to express the concentration as the sum total of the individual species present, e.g. routine monitoring of total hydrocarbons. Alternatively, some members of a group of pollutants may be of special importance and may require specific determination. An example is the speciated measurements of benzene, toluene and xylenes. Analogous to this concept is sampling for a particular physical fraction. For example sampling for total suspended particulate matter, or alternatively for particles of diameter <10 µm (PM10) or diameter <2.5 µm (PM2.5).

Further chemical or physical characterisation

Pollutant sources can sometimes be identified by chemical analysis of the samples, based on the fact that the presence of, or ratios of, certain elements are characteristic to one of the sources. For example historically, the ratio of bromine to lead could discriminate between lead-in-air contributions from a smelter and from traffic. Further characterisation may be of the whole sample or it may be more appropriate to analyse individual particles by, for example, scanning electron microscope (SEM) coupled with energy dispersive analysis by X-rays (EDAX). Physical characterisation by the visual appearance and morphology of particles can also be a powerful tool in identifying the source of the emissions.

Media other than air

Sampling from media other than air, e.g. soil, herbage or water sampling, is most commonly carried out when an objective of the study includes the impact of the pollutants on human or animal health, crops or fauna and flora. In such cases, the pathways by which the pollutants enter the end receptor must be considered and could include ingestion as well as inhalation of the pollutants. An example would be where the objective of the study was to assess the effect on cattle of fluoride emissions around an aluminium smelter. Ambient air quality monitoring in isolation would not provide an adequate assessment and it would be necessary to sample from the medium that forms the most appropriate receptor: in this case, the pasture that the cattle feed on. Since grass absorbs most fluoride directly from the air rather than from the soil, the sampling strategy should include grass sampling and air sampling as part of the overall survey. Measurement of the amounts and rates of pollutant deposition are important where contamination of vegetation and soil is an issue. Other examples are human exposures to dioxins via cows' milk; and exposure to lead, where inhalation of dust and consumption of lead-contaminated garden produce are major routes. In the latter case it would be appropriate to include both air and herbage sampling in the monitoring strategy.

Herbage sampling needs to take account of seasonal factors: the levels of contamination in vegetation can depend strongly on meteorological factors and growth rates, hence sampling in and out of the growing seasons needs to be considered.

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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