

AMBIENT AIR MONITORING:

Introduction:

Air monitoring is usually referred to as long term systematic & routine measurements of air pollution that maybe carried out for diverse purposes.

The sampling sites together with equipments involved in acquiring & analysis the data constitute the monitoring network.

In the past, air monitoring used to be carried out at one or a few stations using chiefly static or manual analytical methods, but now with the rapidly growing demand for comparable data, automatic monitoring is fast replacing the older methods.

Purpose of Monitoring:

1. Research (such as to study a new atmospheric phenomenon, a new atmospheric pollutant or a new air pollution sensor) or surveillance.
2. Acquiring of data on existing air pollution levels for compliance with the air quality standards.
3. Epidemiological studies & determination of the effects of pollution on surrounding area.
4. Health impact assessment.
5. Assessment of any control measure.
6. Locating an unidentified source of pollution such as of odours in an urban area.
7. Development of any air pollution warning system based on the acquired data.

Air Quality Monitoring in Urban Areas:

It is of major interest since most of the population is concentrated in the sites & diverse kind of sources of air pollution are situated there. Depending upon the resources available & the objective of monitoring, three basic air quality networks can be set up.

1. Uniform Area Based Network:

This is also called **Rectilinear Grid System of Air Pollution Monitoring**. In this system, the **sensors** are located uniformly over the urban areas in a rectilinear (straight line) grid.

The number of locations shall depend upon the size of the urban areas. A large number of sampling sites may be required for a big metropolitan area to get the correct picture of air pollution. Normally static or manual method of air quality monitoring are used in this system.

2. Pollutant Concentration Based Network:

This set-up is based on the concept that air quality is normally below the standard where the pollution sources are located. On the other hand, cleaner areas do not have any air pollution problems. Most of the sensors in this network are located in the areas of higher pollutant concentration. One or two sites are also selected in the cleaner areas for obtaining background concentration for the purpose of comparison.

3. Population Distribution Based Network:

In this network, the sensors are placed in the most populated areas without taking into consideration the most polluted areas, which in fact, can be left out as they may have the least population. This system of monitoring will give the levels of air pollutants to which bulk of the population is exposed. The data obtained here are important from the view point of public health.

Number of Sampling Sites & Their Locations:

The necessary number of sampling sites & their locations depend upon several factors including

- The objective of monitoring
- The size of the study area
- The proximity of sources of pollution

- Topographic features &
- Weather

Sampling sites must be carefully selected so as to be representative of the areas under study. Important factors posing difficulties in locating site for placement of sensors are the presence of

- Tall buildings
- Canyon effect of streets
- Conc. of pollutants near ground level

The objective of the study may be important in obtaining a representative air sample.

- If the data are being collected for obtaining average pollutant concentration levels on area-wise basis, the sampling should be carried out in the open areas such as in parks or on the roofs of one or two storey buildings to avoid the effect of streets.
- For the study of health effects, the sample should be collected at the breathing level which in most circumstances can be taken 3-6 meters above the ground as an optimum height.
- Sampling site should be easily accessible for the operation & maintenance & should be safe from any kind of disturbance.

Methods of Air Analysis:

It can be broadly be divided into three categories namely,

1. Static Methods:

The air pollutants are made to collect or react with the reagents at the sites without actually drawing the quantitative air samples. The sampling times are usually longer in terms of weeks, with sensitivity, in general low.

The static methods are

- Dust fall jars
- Lead peroxide candles
- Sodium carbonate cemented filter papers
- Biomonitoring using certain plants

Though these methods cannot be applied for quantitative measurement of the ambient air concentration, they do provide a low cost indicator of relative levels of air pollutants in an area.

2. Manual Methods:

The samples of air are first collected from a given area & then transferred to the laboratory for analysis. Suspended particulate matter (SPM) is usually measured by a most widely used device called **High Volume Sampler**. For the gaseous pollutants, a wet sampling train is employed where the pollutants are dissolved in some collecting medium after drawing the air for some period of time. The exposed collecting medium is then analyzed in the laboratory for finding out the concentration of the pollutants.

3. Instrumental Methods:

A variety of sensors have been developed for individual air pollutants which directly measure the concentration with a fair degree of accuracy. These sensors work on different principles depending upon the kind of air pollutants they measure. The use of sensors avoid the cumbersome exercise of sample collection, laboratory transfer & chemical analysis. The use of instrumental sensors gives a quick reading & is also helpful in obtaining a continuous data.