The objectives of air quality monitoring programmes

2.1 The objectives of air quality monitoring programmes in urban and industrial areas

The most important factor to be considered in designing a monitoring system is the objective(s). Indeed, the International Organisation for Standardisation believes that design criteria 'will only be possible for air quality monitoring systems which deal with equivalent tasks' (IOS, 1975). Unfortunately, air quality data are used for purposes other than those originally intended by the agency that designed the system. This situation is difficult to prevent once the data have entered the public domain.

There are seven principal objectives of urban air quality monitoring programmes.

2.1.1 Objective 1: for regulatory control (surveillance monitoring)

Where air quality standards exist, control agencies and citizens’ groups need information on the concentrations of the substances specified in the regulations. This information is obtained from networks of stations whose locations should be widely accepted as being representative of urban conditions; sometimes the network design and station siting criteria may have been specified in an ordinance or by-law.

2.1.2 Objective 2: to determine present conditions and trends (exploratory monitoring)

Monitoring networks may be established to determine present conditions and trends, for the following interrelated reasons: (1) to determine whether
there is need for regulatory action; (2) as a diversionary tactic, to postpone a politically difficult decision to control emissions; (3) to promote public relations, by providing comparisons of the quality of the air in different parts of a city, or even in different cities, to reassure the citizens that the air they breathe is not excessively contaminated; (4) to determine trends from consecutive observations, by providing an early-warning system that air quality standards may be exceeded if control measures are not taken.

2.1.3 Objective 3: to make short-term (1–5 day) predictions

Monitoring is required for the development, validation and operational use of models for forecasting air pollution episodes. The data requirements for model development and validation may be different from those required for operational use.

2.1.4 Objective 4: to simulate the effects of various land-use strategies on air quality

Monitoring is required for the development and validation of multiple-source air pollution models that predict climatological frequency distributions of concentrations. The models are used in the preparation of various land-use scenarios for industry, transportation and power generation.

As in the case of Objective 3, the data requirements for model development and validation may be different from those required for operational use.

2.1.5 Objective 5: to study dose–response relations

Dose–response investigations require various kinds of air quality data, to relate to the following effects: (1) health effects (epidemiological studies); (2) vegetation effects; (3) soiling of materials, corrosion of metals, damage to painted surfaces, rubber, nylon, etc.; (4) economic effects (reduction of property values, etc.). In each case, the quality of the air in the immediate vicinity of receptors is important, rather than the general pollution levels in a city. There is need for studies of both episodic extremes and long-term means.

2.1.6 Objective 6: to provide input data on air quality for large interdisciplinary urban models

Air pollution data are sometimes needed to provide a relatively small input to a ‘big’ urban model; other components of the model could include transportation, energy throughput, water supply, garbage disposal, and socio-economic factors. In some cases the requirement is for a single