
The tube bundle system of air monitoring

A tube bundle system is a way of bringing air from inbye places underground to the surface for automated sequential sampling, analysis and recording. The air is drawn through small bore polyethylene tubes by evacuating pumps situated on the surface. The sampling lines normally start near the gate ends as single tubes but where two or more tubes meet at a main road they are combined at a junction box into an assembly within one overall PVC cover. The tube bundle can contain up to 19 tubes, and in some cases e.g. to come up the shaft, it is armoured for extra protection.

A continuous record of carbon monoxide enables the norm for each sampling point to be readily established. An upward trend that continues even when mining activities are at a minimum would be an indication of an incipient heating: departures from the norm caused by short term effects such as shotfiring and diesel engines are readily distinguishable.

The mechanical way that the sample is taken in a tube bundle system is clearly superior for general body of the air analysis. When hand sampling is used there is always a measure of uncertainty whether successive samples have been taken in precisely the same place and manner.

The major disadvantage of the tube bundle system is the lapse of time before the analysis on the surface takes place. This may be only 10 or 20 minutes when sampling from quite a short distance but at 4 miles distance the time of travel is approaching 2½ hours if 6.3 mm bore tubing is used – though nearly twice this through 4.3 mm bore tubing. However delays even of this length may be acceptable because spontaneous combustion, for the detection of which the system was designed, always requires an ‘incubation

period’ for its development (see p 10).

Freedom from the restrictions of the Electricity Regulations is a major advantage of having the operating equipment on the surface. Additionally, a wide range of laboratory analysers can be put to use and, at times of emergency, analyses for oxygen, hydrogen and other gases may well prove valuable.

The Unor infra red analyser is now widely used for measuring carbon monoxide (see p 31). It is available in a form approved for use underground so that an alternative to the tube bundle system as described above is to analyse the samples underground and to transmit the data to the surface for display. The main advantage of this method is the speed with which the results are available, an essential if the system is to be regarded as a fire alarm. The chief disadvantage is that the electricity supply to the instrument may have to be discontinued at a time of emergency and this may well be when its functioning would be most valuable. Other disadvantages include maintenance difficulties and the fact that any one instrument can only monitor a rather limited number of sampling points.

Practical aspects of these techniques have been described in a booklet ‘Tube Bundle Techniques’ published in 1972*. However advances in techniques are continuing e.g. in the use of low density polythene, colour coding etc. and it is essential to consult the Regional Scientific Services when new installations are under consideration.

*Obtainable from N.C.B. Purchasing & Stores Dept., Hobart House, London, SW1X 7RE.