ON-SITE ANALYSES, FUTURE OR FANTASY?
Some Aspects of on-site Analyses.

D.H. Meijer MSc.
TAUW Infra Consult BV.
Deventer, The Nederlands.

July 1990

1. Introduction.

Recently there has been a growing demand for on-site analyses. Before discussing the possibilities and techniques of these analyses, a more thorough study of the reasons for the growing interest is necessary to put the subject in its right perspective. The usefulness of the different methods will be illustrated with the help of some projects, in which TAUW Infra Consult BV conducted on-site analyses. Based on this information some conclusions will be drawn.

2. Backgrounds of the use of on-site analyses.

When the developments in the field of environmental analytical chemistry are considered, two kinds of approaches could be distinguished.

On the one hand there are the analyses, that are carried out to obtain more information over the trends in our environment. These determinations are usually carried out in a more or less scientific manner. The analytical quality of the results has to be known and has to be good. Results are treated statistically to get this sort of information. Generally speaking these analytical procedures take relatively long and are rather expensive.

On the other hand there is a very clear demand for quick and relatively cheap analyses, especially in those cases where progress in the project is dependent upon the analytical results. Disposal of excavated soil in soil-sanitation-projects is a good example of this.

3. On-site methods.

It will be obvious that on-site analyses are no alternative for the first case, but are certainly of interest in the second. When considering the use of on-site analyses the following types can be distinguished.

a. Field-tests.

Field-tests are quite well known in several fields, e.g. clinical tests for blood-sugar, urine-proteins, etc. Also for water-analyses there are a lot of field-tests commercially available. For real environmental use there are only a few. The water-testsets have already been mentioned. For determination of organochlorine components in transformer-oil commercial kits are available. TAUW Infra Consult BV developed a field-test for detection of Poly Aromatic Hydrocarbons (PAH) in environmental samples. The advantages of these tests are that they are quick and cheap. This means that they can be used to determine the size of a certain contamination in a preliminary investigation, or to follow a well-defined process, such as a soil sanitation. A major disadvantage is there unreliability, especially in complex matrices, such as soil or waste samples. These tests should therefore only be used for the kind of samples for which they are designed for. When TAUW Infra Consult BV uses such tests for a project reference samples are always analysed at the laboratory using certified methods. In this way a kind of calibration of the field-test can be achieved.

b. The use of a mobile laboratory.

In some projects TAUW Infra Consult BV has built a mobile laboratory. This is a trailer or lorry, in which a complete laboratory is built. This method has the advantage that, since the laboratory is totally dedicated to the project, results can be generated very quickly. Furthermore, the exchange of information between supplier and laboratory is very fast, which results in a very flexible system. Another big advantage is the fact that certified methods, as the ones developed in the laboratory can be used, which enormously enhances the quality of the analytical results. This method of on-site analyses has of course its disadvantages too. Due to the use of a mobile laboratory, advanced instruments and lab-technicians, the costs are higher than those of field-tests. Another disadvantage is the fact, that, while space in the mobile laboratory is limited compared to a normal laboratory, this method can only be used for one, or at most a few parameters. TAUW Infra Consult BV has used a mobile laboratory in a soil-sanitation of tetrachloroethylene in Amsterdam (NL), and a soil-air sanitation project on chlorinated hydrocarbons in Mühlacker (FRG). Next of that TAUW Infra Consult BV has built a mobile laboratory to carry out investigations on petrol-stations in the Netherlands. The laboratory is equipped with GC's for total hydrocarbon analyses and volatile aromatics.