

**WASCON 97  
June 4 - 6, 1997  
Houthem St Gerlach  
The Netherlands**

**Workshop DF2 - Quality Control and Certification**

## **Quality Assurance in the Laboratory Analysis of Soils**

**Leslie Heasman**

**M J Carter Associates  
Station House  
Long Street  
Atherstone  
Warwickshire  
UK. CV9 1BH**

**Tel +44 1827 717891  
Fax +44 1827 718507**

## Quality Assurance in the Analysis of Soils

Land is a resource that is scarce in many countries. In the industrialised countries land which becomes available for development in or near to the industrial and business centres of cities and towns has usually been used before and land which remains under use has frequently been subject to a variety of previous uses. Historically little consideration was given to the potential environmental impacts of industrial activities hence the controls over processes and emissions were not as careful as they are today. In order to minimise the use of green field land for new developments, companies are encouraged to redevelop previously used sites. This results in a need to measure the contamination present at the site and to assess the associated environmental risk. Based on an assessment of risk proposals are made for the remediation deemed necessary to return the site to beneficial use. The entire process of site assessment and remediation frequently involves a number of different professionals with very different backgrounds and experiences. These include:

- landowners
- developers
- financial advisers
- bankers
- insurers
- land agents/surveyors
- legal advisers/lawyers
- planners
- architects/engineers
- regulators
- environmental advisers
- chemists/laboratories

The different backgrounds and degree of knowledge of each of the parties involved in the redevelopment of potentially contaminated sites can create a lack of confidence by each of the various parties in the capabilities, knowledge and skill of the others. It is only when some degree of confidence is achieved between the different professional interests and some degree of trust is established that the main objectives of brown land redevelopment are likely to be achieved.

The area of the analysis of contaminated soil is one in which it is vital to ensure confidence in data as it is the baseline on which risk assessments and remediation programmes are founded. Little work has been carried out on methodology for the analysis of contaminated soils and there is generally a poor understanding by the users of laboratory generated data of the confidence which can be attached to the data generated by any one laboratory. Many examples are cited of extreme discrepancies between data generated by different laboratories asked to analyse the same samples and between duplicate samples analysed in the same laboratories. A number of initiatives are underway in the UK to improve confidence and understanding between the laboratories which analyse contaminated soils and those who use the data in an assessment of the environmental impact of the sites from which the soil was sampled.

A report has been prepared by the UK Environment Agency<sup>1</sup> on quality assurance in the analysis of soils from contaminated land. The report is intended for users of laboratory generated data and seeks to describe and explain the quality control procedures used in analytical laboratories. The report reviews the existing application of quality assurance in the area of contaminated soil analysis. The different quality assurance procedures are explained and their benefits outlined. Recommendations are made for best practice regarding quality assurance in this technical field. Aspects of the general process that are addressed include sampling, transportation of samples, sample preparation, analysis and reporting of data.

A report is in preparation by the UK Environment Agency<sup>2</sup> on the available laboratory methods used for the analysis of contaminated soil. The report is intended to inform users of laboratory data of the existing choice available in analytical methods and the different data which is generated. The effect of the use of different extraction procedures is explained as is the effect of using different analytical techniques. The report identifies the benefits and limitations of each of the methods used currently in the UK for the analysis of priority contaminants in soils.

There is much discussion and confusion regarding the use of different analytical methodologies for the analysis of the same parameter. It is considered by some that consistency and comparability can only be achieved by the selection of single analytical methodologies for specific contaminants. This is not generally the view of the laboratories as this approach would eliminate the potential to develop and improve methods and would reduce flexibility. It is generally agreed by laboratories and the informed users of laboratory data that provided that a method can be validated according to an accepted protocol with specified acceptance criteria standard methods need not be used. Work has been carried out funded by the UK Environment Agency<sup>3</sup> to develop a validation protocol for methods used in the analysis of contaminated soil. The protocol provides guidance on criteria which can be used to assess whether analytical method performance is satisfactory and on the approach laboratories can take to provide data which can be assessed against these criteria. The validation protocol will provide a means by which non standard methods can be validated or standard methods can be validated for different soil types.

Work has been carried out funded by the UK Environment Agency<sup>4</sup> to identify and coordinate research related to the laboratory analysis of contaminated soil. It is concluded that limited research and development work is carried out in a number of areas related to the laboratory analysis of contaminated soils however the work is disparate and not well coordinated. A report on the work considers the drivers for improved methods of analysis for contaminants in contaminated soils which include the need for reliable data which is fit for purpose:

- to inform policy
- to support regulation
- for effective management of contamination
- to reduce the commercial risks associated with land transfer and development

The report identifies the key organisations involved in funding and managing research into the laboratory analysis of contaminated soils and in identifying and improving existing analytical methodologies. Existing or planned relevant research programmes are identified. The report includes proposals for the communication of research outputs and for liaison and coordination between the different parallel research programmes.

A further initiative which has developed in the UK to improve confidence in the assessment and redevelopment of contaminated land is the formation of a body, The Forum on Contamination in Land (FOCIL), which coordinates the approach of the main professional institutions to this technical area. The FOCIL mission statement is *to enhance the understanding of and facilitate improved coordination between professionals dealing with contaminated land thus benefiting the process of assessing and managing risks associated with contamination, both commercially and environmentally*. Key objectives of FOCIL include:

- to expand awareness, knowledge and competence among professional advisers and develop an integrated approach to contamination in land
- to identify, disseminate and encourage the use of best practice
- to assist market confidence, enhance environmental benefits and encourage sustainable development

The activities of FOCIL include:

- dissemination of information on available best practice guidance
- co-ordination and communication meetings with other groups involved with contaminated land
- involvement in development and preparation of best practice guidance
- hosting seminars and workshops on relevant topics and issues
- provision of a unified professional response to Government and other bodies on contamination issues
- maintenance of listings of specialists in contaminated land matters

In order to improve communication and understanding between the users of laboratory data and those who request analyses and use the data in their assessment of potentially contaminated sites FOCIL produced the sheets presented in Annex 1 to ensure that both parties involved in the analytical process are aware of all the relevant facts and have all the information necessary to ensure that the analyses carried out are fit for purpose and that the resultant data are of a known quality.

## References

1. Laboratory of the Government Chemist, M J Carter Associates, Acer Environmental, H B Berridge and Partners. Quality Assurance Associated with the Analysis of Soil from Contaminated Land. UK Environment Agency. In press 1997.
2. Methods for the Chemical Analysis of Soils from Potentially Contaminated Land. UK Environment Agency. In preparation 1997.
3. Hyder Environmental, M J Carter Associates, H B Berridge and Partners. Validation of Methods for the Analysis of Soils from Potentially Contaminated Land. Recommendations from the Working Group on Soil Chemical Analysis. UK Environment Agency. In preparation 1997.
4. M J Carter Associates, Hyder Environmental, H B Berridge and Partners. Framework for the Identification , Prioritisation and Coordination of Research Related to the Laboratory Analysis of Contaminated Soil. UK Environment Agency. In preparation 1997.