

# THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

## SAGTA REPORT 3 - SITE INVESTIGATION OF CONTAMINATED LAND

The issues relating to the investigation of sites for soil and water contamination were discussed on the 26th September 1995. Invited speakers included Ms J Denner, DoE, on DoE research relating to site investigation, Professor C Ferguson, Nottingham Trent University on the philosophy of acceptance criteria in the UK and other countries and Mary Harris, Clayton Environmental on technical guidance on the risk assessment procedure.

Rae Mackay and Rebecca Lunn, Department of Civil Engineering, University of Newcastle upon Tyne, presented a paper on the prediction of contaminant migration beneath industrial sites. A number of case studies were also presented with the aim of sharing experiences and avoiding pitfalls.

Site investigation is the process, which provides the raw data used in managing land contamination. Quality chemical analysis is fundamental in the site investigation and QA/QC was considered important enough to be the subject of a later meeting. The major challenge is striking a balance between the cost of a site investigation and collecting sufficient quality information to characterise the site to meet the objectives of the site investigation. The number of samples taken needs to be kept to the minimum required to define the nature and extent of the contamination. There is clearly a conflict between excessive costs from over sampling and under sampling resulting in the failure to identify all the areas of contamination. To this end, research into site investigation is focusing on methods of non-invasive techniques which can survey the entire site and help target subsequent excavation works, together with on site analytical methods which allow modification of the sampling strategy based on each new set of data. Of these techniques, a case study using laser induced fluorescence was presented.

Subjects covered in this meeting included geophysical remote sensing techniques, electrokinetic sensing techniques, site prioritisation, borehole sampling, building inventories, health and safety and contractor control.

The following key issues were raised: -

### **1 Specification**

Specifications written for site investigations need to be comprehensive to ensure that all significant contamination is discovered. This should include a provision for flexibility to allow the 'chasing' of contamination which may be presented in old pipe runs etc. Pre-tender assessment meetings with consultants can provide a clearer view of their relative competencies and result in tenders which more closely mirror the aims of the client. Good site investigations start with a clear objective whether this is to complete a risk assessment or to design a remediation works. In all instances, collation of all available existing information, including historical records, is essential.

### **2 Accuracy, Speed and Confidence**

- prediction of the fate and transport of contaminants in waters using standard groundwater modelling packages may not be possible because of the nature and complexity of made-ground on many industrial sites;
- a combination of statistical (Ferguson & Abbachi) and judgmental approaches gives the best means of using existing data to define a sampling strategy with known confidence limits of detecting specific hot-spots;

- there is a need to share experiences of the limitations of various remote sensing techniques. In particular these are complementary to and are unlikely to ever completely replace intrusive sampling methods.

### **3 Health, Safety and Environment**

- there is a need to ensure that contractors comply with agreed Health and Safety procedures on sites;
- further research is required to develop more site investigation techniques, which reduce the exposure of workers to potential hazards on the sites. These include non-invasive techniques which indirectly measure contamination, together with sensing probes which can be pushed or lowered through the site strata;
- similarly, methods need to be developed which minimise disruption of the ground and thereby reduce the risk of contamination incidents which are often most likely to occur due to unforeseen conditions.

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