

THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

SAGTA REPORT 14 - CASE STUDIES: LESSONS LEARNT, ANSWERS NEEDED

Introduction

As contaminated landowners with long term remediation strategies, R&D budgets and sizeable portfolios, SAGTA members have a wealth of information and experience of remediation which may or may not have been publicised in the past. SAGTA's workshop on 13th September 2000 aimed to:

- Share practical experience in dealing with contaminated land issues;
- Outline lessons learnt;
- Identify knowledge gaps; and
- Consider how research initiatives could be linked to fill knowledge gaps.

Technologies covered in the presentations included:

- Soil washing using water to separate the fine fraction from soils for offsite disposal.
- Soil washing of hydrocarbon contaminated soils with solvent producing washed soil, water and a solvent/hydrocarbon mixture that can be sold as a waste fuel.
- Volatile organic compound containment plant including groundwater abstraction and air stripping with granulated activated carbon.
- Bioremediation.
- Stabilisation/solidification.
- Groundwater recycling by air sparging.

Lessons learnt from case study experiences

- **Project initiation**

- *the regulator*. Be proactive and involve the regulators as early as possible, including discussions of contingency plans, to clarify planning and licensing requirements. Build the licensing process into the remediation programme

- *the team*. Compile an integrated team who manage and question everything, but with fewer actual people involved

- *the contractor*. Involve the contractor when designing an integrated remedial solution, not relying solely on the consultant designing one remedial strategy thereby locking contractors into that solution at the tender stage. Consider risk sharing with contractors.

Site investigation (SI)

- *quality*. In many cases SI's are not even close to reality and decisions are being based on poor SI results

- *combined SI's*. Don't design the SI around the preferred remedial option, but consider a combined geotechnical/contaminated land SI which includes all relevant parameters necessary to consider the various remedial options. As an illustration, particle size analysis data which is necessary for soil washing is often not included in an SI

- *conceptual site models (CSM's)*. Build an iterative CSM over time which will increase confidence in the choice of remedial option

- *estimate uncertainty*. Uncertainties are not generally calculated, presented or allowed for. Awareness of the magnitude of uncertainty may aid the setting and interpretation of realistic targets. Laboratory quality control data should be included as a demonstration of the fitness for purpose of the information.

- **Remediation design and implementation**

- *tendering*. Being cheapest does not necessarily guarantee success in tenders
- *time*. Time is probably the most important factor in the current climate as to which remedial technology is selected, once it is assessed that land will achieve a positive value after remediation
- *pilot trials*. Undertake pilots to reduce uncertainty, and build up a database to avoid replication
- *mass balance*. Treatment of separate streams such as water arising from remediation may be more costly than excavation and disposal
- *analytical consistency*. Try to use the same testing methodology or even laboratory employed for the SI, especially for long term monitoring.

Knowledge gaps

- **available technologies and operating windows**. Clients, consultants, Regional Development Authorities and regulators need more information about which technologies are actually applicable, available and utilised in the U.K. Operating windows e.g. for bioremediation and monitored natural attenuation, are needed
- **development opportunity versus remediation timescales**. Clients, consultants and Regional Development Authorities need more information on how to build sustainable long term remedial options into site redevelopment
- **residual contamination**. Research into the risk assessment of residual, post remediation hydrocarbons and validation of remediation effectiveness.

Research initiatives

- **potential research topics**

Topics were:

- key criteria are needed during an SI for consideration of all remedial options, with cost implications
- information database of technology vendors
- a model characterisation case study, including post-remediation verification

- **potential activities by CL:AIRE**

CL:AIRE could contribute by:

- promoting consistent testing regimes for remediation contracts
- providing information on risk assessment and remedial targets in the real world
- researching new technologies e.g. accelerating bioremediation with low level electric currents
- co-ordinate a review of air sparging in the U.K., including defining the operational envelope, evaluating appropriate sites further and improving methods to ascertain the radius of influence. Air sparging can be very effective on a localised scale but the true zone of influence may be very low (2m)
- in situ monitoring of performance.

What could SAGTA members contribute?

- **information exchange.** Assist in the design of an information exchange to assist confidence, by developing a Project Assessment Form template for members to present case studies documenting good site investigations, conceptual site models and practices in the U.K. The case studies will be made available on the SAGTA website with a link to and from CL:AIRE. The USEPA has a database, containing general information with contact numbers.
- **operational envelopes.** Aid the quantification of operational envelopes for remedial technologies including successes and failures by developing a matrix of treatment options and application. Leachability tests, for example, need to be focussed on the site specific problem. For further reading, see paper by Martin I. and Lambson M. at *ConSoil 2000*
- **model parameters.** Assist in the assembly of a database of key parameters used in models. Current reference source: European Centre for Ecotoxicology (ECETOC), European Factors Sourcebook for European Populations with Focus on UK Data, Technical Report No 79, Brussels.
- **soil toxicity tests.** Contribute to the improvement, development, standardisation and cataloguing of soil toxicity tests via Institute of Petroleum. Review and where relevant generate case studies of toxicity tests in risk assessment.

For further information on SAGTA please contact the Secretary of the Association Doug Laidler at douglas.laidler@atkinsglobal.com or Tel +44 01372 726140



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