THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

SAGTA REPORT 33 - RESEARCH INTO LAND CONTAMINATION – WHAT IS NEEDED AND WHY?

Introduction

Since its inception SAGTA and its member organisations have contributed to research projects associated with various aspects of contaminated land. Examples include:

- Involvement with CL:AIRE – from feasibility to inception and on-going contribution to management, technical direction and project peer review;
- Specific research within member organisations aligned to their business needs;
- Contributions to nationally based research via specific member funding contribution, specialist consultation and review;
- Collaboration with policy makers in devising keynote workshops on research;
- Disseminating research activities to its members through regular workshops.

A SAGTA workshop was held on 12th September 2007 to look at the status of contaminated land research in the UK and across Europe. Delegates to the workshop were from SAGTA, NICOLE, CL:AIRE, the regulators, the research councils, government research bodies, research brokers and academics.

Way Forward – Opportunities / Areas where SAGTA can contribute

During a plenary session, the following barriers to research were identified:

- Funding availability – contaminated land is not of a high enough profile to justify a higher level of funding;
- Familiarity with the tried and tested - the development of new, improved, technologies requires time and resources and a successful outcome is not always guaranteed ⎯
- Timescale – the delivery time for many promising research innovations is too far in the future to be applied to problems requiring commercial application to the problems of today, or the duration of particular initiatives may not be sufficient to enable commercialisation of better solutions.

Brownfield development of chemically contaminated industrial sites is still a significant issue in the UK and the rest of Europe. New legislation is also likely to drive up remediation requirements. Although there are solutions to dealing with many contaminated problems, there are still potentially better ways of assessing and remediating contaminated land which are more sustainable or cheaper than existing techniques or technologies. Thus applied research is required to understand current applications, as well as develop new more cost effective and sustainable solutions to tomorrow's problems.

SAGTA should therefore:

- Strive to play a role in steering research requirements and
- Actively seek to submit proposals for research into its priority areas in collaboration with other UK (e.g. CL:AIRE and the regulators) and European (e.g. NICOLE) partners.

For this to happen, SAGTA will need to:

- Initiate a method for monitoring calls for proposals for EU research, and
- Develop proposals which not only fit within the theme of the research area, but which are also consistent with its needs
- In collaboration with other bodies such as CL:AIRE should also investigate other funding mechanisms e.g. through revisions to funding from UK Landfill tax provision.

SAGTA members should also:

- Become actively involved with UK research councils to:
    - raise the profile of contaminated land and
    - peer review appropriate proposals (and consider them in light of needs).

 SAGTA members also should continue to participate in:

- Knowledge Transfer Initiatives
- Learning Networks and
- Training initiatives organised by the research councils and CL:AIRE.

Aim of the Workshop

The aim of the workshop was to:

- Review existing national and European research initiatives in contaminated land management;
- Identify areas where research into contaminated land management is still needed, the type of research required (fundamental/ development of techniques and technology/ understanding during application),
- Discuss potential barriers to meeting this need; and
- Suggest ways forward, particularly with respect to how SAGTA could contribute.

The workshop was in the form of:

- Presentations based around the above aims;
- A survey from the attendees of their organisations current and future research directions;
- A plenary session identifying needs, gaps and a way forward.

UK and EU Research Initiatives

In general, contaminated land as a topic for research is not considered as a high profile topic in its own right to warrant significant funding either through EU programmes or through UK research funding mechanisms.

A considerable number of EU initiatives include research into contaminated land management as a part. However, these initiatives tend to focus on "system" based research (such as macro level contamination at an urban and river basin scale and diffuse pollution), or on themes where contaminated land is considered within an ancillary context (e.g. energy from waste, carbon footprint and sustainability).

It was noted that the EU has been funding the development of a number of contaminated land networks/portals. However many of these only exist for the duration of the research initiative and then struggle to attract a self-sustaining funding stream of sufficient magnitude to maintain them and keep them up to date.

In the UK most contaminated land research funding is from the research councils or from the Technology Research Board. Thus whilst the research councils support mainly university based research, the Technology Research Board (TRB) supports (i) pre-market development of innovative products that can be used within the contaminated land industry, and (ii) Knowledge Transfer Networks to disseminate understanding and learning experiences. Neither the research councils nor the TRB have specific research initiatives focused on contaminated land, although research in contaminated land could be shoe-horned into existing programmes.

Current Research Needs of Industry
It would appear from the above funding mechanisms that contaminated land research is relatively low profile, or considered too near market to warrant funding other than from industry itself.

A survey of attendees was carried out to assess whether the current needs of industry and the regulators in particular. The survey showed that further research was required – particularly of continued land issues on the scale of problems on an industrial site (rather than regional scale problems). Thus industry's research needs are mainly in:

- Rapid, cheaper and more effective site investigation/characterisation methods;
- Remote sensing for monitoring;
- Understanding risk drivers better – e.g. bioavailability, toxicology;
- Understanding uncertainty;
- Increased understanding of existing remediation technologies – that is, how the technology works, the application window, the environmental impacts and the verification requirements; and
- Data management.

Whilst some of this research was being carried out by industry itself, this tended to be near market and concerned with near term application. Research projects with long lead-in times before ideas reach fruition were unlikely to be directly funded by industry.

Sources of funding for more fundamental and developmental research currently appear to be relatively modest. Yet it is in these areas that potential innovations could be made which impact on contaminated land management in the future.

Summary of Workshop Presentations

Presentations at the workshop were divided into:

- UK research needs and research initiatives
- EU research initiatives
- Environment Agency current programme and requirements; and
- Examples of research being carried out by industry.

Research Initiatives in Contaminated Land Management in the UK

Positioning the UK Contaminated Land Sector to Operate with More Innovation: CL:AIRE's Perspective
CL:AIRE is a learning network focussed on raising awareness and increasing confidence in practical and sustainable contaminated land remediation technologies. This it does through peer review of innovative site investigation and remediation projects (at research and demonstration scale) and through dissemination of associated reports and bulletins.

At present in the UK there has been a slight increase in the use of alternative/innovative remediation technologies. This is thought to reflect a reticence on the part of the problem holder to adopt anything that has an increased level of risk than previously "tried and tested" solutions.   It is the role of CL:AIRE's research and demonstration projects to better understand the operational envelopes of alternative/innovative remediation technologies so that problem holders understand the risks involved in application and can be more confident of success if applied to their particular sites.

CL:AIRE recognises that remediation using alternative/innovative technologies is still a growing industry and that significant R&D spend is needed in order to gain confidence in application. As a word of warning it was also recognised that by not investing in this R&D now, we could be jeopardising not only the potential to generate more UK business in the domestic market, but also for UK business to generate income from other countries (e.g. Eastern European countries).

Technology Strategy Board
The Technology Strategy Board (TSB) was set up by the Department for Innovation, Universities and Skills "*to stimulate innovation in those areas which offer the greatest scope for boosting UK growth and productivity*". This includes promoting and supporting R&D.

R&D projects within its portfolio are collaborative – with two or more partners of which at least one is from business. These projects fall under the definition of an "Innovation Platform" or a "Key Technology Area". Although not specifically identified as a topic area in itself, contaminated land R&D could fall into the area of "Environmental Sustainability" of the Key Technology Area portfolio.

The TSB funds a number of Knowledge Transfer Networks. These include IPM-NET which covers the integrated management and remediation of pollution in land, water and waste is a part. IPM-NET role includes liaison with industry to identify and prioritise needs and barriers, acting as a partner broker for funding and dissemination of outputs.

The Engineering and Physical Sciences Research Council (EPSRC)
In partnership with industry, other stakeholders and other research funders, EPSRC funds university research. With a budget of £700 million, its programmes include engineering; economy, environment and crime; life sciences; information and communications technology; materials; mathematics; physics; chemistry; e-science; basic technology and energy. Contaminated land research mostly falls within the Economy, Environment and Crime programme and the Engineering Programme. The main areas of contaminated land R&D are associated with understanding problems and of the science/technology to deal with the problems. Over £6 million is currently funding projects associated with the assessment and remediation of contaminated land and groundwater. These include bioremediation LINK projects, Sustainable Urban Environment Consortium: Pollutants in the Urban Environment (PUrE). An element of EPSRC funding also supports the early stages (proof-of-concept) of the commercialisation of innovative projects.

European Research in Contaminated Land Management Needs

European initiatives concerned with contaminated land tend to fall into a number of broad categories such as:

- Understanding systems e.g. soil and water management at an urban or river basin scale;
- Harmonisation of approaches;
- Information exchange networks and dissemination of knowledge;
- Associated topic areas such as sustainable development, or biodiversity;
- Data management;
- Verification and testing.

Whilst obviously valid, these initiatives tend to be less concerned with solving contaminated land problems on the scale of an industrial site.

Research Programmes with the Environment Agency

The Environment Agency's Land Contamination research mostly falls within their Waste, Remediation and Technology (WRAT) programme.

Most of the work is in partnership with other organisations – this ensures that although they have a limited resource, they can play an active role in many research initiatives, and can also influence many associated advisory bodies and other groups e.g. IPM-NET, CL:AIRE, SAGTA, NATO CCMS, FASA etc.

Recent activities include involvement in research into bioaccessibility, on-site testing, verification, permeable reactive barriers, bioremediation, VOC vapour pathway and asbestos.

Future research includes a framework for more effective and confident decision making – based on collation of current and past initiatives, data quality, reviewing decision support tools, and evaluation of remediation strategies (not just technology).

Research Programmes within Industry

SAGTA members provided presentations from the petrochemical industry (Shell) and the nuclear industry (Nexia Solutions).

Key drivers for contaminated land R&D within the oil industry were identified as:

- A better understanding of contaminant behaviour – in order to support risk based solutions e.g. vapour pathways, NAPL mobility, groundwater-surface water interface, spatial and temporal analysis of large datasets;
- More efficient site investigation (e.g. on-site testing) – to reduce the number of iterations of a site investigation and reduce the dependence on large numbers of off-site laboratory analyses;
- Better understanding of remedial technologies within a risk based framework and operating envelopes (projects include MNA, oxygen stimulated biobarrier PRBs, NAPL source zone treatment;
- More efficient use of resources;
- Early detection of leaks (including the use of sensor technologies for monitoring groundwater quality in real time).

Similar themes also drive nuclear industry research, although the specific R&D effort is generally geared to radioactive contaminants. Research includes development and application of a simple spreadsheet dose evaluation tool (RECLAIM), fate and transport models (which incorporate the effects of radioactive decay), tools to optimise sampling plans, in-situ measurement techniques for radioactive contaminants, laboratory test to select potential remediation technologies and modelling tools for remediation options.