

THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

SAGTA REPORT 32 – RISK BASED APPROACHES TO MANAGING LAND CONTAMINATION

Introduction

The March 2007 SAGTA workshop was hosted by the Scottish Environment Protection Agency (SEPA) and held at the BAE Offices in Edinburgh. The objective for the workshop was to review how approaches to risk based management of land contamination were offering the dual goals of obtaining environmental benefit and achieving least cost, robust compliance.

The specific aims of the workshop were to consider:

- Are risk based approaches delivering beneficial impact?
- What are the barriers?

Key Issues

The workshop was judged by all those present to have provided a useful opportunity to obtain various perspectives on risk based land contamination assessment from regulators and the private sector.

Key issues identified during the day included:

1. Groundwater. It was acknowledged that SAGTA members need to keep in touch with emerging developments to ensure that policy is put into practice. Areas where contributions could be sought include the definition of parameters relating to resource potential, clarifying what is meant by the term 'significant' in the updated statutory guidance and the use of cost-benefit arguments.
2. Human health risk assessment. It was acknowledged that a lot of work has been undertaken in the time period leading up to March 2007. SAGTA support was offered to the Defra Contaminated Land Forum to support future developments. It was noted that there needs to be coordination between different forums covering this area (e.g. Brownfield Forum).
3. It was noted that a large number of models are currently being used to support human health and groundwater risk assessments. However, more detailed groundwater modelling codes such as Modflow are used rarely.
4. Landowners should not be fearful of engaging the local community in projects. Such involvement is likely to reduce risks in the long-term, however, it was noted that it takes time and is resource intensive to manage their expectations. The right team/individual is required to build trust.
5. The need for licensed state professionals was discussed. It was acknowledged that SiLC is not doing what it was set up to do with regard to risk assessment. The need to progress this issue was identified at the IEMA conference, and to obtain interest from relevant organisations. Gaps in the current SiLC accreditation system need to be identified. Paul Syms took an action to take this issue forward. Is the role of the Land Condition Record best suited to "do nothing" land?
6. There is currently confusion in the industry about what Generic Assessment Criteria should be used for priority contaminants in soil e.g. use the CIEH/LQM values or consultants own.
7. In the context of its work on ecological risk assessment, the Environment Agency will soon publish 35 Soil Screening Values (SSVs). These have been derived in conjunction with industry. However, the Agency acknowledge that the SSVs are conservative; this is potentially an area for research. Literature sources are considered to have been exhausted; new data are needed to take this further. Over the next 12 months, a comparison of SSVs against UK soil data will be undertaken.
8. New research is needed in bioaccessibility / bioavailability. This has been discussed at the CIEH. This could be a potential area for EU funding.

9. The importance of early engagement with the Environment Agencies was highlighted by the Local Authorities present. This can help avoid blight issues associated with determination.

Summary of Workshop Presentations

Policy and Practice to Risk Based Regulation

CL:AIRE is coordinating with the Environment Agency to look at issues resulting from feedback on the definition of waste. Case studies have been requested from industry on where the guidance is or is not working. The Agency wishes to provide clearer technical guidance on this issue, using actual issues and potential solutions from industry.

The work of the Soil Guideline Value Task Force is now complete. Fifty responses had been received to the Defra Way Forward, which have been reviewed internally and will probably be made public. Comments were generally quite supportive. The key area for debate was whether SGVs provide the right standards for planning. It was acknowledged that, although there have been delays in the programme, progress is required. A full consensus is not going to be achieved, for example with regard to conservatism in toxicological data. However, there is a need to keep the momentum going. The Scottish Executive confirmed that they will be following Defra's lead and had no plans to issue separate documents. Further information on the Way Forward and associated guidance is provided later in this report.

The aims and objectives of the Scottish Executive's environmental policy are focussed towards the acknowledgement that healthy communities need healthy places and that green spaces in towns and cities must be safe and attractive places that enhance communities. Addressing contaminated land, which is generally in disadvantaged areas, can support these objectives. A regeneration statement was published in February 2006. This recognises that substantial remediation is achieved through the planning system, by putting conditions in place to ensure that land is remediated so that it is fit for any planned use. However, there is a legacy of historically contaminated land in Scotland and it was acknowledged that there had been a failure in the past to move towards sustainable development. The Scottish Executive's contaminated land policy aims to:

- Identify and remove unacceptable risks to human health and the environment
- Seek to bring damaged land back into beneficial use
- Ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

The legal framework supporting this policy includes Part IIA of the Environmental Protection Act 1990 and the Contaminated Land (Scotland) Regulations 2000 and 2005. Moving forward, the Scottish Executive and SEPA are core members of the Defra Contaminated Land Forum, with many local authorities corresponding members. This provides the opportunity to coordinate the UK approach towards identification and remediation of contaminated land, including the implementation of the Soil Framework Directive and operation of the part IIA regime, whilst representing Scottish interests.

Assessment of groundwater pollution is being addressed by UK Technical Advisory Group (UK TAG), with representation from SEPA and the Environment Agency. A final policy is yet to be developed, however, emerging thinking from SEPA's perspective was presented which covers the groundwater quality objectives of the Water Framework Directive (WFD) and Groundwater Daughter Directive (GWDD). Some of the key issues include:

- Is perched water included in the WFD definition of groundwater? The need is to protect the quality and resource value of groundwater, which could be minimal for perched water. A definition of a resource value of $10 \text{ m}^3 \text{ d}^{-1}$ has been proposed.
- The WFD sets objectives for the protection of water bodies, including those to prevent or limit inputs of pollutants. UK TAG is currently considering requirements to support this.
- Inputs of hazardous substances; those that are highly toxic/persistent/bioaccumulation potential as listed in Groups 1-6 of Annex 8 of the WFD (equivalent to List I substances), must be prevented. Inputs of

non-hazardous substances; those of low toxicity/persistence/bioaccumulation potential within Groups of 7-12 of Annex 8 (roughly equivalent to List II), must be limited. How to qualify the aim of the directive of no deterioration in chemical status has not been determined yet, for example how to discriminate between one large vs many small inputs. Guidance is in development by UK TAG on the prevention of significant upward trends in pollution concentrations. The GWDD lists a number of exemptions, for example where remedial measures would bring increased risk to human health/environmental quality or be disproportionately costly.

- The WFD considers 'inputs' of pollutants at the source rather than discharges. This applies to all inputs, whether current or historic, which may be difficult to treat holistically.
- Assessment principles will be developed around source-pathway-receptor principles, and a set of standards and a method for defining the compliance regime against which the potential for assessing groundwater pollution can be assessed. Three standards may be used: a limit value to be used at the source and which are set to prevent pollution; a compliance value which is set at a compliance point where groundwater samples may be obtained (may be the same as the receptor or located between the source and the receptor); and a quality standard at the receptor.
- Receptors (i.e. points at which risk of pollution can be assessed) could include surface water, groundwater-dependent terrestrial ecosystems, the present or future use of groundwater (i.e. an abstraction point), protected areas or property. SEPA would like the concept of a pollution assessment point introduced, to be defined for each individual receptor. Pollution assessment points could include a real location where groundwater samples can be obtained or where a concentration of a polluting substance can be calculated. Standards will be receptor-based, with the most stringent to be applied where there is more than one receptor. These are yet to be defined, however, there is to be little or no overlap between standards for status and those for regulation.
- No consensus has been reached on whether dilution should be considered when assessing impacts of inputs to surface water. Environment Agency research indicates that impacts may occur at the point of entry.
- There is a lack of knowledge of the use of cost-benefit analysis, which is likely to be applied more often.

The UK TAG paper is currently being updated and needs to be accepted, probably at Government level. When this is finalised, the relevant agencies need to decide how to interpret it and prepare a framework and methodology, and consult, probably by the end of 2007.

Member Experiences

Regulatory approval of the management of land contamination may be signified by an environmental permit or letter approving a proposed action, however, in many cases there will be no clear sign-off or end point. Triggers for such discussions include: response to permitting requirements, to address a concern raised by a regulator; proactively in response to discovery of contamination; or where site divestment is planned and there is a perception that the land should be sold with regulatory sign-off. It was noted that the 'approval' process becomes less clear moving down this list. A number of issues identified include inconsistency of assessment between different regulators, for example, treatment of groundwater bodies with low resource potential, the treatment of dilution at a receptor and the use of cost-benefit analysis. Risks inherent in site investigation, for example from drilling through a source into a deep aquifer, may not always be considered. Also, the procedure may not be in place to approach the Environment Agency or SEPA directly, even where a local authority does not have relevant specialist knowledge.

A SAGTA Member case study associated with the assessment of groundwater underlying a fuel oil distribution depot in Scotland which illustrated these issues was presented. Remediation had taken place on the site and there was a wish to sell the site with environmental 'close out' for industrial use. This process has been hindered by delays due the local authority being unwilling to engage SEPA until they were sure there was a groundwater issue and debate as to whether contamination of a shallow aquifer where no specific receptors are being impacted required action. It was concluded that landowner requirements for 'closure' are not always realistic. Given that legislation is developing rapidly, landowners and service providers need to ensure that they keep their knowledge up to date.

Three Member case studies for human health risk assessment in England and Scotland were provided. The following points were made:

- An assessment of impacts associated with a former gasworks site which is to be remediated for industrial endues was undertaken using CLEA for exposures via soil contamination and the Johnson and Ettinger vapour transport model for exposure to vapours from groundwater and free phase. Site-specific assessment criteria were developed, which were not much different from generic assessment criteria. These values were considered to be below background concentrations, hence it was considered inevitable that capping was required. The Johnson and Ettinger model was considered very conservative, however, it was easy to mitigate the risk from relevant pathways. It was noted that the resultant report was very long and detailed, making it difficult for review.
- A second case study was presented where a local authority wanted a residential end use GAC of 0.5 mg/kg used for benzo(a)pyrene which had been derived by a consultant for them, compared with a SSAC derived of 1.2 mg/kg used in the assessment. It was noted that both values were indicative of background contamination.
- A third case study was shown to demonstrate that the conceptual site model is critical to determining site sensitivity. Most mitigation solutions break pathways.
- In general, it was noted that there are a many different human health assessment models and it may be difficult to resolve differences between them. There is also the potential for errors where models are adjusted to take into account UK data.
- Output risk assessment documents may be long and detailed. These should be reviewed by the consultant, client (if knowledgeable) and the regulators. This may be difficult given lack of qualified personnel / lack of time. The use of peer reviewers or licensed state professionals or equivalent was suggested as a potential solution.

Role of SGVs and supporting initiatives

It was acknowledged that risk assessment should be unbiased and that recent issues relating to SGVs has led to a loss of confidence in the process. The Way Forward is setting a framework to allow rigorous and comparable assessment.

The scope of the Way Forward is to focus on the role of SGVs in the determination of land contamination under Part IIA, in particular to set out emerging issues, conclusions and proposals for dealing with conditions for “significant possibility of significant harm” (SPOSH) and the meaning of “unacceptable intake. A number of proposals have been put forward and assessed with relevance to their basis and practical effect, the fit to Part IIA and international practice and practicality. Resultant proposals have been split into three areas: Zone B – exposure pathways; Zone C – practical and policy considerations; and Zone D – decisions on individual sites. The most controversial area relates to the determination of unacceptable intakes.

Clarification of existing guidance as opposed to new guidance is proposed, with amendments to current guidance scheduled for the end of 2007. Outputs from this process will include: a new CLAN on policy context on risk assessment for human health; revised CLR7 and CLR9 documents; TOX reports for new substances and supplementary up to date information for existing substances; revised CLEA model, updated TOX reports, further technical guidance on specific issues and training/awareness sessions.

Supporting this work Defra and industry sponsored guidance on statistics is being prepared, resulting from the fact that existing guidance is often fragmented and often incorrectly applied. The aims of this guidance will be to introduce a structured process with signposts to existing guidance, explain the scientific basis for testing, encourage appropriate scrutiny and treatment of data and, most importantly, ensure appropriate (statistical) questions are posed for particular legal context so that correct inferences are drawn.

The statistics will be based on systematic unbiased sampling, although it is understood that most sampling is judgemental or a combination. It is recommended to keep the two datasets separate, using unbiased data for statistics and judgemental data for backup.

The guidance is currently in draft status and undergoing 'real world' testing and internal review.

Local Authority Viewpoints

When Part 2A was introduced, little guidance was given to local authorities and they did not have the necessary skills, which has led to an inconsistent approach being taken by them.

In Perth and Kinross, 10,000 sites, covering a wide range of industries, were identified as potentially contaminated sites in a preliminary assessment. In order to focus on priority sites, a contaminated land working group was set up with the objective of developing a transparent approach to apply guidance consistently. This was done with the use of a GIS based on the National Land Use Database. Geochemical data was input to identify regions of high natural background concentrations of potential contaminants. The GIS has been used to build conceptual site models and identify source-pathway-receptor linkages. Assessment and remediation of a number of contaminated sites in the local authority area have been undertaken. An example was given of a project where a developer had not undertaken any risk assessment and had tried to play off the local authority against SEPA. The result was increased expenses for the developer.

It was noted that many local authorities had a long way to go with respect to understanding the complexities of contaminated land assessment and toxicology, for example the assessment of non-standard land uses. Definitive guidance and policy decisions by Government are needed to assess the process, as well as guidance on what level of risks are people happy to accept.

Vale Royal local authority was a pilot area for the current Part 2A regime in the late 1980s. There are approximately 800 sites of concern in the area. A total of eight potential Part 2A sites have been identified to date of which one has been determined and the others have involved voluntary assessments/remediation.

Two case studies were presented, detailing how public engagement has been used in the management of contaminated sites.

The first case study involved a flash (an area of land which has subsided due to salt extraction activity and has become filled with water) where waste materials from two old landfills were being eroded into the water. Consultation with the Environment Agency, British Waterways and local yacht and angling clubs has led to a sustainable solution being formulated that allows continued use of the facility and encourages biodiversity.

The second case study involved the deaths of two young children from a rare form of leukaemia which might have been linked to environmental factors (potentially benzene from a former landfill). In order to gain trust in the assessment and remediation process from the local population, a residents forum was set up, which was given the authority to select the consultants used as well as providing input to the development of the conceptual site model and risk assessment. A joint approach was taken, also involving the Health Protection Agency, the Primary Care Trust, doctors, the media and consultants. This empowerment process has led to remediation of the site to the satisfaction of residents, such that new residents are moving into the area.

Ecological Risk Assessment – Progress Report

A framework for ecological risk assessment was developed by the Environment Agency and underwent consultation in 2003-2004. In parallel, consultation took place with site owners and a number of follow up practitioners workshops were held. Ecological risk assessment was also the subject of the June 2002 SAGTA workshop. A GIS study in England and Wales had identified ecological receptors and overlapped them with potential sources of contamination. There is a great deal of overlap, for example approximately 500 receptors are located with potentially contaminated sites (mainly historic landfills) whilst there are over 4000 receptors located within a 250m-500m distance between potentially contaminated sites. A similar study is underway for Scotland.

The framework is determined to be protective of three trophic levels (soil microbes, plants and soil invertebrates). Assessment end points comprise the functioning of the ecosystem, species of special interest and favourable conservation status. A tiered assessment framework is proposed, with the development of the

conceptual site model seen as the key first stage. In support of the framework, the Part IIA definition of “harm” is translated for operational purposes to represent “adverse change”.

Assessment at a screening level comprises comparison of soil contaminant concentrations against Soil Screening Values (SSVs). Thirty five SSVs for priority contaminants are currently being tested, for example against UK background concentrations, and will be issued soon. They are conservative and have been designed to act as a trigger for more detailed assessment rather than act as a statutory value.

The Project Board comprises representatives from Government, regulators, conservation agencies and industry. A ‘responses’ document is to be issued in the next few months which will indicate the direction where the framework is heading. The framework is scheduled for launch in Spring 2008 and will include a spreadsheet assessment tool.

Site-specific Approaches vs Generics

Should a land portfolio containing contaminated sites be managed as a risk or an asset? Rather than looking solely at risks and liabilities, a high level cost-benefit analysis could be undertaken, to look at the benefits, risks and barriers for each site. A site investigation and risk assessment comprise a key stage of the process to ensure that the risks associated with the site and potential redevelopment/remediation options are understood to ensure there is a balance between high and low risk sites.

A case study was presented of a former alumina processing site, which was heavily contaminated, had no regulatory driver for remediation, was close to sensitive receptors and had blight issues. A preliminary risk assessment indicated the cost of full scale remediation was £10 million. However, by considering the benefits of redevelopment of the site and undertaking further assessment and stakeholder liaison, a number of alternative remedial options were put forward based on proposed end use and a mixture of do nothing, minimal risk management and remediation. This led to redevelopment of the site with a 75% cost saving. Benefits of the project included removal of the risk at reduced cost, a maximised return on remediation investment, a good public image and substantial investment in the local area.

Barriers to such an approach involve the need to get a consensus amongst professionals, uncertainty in legislation and policy, the definition of waste, perception that this could be an expensive option, available technology and capex and potential admission of guilt. However, there are substantial benefits, for example added value to land portfolio, reduction of liabilities and improving the environment. Moving forward, landowners need to determine how to break down barriers and turn them into opportunities.