THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

SAGTA REPORT 26 – NON CHEMICALS – PERCEIVED RISKS?

Introduction

SAGTA's December 2004 workshop considered non-chemical contaminants, the risks they pose and perceptions that may apply and should be taken into account as part of the management process. Various member companies of SAGTA are exposed to risks associated with land management that fall outside the more typical chemical risks.

The objective of the workshop was to provide a forum for sharing and comparing experiences in addressing non-chemical risks - i.e. radiological, ordnance and asbestos – in the context of:

- Risk assessment
- Public perceptions and expectations
- Communications
- Management of residual risks.

KEY ISSUES DRAWN FROM WORKSHOP PRESENTATIONS AND DISCUSSION SESSIONS

"Is perception a reality?" was the question posed at the beginning of the workshop. One view is that perceptions are truths because people believe them. It was demonstrated during the workshop that perceived risk can potentially be as damaging and costly as real risk. Managing this perception can result in large costs to businesses with sensitive PR issues. Society cannot apply all of its resources to prolonging life and avoiding risk, therefore a value judgement is implicit. Proportionality principles, such as ALARA, all involve a trade off between risk reduction and economic, social and technical considerations.

Summary of Workshop Presentations

Assessment of Risks from Radioactive and Chemical Contaminants
This presentation looked at the scope for comparison between radiological and chemical contamination. In terms of exposure, there are both similarities and differences. They are similar in that intake is primarily via ingestion and inhalation. The contamination in both cases is usually present in low concentrations and, therefore, does not affect the bulk properties of the soil, making its immediate detection difficult. Both types of contamination can also have effects without being taken into the body. Radioactive contamination can cause irradiation at a distance, while hyper-sensitisation can also be a problem associated with contact with chemical contamination, such as nickel.

The exposure response to chemical contamination differs in that there is no common interaction and the toxicological response will be different for different chemicals. Much of the current knowledge base on exposure response comes from animal studies. The understanding of different types of chemicals is also very variable.

As with radionuclides both deterministic and stochastic effects can occur and uncertainties still exist due to extrapolation from animal studies, differing exposure conditions and the intra-species variability (e.g. Children vs. Adults).

There are also differences in the standards and criteria used for chemical and radioactive contamination. Standards set for radioactivity are independent of particular radionuclides and are based upon risk (e.g. 10^{-6} y^{-1}) and thresholds. UK legislation reflects the recommendations of the International Commission for

Radiological Protection (ICRP). For chemical contamination the standards are directly based on observed effects for specific chemicals (i.e. CLR toxicological reports) and are set for individual substances.

While the assessment of chemical contamination is well defined under Part IIA of EPA 1990 and there are a number of 'approved tools' (such as ConSim and CLEA), there is limited regulatory guidance at present for radionuclides. Assessments for radioactivity are often site specific and consider all media, are applied to hypothetical exposure groups and consider the total dose from all radioactive contaminants. Chemical assessment on the other hand generally considers soil and water separately using contaminant specific standards and derived concentrations.

A common basis for comparison was presented for illustration purposes. Three measures of impact on health were be used, namely:

- Compare intakes to threshold criteria
- Calculate risks for non-threshold effects
- Compare with environmental background (not a measure of health effect, but gives an idea about what humans are tolerating).

Each measure is then presented separately. The comparison could give an indication that one contaminant is more important than another. Another method for comparison was suggested which compared concentrations with the relevant standards, to give an 'exceedence factor'. Exceedence factors can then be compared for different contaminants.

Communicating with the Public in Brownfield Site Management

The landowner is vulnerable to misinterpretation of data. There is a need to be proactive in communicating contaminated land issues, because of the potential for local speculation and media sensationalism. In order to deal with these issues, it is important for companies to put in place arrangements to ensure effective communication (for example through the support of skilled PR representation, who are able to give advice to managers).

Examples of the strategies employed to manage public perception included widening the understanding of contamination issues, particularly among the Environmental Health sector. This included the preparation of communications media, such as mailings to environmental health officers, and participation in Local Government and CIEH events. Hazards and risks associated with contaminated land should be communicated in everyday language and analogies.

Communications centres can be used to control comment and speculation, for example through vetting the activities of property advisors and consultant etc., providing a 24 hour contact point and handling media, marketing and public enquiries regarding specific sites. Site specific strategies should be developed and local people informed in advance of any work on the site to head off any problems. Fear can be created when people in protective clothing carrying probes suddenly descend on an innocuous patch of derelict land. It is important to project openness and willingness to talk rather than reticence and silence.

Communicating perceived risk: Lessons from petrochemicals

Reputation risk management can be an important consideration for large companies. Incidents that require careful management can range from the large scale 'bangs and crashes' type incident, where the media are likely to be outside the gate, to longer term, slow burn issues. Companies can require assistance in reputation risk management. This may involve media training, risk communication, issues management and crisis management.

The presentation proposed that perceived risks are truths because people believe them. One key is to ensure that company staff understand that perceived risk can be potentially as damaging and costly as real risk.

The public's decisions on risk are value based, rather than technical:

- Risk=Hazard + Outrage (preconceived attitudes, values and bias)
- High Hazard and Low Outrage – smoking, alcohol, driving a car
- Low Hazard and High Outrage- SARs, MMR, mobile phone radiation

Regulation of Contaminated Land on Nuclear Licensed Sites in the UK

The main legislation covering the safety of workers and the general public at nuclear installations in the UK, is the Health and Safety at Work Act 1974 (HSWA74) and associated statutory provisions, which include the Nuclear Installations Act 1965 (as amended) (NIA65). Radioactively contaminated land is regulated by the Nuclear Installations Inspectorate (NII), who are part of the Health and Safety Executive (HSE), under NIA65. The NII regulate radioactively contaminated land as an accumulation of waste and therefore the same fundamental principles that apply to waste also apply to radioactively contaminated land. These are:

- prevent in first place (contain and detect)
- manage appropriately
- safety case, contingency plans, remediation
- monitor and record
- retrieve/dispose where appropriate
- progress to acceptable end-state

Once a site is licensed it cannot be de-licensed until the site has been cleaned up so that there is "no danger" from ionising radiation. Possible end states may consist of the following individually or in combination:

- Clean Site and De-licence
- Perpetual Management under licence conditions
- Obtain EA agreement for all remaining activity to be authorised disposal (note licence continues)

Part IIA extension to cover radioactively contaminated land on non-nuclear sites is expected to be implemented by Dec 2005, involving criteria that relate to no significant harm rather than no danger, as is the case for delicensing.

Issues and Implementation of Exemption Orders

Under the Environment Act 1995 (EA95), the disposal of radioactive waste on or from all nuclear sites in England and Wales is regulated by the Environment Agency. The Environment Agency exercises its powers under EA95 through the Radioactive Substance Act 1993 (RSA93). Authorisations are granted under RSA93, subject to such limitations and conditions as the Environment Agency thinks fit. Key principles include:

- waste minimisation
- BPEO
- environmental protection
- socio and economic effects
- protection beyond national borders- involving various stakeholders and impositions from Europe.

Exemption Orders are in place to prevent the authorisation of practices becoming an administrative burden.

Current guidance on radioactively contaminated land on non-nuclear sites is to maximise remediation without disproportionate costs. The expectation is that dose to the critical group should be less than 20 μSv after remediation.

Triangular working arrangements are in place between EA, NII and NDA to discuss NDA's developing strategy, amongst other issues. NDA have also drawn up a list of 50 or 60 strategic issues such as VLRM, ILW etc. One advantage of the NDA, as perceived by the regulators, is that they have a national remit. Site delicensing strategy will move from operators to NDA with NDA and operators needing to work with NII to agree expectations. EA have been involved in reviewing Lifecycle Baselines (LCBLs) and Near Term

Work Plan (NTWPs) to set out the long-term objectives for the site and in-depth views covering in general the next two or three years respectively.

Case study experiences: Facts, Figures and Reality
A case study was presented involving total costs to date of approximately £10M in external contractor support (which does not include internal effort). A programme of work, which has been driven by regulatory requirements, incurring significant expenditure and attention has been undertaken although environmental risks are minimal (overall risk to an individual of<<10-9). The resulting benefit of this expenditure has been estimated to be approximately £1M. These benefits include well-defined risks, job creation and improved scientific knowledge. A BPEO study is currently being undertaken to look at the appropriate management of the issue. The cost benefit and risk arguments are strongly in favour of "do nothing", but this is not an option.

A Method for Rating Risk associated with land potentially contaminated with Conventional Ordnance
Most countries have a requirement for ordnance clearance, although few (if any) have sufficient resources to deal with it fully. An explanation of Explosive Ordnance Clearance (EOC), the planned and systematic searching of an area for ordnance, and Explosive Ordnance Disposal (EOD), the safe and controlled disposal of explosive ordnance including provision for emergency response to unexploded bombs etc., was given.

EOC frequently addresses the hazard and not the risk. The risk rating method considers six events, each of which are rated, and produces a numerical output which rates risk to human health. Each event is considered by a team of experts, who jointly agree a rating for each event. The following events are considered:

- UXO Present on Site
- Public Access
- Intent to exploit access
- Contact with Ordnance
- Probability of Detonation or Deflagration
- Event capable of causing harm to humans

The risk rating score is the product of the six events and is used to rank sites in order of risk.

Air dropped Unexploded Ordnance- A Risk Management Approach
Air dropped unexploded ordnance (UXO) generally includes item such as high explosive bombs, parachute mines etc., that have been launched from height, mainly from aircraft. Some 250,000 HE bombs were dropped on the UK during WWII, targeting key industrial sites and large cities. Ten percent of HE bombs failed to explode. No incidents involving accidental detonation of UXO have occurred in the UK, but numerous UXO are encountered (~10) every year. In Berlin however, a bomb was struck during a site investigation, killing three workers and causing significant damage to property. The public perception of the risk associated with UXO is influenced by the fact that explosives create a very visible impact and a severe and immediate acute risk.

The risk management approach outlined involved a phased approach of desk study, geophysical investigation and intrusive investigation. Processes covered comprise site investigation, redevelopment and construction with the need to address all such risks under CDM. Key information that feeds into the desk study is derived from WW II Aerial Bombing Campaign- based on UK and German records. The perceived risks are high, but UXO risk can easily be managed to a low level.