REPORT OF THE NICOLE Workshop: Using baselines in liability management – what do upcoming Directives require from us?

14-16 November 2007

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www.nicole.org

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NICOLE (*Network for Contaminated Land in Europe*) was set up in 1995 as a result of the CEFIC "SUSTECH" programme which promotes co-operation between industry and academia on the development of sustainable technologies. NICOLE is the principal forum that European business uses to develop and influence the state of the art in contaminated land management in Europe. NICOLE was created to bring together problem holders and researchers throughout Europe who are interested in all aspects of contaminated land. It is open to public and private sector organisations. NICOLE was initiated as a Concerted Action within the European Commission's Environment and Climate RTD Programme in 1996. It has been self-funding since February 1999.

NICOLE's overall objectives are to:

- Provide a European forum for the dissemination and exchange of knowledge and ideas about contaminated land arising from industrial and commercial activities;
- Identify research needs and promote collaborative research that will enable European industry to identify, assess and manage contaminated sites more efficiently and cost-effectively; and
- Collaborate with other international networks inside and outside Europe and encompass the views of a wide a range of interest groups and stakeholders (for example, land developers, local/regional authorities and the insurance/financial investment community).

NICOLE currently has 145 members. Membership fees are used to support and further the aims of the network, including: technical exchanges, network conferences, special interest meetings, brokerage of research and research contacts and information dissemination via a web site, newsletter and journal publications. NICOLE includes an Industry Subgroup (ISG) – with 29 members; a Service Providers Subgroup (SPG) with 44 members; 55 individual members from the academic sector/research community; and 17 members from other organisations, including research planners, non profit making organisations, other networks, funding organisations. Some members are involved in both the ISG and the SPG. For further general information, further meeting reports, network information and links to contaminated land related web sites, please visit NICOLE's web site: *www.nicole.org*.

Membership fees are currently 3,500 EURO per year for companies (1,750 EURO for smes), and 150 EURO per year for academic institutions. For membership requests please contact:

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Executive Summary

Managing liability for contaminated land and groundwater is a topic that naturally is of interest to NICOLE members. Crucial questions about liability include:

- How far does my liability extend?
- To whom does the liability belong?
- Is the contamination historical or more recent?
- How far do I have to go with the mitigating measures to manage risks (to human health and environment)?

Baselines are a useful tool in liability management. The definition of a baseline condition may vary for different applications and could, for example, represent the starting condition, the condition that prevailed before the site was contaminated or the condition to which a site has to be restored. The importance of baselines has been highlighted by the Environmental Liability Directive and its transposition in the EU Member States. However, other pieces of legislation such as the Integrated Pollution Prevention and Control (IPPC) Directive and the Groundwater Daughter Directive also include elements of baseline thinking.

In terms of managing liability the "real" question that underpins any transfer of risk or remediation requirement is: "What is the baseline condition that needs to be returned to and does the liability for reaching it belong to me?" Hence baselines play a role in scenarios concerning, for example, sales and acquisitions of sites, insurances for pollution and remediation, liability transfers and contractual negotiations, land valuation, redevelopment, etc.

The objective of this workshop is to investigate what requirements current and upcoming legislation will put on the site owner, the seller of a site and the buyer of a site. Sessions dealt with regulatory aspects, financial aspects and methodologies for dealing with the definition of baselines and for designing risk management approaches to meet those baselines. An interactive session was included, in which the participants developed plans for defining a baseline condition in short case study.

The following comments have been drawn from the concluding session of the workshop and from comments invited from NICOLE Steering Group members, the meeting organisers and speakers in the weeks following the workshop, and also from comments kindly sent in by a number of delegates after the workshop.

Baselines a difficult concept to relate to contemporary practice in historic contaminated land management (e.g. cost estimation and modelling, transactions and due diligence). However, baselines are now part of the regulatory framework for those owning and managing landholdings and/or processes that can impact land or water. Baselines are explicit in the Environmental Liability Directive and also in the Water Framework Directive as benchmarks against which decisions on remediation or restoration must be undertaken. Both Directives also bring a new dimension of damage into play. Typically, the environmental management of sites has related to risks to human health and to water. In some cases risks to particular built services and/or conservation sites has also had to be considered depending on their proximity to the contamination source and the prevailing national or regional legislation. With the Water Framework Directive and its daughters) and the Environmental Liability Directive impacts on ecology is an explicit consideration, and impacts may need to be considered on ecological status that is distant from the manager's or owner's site or process, for example in the context of river basin management action plans. The Environmental Liability Directive provides a framework that Member States are currently implementing in detail, and implementation has been allowed to vary substantially between countries. There are therefore a number of areas of uncertainty in planning for the future for NICOLE Members, be they industry or service provider members. These relate to how baselines are to be assessed and used, how significant damage to ecological "services" is to be judged and the types of remedy that might be required. The Environmental Liability Directive describes "primary" remediation which is similar to remediation

concepts already familiar to NICOLE members where ecological services on a site are restored to their former function under the "baseline" condition, but also two alternative remedies if primary remediation is not feasible: compensatory or complementary remediation. These alternatives are based on the concept of providing some kind of equivalent ecological resource for the one that is damaged. These alternatives are new concepts in Europe, although they have been practiced in the USA. The Environmental Liability Directive does not provide explicit instructions on how equivalency is to be determined, although a EU funded research project is developing a "resource equivalency" tool-kit.

The overall situation is one that can be best described as emerging, with potential new obligations and liabilities for operators of processes and managers of land, and new requirements that service providers will need to meet. However, the (deliberate) flexibility in Member State implementation and the varying pace of implementation means that responses will be strongly affected by national developments, even if the overall liability framework is a European one. What would be interesting for NICOLE members might be to find out how particular organisations are gearing up to meet these challenges, and whether "early innovators" have some useful experiences for the rest of us to share.

The baseline concept has its theoretical attraction, but in the case of historic contaminated land management is not necessarily practical, not least because the baseline (as described by the ELD) refers to a point in time before which substantial changes in ecological services may have already taken place, and distinguishing a new change from these may be next to impossible. It may be more appropriate to look at what is possible in terms of providing additional ecological services during contaminated land management and remediation. The case study provided by Honeywell demonstrated the potential for synergy between remediation and ecological restoration, where enhanced ecological services can both be used as a route to enhanced "sustainability" and costs savings.

NICOLE believes it is important that there is a debate about the usability of baseline concepts in historic contaminated land management, and whether more practical measures may add ecological services as a normal consideration in contaminated land remediation. An ongoing action for NICOLE will be to continue this debate and collect case study information about both the use (attempted) of baselines by its members and their work on ecological restoration as a practical part of contaminated land management.

The full report provides summaries of the papers given, along with a discussion based on points raised during the meeting, and comments from a number of delegates after the meeting.

Contents

1 Introduction

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A baseline is a "status" established at a certain moment and location. It triggers ongoing monitoring of the status, and if the status changes this may trigger actions. A lot of EU legislation makes use of baselines, for example:

- Groundwater Daughter Directive (2006/118/EC): *'baseline level' means the average value measured at least during the reference years 2007 and 2008 on the basis of monitoring programmes implemented under Article 8 of Directive 2000/60/EC or, in the case of substances identified after these reference years, during the first period for which a representative period of monitoring data is available establishes a date that distinguishes historical versus new pollution.*
- Environmental Liability Directive (2004/35/EC): *damage to protected species and natural habitats, which is any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species. The significance of such effects is to be assessed with reference to the baseline condition, taking account of the criteria set out in Annex I.*

The Environmental Liability Directive has triggered the need for some land owners to look at the status in 2007 of habitats that they are responsible for or might impact, the year in which the Directive came into force (as liability before this date is excluded from the Directive and falls under whatever provisions already exist in national legislation)[1].

This report provides summaries of the papers given, along with conclusions based on points raised during the meeting, and comments from a number of delegates after the meeting. Table 1 provides a list of other recent NICOLE publications.

[1] Paragraph 30 in the Directive Preamble, L 143/56

Table 1 Selected NICOLE Publications from 2004 Onwards

2007	**Report of the NICOLE Workshop**: Redevelopment of sites – the industrial perspective, Akersloot, the Netherlands. See www.nicole.org/publications/library.asp?listing=1
2007	**NICOLE Position Paper** (2007) Comments on the Proposal for a Directive of the European Parliament and of the Council on Waste. NICOLE, TNO, Appeldoorn, Netherlands. Downloadable from www.nicole.org
2007	**NICOLE Position Paper** (2007) Concerning European Commission Communication "Thematic Strategy for Soil Protection" COM(2006)231 final ("strategy")& Proposal for Directive of the European Parliament and of the Council establishing a framework for the protection of soil and amending Directive 2004/35/EC ("directive"). Available from NICOLE Secretariat, TNO, the Netherlands. www.nicole.org
2006	**Report of the NICOLE 1996-2006 Ten Year Network Anniversary Workshop**: Making Management of Contaminated Land an Obsolete Business - Challenges for the Future. 5 to October 2006, Leuven, Belgium. See http://www.nicole.org/publications/library.asp?listing=1, and *Land Contamination and Reclamation*, **15** (2) 261-287
2006	*NICOLE News* 2006 issue, www.nicole.org/publications/library.asp?listing=9
2006	**Report of the NICOLE Workshop**: Data Acquisition for a Good Conceptual Site Model 10 – 12 May 2006, Carcassonne, France. See www.nicole.org/publications/library.asp?listing=1, and *Land Contamination and Reclamation*, **15** (1) 94-144
2006	**Report of the NICOLE Workshop**: The Impact of EU Directives on the management of contaminated land, 1-2 December 2005, Cagliari, Sardinia, Italy. See www.nicole.org/publications/library.asp?listing=1 and *Land Contamination and Reclamation* **14** (4) 855-887
2005	**NICOLE Report:** Monitored Natural Attenuation: Demonstration and Review of the Applicability of MNA at Eight field sites, http://www.nicole.org/publications/library.asp?listing=5 (summary). The full report can be ordered from the NICOLE Secretariat
2005	**NICOLE Report:** The Interaction between Soil and Waste Legislation in Ten European Union Countries sites, http://www.nicole.org/publications/library.asp?listing=7 (summary). The full report can be ordered from the NICOLE Secretariat
2005	*NICOLE News* 2005 issue, www.nicole.org/publications/library.asp?listing=9
2005	**Report of the NICOLE Workshop**: State of the art of (Ecological) Risk Assessment, 15-16-17 June 2005, Stockholm, Sweden see http://www.nicole.org/publications/library.asp?listing=1 and *Land Contamination and Reclamation* **14** (3) 745-773
2005	**Report of the NICOLE Worksho**p: Unlocking the Barriers to the Recovery of Soil and the Rehabilitation of Contaminated Land. 15-16 November 2004, Sofia, Bulgaria see www.nicole.org/publications/library.asp?listing=1 and *Land Contamination and Reclamation* **14** (1) 137-164
2004	**NICOLE Booklet** Communication on Contaminated Land, www.nicole.org/publications/library.asp?listing=2
2004	*NICOLE News* 2004 issue, www.nicole.org/publications/library.asp?listing=9
2004	**Report of the NICOLE Workshop**: *Sediments and sludges: an issue for industry?*, Frankfurt, Germany see www.nicole.org/publications/library.asp?listing=1 and *Land Contamination and Reclamation* **12** (4) 379-400
2004	**Report of the NICOLE Workshop:** *NICOLE Projects Reporting Day*, Runcorn, UK - see www.nicole.org/publications/library.asp?listing=1 and, *Land Contamination and Reclamation* **12** (3) 286 - 308

Update on activities of the NICOLE Working Groups

Monitored Natural Attenuation (MNA) – Chair: Roger Jacquet, Solvay, Belgium

This Working Group (WG) is the focus for NICOLE's work making the case for MNA as a recognised option for land remediation.

In 1998 NICOLE began a project reviewing existing MNA protocols, which resulted in the publication of a report detailing the findings of the work, available upon request from the secretariat. This work was followed up in 2000 by setting up a data-sharing programme for industrial sites to investigate the possibilities for MNA. Over four years eight industrial partners made investigations as part of this demonstration project and summary site reports were reviewed by twelve independent reviewers. In general MNA was viewed as applicable and effective at many sites. Differences of opinion from reviewers of different nationalities were marked. The results and final report of this project was presented at the NICOLE meeting in Sardinia in December 2005.

In recent years the legislation of NA has developed in line with increased recognition of its role as a management strategy, with protocols and guidance for its application having been developed in England and Wales as well as Flanders, while initiatives are also being undertaken in Germany and France. The MNA Working Group follows on from the pioneering NICOLE projects. Its members are a combination of industry representatives, service providers and those working in research institutes. The MNA Working Group aims to build on the successful work of NICOLE and the increasing interest in the technology to move from theory to the practical implementation of MNA as a remediation strategy. It also aims to document (anonymously) case studies of the use of MNA in Europe to further the prospects of the technology. The group will also keep NICOLE members abreast of legal and technical developments in European countries

Activities in recent months include presentations to several technical meeting: Sites pollues - *Quelles avancées autour de l'atténuation naturelle* organised by the ADEME (Agency for the Environment and mastery of energy) in Bordeaux, France, May 2007; and the KORA Status seminar 2007 in Stuttgart, Germany, September 27. The Working Group also participates in the organising committee of the Dechema 3rd European conference on *Natural Attenuation and in-situ Remediation*. Recently the WG launched an update review of the potential for MNA implementation in Europe according to national and regional guidelines, protocols and legislation.

The WG renews its call for case studies, which appear to be difficult to find, perhaps related to the relatively slow rate of implementation of MNA across Europe; and the relative newness of many larger projects.

Soil - Chair: John Waters, ERM, UK

The Soil WG has been addressing the Soil Framework Directive and co-ordinating NICOLE's response to it. It was launched by NICOLE as part of its initiative to become more proactive and influential in the ongoing development of legislation of relevance to contaminated land. Until recently soil was one of the few, if not the only environmental compartment without specific legislation at an EU level, a situation that is now changing with the development of the EU Soil Directive.

The WG was led from its inception by Johan De Fraye of Honeywell. John Waters of Environmental Resources Management (ERM) has taken over the role of chairman of the WG, which comprises more than 20 members drawn from industry, academia and consultancy.

The focus of the SWG during this year has been on developing and submitting a response to the draft Soil Directive, released for public consultation late in 2006[2]. NICOLE's comments were submitted in January 2007. They proposed amendments to the text in six areas, namely soil sealing, the characteristics and functionality of soil, the definition of polluted sites, the cost-effectiveness and technical feasibility of remediation measures, the likelihood of risk and the liability for remediation funding.

A huge number of amendments (594) were reviewed by the EU Parliament rapporteur and compromise amendments were issued on 4 October 2007. These were laid before the EU Parliament Environment Committee during their meetings on 7-9 October 2007. A summary report on the approved amendments was published on 24 October 2007[3].

Important changes to the draft text include:

- The definition of contaminated land, as originally included (article 2) now talks about "confirmed presence", "caused by human activities", "significant risk" etc. It also makes specific reference to "current and approved future use of the site"
- Article 4 now talks about "proportionate" measures to "avoid, reduce or control" substantial impact on soil function and links this to "current and approved future use of the site"
- A lot of flexibility is introduced for Member States (MS) to decide how to implement elements of the Directive - such as monitoring to establish the "state of the soil".
- Article 11 has reintroduced the requirement for Member States to produce national (or regional) inventories of contaminated sites within seven years, updated every five years. Specific provision is made that sites should be removed from the inventory post remediation.
- •Article 12 proposes that Member States establish funding mechanisms for remediation where the polluter cannot be identified. No explicit provision is made for liability passing from one party to another as part of a "with information" transaction.

Reportedly the Portuguese presidency is anxious to get agreement on the Directive by the end of 2007. The WG has decided to focus its remaining comments on two issues: the inventory and funding; and sent further comments on to Cristina Gutierrez-Cortines, the EU rapporteur for the Soil Thematic Strategy.

NICOLE is concerned that automatically placing a site on an inventory will discourage voluntary remediation by owners and therefore slow the pace of remediation and in particular the re-use of Brownfield sites. In this way sharing of information with the competent authorities and voluntary remediation is encouraged, with the stigma associated with the "contaminated site" label being reserved for cases where remediation is not initiated and completed in a reasonable time. If an inventory is unavoidable, then NICOLE strongly supports the Parliament's Amendment to be able exclude remediated sites from the inventory, once remediation is complete.

Regarding funding, NICOLE supports "polluter pays" principle is supported. However, more clarification in the text is required about the obligations and liability of owners, operators and polluters, if these are all different. For example, who would be considered to be the polluter in a case where the original owner of the land (and operator of the "polluting" process) sold it with full information to a purchaser, and at a discount to allow the purchaser to deal with the pollution, who then exposed humans to the chemicals of concern by redevelopment of the site? It would seem inequitable for the responsibility to remain with the original owner.

[2] http://www.nicole.org/news/downloads/NICOLE%20SOIL%20POSITION%20PAPER.PDF
[3] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A6-2007-0410+0+DOC+XML+V0//EN&language=EN

Waste – Chair: Ian Heasman, Taylor Wimpey Developments Ltd, UK.

The NICOLE WG on Waste held its first ever meeting in Birmingham (August 2006), followed by meetings in Leuven, Amsterdam and Akersloot. The principal aim of the group is to track and, where possible, influence productive revisions to the Waste Framework Directive to enable and facilitate the sustainable reuse of soil materials. With this in mind, in May 2007 the group published the NICOLE Position Statement on the Waste Framework Directive[4]. The WG considered in particular "exclusions": ways in which soil materials could be by-products rather than wastes and criteria to define when soil materials that had become waste to cease to be waste.

In July 2007 members of the waste working group secured the opportunity to meet with Caroline Jackson, the rapporteur for the Waste Framework Directive, at the European Parliament to discuss our concerns regarding drafting. Dr Jackson invited the Waste WG us to write back to her summarising key issues with the latest draft.

The Waste WG has since tracked the passage of the revised Waste Framework Directive through the European institutions. At the end of June 2007 political agreement on a text was reached - the "Common Position", although the text was not finalised until November. The WG was happy to note that most of the key aspirations outlined in the NICOLE Position were included in the Common Position. These related to: exclusions, by-products, recovery, disposal, protection, and the "end of waste", as set out in the WG's Position Paper.

The Portuguese presidency is hoping for adoption at the Environment Council meeting in late December. If adopted, the Directive will be formally communicated to Parliament under the Slovenian Presidency in early 2008. The next step would be Parliament's second reading.

The WG's future work will be continuing to follow the passage and progress of the Waste Framework Directive through the European institutions; and when it is finalised, to look at its transposition into Member States legislation, in particular in regard to practicality and consistency. The group has also agreed to communicate with the EC - Joint Research Centre regarding their "end of waste" project work for DG Environment.

Ecological Risk Assessment – Chair: Bertil Grundfelt, Kemakta, Sweden

The aim of the Ecological Risk Assessment (ERA) WG is to follow up the conclusions of the NICOLE Stockholm Workshop on ERA in June 2005[5] and to produce a proposal a NICOLE position/ statement / action plan regarding ERA. The group met at Akersloot and Brussels (in 2007). It has focused on two issues:

- the implications of the Environmental Liability Directive (ELD) and its transposition into national legislation, and
- procedures used for ERA in the various Member States.

With respect to the ELD it was concluded that it might be worthwhile to set up a project to produce an inventory of the Member State transpositions of the Directive, as its implementation is flexible across the various Member States. The WG also decided to carry out an inventory of ERA procedures used in different countries. The inventory will review whether procedures are laid down in the legislation, what kind of reference levels or screening values are used, and whether there are generally used or legally prescribed schemes for ecological testing of soil and groundwater.

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4 http://www.nicole.org/publications/NICOLE%20Position%20Paper%20on%20Waste%20_FINAL%20May%202007_.pdf

5 Report of the NICOLE Workshop: State of the art of (Ecological) Risk Assessment, 15-16-17 June 2005, Stockholm, Sweden see http://www.nicole.org/publications/library.asp?listing=1

Site Characterization and Monitoring – Chair: Derk van Ree, GeoDelft, the Netherlands

The new NICOLE Working Group on Site Characterisation and Monitoring was launched in June 2007. Its aim is to identify key issues for improving the prospects for the successful implementation of innovative characterisation and monitoring techniques in the contaminated land sector. There are many new rapid characterisation and monitoring techniques that are currently underused in industrial applications for a variety of reasons. Some are not accepted in all countries. Some are not widely used simply because they are very expensive. The WG intends to investigate and address the following items in the coming year:

- What are the barriers preventing the implementation of novel techniques?
- Is the innovative technique replacing an accepted 'standard' technique, or is it an additional technique that could be offered as an alternative?
- Why are some techniques acceptable in one country and not acceptable in another? How can such discrepancies be addressed?
- How can techniques be compared?
- Creating opportunities to share experiences of using novel techniques

Groundwater – Chair: Wouter Gevaerts, Arcadis, Belgium

In 2006 the Groundwater Daughter Directive (GWDD) was approved. In 2007 guidance documents (to help the Member States translate the GWDD into Member State legislation) were finalised. The most important guidance documents deal with monitoring, drinking water protection zones and prevention and limitation (i.e. direct and indirect inputs). The WG has been involved in the development of this last guidance document. The most important issues in the prevention and limitation document are:

- the introduction of risk assessment to define if a receptor can be reached;
- where a risk cannot be excluded "points of compliance" have to be foreseen. Between the source of contamination and a possible receptor, several monitoring points are checked to see if the receptor could be reached by the contaminant;
- where a receptor can be reached, remediation is necessary; the measures must be BATNEEC (best available technology not entailing excessive costs) and based on a risk assessment.

NICOLE is also involved in the EC working group that will write the guidance document on groundwater risk assessment and conceptual hydrogeological models.

2 Presentations

Relevance of nature conservation issues for site remediation, Martin Schamann and Irene Oberleitner, Umweltbundesamt, Austria / Common Forum

Restoration of degraded natural habitats has been integrated in international and regional conventions, treaties and Directives. The EU is a signatory to a number of international conventions and agreements related to conservation and wildlife, including: the Convention on Biological Diversity, the Convention on Migratory Species, the African-Eurasian Waterbird Agreement, the Alpine Convention: Nature Conservation Protocol and the Ramsar Convention: Resolution on wetland restoration. The Convention on Biological Diversity was signed by 150 government leaders at the 1992 Rio Earth Summit. It has three main goals: (1) the conservation of biodiversity (diversity of species, ecosystems and genetic diversity), (2) sustainable use of the components of biodiversity (species, ecosystems, genetic diversity) and (3) sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way. Article 8 (f) of this convention

requires that: Member States shall rehabilitate and restore degraded ecosystems, promote the recovery of threatened species, *inter alia*, through the development and implementation of plans or other management strategies. In April 2002 the Parties of the convention committed themselves to achieving a significant reduction in the current rate of biodiversity loss, with the EU: seeking a more stringent goal: to stop the loss of biodiversity by 2010. This has an impact in industrial activity, for example through the minimisation of environmental impacts and the application of the Precautionary Principle. The EU has enacted several Directives to support its obligations under this convention, including Directives on Protection of Wild Birds (1979) and Natural Habitats (1992). Protected areas under these Directives form the Natura Network, set up in 2000.

The losses of functions and values of natural habitats resulting from human impacts are in geological terms a recent phenomenon. Restoration of former or degraded natural habitats has in recent years gained momentum over most of the world. Conventions relevant to nature conservation aim to provide a favourable conservation status for wild animal and plant species and natural habitats. They do not refer to a baseline. Favourable conservation status is the central scale to assess whether damage to the environment is considerable or not. Natura 2000 established a series of conservation objectives across Europe for the habitats and species registered in the appendices of the regulations for the protection of habitats and birds. Other Directives supporting ecological systems include the Environmental Liability Directive and the Water Framework Directive. National measures include National Parks and Nature Reserves etc.

Directive 79/409/EEC on the conservation of wild birds requires Member States to take measures to preserve, maintain or re-establish a sufficient diversity and area of habitats for wild birds, and to support the preservation, maintenance and re-establishment of habitats, including for instance the re-establishment of destroyed biotopes[6] and the creation of biotopes.

Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora defines conservation as measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status. It is based on the Precautionary Principle and so its obligations may be independent of observed damage or threats. Liability under this Directive is possible even if the damage was caused by an emission complying with what would be normal regulatory permitting if the polluter was informed in advance by the regulator about relevant habitats and species).

No baseline condition is considered in either the Birds or Habitat Directives. The Habitats Directive defines conservative status as “favourable” when a habitat’s natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable. Conservation status for a species considers the population dynamics data on the species concerned. A favourable status is where these indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; that the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and that there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. Criteria for favourable conservation status are summarised in Table 2.

The Natura 2000 network[7] is a European network of special areas of conservation (defined under the Habitats Directive, Article 3) and includes sites hosting natural habitat types listed in Annex I of the Directive and habitats of the species listed in Annex II of the Directive; and also special protection areas pursuant to the Birds Directive. Member States have to establish necessary conservation measures for Natura 2000 sites (as set out in Article 6). As of December 2006 Natura 2000 sites accounted for 12% of the terrestrial area of the EU.

[6] A biotope is a small area with uniform biological conditions (climate, soil, altitude, etc.).
[7] http://www.natura.org/

Table 2 Criteria for Favourable Conservation Status

	Quantitative criteria	Qualitative criteria
Habitats	• Range (distribution area) • Habitat area	• Site characteristic • Site structure • Indicator species • Management
Species	• Range (distribution area) • Population size • Habitat area	• Population structure • Population dynamic • Habitat structure • Management

Companies should gather information, which Natura 2000 conservation objectives exist and may be impacted by their activities. Furthermore, companies take part in the EU programme for environmental management and audit scheme[8] (EMAS-system "Eco- Management and Audit Scheme") as a means of problem prevention.

The Environmental Liability Directive relates to damage to all species and habitats protected under the Habitats Directive as well as most threatened species and migratory birds protected under the Birds Directive. "Environmental damage" means damage to protected species and natural habitats, and damage is defined as "significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species." Damage is determined in relation to a baseline condition (as described in Annex I of the Directive) which is the conservation status at the time of the damage.

However, after an incident of environmental damage it is usually difficult to determine this baseline, i.e. the affected area's initial conservation status as it is often not well documented. If data is scarce the initial status has to be estimated. National and regional monitoring programmes that record and observe ecology and biodiversity are very important in this estimation. The Habitat Directive requires the EU Member States to keep regular records and monitor the Natura 2000 conservation objectives every six years. A new reporting phase is to be completed for Natura areas in 2007. Thus the Member States also gain an overview at national level over the conservation status of the Natura 2000 sites. At a local level nongovernmental organisations and voluntary groups play an important role, since they may maintain detailed information on biodiversity at the local level which supports setting/reconstructing baselines.

Review of Ad Hoc Industry Natural Resource Damage Group's 17-18 October 2007 briefing, associated technical workshop and related issues, Barbara Goldsmith, Ad-Hoc Industry Natural Resource Damage Group, USA, Belgium

The Ad Hoc Industry Natural Resource Damage Group was formed in the United States in 1988, by a collection of large industrial companies, in response to Federal conservation legislation. It is an industry network and the multi-national nature of its some network participants led the group to consider EU Directive on Environmental Liability. The Group acts as a resource or partner to EU industry. Its past experience helps it to identify key issues, and the Group has an extensive document library. It has held meetings with DG Environment on behalf of its members, collated a series of case

[8] http://ec.europa.eu/environment/emas/index_en.htm

studies, held numerous briefings for industry and developed a White Paper for industry, the "EU ELD White Paper: EU Environmental Liability Directive: Practical Suggestions to Ensure Sound Implementation" highlighting key considerations in ELD implementation by Member States and ways that the industrial community can work to facilitate regimes that reflect sound policy, law and methodology[9].

The European Union (EU) Directive on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage ("Directive") was adopted by the European Parliament and Council on 21 April 2004. The Directive makes Member States responsible for ensuring that damage to water, land, and biodiversity is either prevented, by taking appropriate measures in cases of imminent threats, or effectively remedied by restoring the previous condition if the damage has already been done. Member States were obliged to implement the Directive by April 2007. So far the following Member States have implemented the Directive: Italy, Lithuania, Latvia, Hungary, Germany, Romania, Slovakia, Spain, and Sweden. Transposition is partially completed in Austria, Belgium, Czech Republic, Poland and the UK (where it is currently out to national consultation). Preparatory work is underway ion the other Member States. The degree of flexibility in implementation means that impacts on business and industry may vary from country to country depending both on the extent to which there is pre-existing legislation, and the stringency with which new legislation is enacted. The mode of implementation in Spain suggests the possibility of widespread impacts, whereas in the UK the existence of national environmental protection legislation means that the implementation of the ELD may not lead to great regime changes.

The Directive's fundamental aim is the prevention of damage to the environment, which it seeks to secure by creating potential liability, based on the idea that if operators are exposed to financial liabilities for damage, they will be induced to adopt measures and develop practices to minimise risks of environmental damage. The Directive requires action to prevent the imminent threat of damage and on restoration of injured resources in the event that damage does occur.

The Directive imposes liability for damage to natural habitats and species protected at Community and national levels, surface and ground waters covered by the Water Framework Directive and land. It subjects operators of activities covered by listed EU environmental directives to strict liability and operators of other occupational activities to fault or negligence liability. It incorporates provisions for determination of and restoration of environmental damages.

The Directive appears in part based on the natural resource damages (NRD) regime under United States (US) laws. Annex II of the Directive sets out a common framework to be followed in order to choose the most appropriate measures to ensure the remedying of environmental damage. This annex closely resembles the US Natural Resource Damage Assessment (NRDA) regulations under the Oil Pollution Act (OPA). For example, the Annex II definitions of the key concepts of primary and compensatory restoration are identical, as are the Directive's definition of "damage" and the OPA regulations' definition of "injury". Other terms, such as "baseline" and "recovery", have analogous definitions. The industrial community in the US has gained extensive experience with NRD, and there are many lessons to be learned from NRD law, policy and practice that can instruct the direction and substance of the Environmental Liability Directive's implementation in the EU. Although there are distinct differences between NRD and the regimes that will be developed to comply with the Environmental Liability Directive, there are a number of common issues, such as establishing causation, determining baseline, restoration options, injury determination, valuation methodologies, and ways to work with authorities, that are important to consider in order to learn from both the successes and failures of the US system.

A wide range of companies will be exposed to liability under the Directive, including transporters or disposers of waste and hazardous waste, companies whose operations have resulted in a discharge of dangerous substances or genetically modified organisms, and other industries. The critical issues in

[9] Available from www.NRDonline.com

considering damage under the Environmental Liability Directive (ELD) are: the type of operations that took place; the geographical and temporal scope of the damage; and the baseline condition of the area. The ELD poses a significant risk to industry although there are exceptions and defences. The implementation of the Directive is subject to a framework within which Member States have considerable freedom of action, which leads to considerable uncertainty for business and industry as set out in the Ad Hoc Industry Natural Resource Damage Group White Paper.

The Ad Hoc NRD Group published the "Industry Case Studies: an Examination of Potential Effect of the EU Environmental Liability Directive (ELD) in Practice and Options Available to Member States" containing a collated series of case studies considering environmental damage / liability. Each case study includes background facts, cases, variations, issues and discussion. The case studies explore practical implementation issues, and are meant to inform dialogue with Member States on how to implement the ELD. Four case studies are reviewed: an explosion and fire, a tank failure, a railway wagon accident and an oil spill. A technical annex to the case studies describes in detail issues relating to: baselines; defining of damage; understanding ecological services; and scaling issues. It also includes a bibliography of references for valuation techniques. The case studies tell us that complexity is inevitable. There is often ambiguity in what constitutes a service or damage which needs to careful consideration. There are, however, ways to minimise potential problems. The case studies demonstrate the need for simple clear legislation and guidelines. The goal should be preventing / remedying damage not arguing about assigning liability. The case studies are of course only illustrative.

The Ad Hoc NRD Group is a member of NICOLE, and sees a number of possible avenues for collaboration: possible expert role in NICOLE meetings, possible collaboration for best practice documents, exchange of case study information and technical information.

Some thoughts about the discussions around Environmental Liability Directive, Pascal Mallien, Baker and McKenzie, Belgium

Liability issues in the Bird and Habitat Directives are not strictly comparable with the Environmental Liability Directive (ELD)[10]. The former are based on the "precautionary principle", while the ELD applies mainly the "polluter pays principle". It is an important that while some European legislation is based on the "precautionary principle"; the ELD is based on the "polluter pays principle", even although related legislation has a "precautionary principle" basis.

The fundamental principle of the ELD is that *an operator whose activity has caused the environmental damage or the imminent threat of such damage is to be held financially liable, in order to induce operators to adopt measures and develop practices to minimise the risks of environmental damage so that their exposure to financial liabilities is reduced.*

Liability under the ELD is directed in the first instance at the competent public authority. A non-governmental organisation, for example, may go to court and force the Member State, region or Land to prevent or remedy environmental damage. However, the NGO can not use the ELD to start a direct procedure against the operator. The public authority will then try to recuperate the costs from the operator, which creates a new kind of liability: an administrative / public obligation. It is possible that a company has a duty to remedy certain environmental damage, as enforced by the competent authority, but is not liable on a tort basis for this damage were there to be a claim from e.g. neighbours. The ELD provides for the possibility for the public authority to claim costs from the polluter for up to five years after remediation work. This does not mean that other individuals can

[10] http://eur-lex.europa.eu/LexUriServ/site/en/oj/2004/l_143/l_14320040430en00560075.pdf

claim some indemnity. That legal action will probably be prescribed[11]. This also prevents an operator from recuperating remedy costs already paid from a vendor, a subcontractor.
Competent authorities are under an obligation to first contact the operator before remediation or prevention is determined. Where more than one operator is involved costs may be collective in nature. Allowable defences are compliance with an existing permit and also that the operator acted according to the state of scientific and technical knowledge at the time. The Directive gives a large degree of autonomy to Member States in how to implement these guidelines, and also in defining "operators" (although their definition cannot be narrower than mentioned in the ELD), the extent of the strict liability and the necessity of financial securities or insurance. The European Commission is in effect using the 27 Member States as a laboratory to analyses different ways of implementation, and further harmonisation based on their experiences can be expected after the Directive is reviewed in five years time. Important definitions from the perspective of NICOLE members are those relating to biological services and biodiversity, to avoid a situation where these can be used as grounds to refuse a reasonable brownfield redevelopment.

The "baseline" for the application of the ELD is the state of the land, the groundwater and the biodiversity at the latest on April 30th 2007. Environmental damage that originated before May 1st 2007 does not lie within the scope of the ELD. It may be prudent for organisations that believe they may be responsible or impacting on areas considered under the ELD to carry out a baseline survey. However, such baselines can be ambiguous. Of course in a court action the burden of proof rests with the public authority that wants to recuperate the costs of remediation (*actori incumbit probatio*[12]).

Competent authorities are in a difficult position in Member States where implementation of the ELD is not complete. While an NGO may take legal action at a European level to force an application of the ELD on a particular site; in the absence of national legislation the competent authority has no mechanisms to recover its costs form the operator. Article 1 of the First Protocol on the European Human Rights Act prevents the Competent Authority from recovering its costs via a retrospective action to cover the period when no national legislation was in place.

It is conceivable that the environmental liability objective might develop into a broader sustainability directive taking the social and economic aspects of sustainable development also into account. As a general principle the operator should avoid limiting resources for future generations; and this is likely to be the criterion for the recuperation of the remediation costs.

Environmental Liability Directive: thresholds, scope and baseline, Edward Lockhart-Mummery, consultant to the Department for Environment, Food and Rural Affairs, UK

The ELD is an EU law that makes polluters responsible for: preventing "imminent threats" of damage to the environment and cleaning-up and restoring the environment. It was agreed in 2004 and 2007 is the implementation deadline. Its aim is to use a liability mechanism to induce risk reduction measures. The ELD applies to:

- Damage after implementation date (April 30th 2007)
- "Damage to protected species and natural habitats", "water damage" and "land damage" caused by a series of activities listed in Annex III of the Directive (operations subject to integrated pollution prevention and control; waste management including mining waste and waste shipment; discharges to inland surface water and groundwater; water abstraction; manufacture, use, storage,

[11] The legal term of "negative prescription" can be defined as "the limitation of time beyond which a legal action is no longer valid or enforceable.

[12] Literally translated as: "the proof has to be given by the claimant". This relates to part of the so called "*onus probandi*" (the burden of the proof). The Code Napoléon, art. 1315, explicitly states that anyone seeking to enforce a legal obligation, has to prove its existence. This principle has existed since medieval times and has its origin in the Old Latin legislation. It is literally translated as: "the proof has to be given by the claimant".

processing, filling, release into the environment and onsite transport of dangerous substances or preparations, plant protection products, biocides; transport of dangerous or polluting goods, emissions to air, use / release of genetically modified organisms)

- "Damage to protected species and natural habitats" caused by all other activities where there is fault or negligence
- "Operators" of "occupational activities".

There are exclusions in the ELD for damage caused by natural disasters and hostilities; national defence and international security activities; international nuclear and marine conventions and damage caused 30 years before the transposition of the Directive. Defences against liability are compliance with a permit, acting according to state of knowledge, damage was caused by third party and damage was caused by complying with a regulatory order.

Member States are allowed to enact more stringent implementation, for example to consider other activities, less serious damage, or damage to other natural resources.

In the ELD "damage to protected species and natural habitats" is defined as: "significant adverse effects on reaching or maintaining favourable conservation status". Species and habitats are already protected under the Birds and Directive Habitats Directive. Under the Habitats Directive "favourable conservation status" is reference point for Member State obligations to improve biodiversity. A first assessment of conservation status was recently completed and ELD interpretation seems likely to be based on the Habitats Directive methods used in this assessment. However, under the ELD damage to species and habitats apples across their range and liability is not restricted to damage to Natura 2000 sites.

"Water damage" is defined as: "damage that significantly adversely affects the ecological, chemical and/or quantitative status and/or ecological potential, as also defined in Water Framework Directive 2000/60/EC (WFD). Methods for evaluating "status" are developing or have been developed and interpretation likely to be based on WFD methods.

"Land Damage" is defined as: "land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms". Existing contaminated land regimes in EU Member States is used as a basis. Assessment is on the basis of risk assessment based on generic or site-specific assessment criteria.

Figure 1 sets out the procedural steps under the ELD. The operator is responsible for controlling and containing his operation. The operator has a responsibility to notify the competent authority of possible damage. The then determines what action needs to be taken. The operator can then propose a remedy for evaluation by the competent authority. When measures are agreed, the operator carries out the remedy.

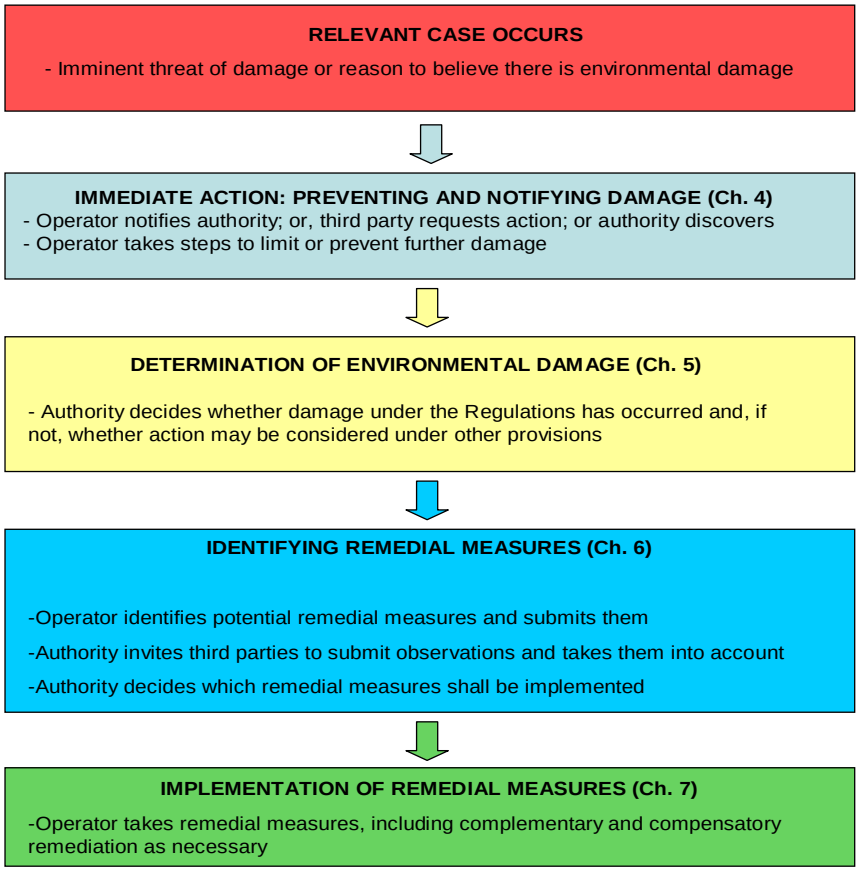

Figure 1: Stages in the Environmental Liability Directive

The ELD sets out a number of requirements for remediation and describes how it is to be assessed. For land quality the measures undertaken must ensure that land no longer poses any significant risk of adversely affecting human health. Requirements for water and for species and habitats offer three possibilities:

1. "Primary remediation" to return natural resources to or towards baseline,
2. "Complementary remediation" to compensate for any deficit from baseline, and
3. "Compensatory remediation" to compensate for interim loss until primary remediation has taken full effect.

Assessment for land requires the demonstration of removal of risks using risk assessment procedures agreed with the competent authority. Assessment of complementary and compensatory remediation (water and species and habitats) is based either on resource-to-resource or service-to-service equivalence approaches or alternative valuation techniques.

The role of the baseline in the ELD is to establish the condition of the environment at the moment of damage had damage not occurred and establishing what that environmental condition would have been through time to estimate the required scale of remediation. The baseline should be measured on the basis of best information available. There is no mandated requirement to measure the baseline before damage occurs. Baselines are primarily relevant to water damage and damage to species and habitats because of requirement to return environment to baseline, and may not be necessary for land damage as requirement is to remove risk to health, which does not necessarily require knowledge of prior condition. Knowledge of prior condition may be desirable where contamination caused by more than one operator or contamination was caused both pre- and post- implementation of the ELD. Assessment of baselines is complicated since it may not be appropriate to assume that they are static or constant – they may be dynamic baseline. The baseline assessment itself relies on available data and information. In context of the types of damage covered by the ELD there should be some data available from monitoring carried out for the Habitats Directive and Water Framework Directive but

other less formal sources may also be important, including photographs. Gaps in data can be expected so there may be a need to use reference sites and ultimately judgement.

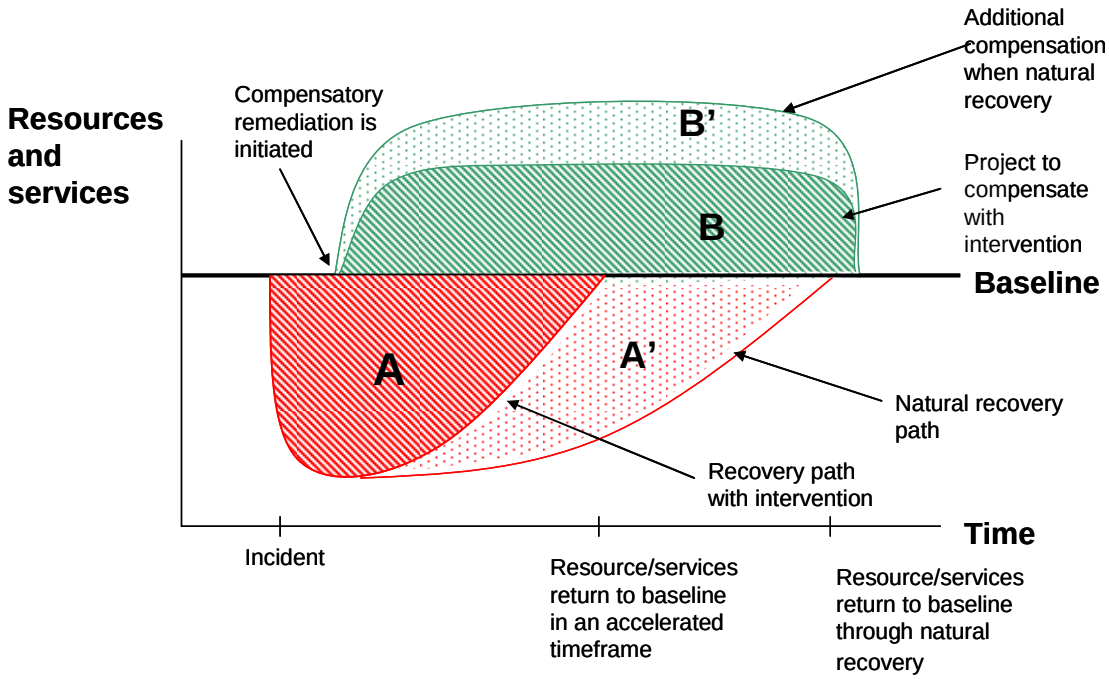

Figure 2 Role of the Baseline

Figure 2 illustrates the role of the baseline assessment in determining the management of an incident on "Site A". The "primary remediation" approach aims to secure an accelerated recovery compared with the natural recovery path. Where this is not possible compensatory and complementary remediation are alternative approaches to provide an enhancement in services at "Site B".

Due diligence – Fast track baselines – the financial aspects, Marianne Blom, Environcorp, NL

This presentation discussed the use of baseline sin due diligence. Due diligence is typically a rapid assessment taking place over days, rarely weeks, which requires a "fast track" approach to fast track assessment. The time scales are controlled by financial and investment decision making. Opportunities can be quickly lost, and large amounts of borrowed money cannot he held "stationary". This presentation considers the issues usually dealt with by due diligence including the issues of compliance with legal requirements and the management and quantification of liability, which is affected by Directives and broader environmental monitoring needs.

The reporting of due diligence covers two aspects: the due diligence information, and the quality of the due diligence information – in other words the extent to which due diligence was possible and any uncertainties associated with the information collected. The reporting output is information in whatever format is amenable to commissioning company's needs, and is usually an unpublished output. Its contents are likely to be a briefing note of the key findings with supporting volumes describing any protocols applied (e.g. environmental auditing standards); detailed legal information for example reviews (and original documents) relating to submissions made by the vendor and possibly also a suggested schedule for inclusion with any transfer agreement to take account of the due diligence findings; a report for lenders often with some quantification of financial risks and modelling of likely profitability to support decision making and price negotiation. What are not usually

appended are technical site investigation reports or "baseline" considerations. Due diligence reports in the Netherlands are often fairly bespoke pieces of work, but may be loosely based around a useful US format (the ASTM 1527[13]).

The aim of due diligence is risk identification, particularly related to business risk and often also risk to reputation. It as a reconciliation and validation of buyer beware and seller disclosure obligations, and a process typically forming part of a merger and acquisition process to provide evidential support for lenders and insurers. In terms of a property transfer the baseline issue is broadly speaking not addressed as the deal either stands or falls on the condition of the property "as is". What is important in due diligence work is understanding what "work" needs to be done to ensure regulatory compliance and reduce the financial risk of ongoing environmental liabilities to an acceptable level, and who is responsible for this work and any possible residual liabilities. In this context the due diligence question relates to each property in a portfolio and asks is there a baseline condition that needs to be reached and who does the liability for reaching it belong to.

The due diligence process needs to clarify the baseline condition that needs to be reached, e.g.:

- Where: for example, on site or at compliance points or both, at site boundaries, at the receptor, etc
- When: by what date
- To which end point: for example agreed "clean-up values" to "background" values, to the site's original state?
- Under what conditions (e.g. environmental site conditions).
- Who has previously occupied, owned, and been active at the site?
- What: which responsibilities do they hold, which warranties, which indemnifications…?
- Why: under which conditions are the above offered, for how long, for which maximum amount?

Typically due diligence work is an appraisal of exiting site investigation reports concerning the nature of each property in the portfolio. These may include intrusive site investigation reports, if contamination is suspected. These inform of the current condition of sites, and are narrower in purpose than a baseline. They are used to determine what actions are likely to be necessary for each property in board terms, which can then be assigned an outline cost. The overall costs of transaction can then be considered as part of the deal making. It is rare that the available time allows for further site investigation work, so uncertainties must be highlighted. The greater the uncertainty the greater the potential cost / risk in the financial model. In some cases site access is not even possible (for example because the deal development is being kept discrete) which may translate to a higher potential range of liabilities, and hence lower transaction value.

The effect of the ELD is to add a further dimension of uncertainty to transactions that the due diligence process must address. It creates not only financial liabilities, but also risks to reputation from damage to habitats for example. Due diligence may encompass a far wider range of considerations than the condition of properties, for example if the transaction is for ongoing operational concerns then a range of EU and national legislation ranging from waste management, through pollution control to safety will need to be considered to fully understand the financial risks of a transaction. In such a complex due diligence exercise it is likely that different teams will be addressing different aspects of the due diligence. It is important that together the teams provide an integrated coverage of relevant EU legislation, with no gaps, and this is a major challenge for due diligence work.

Turnkey and liability transfer, Erhard Robold, Arcadis, Germany

Arcadis is a consulting, project management and engineering company operating in Europe, North and South America and Asia. It one of the three largest companies in Europe and ten in the world, with more than 12,000 employees and over € 1.4 billion in annual revenues. This presentation centred on

[13] http://www.eugris.info/DisplayResource.asp?ResourceID=4548

its GRiP® Guaranteed Remediation Program for managing liabilities arising from remediation. This applied to projects dealing with "clean-up" to achieve regulatory compliance and for brownfield redevelopment. Financial risks in the remediation process include:

- Remediation cost over-runs
- Undiscovered or larger migration of contamination, technology failure, accidents
- Changes in regulatory standards, Regulatory re-openers
- Loss of business and/or financial standing, negative publicity
- Uncertain basis for company decisions (selling/buying)
- Legal liability issues: Bodily injury, property damage,
- Legal and cleanup expenses associated with
- Third-party liability
- Property values & losses
- Non-owned disposal coverage
- Future spills.

The GRiP® service product starts with the premise that remediation contractors and consultants should recognise that they will have to shoulder part of the remediation project financial risks, and that finding a good solution to this helps address a possible market perception that consultants are not necessarily solution orientated but fee orientated. It also addresses a number of market developments identified by Arcadis: that (1) there is an increasing demand for "turnkey" projects[14] as opposed to projects costed on the basis of time, materials and services, (2) the reducing significance of expertise in *in situ* techniques as a business differentiator as techniques become more widely used, (3) difficulties in providing guarantees, and (4) difficulties in building sufficient margin into conventional project models to cover their inherent financial risks to the contractor. The service provides certainty in mergers and acquisitions as environmental liability is transferred to Arcadis, and certainty for redevelopment project costs, as well as providing a more rapid solution as subsequent discussions about performance, fees are avoided.

GRiP® is not intended for projects relating to: damage caused by third party contamination or natural resources damage.

The GRiP® service product has been available since 1994. It is a transaction driven service offered to Private Sector clients. It offers guaranteed fixed price remediation, with financial risks covered by a cost cap insurance policy that protects both Arcadis and the client. It makes use of Arcadis' cost effective, proprietary remediation technologies. 60 contracts awarded to date. The average size of contract over the last two years has been $17 million. 26 of these projects have so far been finalised. In only one case has a cost over-run triggered and insurance enquiry.

Its aim is to remove the burden of environmental compliance and closure management from Arcadis' clients and also remove the cost headaches and the management distractions. Its goal is to provide a fully indemnified fixed price for remediation and specific endpoint – guaranteed. The advantages Arcadis sees for this service are that it facilitates transactions, improves balance sheet, optimises property values and provides a means of resolving disputes and litigation. GRiP® is based on a functional specification such as regulatory closure and includes investigative work, engineering, negotiations with authorities and execution. Arcadis seek to use technology advantages and efficiencies to accelerate cleanup and reduce projected costs, focusing principally on *in situ* bioremediation. The underlying concept is that: the only really effective means by which to transfer liability is to eliminate environmental liabilities as quickly as possible.

[14] Project types: "turnkey": the contractor performs all work phases required to realizes the project (consultancy + execution) on basis of a fixed scope; "fixed fee": the contractor performs work required for a lump sum (to a fixed scope and fixed price); and "guaranteed solutions": the contractor performs all work required (consultancy and execution) to a guaranteed end-point for a lump sum; guaranteed end-point such as regulatory closure.

From the point of view of Arcadis GRiP® projects provide partnership instead of a conventional supplier-client relationship and more satisfying projects. However early involvement by Arcadis in the project is necessary and preparation and negotiation work will tend to be more intensive than for conventional contracts. The GRiP® service product is technically feasible in all countries, but may not be favoured in some countries where legal and cultural hurdles to its use need to be tackled.

Liability assessment: the RISQUE methodology, Andrew Kube, URS, NL and Paul Jackson, URS, UK

The objective of IAS[15] 37 is to ensure that appropriate recognition criteria and measurement bases are applied to provisions, contingent liabilities and contingent assets and that sufficient information is disclosed in the notes to the financial statements to enable users to understand their nature, timing and amount. Understanding liabilities from historic land contamination is therefore now an explicit requirement for corporate financial reporting, and the same will apply to liabilities under the ELD.

The findings of investigations of contaminated land are always subject to uncertainty, for example because of sampling error, particularly as they are typically cost constrained. The RISQUE methodology is used to model financial uncertainties in liabilities on the basis of these site investigation uncertainties. RISQUE modelling is built around an Expert panel that presents technical complexity in financial terms and provides robust information that can help direct additional investigation needs, remediation design and cost estimation of remediation. The methodology is an information management tool which captures the knowledge from the holistic "discussion" process at the beginning to maximise the influence of how liabilities are investigated and managed.
In modelling soil liabilities, the expert panel assigns confidence levels for uncertainties such as the lateral and vertical extent of contamination, and the capital cost and operational cost of remediation work. The panel offers a view about probability distribution best represents what happens in reality (e.g. log normal, normal or uniform) based on the nature of contaminant, the nature of release, the geology of the site and cost and time considerations. Model inputs are area, depth and unit cost. Figure 3 illustrates model inputs and associated probability distributions and consequent model outputs.

In modelling groundwater liabilities, the following are considered: design, installation and capital and operational costs, volumes requiring treatment and operational time, with probability distributions again selected on the basis of expert judgement.

Initial results provide a range of costs associated with the expected outcomes. Costs are presented against the probability of that cost occurring. Sensitivity Analysis can be used to gain an understanding of the issues that drive risk and drive liabilities. Further cost benefit analysis can focus on further reducing uncertainties, for example comparing different remediation options. Understanding uncertainty is useful in portfolio management, since the site's whose liabilities are most uncertain are probably those where further investigation is most warranted. Understanding likely cost outcomes assist portfolio management by identifying which sites contribute the most to overall liabilities.

RISQUE can help describe environmental obligations under the IAS 37 headings for: probable, possible and remote cost scenarios (outlined in Table 3). It enables the assessment of these scenario costs to be transparent. Most likely "cash flows" can be calculated for each of them which helps companies better understand what cash provisions might need to be allocated. Provisions have to be recognised when there is a present obligation (legal or constructive) resulting from past events. Their settlement will probably result in an outflow of economic resources (cash flow) which can be estimated using modelling. Hence RISQUE supports the modelling of the contingent liabilities for

[15] International Accounting Standard, http://www.iasplus.com/standard/ias37.htm

environmental obligations for site remediation. It can also be used to identify remediation responses that most effectively control costs and uncertainty.

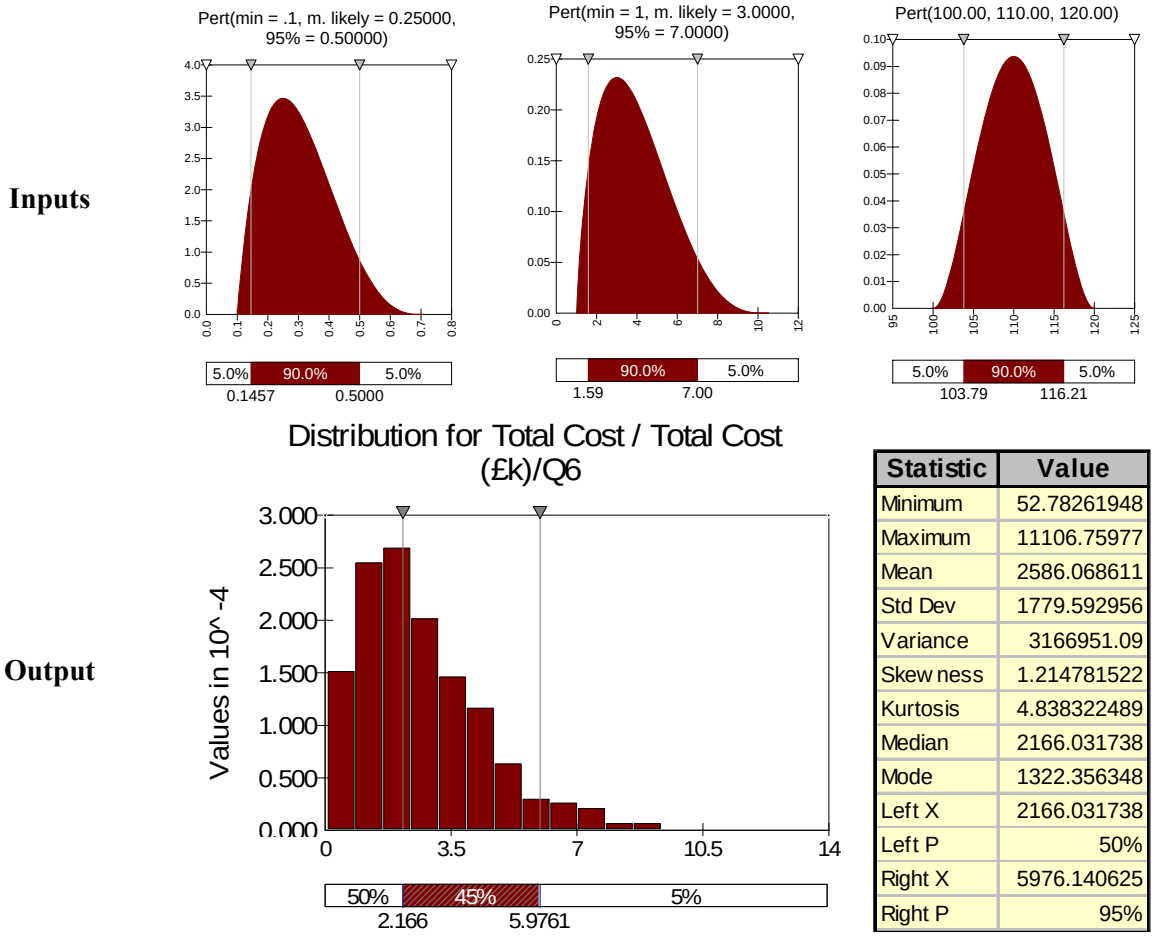

Figure 3 Sample RISQUE Model Inputs and Outputs for Soil (for a single Remediation Approach)

Table 3 Cost Scenarios in the Context of Remediation

Probable	A "probable" outflow of resources is one that is more likely than not and might be characterised by a site with ongoing remediation activities, significant identified contamination, or strong indications for contamination due to the history of the site. As well as regulatory drivers, "constructive obligations" can also create a probable liability, such as published (environmental) policies, which create a valid expectation on the part of third parties to remediate contaminated sites.
Possible	Possible obligations depend on whether uncertain future events occur e.g. due to the lack of investigation results or uncertain responsibilities
Remote	Not clear whether remediation would be required Not clear what the costs would be

The use of modelling gives an indication of the full of range of outcomes for full range of events at the beginning of the site or portfolio management process, rather than decision making being driven by technical advice on an issue by issue basis. It can also take account of non-linearity or barriers in decision making such as likelihood of regulatory approval. It identifies the most cost-sensitive issues and allows investment to be targeted to reduce their risk/uncertainty rather than undertaking additional investigation simply for technical "completeness".

Similar modelling can be used to model operational risks, for example to determine whether investment in IPPC is worthwhile compared with (say) closure of a facility.

The Triad Approach to site characterization and remediation, Jody Edwards, Stone Environmental, USA

Traditional, promulgated and institutionalised approaches to site characterization have historically focused on reducing sampling and analytical uncertainties of site investigation versus managing all forms of site uncertainty for the purposes of site divestiture or reuse. Site uncertainty undermines key stakeholders' risk management confidence and the collective ability to reach consensus on key site decisions. Critical site uncertainties result in increased costs, extended schedules, and/or implementation of inappropriate or ineffective remedial strategies that do not meet site target baseline conditions.

The Triad Approach to Site Characterization and Remediation (Triad Approach) has proven effective at expediting and lowering costs of meeting site risk management objectives via use of its key elements: Systematic Planning, Dynamic Work Strategies and Real-Time Measurements. The Triad Approach can result in more effective site characterizations, thus reducing site uncertainty and facilitating better risk management, site decision making and execution.

Under the Triad Approach, development and real-time updating of a Conceptual Site Model (CSM) provides site owners with a unifying platform to understand, communicate, and manage all site uncertainties to support final site decision making. The CSM serves as a highly effective tool for creating and meeting risk management objectives and would directly support development of a comprehensive baseline.

The three elements of Triad are: systematic planning (using a conceptual site model - CSM), adopting dynamic work strategies and using real-time measurements. The main goal of the Triad Approach is to manage all sources of project uncertainty, including analytical uncertainty, sampling uncertainty, site heterogeneity, and decision making uncertainty. Inadequate management of uncertainty results in a lack of consensus or confidence in site status and may result in an increased cost and schedule as a result of multiple investigation mobilisations and the selection of incorrect or ineffective remediation strategies. In the worst case it might result in site closures being delayed or never reached. Figure 4 shows, conceptually, how the Triad Approach can be used to manage effort to project closure. Some clients may find the initial planning investment a disincentive, however, the cost of execution is typically significantly lower than traditional investigation approaches. A number of case studies in the US have shown significant time and cost savings to site closure are possible from the Triad Approach[16].

Element 1- Systematic Planning The first step is to establish multi-disciplinary, experienced technical team and involve enabled decision-makers from key stakeholders. Together they define the decisions to be made, the framework they are to be made in and the process of decision making. It is important also at this stage to decide the site end use and project objectives or goals. An initial CSM should then be developed to identify data gaps that impact site decision-making and determine the types, rigour

[16] www.triadcentral.org

and quantity of data needed to fill these gaps. These data need to be clearly linked to site end use and project objectives or goals, i.e. what is needed to complete the project. These components are then used to develop a dynamic work strategy for collecting data at the site.

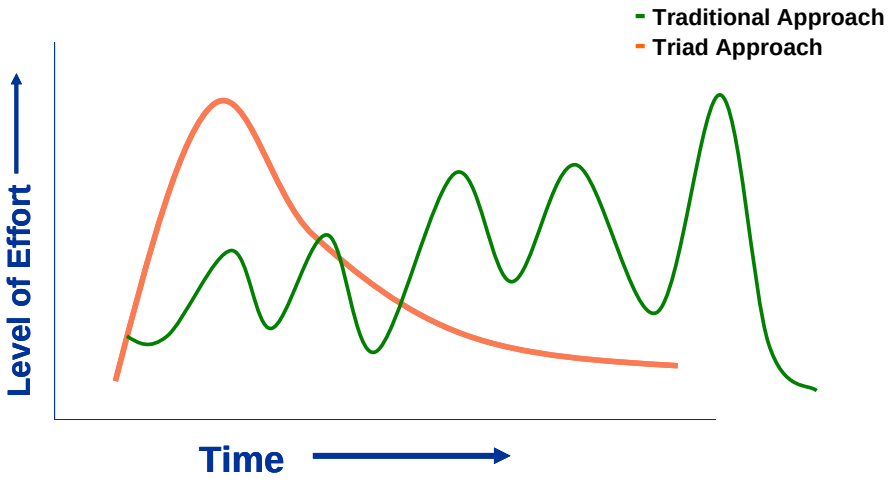

Figure 4 Reducing Time and Effort Using Triad

Element 2- Dynamic Work Strategy. This is a field decision-based, adaptive sampling strategy encompassing: a project decision framework with field decision logic diagrams and rules, and contingency plans and options for changed conditions. It requires real-time, near real-time or recent time data to be effective and benefits from an integrated use of mid level and senior level staff. The strategy needs to establish modes of regular and reliable communication, including data management and presentation tools to manage an iterative and developing CSM. The strategy requires the participation or representation of all stakeholders involved in decision-making and the appropriate level of QA/QC to satisfy them, including project quality plans and site-specific and standard operating procedures. The strategy needs to eliminate multiple unnecessary work plans, field remobilisations and reports. Work strategies can be summarised in dynamic decision logic diagrams (such as the example in Figure 5).

Element 3 - Real-Time Measurements. The Triad Approach utilises two types of "real-time" data: direct sensing data and field-generated sample analysis data. Real-time measurement under the Triad Approach involves collecting a large number of field measurements and/or samples using lower cost sensing, screening and/or analytical methods instead of collecting only a limited number of samples for off site analyses via relatively higher cost, traditional analytical methods. Due the variety of technologies available, the actual time between obtaining a measurement and/or sample and receiving a result may vary from instantaneous to minutes to hours to days. As long as the results are received "within time" to support the uninterrupted execution of the field effort, the length of time between collection and receipt of results will satisfy the intent of "real-time". The premise of this approach is to provide a more complete site delineation at lower costs and a shorter time frame overall. The major driver for uncertainty relates to site heterogeneity rather than analytical errors, hence maximising the number of measurement and/or sampling points by using faster lower cost methods is a more efficient approach to reducing uncertainty and delineating contamination. Where corroborative off site analyses are required, these can be targeted on the basis of the findings of the on site data results. Some stakeholders may require that the applicability of techniques they are unfamiliar with are validated beforehand or benchmarked in some other way during the field effort.

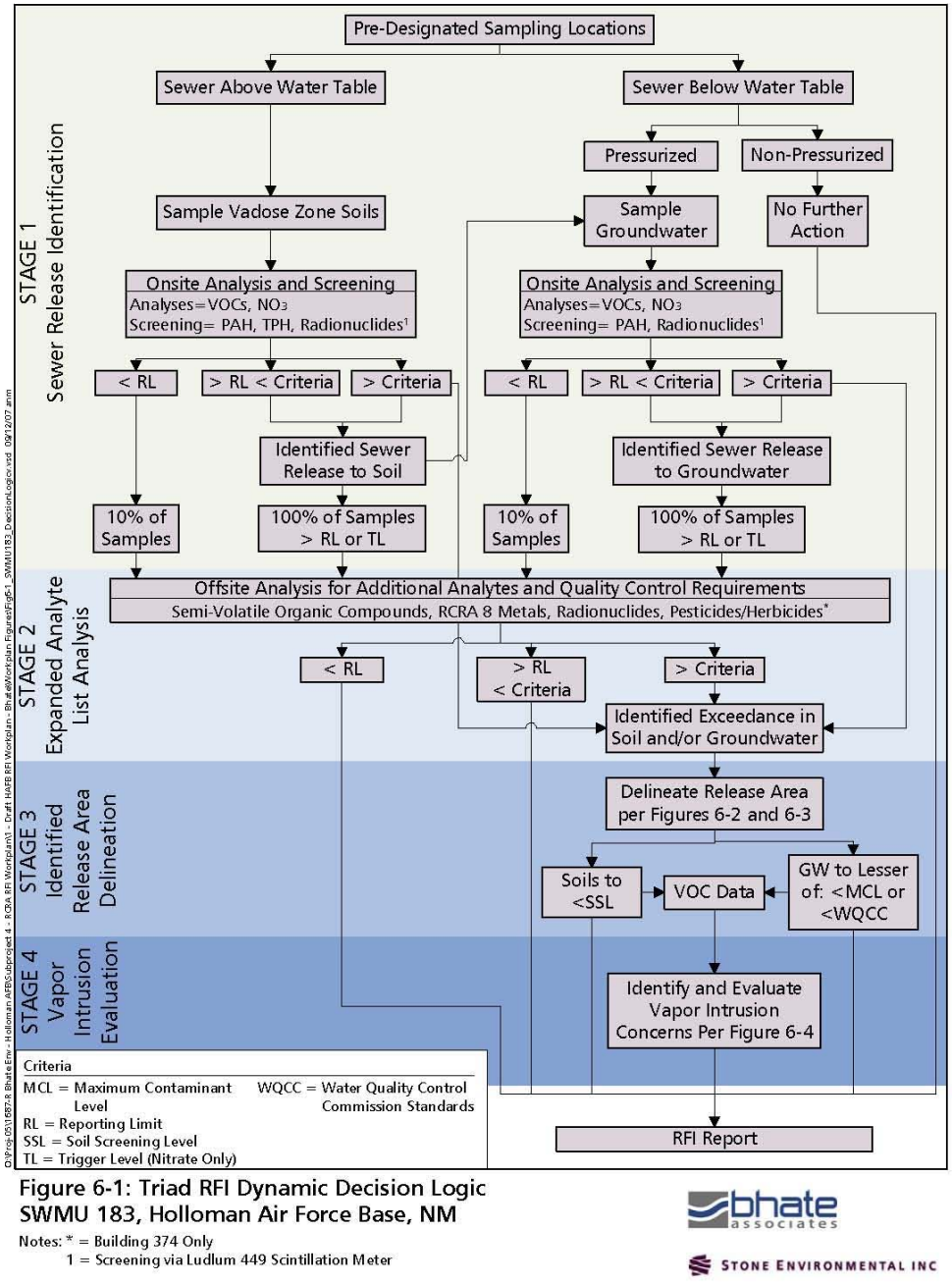

Figure 6-1: Triad RFI Dynamic Decision Logic
SWMU 183, Holloman Air Force Base, NM

Notes: * = Building 374 Only
1 = Screening via Ludlum 449 Scintillation Meter

bhate associates

STONE ENVIRONMENTAL INC

Figure 5 Example Dynamic Decision Logic Diagram

The Conceptual Site Model (CSM) is a powerful tool for managing uncertainty and risk and as a means of summarising what is known and building consensus. Figure 6 is an example conceptual site model (produced with a high level of graphical quality – simpler formats are acceptable – the important thing is that the CSM clearly communicate the integrated nature of site attributes and concerns).

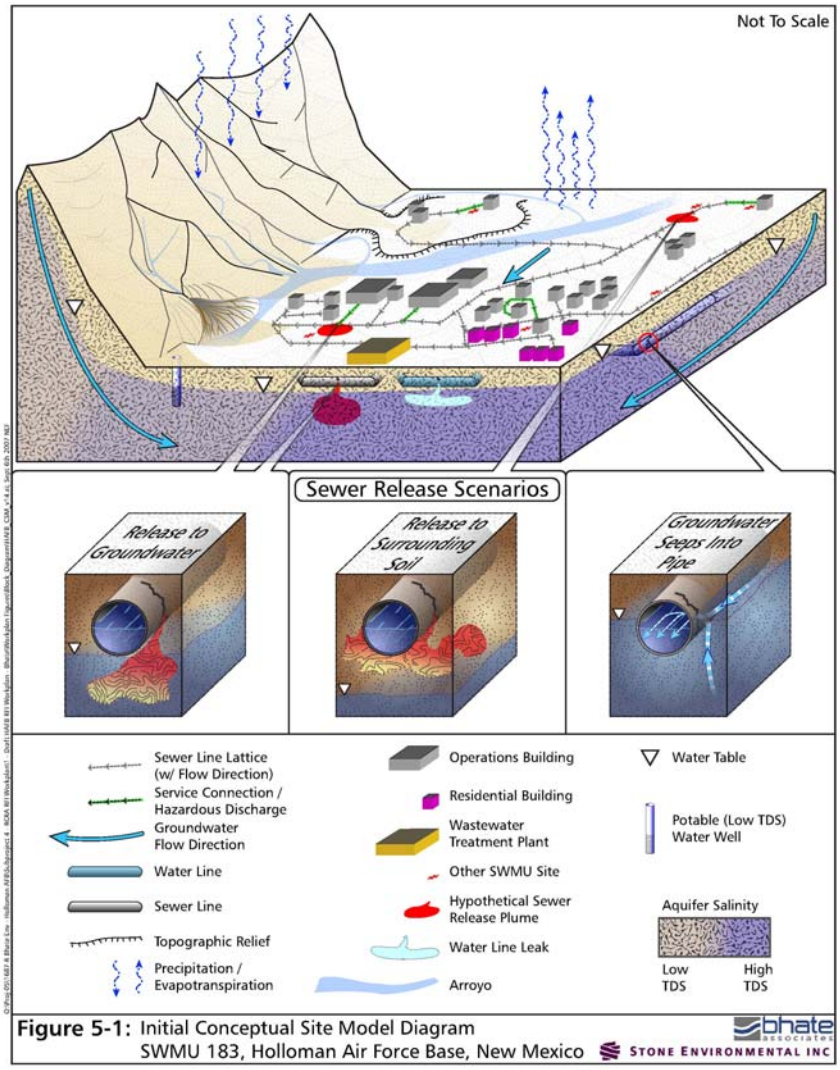

Figure 5 An Example Conceptual Site Model

The CSM organises known information and working site hypotheses and provides basis for designing the dynamic work strategy. It is a flexible platform for updating and communicating site understanding and provides stakeholders with a unified understanding of site conditions. The CSM includes variety of data elements

- Current site use and future reuse scenarios (structures, receptors, etc.)
- Environmental framework (hydrogeology, surface water, atmospheric, etc)
- Nature and extent of contamination, transport mechanisms and exposure routes.

It is intended to evolve over the life of the project, be updatable in real-time during investigation and serve as a basis for decision making and remediation planning. The greater sampling density may also better delineate (and so target) remediation measures. It also explicitly describes the source-pathway-receptor linkages that remediation needs to address, and so allows validation efforts to be focused: both in terms of sampling and analysis; and in terms of determining when particular linkages no longer pose a threat so that efforts can be focused on remaining problem linkages. Updating the CSM during and after remediation can be used to benchmark and document success.

CSM is also a useful tool in property transfers as they can be used to determine the scope of liabilities and the point in the site management process at which an acceptable deal can be found between the interested parties (and insurers). Of particular interest here might be their use in agreeing to a phased

approach, where imminent and substantial risks are distinguished from a longer term effort to reach site closure.

Conceptual site models as a concept would appear to be also of direct use in understanding ecological damage, as described in the Environmental Liability Directive: both as a management approach for baseline assessment, and for assessing damage and possible remedies, at least for primary remediation. Indeed a CSM may be able to illustrate multiple baseline scenarios. The CSM approach may be of particular value in consensus building for conservation and habitat related situations, for example in communicating ideas with lay audiences.

Ecological baselines; level of detail, Mark Kamilow, Honeywell, USA

In the US the Superfund-CERCLA legislation sets the framework for dealing with federally regulated historically contaminated land. The aim of this framework is the Remediation of hazardous conditions to protect human health. It is described by the speaker as "punitive", following the "polluter pays principle". A different federal regime relates to natural resources damage (NRD) which seeks to restore ecological losses by supporting in kind ecological / recreational landscape services. This was described as "not punitive". Both schemes may impact on a particular site or operation, but they vary in their management approach, as illustrated in Table 3. Large ecological restoration projects may be best managed independently as they may extend over a wide area beyond the facility / operation; the timeline for assessment and action may be hard to synchronise with that of conventional remediation work; and a large number of stakeholders may be involved. For smaller projects it may be expedient to manage both CERCLA and NRD responses in parallel to save time and money and find easier stakeholder consensus (in particular being able to look for public acceptance in an integrated as opposed to piecemeal way).

An example of an integrated approach applied to a small project is the former Honeywell "LCP" site on the Brunswick Peninsula in Georgia. Operation on the site began in 1919 with an oil refinery till the end of World War 2 when the site became a paint factory. From 1958 to 1994 the site held a caustic chlorine plant. The holding company went bankrupt and Honeywell as a previous site owner became liable under US law for its clean-up. The site is on an estuary and the facility contaminated a tidal marsh and creek. A major risk driver was mercury in estuarine sediments by the site (see Figure 6). Other contaminants included lead and polynuclear aromatic hydrocarbons. Contamination problems had meant that fishing had been banned in the area since 1991.

Table 4 Comparing CERCLA and NRD Management Stages

	CERCLA	NRD
Problem definition	Remedial investigation: • Conceptual site model • Human health risk assessment • Baseline ecological risk assessment	Injury assessment: • Conceptual site model • Habitat equivalency model • Economic model
Solution Identification	Feasibility study: • Identify technologies • Screening • Record of decision	Restoration plan: • Identify projects • Ecological evaluation • Economic evaluation
Solution Implementation	• Remedial design • Remedial action • Five year review	• Design • Implementation • Effective monitoring

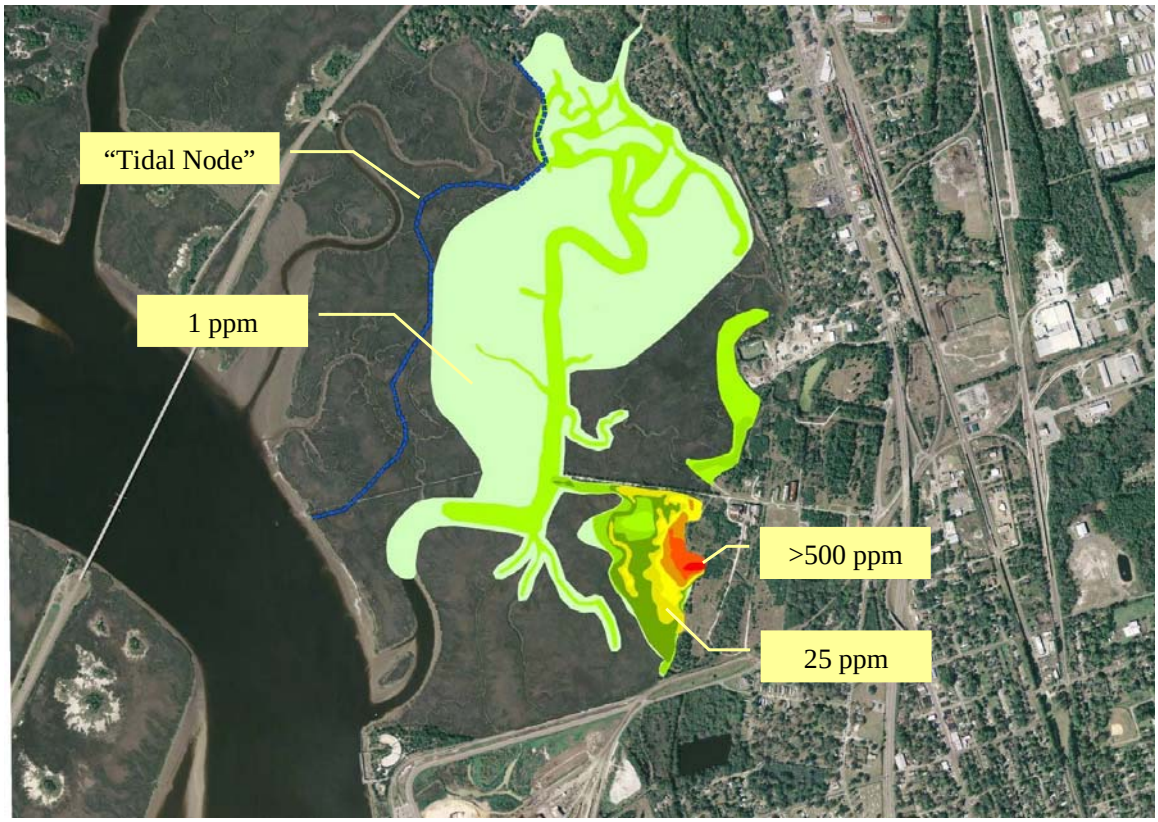

Figure 6 Mercury Distributions in Estuarine Sediments around the "LCP" Site

A removal action was carried out prior to 2001 at a cost of $50 million (a removal action is a rapid response focused on removing source term). This removed some 225,000 m3 of sediment and soil form the site and marsh area, some 60% of the mass in the marsh. The future of the site was seen as a real estate development on the site of the former facility and recreational/ecological preservation landscape for the marsh. The real estate development required the driving of a road through the marsh, occupying 1 ha of the marsh area. The road was also going to serve as the repository for material excavated from both marsh and upland areas of concern left after the 2001 action. These were to be confined behind the sheet piling required for the road. The law required compensatory marsh creation for the marsh area lost to the road at a ratio of two to one. This was sited on an upland area, adjacent to a freshwater wetland, seen as low value for real estate redevelopment. Hammocks (elevated areas above high tide in the marsh) were going to be created by capping some of the larger contaminated sediment areas. Hammocks add ecological value to the marsh as they attract different species, diversifying the overall marsh population. The plans sought to increase value by combining ecological upgrades with cost savings. These included:

- Creating oyster reefs in excavated marsh areas (which avoided the need for backfilling and seeding)
- Creating hammocks in the marsh
- The creation of the 2 ha of new marsh area yielded soil and fill materials which were used in the construction of the new road).

Hence overall both cost savings and net ecological benefit were achieved.

Overall the speaker's view was that remediation and ecological restoration should be combined where possible; looking for ecological "upgrades" across the remediation scheme enhances sustainability and may create opportunities for cost saving. This is especially effective at sites where there was ecological damage was minimal, and these upgrades can replace the costly Natural Resource Damage Assessment process altogether.

Several examples of ecological upgrades integrated into the remedial process were given:
Instead of stabilizing shorelines with rip rap, create habitat for fish spawning or oyster reef construction.

- Instead of grading for maximum sheet flow, grade for maximum recharge where appropriate
- Use trees to control landfill infiltration instead of using an impermeable cap with surface runoff
- Design excavations in low areas to promote wetland development
- Use trees to isolate an area as opposed to a fence
- Think "green" early in your remediation process.
- Ecological sustainability instead of remediation

Legal issues related to baseline studies, Stefan Remmerswaal, Crawford & Company, NL

Crawford & Company (Nederland) B.V. is the Dutch division of the world's largest independent firm of loss adjusters, which employs more than 10,000 people in approximately 70 countries. Loss adjusters investigate the cause and the extent of a particular loss and report to our principals. In more than 90% of the cases these principals are insurers. Our investigations are used by insurers to determine if and to which extent they have to indemnify a loss under the terms of the policy. Two types of "baseline study" were proposed:

1. A baseline study as an inventory of the extent and the nature of the pollution of an industrial facility (an environmental status report)
2. A baseline study related to the environmental responsibility of an individual industry, investigating the environmental influence of the industry outside its sites. This can also include an investigation at a certain moment of the environmental status outside the facility in the neighbourhood of the facility. As such, the study can be used as an investigation into the influence of the industry and its environment over the years.

Environmental status report as baselines. Investigations into the extent and the nature of the pollution of an industrial facility have no formal legal status as such. However, the study can be used as a part of a contract when a facility changes ownership, so that the new owner is aware of the extent and the nature of the pollution of the site, the moment the site becomes your property. When the degree of the pollution is known, future liabilities can be estimated and form part of the transfer of ownership negotiations. Crawford & Co has experience of dealing with claims by new owners against the former owners for cleaning costs that were claimed long after the transfer of the site. In the speaker's experience a good baseline study is vital. In the absence of such a study, or when an improper study is used, there is no basis for determining the correctness of claims afterwards. A new owner would then have great difficulties in proving which cleaning costs can be attributed to the old pollution. Purchasers have a strong incentive to make sure that a proper and comprehensive baseline study is carried out taking into account likely future liabilities. It is advisable that the transfer arrangements make complete and final provisions for liabilities. Avoiding or postponing these discussions is a source of future problems. It is possible for claims to be made by purchasers against vendors years in the future, if unexpected problems come to light. Typically, without an adequate transfer arrangement, the purchaser will be in a poor position to press such claims.

Baseline study of environmental responsibilities. A usual occurrence of this type of study is when a new operation seeks approval from regulators to commence; these authorities will want to be informed about the possible effects on the environment and the precautions which have been taken. Such studies can also be used as a tool for business risk management as an inventory of possible exposures to future liabilities for losses (environmental impacts) caused to third parties. With the inventory, an operator knows potential risks and can find solutions before the risks actually occur, for example a specific environmental liability insurance.

Table 5 provides a series of recent case studies of environmental losses from Crawford & Co. Incidents can last for protracted period, when surrounding companies cannot operate, resulting in large financial losses. A Baseline study will never fully prevent these types of losses from happening. Many of them are the result of human errors and human errors will always be made. But baseline studies create an opportunity to evaluate which types of risks and losses are likely to happen and take precautionary measures.

Table 5 Examples of Past Environmental Losses

Asbestos: older buildings especially roof panels, may contain asbestos. In case of a fire in the buildings, this asbestos will spread in small particles over large area. The consequence of this is a major asbestos clean-up operation.
Transport of liquid chemicals sometimes takes place via underground piping systems, form which leaks may occur. Recently a pipe burst between Rotterdam and Antwerp. Crawford were appointed by the liability insurers of a contractor who was blamed for the damaging the pipe during infrastructure they were carrying out. A range of losses ensued: clean-up costs, costs of emergency operations resulting from the incident, and economic losses. Another example was a leak from a pipe conveying naphtha was transported, which resulted in a large spread of naphtha through the environment. Clean-up costs were enormous.
Escapes from petrochemical industries have resulted in crude oil being blown into the air and spread over surrounding areas. Large areas were polluted with drops of crude oil. Clean-up was needed of streets, houses, cars etc. Crawford and Co dealt with more than 5,000 claims in the Antwerp area. Teams of adjusters were needed to make an inventory and arrange compensation. In an example in the Rotterdam port area Crawford and Co dealt with cases involving the oil fallout over thousands of cars. Then the cleaning of the cars must be organised. Organisation is a major item in the handling of this type of widespread public impact which can have a major bearing on the future for the operation concerned. In the worst-case scenario the operation is not allowed to continue.
Another type of loss is the financial loss of third parties that are prevented from operating, for example owing to ammonia escapes (e.g. from refrigeration systems) when large areas may be sealed off by the authorities until the ammonia has disappeared.

Can insurance provide cover? Tony Lennon, Chubb Insurance Company of Europe, UK

Most environmental insurance purchasing in the UK has been prompted by concerns about liabilities associated with land contaminated from historical activities, however, environmental incidents are caused by current day to day operations where the Environmental Liability Directive is of prime importance. Awareness of environmental liability risks is not high, for example a recent re-survey for the Environment Agency in England and Wales found that only 15% of small or medium sized enterprises (SMEs) thought business could harm the environment, and less than 25% o could name relevant environmental legislation they were affected by.

The traditional insurance products are public liability[17] and property policies. Public liability policies are limited to third party property damage and bodily injury. They often exclude indemnity for regulatory clean up and in any case provide no indemnity for own site damage/clean up. They only cover sudden and accidental events leading to pollution. Business sustainability (business interruption losses following a pollution incident) and mitigation costs are not covered. Property policies cover

[17] Also known as general liability cover

debris removal following insured event. In general the scope of property covered by such insurance is limited, usually to "bricks and mortar", with no cover for cleaning up contamination on site and no cover for business interruption following a pollution incident. Insurance does vary from country to country, for example in Sweden property insurance may cover some remediation costs.

Environmental insurances have been developed to address some of these gaps in cover. The broad types of policy available are:

- Site based environmental insurance policies which insure environmental liabilities that arise from the operations of an insured at their sites(s)
- Contracting based pollution policies which insure the environmental liabilities that arise from remediation contracting activities undertaken on a client's site(s).

Site based policies typically cover:

- Third party property damage, bodily injury, remediation costs, defence costs arising from a pollution incident/condition
- Mitigation (emergency expenses) incurred to forestall a third party claim
- Remediation costs incurred by the insured at their own sites
- Definition of pollution incident/condition does not differentiate between a sudden and accidental cause and any other cause of a pollution incident – normal operations are covered

Other risks covered include: transportation of hazardous materials, impacts at non-owned sites such as waste disposal sites, and the possibilities of changes in legislation.

Contractor's pollution liability policies typically cover:

- Property damage, bodily injury, environmental damage caused by a pollution incident arising from "covered operations"
- Environmental damage includes remediation costs and natural resource damage.

No distinction is made between sudden and accidental and gradual causes of pollution incident.

Traditional" environmental policies provide indemnity for legal liability arising from remediation costs, e.g. – sample policy wording - "costs to investigate, neutralise, remediate…effects of pollution incidents". There is no intended cover for the wider range of liabilities imposed by ELD, other than for "primary remediation" as defined by the ELD. It is possible to extend cover to compensatory and complementary remediation as defined by the ELD. Some countries may have limited cover provided by insurance pools (France, Spain, and Italy) there is a proposal in Germany to establish specific coverage for ELD liabilities for accidental / unexpected events.

Environmental policies only provide indemnity for liabilities that arise from a pollution incident i.e. a "discharge, dispersal, seepage, migration, release or escape of any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapour, soot, fumes, acids, alkalis, chemicals and waste into or upon land, or any structure on land, the atmosphere or any groundwater, surface water or coastal waters.". However, damage to species and habitats may be caused by factors other than pollution.

In providing insurance solutions for the ELD the biggest challenge to insurers is not the cover that might be needed in principle, but the lack of consistency in the implementation of the Directive provisions throughout Europe. It does not seem likely that a single approach can be designed to fit all countries. A possible way around this may be to base policy wording on the Directive text itself rather than national implementations, which is likely to be the Chubb approach. Other barriers to developing an ELD insurance solution is uncertainty in establishing baseline conditions, a lack of knowledge on complimentary and compensatory remediation might entail.

Resource Equivalency Methods for Assessing Environmental Damage in the EU, Ece Ozdemiroglu, Economics for the Environment Consultancy Ltd., UK

This presentation is based on the Framework 6 Programme Project REMEDE: - Resource Equivalency Methods for Assessing Environmental Damage in the EU. The objectives of REMEDE are to develop, test and disseminate resource equivalency methods appropriate for determining the scale of complementary and compensatory remedial measures necessary to adequately offset environmental damage. The project draws on US experience and that of EU Member States. The goal is to apply and develop resource equivalency methods in accordance with the requirements of the Environmental Liability Directive and the EIA, and Habitats Directives, in order that a standard toolkit can be applied to all damage cases in the EU.

This toolkit will support the interpretation of Annex 2 of the ELD to choose the most appropriate measures to ensure the remedying of environmental damage. Resource equivalency can be used in the assessment of the environmental damage and the identification of needs for complementary remediation or compensatory remediation. The toolkit is a means of comparing the substitution of resources and services in terms of their value and their cost. The fundamental question addressed is: what types of resources should be remediated and how much remediation is enough? REMEDE will combine ecological (scientific) perspectives and economic (public preference) perspectives as shown in Figure 7.

Annex I of the ELD provides the criteria to be considered when deciding if a given environmental damage is significant. The toolkit will not make prescriptive judgements about significance. Annex II of the ELD covers the basic concepts of remediation and resource equivalency methods and sets priorities. However it does not describe in detail methods to allow for their consistent application throughout the Member States. The REMEDE toolkit is intended to provide this detail: to cover the stages of implementing each method and decision making criteria. It is not possible to make such a toolkit prescriptive enough to cater for all eventualities of environmental damage, ecosystem, geographical coverage and remediation measure. It will however provide the methodologies.

The ELD is intended to serve the needs of the public by repairing the environment back to baseline (without the incident causing damage) conditions. Three types of remediation are envisaged – primary, complementary and compensatory:

- Primary remediation – any remedial measure which returns the damaged natural resources and/or impaired services to, or towards, baseline condition (it applies to same site and same resources);
- Complementary remediation – any remedial measure to compensate for the fact that primary remediation does not result in fully remediating the damaged natural resources and/or services (it applies to the same and/or different site and/or resource); and
- Compensatory remediation – any remedial measure to compensate for interim losses that occur from the date of damage occurring until primary remediation has achieved its full effect (it applies to different site and/or resource).

The focus of the REMEDE toolkit is in supporting complementary and compensatory remediation decision-making.

The scale of each remediation necessary is selected by comparing the environmental damage to the benefit of remediation. These can be compared in three ways:

- **Resource-to-resource**: The metric of equivalency used here is the unit of the affected resources (e.g. number of trees, organisms, individuals of a species population etc.). Equivalency is sought between the number of resources damaged by the incident and the number resources gained through each remediation option.

- **Service-to-service**: The focus here is on services, not resources: because services per unit of resource are not necessarily the same at the damage and remediation sites. Services here refer to the ecosystem services provided by the damaged resource (provisioning, regulating, human use etc. as per Millennium Ecosystem Assessment typology). The trade-off may not be one-to-one in resources, i.e. the physical size of the remediation could be more or less than the physical size of damage. For example, if the comparison of gains and losses is made on the basis of the amount of habitat lost (e.g. hectares), then a Habitat Equivalency Analysis (HEA) can be undertaken. Here, the main challenge is to differentiate the environmental impact losses and remediation gains of interest from population fluctuations caused by other factors, such as immigration, emigration, competition, and other ecological constraints.

- **Value-to-value** scaling can be applied to the variety of situations that are not well-suited for resource-to-resource or service-to-service equivalency. For example, in instances where (a) proposed remediation projects provide different natural resources, habitats, or services than those damaged; (b) organism numbers, habitat area, or important services (as defined by ecosystem experts or the general public) cannot be measured accurately in damage or remediation cases; or (c) differences between damage losses and remediation gains are more important than similarities that could potentially be compared directly between remediation and damage. The fundamental approach here, as with all of the equivalency methods, is to match remediation to damage: in this case, to equate the (monetary) value of the environmental damage to the value of the environmental benefits (in monetary terms) generated through remediation projects.

- While not specifically a resource equivalency method, Annex II of the Environmental Liability Directive also stipulates that a value-to-cost method can be used (within the discretion of the Member States) if it is not possible to use the above three approaches. This method involves estimating the (monetary) value of the environmental damage and selecting remediation options that have a financial cost equivalent to this value.

Figure 7 shows these equivalency methods and the information and expertise required to implement them.

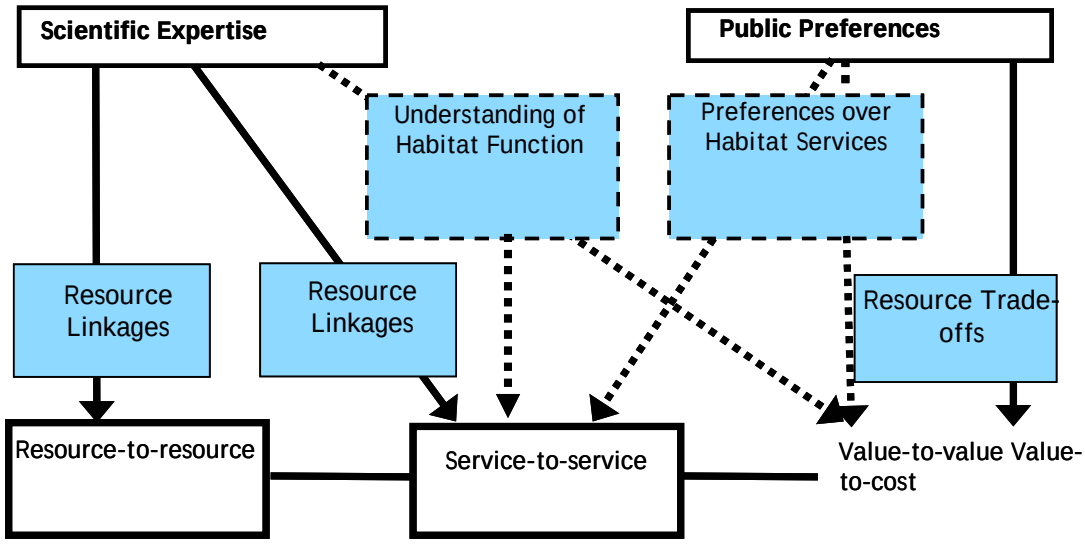

Figure 7 The REMEDE Valuation Concept

The project is comprised of three Work Packages.

1. Methods development (May 2006 – March 2007) assessing the legal context, reviewing the state of the art of resource equivalency analysis and developing a first draft of the toolkit (see Figure 8)
2. Case studies (March 2007 – January 2008) testing and developing the toolkit through case studies in Spain, Poland and elsewhere in the EU – listed in Table 6; and then revising the Toolkit in the light of lessons learnt.
3. Dissemination and final report.

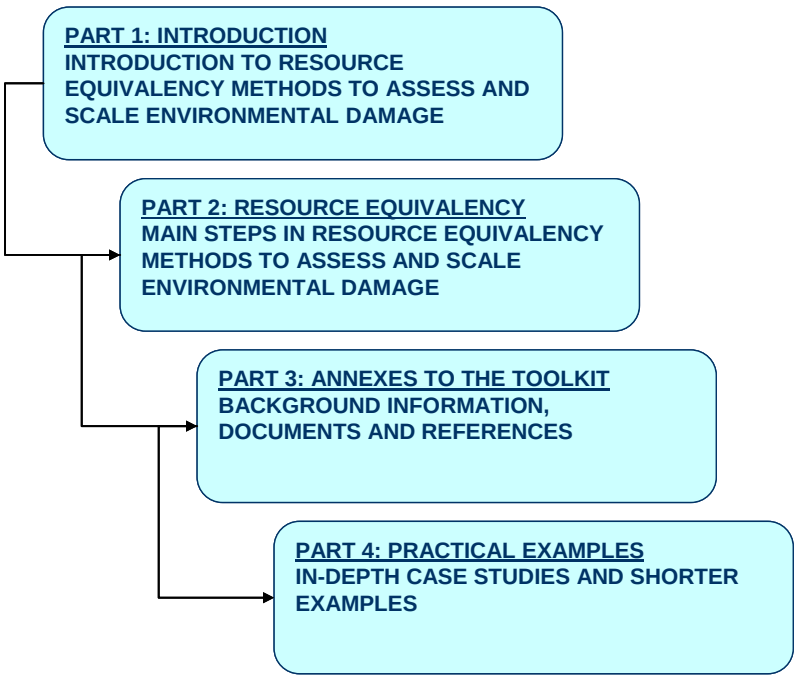

Figure 8 The REMEDE Toolkit

Table 6 REMEDE Case Studies

	Chemical Tank Collapse	Mining Spill (Donana NP)	Chronic Mining Pollution (Czech)	Forest Fires (BABE)	River Vistula Pipeline Crossing	Hypothetical Road Construction Project
Relevant EU Directive(s)	ELD	ELD, Habitats and Wild Birds Directives, WFD	Habitats and Wild Birds Directive, Convention on Migratory Species, Bern Convention.	ELD	Habitats and Birds Directive	Habitats Directive
Treatment of baseline	Before and after data (assuming improving environmental quality in the baseline)	Before and after data	Before and after data	Before and after data and some modelling of growth	Before and after data	Before and after data

The basic principle of resource equivalency methods is to determine damage (debit), determine the benefits of remediation (credit) and to find a balanced value between them. The concept of ensuring equivalency between the debit and credit is quite simple: add up all losses caused by the damage; determine amount of benefit expected per unit of remediation; and then divide the debit by the per-unit credit to get the amount of remediation needed. In practice this determination is more complex. Ecosystem systems themselves are complex; understanding and quantifying impacts can be difficult; and quantifying the benefit that will be provided over time can be difficult, so overall the determination requires expertise and professional judgment.

Interactive session: Using baselines in liability management; what do current and future Directives require? Bertil Grundfelt, Kemakta, Sweden

The definition of a baseline condition in conjunction with contaminated land management may vary for different applications. It could, for example, represent the starting condition, the condition that prevailed before the site was contaminated or the condition to which a site has to be restored. Baselines play a role in scenarios concerning, for example, sales and acquisitions of sites, insuring for pollution and remediation, liability transfers and contractual negotiations, land valuation, redevelopment, etc. This interactive session was based on a fictitious case study (see Box 1). Syndicates of meeting participants were asked to discuss the case and answer the following two questions:

1. What knowledge of the baseline conditions is needed, in order to define liability and the risk exposure?
2. What are the residual uncertainties and how can they be managed?

The delegates were divided into syndicate groups exploring these questions from three different perspectives:

1. Damage to natural resources from pollution events falling under the Environmental Liability Directive (WLD),
2. A Due Diligence perspective in the context of a sale and an acquisition,
3. Redevelopment of a brownfield.

Box 1 Interactive Session Case Study

The (fictitious) case study centres on a manufacturing facility which has been providing metal parts to various industrial segments for the last 75 years. Process operations have included metal fabrication, solvent cleaning, plating operations and painting. The facility recently experienced a failure of one of their plating bath tanks, releasing approximately 10 m^3 of plating wastes. The plating wastes entered a floor drain that was connected to a local storm sewer. The wastes entered the storm sewer and discharged into a wetland protected under the Habitat Directive, causing fish kills. Subsequent interviews with facility personnel indicated that there had been prior releases of plating wastes that had likely entered the floor drain, although of a smaller volume. Inspection of the storm drain indicated it was in disrepair and would likely represent a migration pathway into the environment.

The outcomes of the syndicate group discussions were as follows.

Dealing with Damage as Defined under the Environmental Liability Directive. The participants in this syndicate group consisted largely of people from a technical or engineering background. They began with the second question, in particular managing risks. Their view was that the first action to be carried out should be to control the source term, after this questions liabilities should be considered. An important starting question is whether the damage caused is legally significant as defined by the ELD. If the damage is significant the next step is to establish the scope of the liability which would

require data on the status of the wetland before the incident as a *baseline*. Such data may be held by non-governmental groups such as wildlife trusts and voluntary conservation groups. Similar local unaffected wetlands could also be used as comparators. It is then possible to determine what might be needed to restore the wetland to this baseline. However, it is important to consider the impact of the previous spills which may have "lowered" the baseline, so reducing liability under the ELD. It is likely that restoration will be related to target environmental quality objectives set out by a regulator, in particular requirements for residual contaminant concentrations after remediation; or alternatively a desired compensatory measure. These negotiations would reduce the uncertainty over liability. The syndicate identified two barriers to successful negotiations: firstly uncertainty over what the status might have been before and after the time horizon set out in the ELD text (before which liability does not apply); and also a potential knowledge gap in applying remediation for an ecological restoration application.

Due Diligence. The syndicate assumed for the purposes of the exercise that the site was subject to a property transfer and there was a potential buyer so that a due diligence process was taking place. The syndicate focused on understanding at what point a sale or transfer decision can be made, and what is an acceptable degree of uncertainty in liability in making that decision. Perception issues are very important in commercial decisions, and this also includes how the sites neighbouring the facility are viewed. "Baseline" was felt to be complex to use in terms of due diligence. While a regulator is likely to see a baseline in terms of environmental quality objectives, the due diligence process is orientated on possible impacts of the sale and transfer on business and financial risk and also compliance with corporate policies, such as Corporate Social Responsibility. The due diligence process begins by establishing "known" facts, for example in the case study the pollution incident and the likely contaminants. However, to address uncertainties in the transaction due diligence must go further and requires information about:

- historic practices and previous leaks
- existence and condition of underground structures
- other liabilities that might be held by the company being acquired (on or off site)
- the requirements of the regulator(s)
- the adequacy of the problems investigation and what further sampling is necessary versus possible (for example sampling off site may be considered necessary for due diligence, but may not be possible for land in third party ownership)
- what pending legal actions exist for the company being acquired
- the financial status of the seller (can they meet their liabilities)
- the motivation of the seller (e.g. is the reason for sale one that the buyer finds enticing).

The greater the level of information the more uncertainty is reduced, and liabilities assigned. If the level of uncertainty is acceptable to the purchaser, the management of residual liability can be managed in the sale/transfer contract. One of the major barriers to due diligence for a transaction involving potential ecological damage is how that damage is to be valued, as that valuation is in effect the liability.

Brownfields Perspective. "Brownfields" as a term has a range of interpretations, including legal definitions in some countries. For the purposes of this exercise the case study site was assumed to be in the EU and was a site with an industrial facility which was being sold, with the new owner being interested in "adding value" to the site. The new owner would need information not just about the baseline of the impacted wetland as a snapshot at the time of transfer, but the contamination status of the industrial site and its off site impacts more generally. These impacts would need to be considered not just for the wetland but also for the site surroundings more generally, taking into account possible transfer of contamination off site, for example via groundwater. The information needed has to be sufficient to make effective predictions about how impacts on the wetland and elsewhere will change over time and as a result of any changes in land use envisaged. This syndicate group felt that the most effective route to a brownfield redevelopment solution to the case study would be via a public-private partnership (PPP) where all partners accept an element of uncertainty and hence risk. It was further suggested that if such a PPP brownfield project encompassed the wetland (for example for leisure) this might achieve the maximum synergy and mutual benefit for the developers and the local community.

3 Discussion

Baselines a difficult concept to relate to contemporary practice in historic contaminated land management (e.g. cost estimation and modelling, transactions and due diligence). However, baselines are now part of the regulatory framework for those owning and managing landholdings and/or processes that can impact land or water. Baselines are explicit in the Environmental Liability Directive and also in the Water Framework Directive as benchmarks against which decisions on remediation or restoration must be undertaken. Both Directives also bring a new dimension of damage into play. Typically, the environmental management of sites has related to risks to human health and to water. In some cases risks to particular built services and/or conservation sites has also had to be considered depending on their proximity to the contamination source and the prevailing national or regional legislation. With the Water Framework Directive and its daughters) and the Environmental Liability Directive impacts on ecology is an explicit consideration, and impacts may need to be considered on ecological status that is distant from the manager's or owner's site or process, for example in the context of river basin management action plans. The Environmental Liability Directive provides a framework that Member States are currently implementing in detail, and implementation has been allowed to vary substantially between countries. There are therefore a number of areas of uncertainty in planning for the future for NICOLE Members, be they industry or service provider members. These relate to how baselines are to be assessed and used, how significant damage to ecological "services" is to be judged and the types of remedy that might be required. The Environmental Liability Directive describes "primary" remediation which is similar to remediation concepts already familiar to NICOLE members where ecological services on a site are restored to their former function under the "baseline" condition, but also two alternative remedies if primary remediation is not feasible: compensatory or complementary remediation. These alternatives are based on the concept of providing some kind of equivalent ecological resource for the one that is damaged. These alternatives are new concepts in Europe, although they have been practiced in the USA. The Environmental Liability Directive does not provide explicit instructions on how equivalency is to be determined, although a EU funded research project is developing a "resource equivalency" tool-kit.

The overall situation is one that can be best described as emerging, with potential new obligations and liabilities for operators of processes and managers of land, and new requirements that service providers will need to meet. However, the (deliberate) flexibility in Member State implementation and the varying pace of implementation means that responses will be strongly affected by national developments, even if the overall liability framework is a European one. What would be interesting for NICOLE members might be to find out how particular organisations are gearing up to meet these challenges, and whether "early innovators" have some useful experiences for the rest of us to share.

The baseline concept has its theoretical attraction, but in the case of historic contaminated land management is not necessarily practical, not least because the baseline (as described by the ELD) refers to a point in time before which substantial changes in ecological services may have already taken place, and distinguishing a new change from these may be next to impossible. It may be more appropriate to look at what is possible in terms of providing additional ecological services during contaminated land management and remediation. The case study provided by Honeywell demonstrated the potential for synergy between remediation and ecological restoration, where enhanced ecological services can both be used as a route to enhanced "sustainability" and costs savings.

This discussion has been drawn from the discussions within the workshop and from comments kindly sent in by a number of delegates and NICOLE members after the workshop.

4 Concluding Remarks

NICOLE believes it is important that there is a debate about the usability of baseline concepts in historic contaminated land management, and whether more practical measures may add ecological services as a normal consideration in contaminated land remediation. An ongoing action for NICOLE will be to continue this debate and collect case study information about both the use 9attemoted) of baselines by its members and their work on ecological restoration as a practical part of contaminated land management.

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