Embedding Sustainability in Contaminated Site Management

Practical Experiences

Alan Thomas
ERM, Oxford, UK
Lance Robert, ERM Iberia
Objectives

Offer a perspective on development and implementation of sustainable remediation

Provide some examples of application

What we have learned to date and our next steps
Our understanding

Evolution in way we manage contaminated land

Development since 2008, influenced by SuRF, SuRF UK and NICOLE definitions & frameworks,

- The practice of demonstrating, in terms of environmental, economic and social indicators, that an acceptable balance exists between the effects of undertaking the remediation activities and the benefits the same activities will deliver (SuRF-UK)

- Sustainable remediation is a framework in order to embed balanced decision making in the selection of the strategy to address land [and/or water contamination] as an integral part of sustainable land use (NICOLE)
Sustainability in contaminated site management

What are the key drivers in influencing our approach?

Internal Policy

Legislation

Clients
ERM and sustainability

Global Policy

- States our commitments
- Sets out our approach
- Embedding sustainability into everything we do

Key indicators

- Clients
- People
- Business conduct & ethics
- Environment
- Health & Safety
- Community
- Thought Leadership
ERM Sustainability Survey

Objective: to provide a perspective on how sustainability is being embedded within our Contaminated Sites practice.

- ~250 respondents
- >80% view sustainability “important to v.important”
- ~80% know what is meant by “sustainability” in our practice
- ~70% indicate client requirements have “some effect” (7% indicating a strong effect).
- Guidance developed does appear to be having an influence as a driver in majority of respondents.
- ~28% say regulatory requirements drives team to adopt “sustainable/green remediation” practices
- Major influences on incorporating sustainability in projects:
  - Senior leadership
  - Colleagues
  - Clients
- Regulator awareness of SR in last year
  - 34% ...increased
  - 45% ...no change
  - 20% ...never raised
UK Legislative Context

Guidance
- Primary Legislation
- DEFRA Model Procedures CLR11
- EA Remedial Targets Methodology
- UK SuRF Sustainable Remediation

Process
- Conceptual Model
  - Identified Significant Pollutant Linkages
- Identification of all potentially applicable technologies
- Screening Options Appraisal
- Detailed Options Appraisal
- Technical Assessment
- Sustainability Assessment
- Recommendations

Technologies
- Source Treatment
  - Excavation
  - Soil Vapour Extraction
  - Dual Phase Vacuum Extraction
  - Thermally Enhanced DPVE
  - In Situ Chemical Oxidation
  - In situ Biodegradation
  - Surfactant Flushing
  - Air Sparging
- Pathway Interception
  - Monitored Natural Attenuation
  - Hydraulic Containment
  - Permeable Reactive Barrier
  - Funnel & Gate
  - Injectable Permeable Reactive Zone
- Receptor Protection
  - Treatment at point of abstraction
  - Institutional Control
  - Long Term Compliance Monitoring
UK Vs Spanish Legislative Context

Objectives of UK Part IIa regime – extracts

- “The authority should take a precautionary approach to the risks raised by contamination, whilst avoiding a disproportionate approach given the circumstances of each case. The aim should be to consider the various benefits and costs of taking action, with a view to ensuring that the regime produces net benefits, taking into account local circumstances.”

- The authority’s initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would likely to bring and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action.

Sustainable view of the Spanish Royal Decree 9/2005

- Environmental Responsibility law (Ley 26/2007) establishes that prior to the implementation of whichever remedial actions are considered, a study for the natural attenuation of the contaminated land may have to be conducted.

- RD 9/2005 considers as well that the remedial actions may have to be able to reach permanent goals, prioritizing in situ treatments, and therefore avoiding waste generation, transport and elimination.
Our clients positions

Spectrum of positions

- Vast majority have Sustainability policies and Sustainability commitments
- Sustainable indicators tend to be environmental – usually Greenhouse gas emissions, Energy Efficiency, Waste Minimisation, Worker and Community Safety
- A few make specific mention of sustainable remediation
- One or two are leaders – and promote active engagement
Challenge

Translate sustainability ideals into practical action
Incorporate into daily work
Provide consultants with something tangible
The NICOLE Roadmap - overview
Integrating Sustainable Remediation

ERM has integrated the NICOLE framework with key stages in project delivery.

- Setting the remediation specification and strategy
- Setting the remediation technical approach

- Community & stakeholder engagement
- Sustainable Procurement

ability to influence sustainability
Case Studies

The world's leading sustainability consultancy
Mass flux evaluation; Spain

**Background:**
- The study site is a former car-parts manufacturing site
- Remediation of on-site sources - excavation of soil, treatment of shallow groundwater with a reactive barrier.
- Local Environmental Agencies requested further work in 2011.
- Elevated concentrations of chlorinated solvents in groundwater both at the site and migrating down-gradient – 6 potential pathways of concern.

**Sustainability Factors**
- ERM proposed a Mass Flux technique for evaluation of risks.
- The results of the Mass Flux investigation informed the future strategy in the following ways:
  - Off-site monitoring is now focused on one area (not 6 as was previously);
  - Monitoring reduced from 31 to 10 sampling points,
  - Waste, labour, travel reduction, etc.
  - CO2 emissions derived from transport, and cost effective.
Greener Remediation in Angola (Africa)

Background:
- 170,000 sq m former construction Site in Angola
- Deep groundwater, hydrocarbons in soil
- Client selling the property under residential scenario.

Sustainability Factors
- Impacted soil stored at a specifically dedicated area at the Site
- Treatment of soil proposed onsite in lieu of disposal at an authorized Angolan landfill.
- Reduced traffic, avoid high disposal costs,
- Reuse of treated soil in areas with low risk of exposure
- Incorporate soil placement with future land use design
Site Specific Risk Assessment

QRA in Spain

• The Royal Decree 9/2005 for contaminating soils establishes activities that are considered potentially contaminating.

• RD guidelines, the risk assessment should be considered as the key tool to evaluate and remediate contaminated sites.

• Triggered when detected concentrations in soil exceed the generic reference levels established in RD9/2005.

• Soil “contaminated” if determined to have unacceptable risk to human health or the environment.

• Remediation shall be conducted until levels do not pose an unacceptable risk.

• Actions conducted should avoid waste generation, transport and elimination will be preferred.

• QRA expected, widely accepted, for both water and soil – however, remedial goals and decisions for closure not entirely risk based.
Green Remediation – Renewable Energy Use

Incorporating Sustainability Concepts into Site Remediation Using In-Situ Chemical Oxidation

Key areas of focus

- Power supply
- Water Supply
- Operation & Maintenance

Benefits

- Reduced Environmental Footprint
- Reduced Costs
What have we learned

- Provides a positive message and a means of linking together many strands – integral part of practice not an add on
- Real bottom line economic benefits for clients
- Importance of a life cycle approach – A robust conceptual site model underpins a sustainable remediation approach - upfront efforts increase
- Setting the remediation specification and strategy is as (if not more) important as selection of remedial option – but our approach is flexible to address regulatory requirements
- Most of our examples tend to demonstrate environmental/economic benefits – a reflection of the nature of the projects
- Still some way to go in terms of educating/convincing all parties
Next steps

■ Embedding sustainability into our practice is a long term commitment
■ Continue to share learnings internally and externally
■ Engage with clients/regulators to further develop
Thanks