Risk Based Corrective Action and Risk Based Decision Making

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RBCA and Activities Required at Contaminated Sites

Site Characterization

Risk Assessment
- Explosive Conditions
- Human Health
- Environment
- Nuisance conditions

Regulatory Policies and Procedures

Risk Management
- Cleanup
- Institutional controls
A narrative and graphical description of site characteristics that provides a foundation for understanding a site and the distribution of chemicals in space and time.

- Identifies general and specific physical conditions that influence contaminant transport and receptor exposure.

- Identifies environmental issues that need to be investigated (and those issues that do not need to be addressed).
- Used to select and design the best options for remediation

- Provides a framework for the entire project and a communication tool for the regulators, PRPs, and other stockholders

SCM is the cornerstone of good RBDM
Ideally would like to clean properties to pristine conditions, however extensive experience suggests:

- Technology nor resources exist to clean sites to pristine conditions
- Not necessary to clean to pristine conditions

Risk assessment is used to answer two questions:

- What is the risk at a site?
- How clean is clean?
Application of Risk Assessment (RA)

Risk Assessment is a scientific and regulatory process used to:

1. Estimate risk based on site-specific factors and concentrations: forward mode of RA.

2. Estimate cleanup levels based on site-specific factors and acceptable risk standards: backward mode of RA.

FMRA and BMRA are a key part of RBCA process.
Forward And Backward Modes Of Risk Assessment (Indirect Routes Of Exposure)

Backward Mode - Are the representative site concentrations below the estimated clean-up levels?

Forward Mode - Is risk below regulatory acceptable level?

### Compliance Point Concentrations

- Default or Site-Specific
- EPA/State Databases

### Exposure Factors

- Default or Site-Specific
- EPA/State Databases

### Toxicity

- Default or Site-Specific
- EPA/State Databases
- Policy

### Risk

- Default or Site-Specific
- EPA/State Databases

### Media Parameters

- Default or Site-Specific
- EPA/State Databases

### Chemical Specific Properties

- Default or Site-Specific
- EPA/State Databases

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Risk Management (RM) follows RA and is used to:

1. Decide whether calculated risk is acceptable,

2. Develop cleanup levels

3. Remediate site to cleanup levels or use institutional controls to manage risk.

RM includes technical and non-technical considerations such as policy choices, cost, stakeholder agreements, risk perception, institutional controls, etc.
Risk Management (RM)

- Engineered treatment systems
  - Pump & treat
  - Soil Vapor Extraction
  - Enhanced bio-degradation
- Land use controls
  - Land use restrictions
  - Water use restrictions
- Engineered controls
  - Capping
  - Slurry walls
- Information and training
Institutional Controls
An Important Risk Management Tool

- Allow productive and safe use of property
- Ensures that the assumptions used in risk assessment remain valid
- Knowledge of impacted sites is not lost
- Provides long-term protection for risk based remedies
Outcome of RBCA Process

- Letter of Completion
- Continued monitoring until the plume becomes stable
- Remediation (passive or active) to meet specific target levels.

Should provide a “finality” to the site provided........ it is implemented correctly!
A Fundamental Paradigm Shift

- **Conventional Approach:**
  - How much chemical mass can we remove?

- **RBCA Approach:**
  - How much chemical mass can we safely leave behind?
  - How do we ensure that future generations are aware of the chemical left behind so there are no surprises?
Key Aspects of Risk-Based Decision Making

- **Site Conceptual Exposure Scenario:** Establishes the framework
- **Quantitative Target Levels:** Establishes measurable goals
- **Tiered Approach:** Ensures efficient use of resources
- **Upfront Involvement of Concerned Parties:** Enhances acceptability of results
Summary of RBCA Process

• **Process:** SA, RA, RM, involvement of stakeholders

• **Outcome:** Identification of need for and extent of risk management

• **Benefit:** If implemented & documented correctly should provide a “finality” to the site activities

For additional information refer to ASTM Webinar series