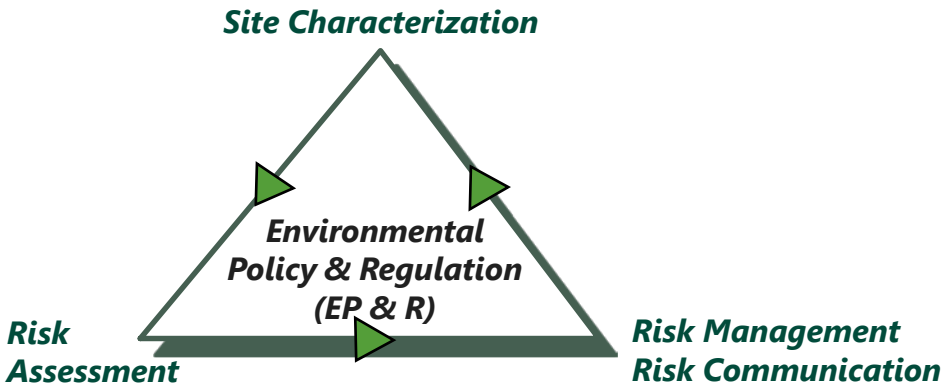
Risk Based Corrective Action and Risk Based Decision Making



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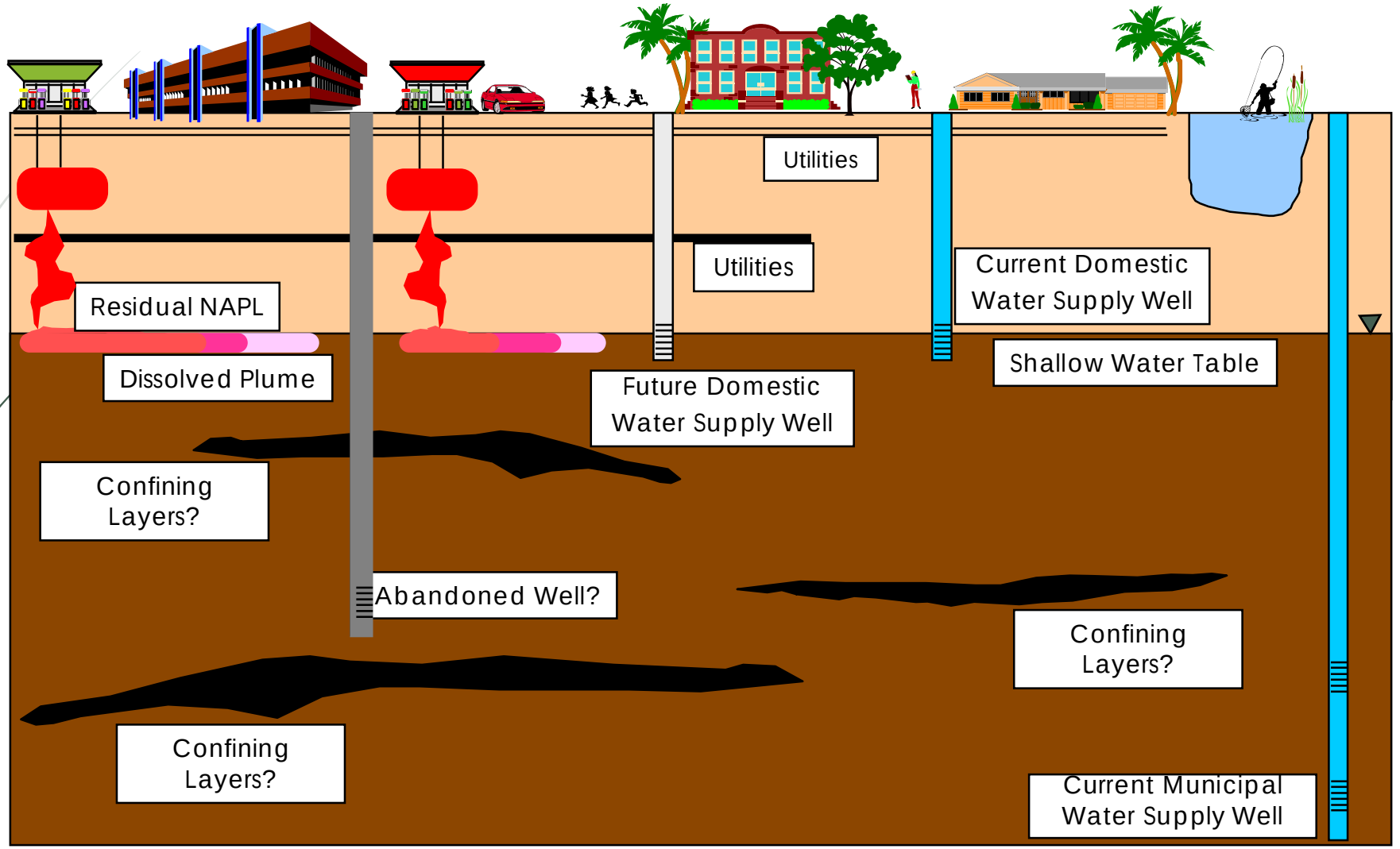
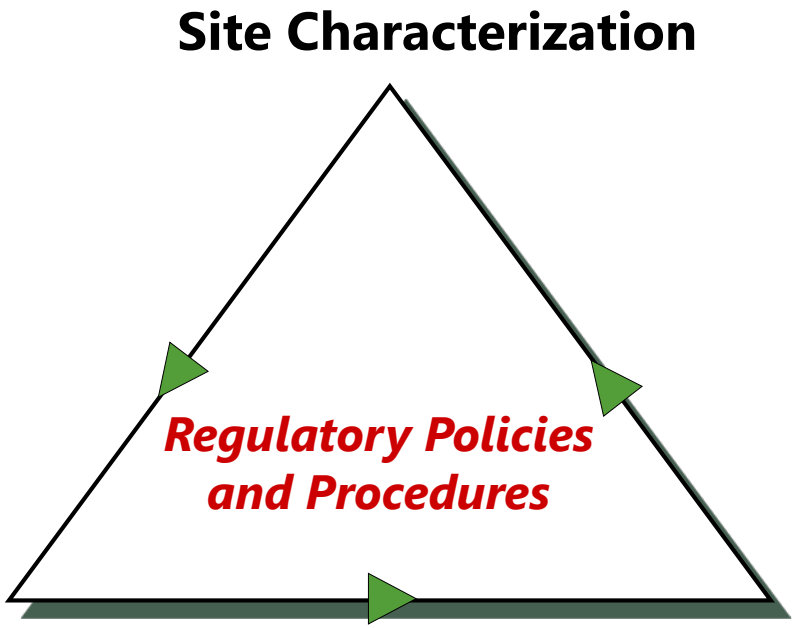
October 2017

A General Site Model



RBCA and Activities Required at Contaminated Sites



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

Risk Management
- Cleanup
- Institutional controls

CONCEPTUAL MODEL

- **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) .**

CONCEPTUAL MODEL

- **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

RA Two Questions

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)

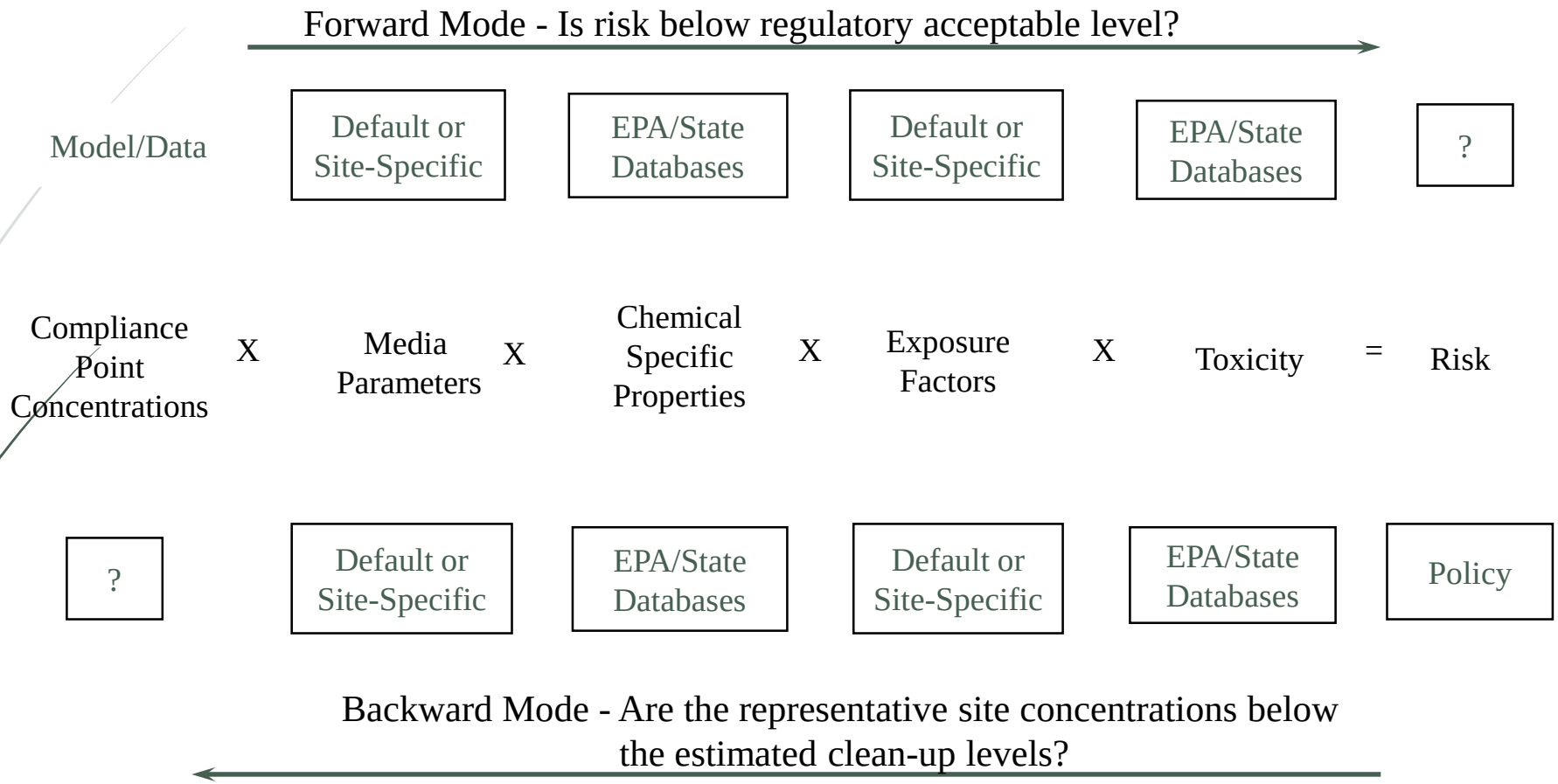
Risk Assessment is a scientific and regulatory process used to:

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)



Risk Management (RM)

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 Stake holders**
- **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