RCRA Corrective Action Training Program: Getting to YES!

Strategies for Meeting the 2020 Vision

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Module 7

Selecting and Approving a Protective Remedy

Part 1 - Policy Considerations
Part 2 - Field Considerations

Policy Considerations

- Remedy Decision Defined and Remedy Objectives
- Selecting the Remedy
  - Anticipated land and groundwater use
  - Final cleanup goals (and threshold and balancing criteria)
  - Engineering solutions
  - Institutional controls
- Documenting the Remedy Decision

Remedy Decision Defined

- Remedy Decision met when State or EPA approves remedy designed to meet corrective action (CA) long-terms goals
- Facility recommends remedies or remedy performance standards
- State or EPA approves and documents the remedy and associated performance standards
- Final remedy may be No Further Action
- Site-wide versus partial or phase remedy decisions

A formal Corrective Measures Study document is not necessary to select a final remedy.

Remedy Objectives

- Protect human health and the environment (HH&E) and maintain that protection over time
- Address all environmental media
- No unacceptable risk based on current and reasonably anticipated future land and groundwater uses
- Include Engineering Controls (ECs) and Institutional Controls (ICs) to ensure long-term protection

Anticipated Land Use

Planned Urban Residential

Light Industrial

Planned Commercial

Heavy Industrial

Establishing Goals

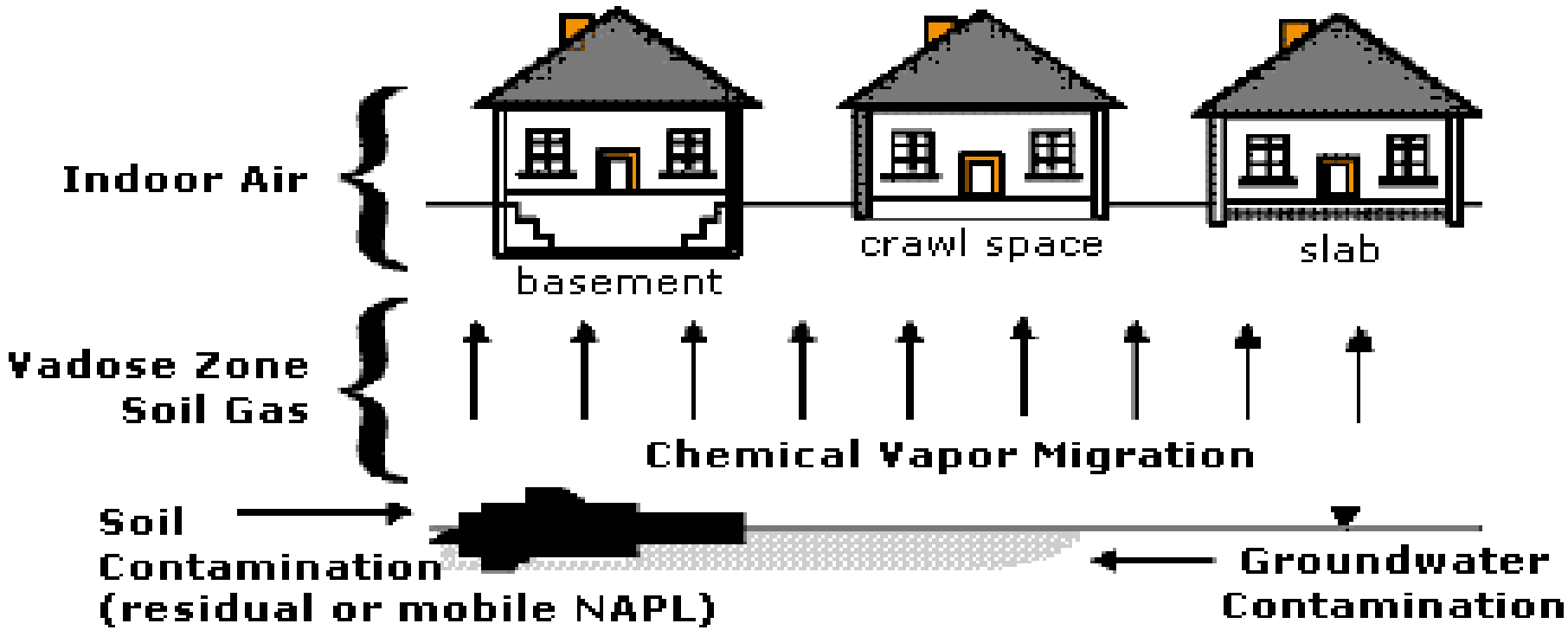
the What?

Establishing Cleanup Goals

- Standards for all environmental media
- Based on reasonably anticipated land and groundwater uses
  - Human exposure scenarios, including vapor intrusion
  - Ecological scenarios
  - Groundwater/surface water interaction
- Normally state decisions

Vapor Intrusion

The migration of volatile chemicals from the subsurface into overlying buildings



Vapor Intrusion Questions

- *Source* of contaminated vapors?

- *Potential receptors* present?

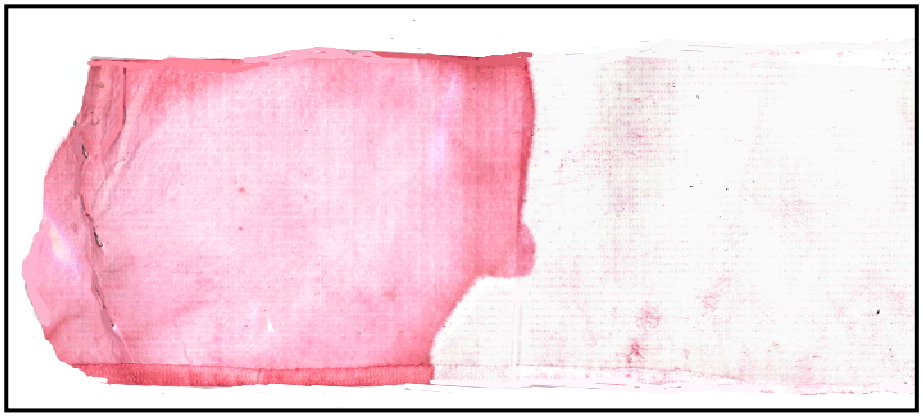
- *Connection* between vapors and receptors?

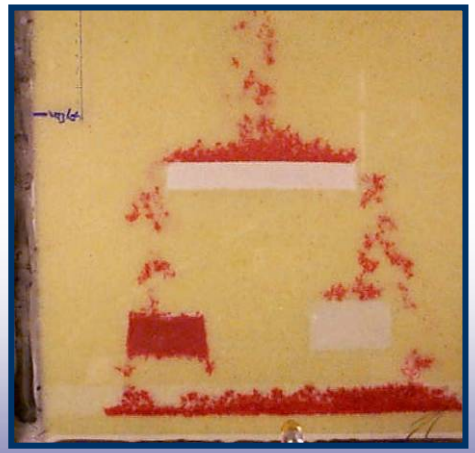
- *Complete pathway*?

- *Potential significant risk*?

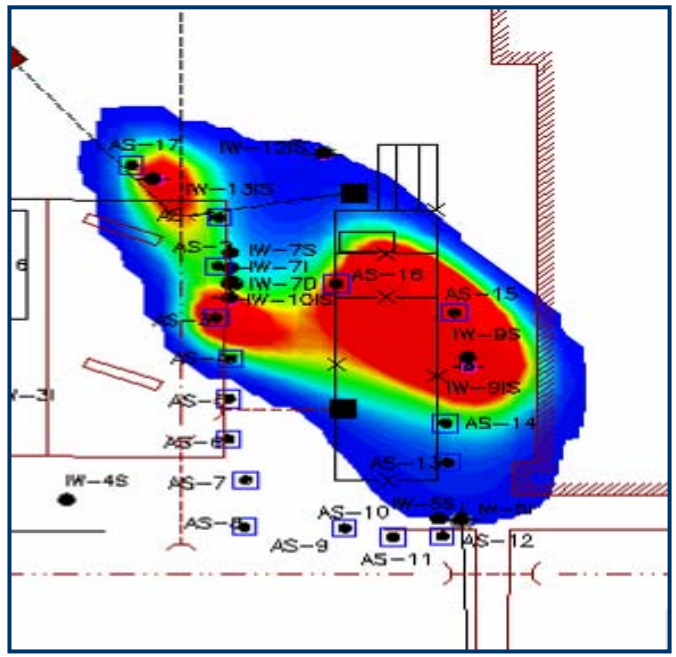
Special Case for Establishing Cleanup Goals: NAPL Remediation

Flute™ liner showing TCE





Lab demo of PCE DNAPL



Concentrations indicative of DNAPL

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Special Case: NAPL Remediation

- Non-numeric cleanup criteria
  - Stabilization
  - Containment
- Engineering solutions to reduce source
- Institutional controls to protect HH&E
- Dissolved phase criteria

the Where?
Defining the Remediation Area

- Remedy Decision applies to entire facility
- Options for applying numerical standards
  - Soil
    - Based on current and reasonably anticipated future land use
    - May vary (for example, residential off site, industrial on site)
  - Groundwater
    - At and beyond the unit boundary (when waste left in place)
    - Throughout the plume (when no waste left in place)
    - At and beyond a defined groundwater management zone
- Parceling property

Parceling

- Benefits
  - May jump-start cleanups
  - Makes valuable real estate available
  - Provides benefits to the community before final cleanup
- Considerations
  - Safe future anticipated uses of the property
  - ICs when wastes left in place
  - Financial considerations

Overarching Parceling Framework

- CA obligations
  - Authorized states
  - Regional EPA offices in non-authorized states
  - Case-by-case approach
- Permit requirements
  - States make modifications when necessary
  - Consider performance-based permit

Example: ***Using the minor modifications requirements…may redefine facility boundaries whenever a parcel of the facility is sold…so long as the parcel does not include a solid waste management unit (SWMU).***

- Expedited parcel cleanup = revitalization

Overarching Parceling Considerations

- Brief window of opportunity for developers
  - Phased cleanup, by parcel
  - Voluntary/other State programs useful
  - Expeditious agency reviews / cleanup decisions
- Parceling allowed regardless of cleanup status
  - Most cleanups occur before sale
  - Enforceable mechanism is required when cleanup not completed before sale

Parceling Example

- Union Pacific Railroad Maintenance Yards, Omaha Riverfront

Redeveloping the Riverfront

Omaha has joined the growing national trend of rebuilding along riverfront areas to revitalize old industrial spaces as well as control urban sprawl. These once heavily industrialized areas are being developed for numerous uses, including parks, recreation areas, office space, and convention facilities.

Riverfront areas were commonly industrialized due to the need for access to water at manufacturing and processing facilities, as well as for transportation of raw materials and goods.

RAPMA sites. All are located adjacent to or near the Missouri River along the city's eastern edge.

Gallup Campus and National Park Service Area Headquarters

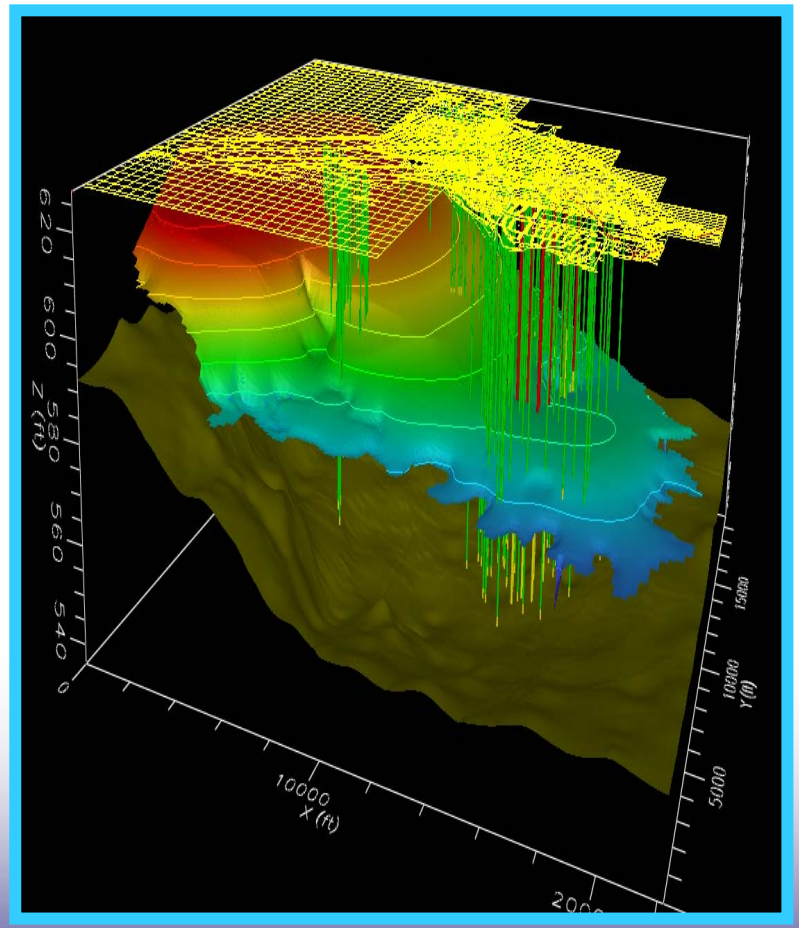
The area known as the Omaha Riverfront Redevelopment site is composed of several former industrial, commercial, and landfill properties. The City of Omaha has acquired properties where the Gallup Organization plans to build its headquarters and education campus facility. The National Park Service

. . . and the When?

Setting the Cleanup Timeframe

- Based on facility goals
  - Property sale/environmental restoration
  - Close-out of regulatory mechanism
  - Continued property use
- Timing affects technology selection
- Establishing milestones

Remedy Selection



- What: Meet risk-based groundwater criteria
- Where: Throughout the plume
- When: 2012
- ECs and ICs required

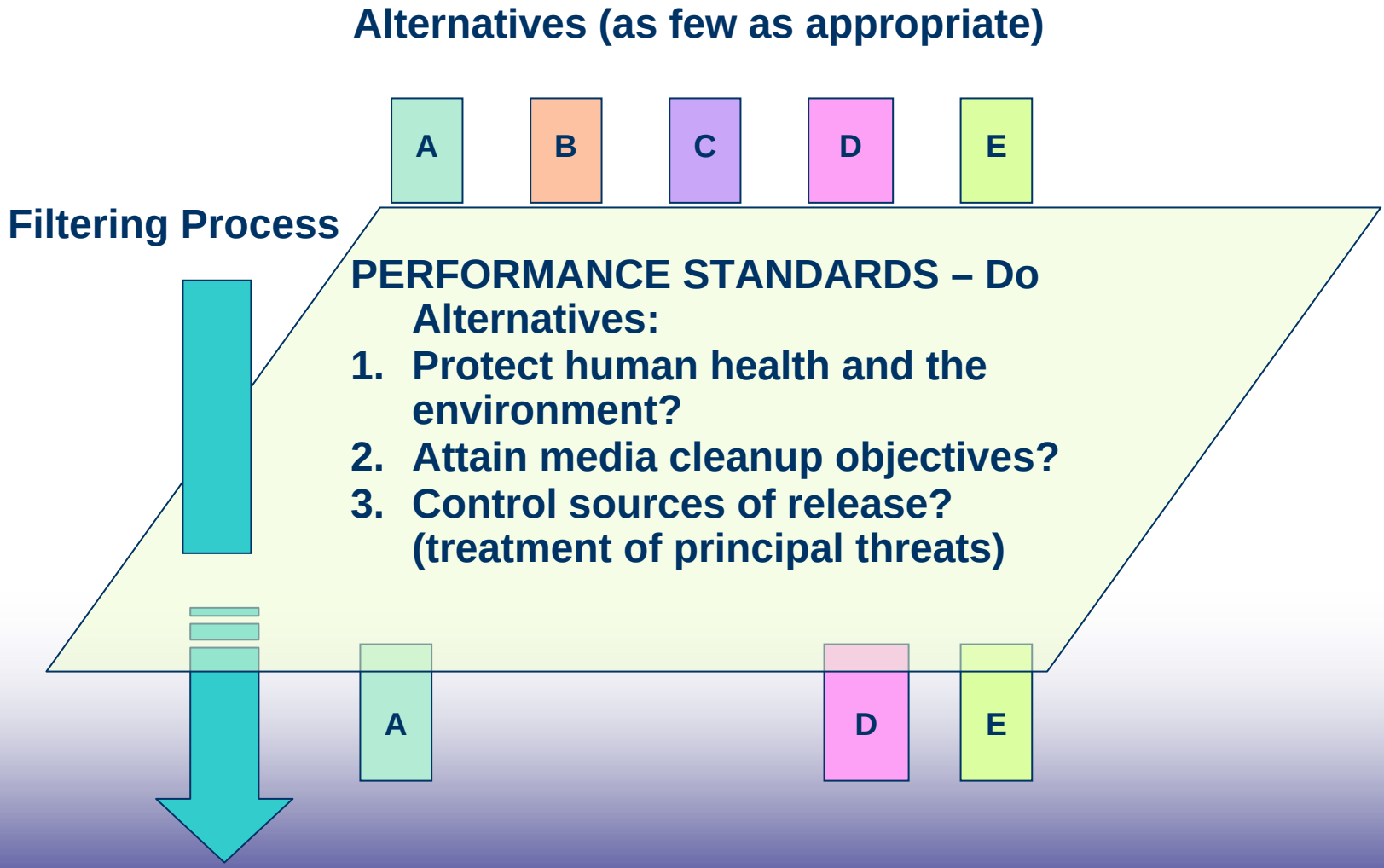
Evaluation Criteria: Selecting the Right Remedy

- Threshold criteria
- Balancing criteria

Expectations for Final Remedies at RCRA Corrective Action Facilities (Fact Sheet #2)

Final Remedy Selection for Results-based RCRA Corrective Action (Fact Sheet #3)

Threshold Criteria

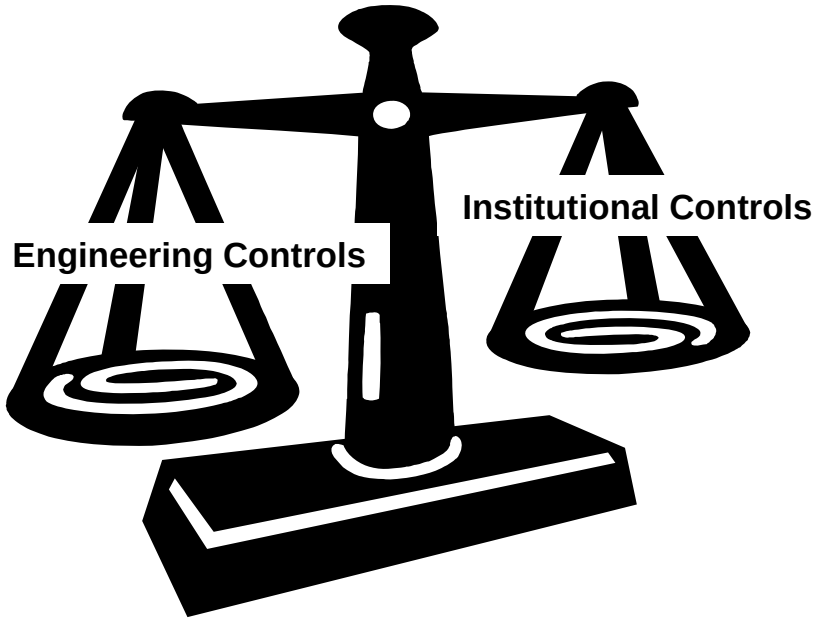


Balancing Criteria

- Long-term effectiveness
- Toxicity, mobility, or volume reduction
- Short-term effectiveness
- Implementability
- Cost
- Community acceptance
- State acceptance

Institutional Controls

- Legal or administrative instruments
- Minimize potential for exposure
- Limit land or resource use
- Examples:
  - Government controls
  - Enforcement tools
  - Proprietary ICs
  - Informational devices



REFERENCE

ICs: A Guide to Implementing, Monitoring, and Enforcing ICs at Superfund, Brownfields, Federal Facility, Underground Storage Tank and RCRA CA Cleanups. Draft. 2003. http://www.epa.gov/superfund/policy/ic/guide/index.htm

Guiding Principles for ICs

- Necessary when remedy does not provide for unlimited use and unrestricted exposure (UU/UE)
- Early planning required
- Ensure enforceable mechanisms
- Layering of ICs

Evaluating ICs

- Identify objectives
- Determine that enforceable mechanisms are available
- Determine long-term effectiveness
- Evaluate costs

Other Considerations in Remedy Selection

- Green Remediation
  - Maximize net environmental benefit of remediation
- Long-term Stewardship
  - Manage on-site waste and contaminated environmental media to protect HH&E
- Sustainability
  - Meeting the needs of the present w/o compromising the ability of future generations to meet their own needs

Documenting the Remedy Decision

- Facility documentation – letter report, CMS, or other
- Timely regulator review
- Regulatory documentation – Statement of Basis or equivalent
- Public participation – comments in response to public notice
- Final regulatory decision (CA 400 measure)

Field Considerations

- Health and Safety
- Nature of the Site

Health and Safety

- Off-site Issues
  - Community Impacts
  - Proximity of Neighbors
- On-site Issues
  - Worker Exposure
  - Employee Exposure

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Health and Safety

- Associated with the remedy:
  - Dust Control
  - Emissions
  - Dermal Contact
- Associated with site operations:
  - Physical hazards, traffic
  - Electrical and other utilities

Safety at Operating Facilities

Nature of the Site

- Location
- Status
- Accessibility
- Site conditions and contaminant distribution
- Waste management considerations

Location – Area Use

Industrial

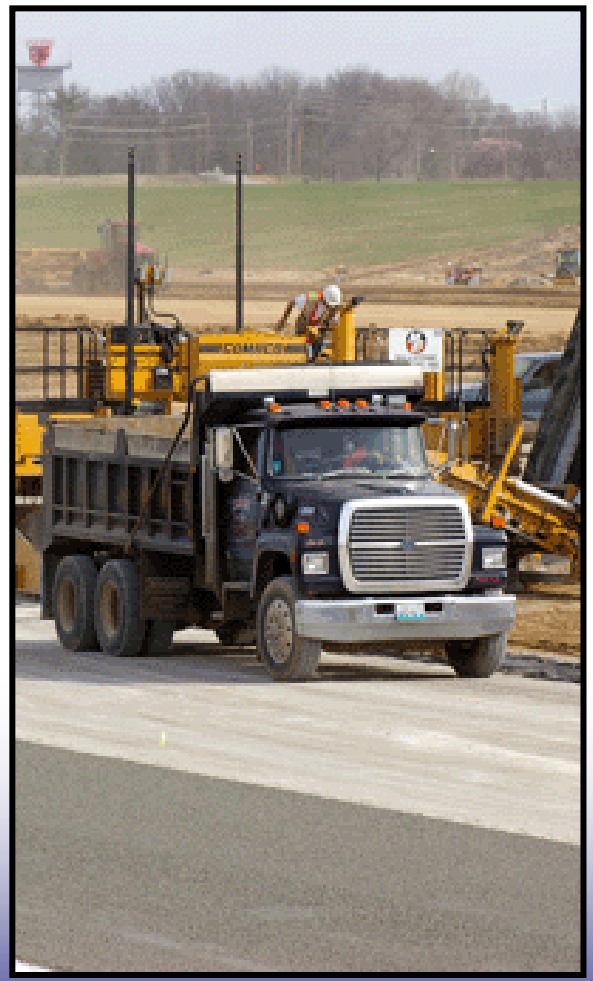
Suburban

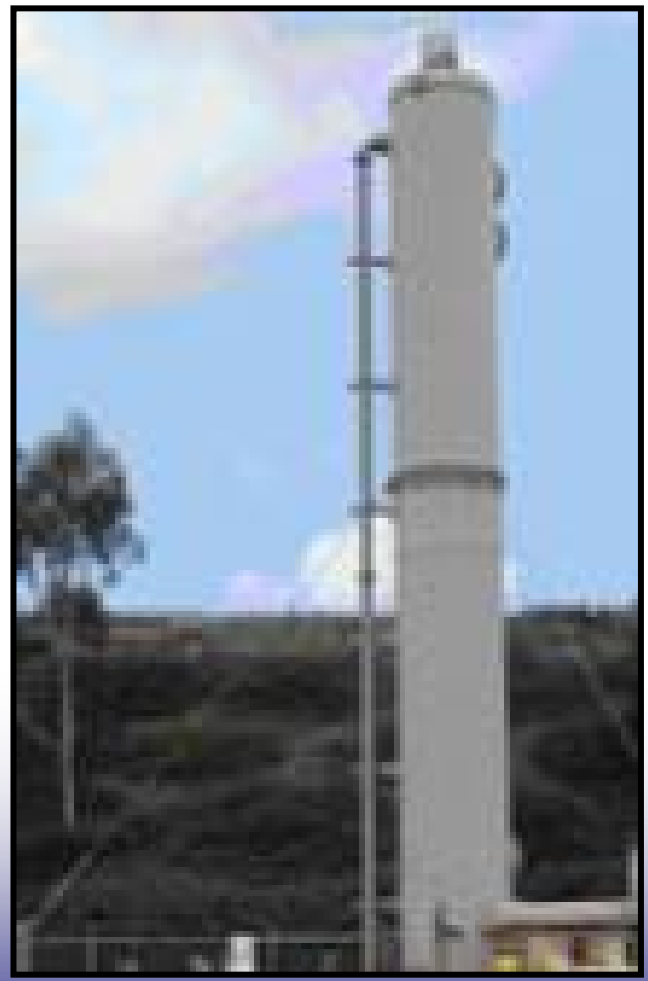
Commercial

Urban

Ecologically sensitive

Location – Noise and Air Quality





Location - Weather

- Extreme Cold / Heat
- Tropical Storms / Hurricanes
- Floods
- Rainy Season

Location - Weather

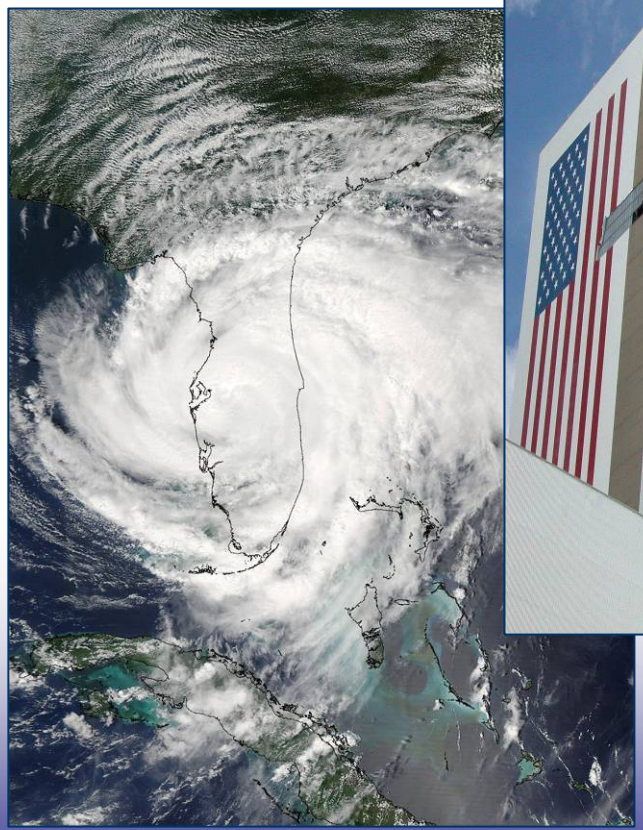
Hurricanes

140 MPH Design

CCF AST's Survived

2004 – Frances

108 MPH Gusts



Shuttle VAB
Damaged

Facility Status

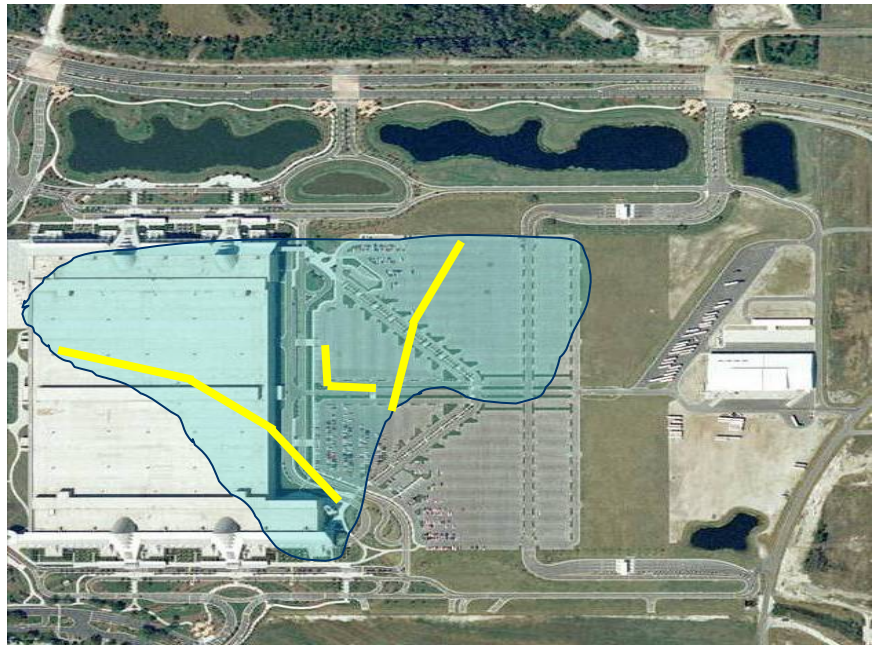
Active Versus Inactive Facilities

Bioremediation system at an operating facility, visible to plant personnel

Bioremediation system at an inactive facility, with restricted access

Facility Status

Avoiding Operational Interruptions



Facility Status

Site Security

Accessibility

Elevated piping for groundwater recovery

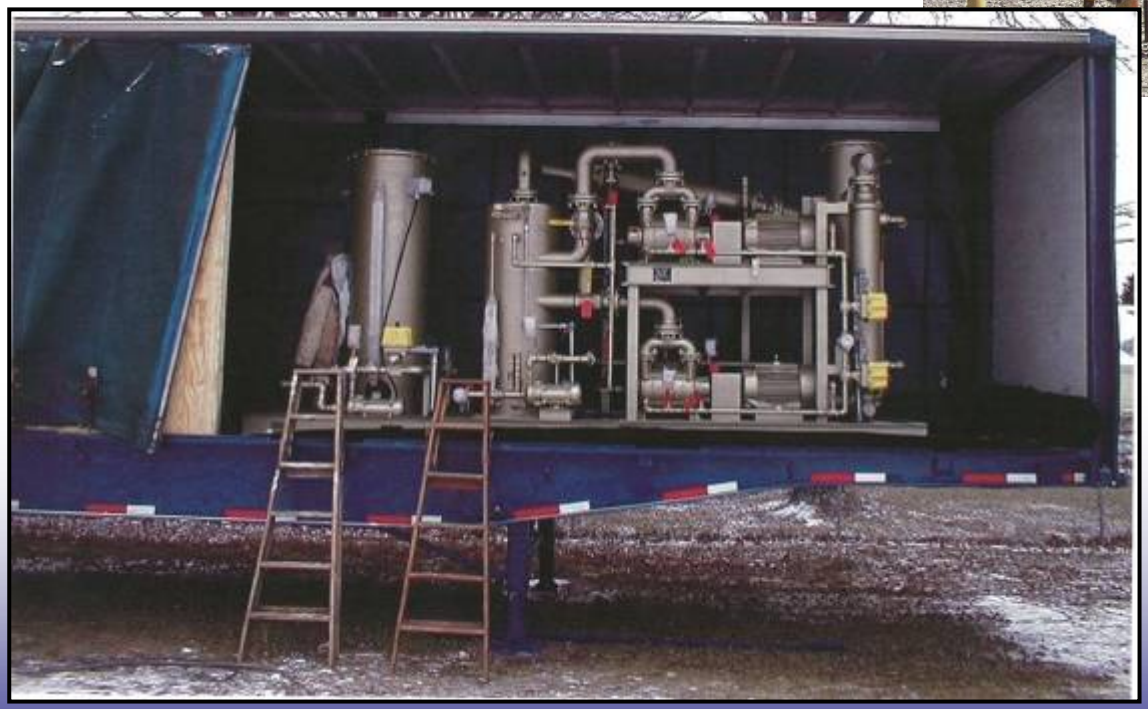
Compact, indoor controls

No accessibility issues for air sparge equipment

Accessibility - Right of Way / Ownership / Utilities

Accessibility – Facility Operations

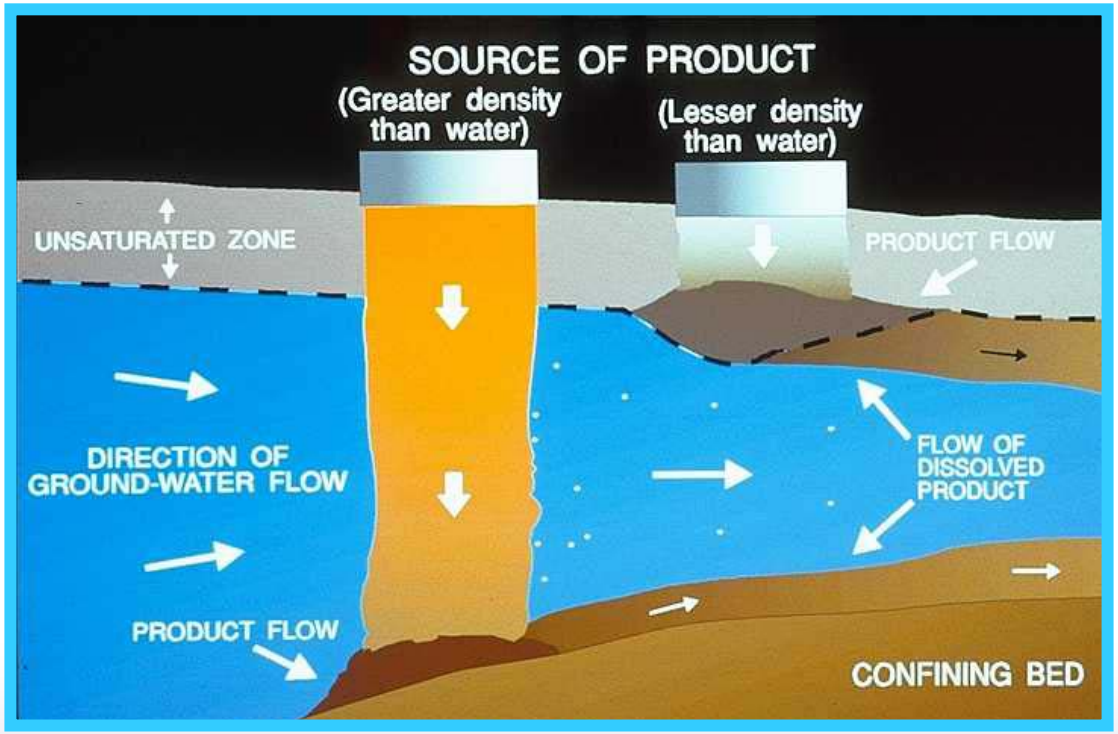
LPH recovery well



Multi-phase extraction trailer

Site Conditions and Contaminant Distribution

- Hydrogeology
- Release characteristics
- Natural groundwater chemistry
- Natural environment



Natural Groundwater Chemistry

Calcium scale

Biofouling

Iron fouling

Natural Environment

Pilot Studies

Bioaugmentation Unit

Air Sparge Unit

Waste Management

- Air Emissions
- Effluent Disposal
  - Where?
  - How?
- Remediation Waste Handling
  - storage
  - transport
  - testing

Waste Management

Selecting the Remedy: Remedy Matrix

Criteria	Pump and Treat	Air Sparge	Bio-remediation
Implementability	1 (effluent discharge)	3	2 (injection permit)
Cost (2 X Factor)	4	6	2
Effectiveness (3 X Factor)	3	6	9
Total	**8**	**15**	**13**

Green Remediation Evaluation

	ZVI-Clay In Situ Treatment	Excavation & Off-Site Disposal	Ex-Situ Thermal Desorption	Soil Vapor Extraction	Capping
Tons of CO_2 Equivalents	85	252	586	306	21

Adapted From: Deborah Goldblum (EPA). 2007. Integrating Sustainability into EPA's Cleanup programs. Region 3: RCRA Dupont Pilot. June 27.

Summary

- Remedy selection includes
  - Policy considerations
  - Field considerations
- The regulator's focus is on achieving a protective and effective remedy within a reasonable timeframe.