Feeling the Need for Speed: Using Triad to Tackle Brownfields

Cleanup Topic Area
Tuesday, October 28, 2003
10:45 AM – 12:15 PM
The Triad Approach

Systematic Project Planning

Managing Uncertainty

Dynamic Workplan Strategy

Real Time Measurement Technologies

Synthesizes practitioner experience, successes, and lessons-learned into an institutional framework.
Why Triad?

Emphasize time and savings, but increasing decision confidence (i.e., managing both sampling AND analytical uncertainty) is the key.
Why Triad?

• Planning emphasis:
  – Organizes understanding of what is known about a site and what you need to know better
  – Focuses assessment, investigation, monitoring, etc. activities on collecting the data needed to support decisions
  – Therefore, clarifies efforts to determine what data is telling you (data does not create more questions than answers)
  – Minimizes review steps (and time), minimizes debate over results and next steps, and minimizes need for multiple mobilizations to fill gaps in data
Why Triad?

• Saves time and money:
  – Affordably increase density in sampling needed to understand heterogeneity with rapid sampling and field analytics
  – Reduce need for multiple mobilizations by employing a dynamic work strategy approach
  – Reduce review steps (fewer mobilizations, fewer reports)
  – Reduce review time (know what you are looking for in resulting data, collecting only data you need)
  – Reduce future analytical costs (collecting data to support future steps vs. redoing sampling at every step)
Why Triad?

• Saves time and money (continued):
  – Reduce cleanup costs, time (more certainty on where contamination is reduces treatment and/or disposal costs)
  – Reduce unknowns, i.e., lessens likelihood of “we weren’t expecting to see this” or the “Uh-oh!!!’s”

• Where savings felt
  – Assessment
  – Cleanup
  – Development
  – Transaction support (insurance, finance)
Connecting the Triad and Brownfields

A Marriage of Necessity

• Focus on time, money but need defensible decisions

• “Land Revitalization” focus of waste programs
  – Focus on reuse goals: site end-use creates discipline for systematic planning
  – Less segmented, compartmentalized approaches.
  – Continually building on data (old and new) is the key to affecting total costs
  – Flexibility
Connecting the Triad and Brownfields
A Marriage of Necessity

- Shifting site universe
  - As move from “low hanging fruit” to less straightforward sites, need for innovation increases
  - Rural, poorer communities may not have as much money to leverage: maximize assistance funds
Panelists

Nick DeRose, Langan Associates
Robert Howe, Tetra Tech EM, Inc.
Mark Johnson, California Regional Water Quality Control Board
Kira Lynch, U.S. Army Corps of Engineers
Judith Shaw, New Jersey Department of Environmental Protection
TRIAD – A FORMULA FOR LEVERAGING BROWNFIELDS INVESTIGATIONS

November 5, 2003

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THE THREE LEGS OF TRIAD

SYSTEMATIC PLANNING

DYNAMIC WORK PLANS

REAL TIME ANALYSIS

Triad
APPLYING TRIAD TO LEVERAGE BROWNFIELDS INVESTIGATIONS

• It’s the Process!
  – **Systematic Planning** to determine investigation objectives that will establish remediation requirements consistent with planned site re-use (Apply PA, CSM and Re-use Plan)
  
  – **Dynamic Workplan** identifies reasonable assumptions and documents Decision Rules to align field effort with Systematic Planning Objectives
  
  – **Field Analytical Methods** using experienced field personnel (Select Screening vs. Delineation vs. Confirmation)
CASE STUDY - APPLYING TRIAD TO ASSUNPINK GREENWAY

• The goal of the Assunpink Creek Greenway Project is to redevelop several Brownfield Properties into a recreation area and greenway.

• The City of Trenton entered a Memorandum of Agreement with the NJDEP to include four sites into the Voluntary Cleanup Program:
  – Crescent Wire Site
  – Massaro Property
  – Hollywood Auto
  – Former Freight Yard
ASSUNPINK CREEK PARK - CURRENT CONDITIONS
ASSUNPINK CREEK PARK - CONCEPTUAL MASTER PLAN

Conceptual Master Plan

ASSUNPINK CREEK PARK
Trenton, New Jersey
Prepared for: Department of Recreation and Cultural Affairs, City of Trenton
Crescent Wire Site

Freight Yards Site

CRESCENT WIRE – Preliminary Assessment
Perceptions, Uncertainty, Areas of Concern

PCB/Oil Impacts
Conceptual Site Model
  • PCB/ Petroleum Hydrocarbon Smear Zone with unknown source

Objectives for Investigation / Decision Rules
  • Determine source location and approximate extent of impacts through screening soil samples
  • Assess potential impacts to ground water through screening
  • Characterize Levels of COCs relative to NJ Soil Cleanup Criteria through screening
  • Verify clean zones through limited conformational samples run at off-site certified laboratory
Results

- Mapped extent of PCB/Petroleum Hydrocarbon smear zone
- Delineated impacts extending downgradient to Assunpink Creek
- Determined on-site impacts due to a suspected off-site upgradient source
RAIL YARD AREA OF FREIGHT YARD – LEVERAGING TRIAD

Conceptual Site Model
  • Site wide impacts and hot spot areas within historic fill overlying native soils and shallow ground water

Objectives for Investigation / Decision Rules
  • Determine extent of historic fill through screening and non-standard analytical methods

  • Characterize existing hot spots using screening and non-standard analytical methods

  • Screen for potential unidentified hot spots within historic fill using screening techniques

  • Assess potential impacts to ground water using soil results

  • Verify clean zones through limited conformational samples run at off-site certified laboratory
Triad Approach used to characterize site wide impacts and hot spot areas, determine if soil contamination had impacted groundwater quality.

Results

- Characterized site wide extent of “historic fill”
- Delineated petroleum “hot spots”
- Identified previously unknown hot spots, including a significant area with surface soil PCB impacts above the TSCA regulated waste criteria
- Characterized potential impacts to groundwater
CONCLUSIONS: GENERAL BENEFITS OF USING THE TRIAD APPROACH

• Accelerates investigation process
  – Reduces number of sampling events/investigative phases

• Improves quality of site characterization process
  – Greater sampling density, less risk of not finding an environmental condition

• Supports generation of accurate cleanup costs
CONCLUSION: TRIAD VS. TRADITIONAL INVESTIGATION

- **Understanding of Site Conditions**
- **Critical Knowledge Level Needed to Begin Effective Remediation**
- **Time (years)**

- **Preliminary Assessment**
- **Site Characterization**
- **Triad Investigation**
- **Traditional Investigation**
- **Remedial Investigation (Multiple Phases)**

Diagram showing the timeline and stages of site investigation with comparison between Triad and Traditional methods.
CONCLUSIONS: PROJECT-SPECIFIC BENEFITS FROM APPLYING TRIAD

- Limited “hot spot” removal
- Integration of site wide engineering controls into redevelopment
  - Protection of Assunpink Creek from Petroleum Hydrocarbons at the Crescent Wire Site
- Reduced liability by identifying potential off-site impacts
East Palo Alto Brownfields Site Pesticide Investigation using the Triad Approach

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Project Team

• City of East Palo Alto
• Water Board, Region 2
• US EPA
• ICES (Environmental Consulting)
• US COE
• San Mateo County Environmental Office
• Strategic Diagnostics Inc. (SDI)
The Sites

• Four former agricultural properties scheduled for residential redevelopement:
  – 791/805 Runnymede St. – 1.38 acres
  – 855 Runnymede St. – 0.52 acres
  – 872 Runnymede St. – 0.84 acres
  – 875 O’Conner St. – 0.87 acres

• DDT and cyclodiienes are the potential contaminants.
Goals

• City of East Palo Alto.
  – improve estimates of contaminated soil.
  – cost effectively increase sample density.
  – facilitate redevelopment.

• Regional Water Board.
  – ensure that mixing areas are found.
  – protect groundwater.
  – improve overall characterization.
Desired Outcome

• Achieve residential development.
  – 7000 ft\(^2\) average lot size.
• Protect human health and environment.
  – on-site management.
  – dig and haul to regulated disposal facility.
• Build trust with community.
• Minimize remediation cost to facilitate redevelopment.
Decisions

• Decisions for this project include:
  – Are hot spots (mixing areas) present?
  – Are pesticide application residues present?
  – What are the boundaries of the contamination?
  – What is the volume of soil exceeding action levels?
Initial Planning

• How did we get started?
  – Systematic Project Planning Memo.
  – multiple project team meetings and telephone conferences.
  – established goals, work strategy, decision logic, action levels.
  – began preparing the Conceptual Site Model.
Coordination

- Rights of entry for the properties.
- Coordinate access for sampling.
- Fixed-laboratory analysis.
- Field test kits.
- GPS surveying.
- Central location for field analysis.
Conceptual Site Model (CSM)

- Organochlorine pesticides and metals.
- Two distinct release mechanisms – mixing areas and direct application/airborne drift.
- Soil contamination main concern:
  - resistant to degradation.
  - low water solubility and vapor pressure.
  - high affinity to sorb to soil/relatively immobile.
Conceptual Site Model (CSM)

- Average lot size 0.9 acre.
- Residential building constructed between 1916 and 1956.
- Depth of tilling ranged from 18 to 24 inches.
- 1-1.5 foot fill layer present on one property.
- Main exposure pathway inhalation of contaminated soil.
Dynamic Work Strategy

- Set decision unit (sampling design boundary) using knowledge regarding future land use and potential lot size.
- Identified collaborative analytical approach which utilizes immunoassay, GC, and ICP analyses.
- Sample grid designed to identify a 50-foot hot spot.
- On site decision analysis for defining horizontal and vertical extent of soil contamination developed.
  - sample support influence by contaminant release mechanism and limitations of excavation equipment.
Decision Logic

• Concept – determine if pesticide hotspots or application residue are present.
• Hotspots represent mixing areas - defined as DDT > 10 ppm and cyclodienes > 2 ppm.
• Initial grid designed to find 50-foot hot spots.
Implementation

- **Field activities**
  - Coordinate with homeowners/tenants.
  - Establish and survey sample locations.
  - Collect samples at multiple depths, archive all but uppermost.
  - Establish field analysis office, begin analysis.
  - Evaluate results of field analysis.
Near Realtime Decisions

• Evaluating field data
  – no detection
    • no further sampling at this location
  – detection but less than “hot spot”
    • characterize vertical extent
  – find hot spot
    • characterize horizontal and vertical extent
Next Steps

• Sites with contamination < action levels – proceed with redevelopment
• Sites with area wide pesticide residues > action levels – consider on site management as a part of redevelopment.
• Sites with hot spots – implement “dig and haul” remedial solution prior to redevelopment.
Summary

• Stay focused on ultimate goal.
• Develop and use a conceptual site model.
• Use a multi-disciplinary team.
• Evaluate potential causes for making decision errors; identify and manage uncertainty.
• Plan to encounter and resolve site uncertainty during field work.
• Develop site specific QC protocol.
• No field work until consensus that planning is complete and acceptable.