Welcome to the CLU-IN Internet Seminar

NARPM Presents...Practical Applications and Methods of Optimization across the Superfund Pipeline (Part 1)

Sponsored by: EPA Office of Superfund Remediation and Technology Innovation

Delivered: April 30, 2013, 1:00 PM - 3:00 PM, EDT (17:00-19:00 GMT)

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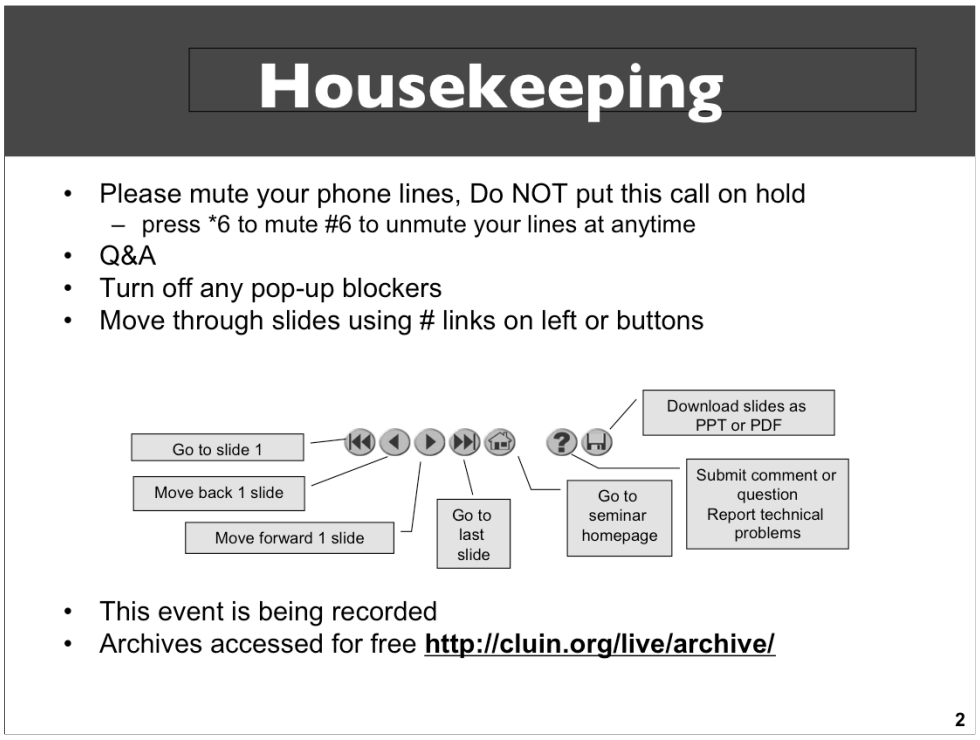
Visit the Clean Up Information Network online at www.cluin.org



Although I'm sure that some of you have these rules memorized from previous CLU-IN events, let's run through them quickly for our new participants.

Please mute your phone lines during the seminar to minimize disruption and background noise. If you do not have a mute button, press *6 to mute #6 to unmute your lines at anytime. Also, please do NOT put this call on hold as this may bring delightful, but unwanted background music over the lines and interupt the seminar.

You should note that throughout the seminar, we will ask for your feedback. You do not need to wait for Q&A breaks to ask questions or provide comments. To submit comments/questions and report technical problems, please use the ? Icon at the top of your screen. You can move forward/backward in the slides by using the single arrow buttons (left moves back 1 slide, right moves advances 1 slide). The double arrowed buttons will take you to 1st and last slides respectively. You may also advance to any slide using the numbered links that appear on the left side of your screen. The button with a house icon will take you back to main seminar page which displays our agenda, speaker information, links to the slides and additional resources. Lastly, the button with a computer disc can be used to download and save today's presentation materials.

With that, please move to slide 3.

Practical Applications and Methods of Optimization Across the Superfund Pipeline

United States Environmental Protection Agency

NARPM Presents... April 30, 2013

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Session Agenda

- Part 1 of 2 – Optimization Overview (4/30/13)
  - National Optimization Strategy
  - Optimization Evaluation Process
  - Optimization in Superfund Pipeline Stages
- Part 2 of 2 - Optimization Case Studies (5/8/13)
  - Black Butte Mine, CA
  - Grants Solvents, NM
  - Gilt Edge Mine, SD

Instructors

- Kirby Biggs, EPA TIFSD
- Steve Dyment, EPA TIFSD
- Doug Sutton, Tetra Tech
- Mindy Vanderford, GSI Environmental, Inc.

National Optimization Strategy and Optimization Evaluation Process

Kirby Biggs
EPA Technology Innovation and Field Services Division

Introduction

- Optimization not new; active effort 13+ years with over 140 reviews conducted
- OSWER management directive to expand optimization efforts and integrate into Program activities from RI to site completion
- Strategy finalized 9/28/12
- Now in implementation
- Action 10 of Integrated Cleanup Initiative (ICI)

Working Definition of "Optimization"

Systematic site review by a team of independent technical experts, at any phase of a cleanup process, to identify opportunities to improve remedy protectiveness, effectiveness and cost efficiency, and to facilitate progress toward site completion.

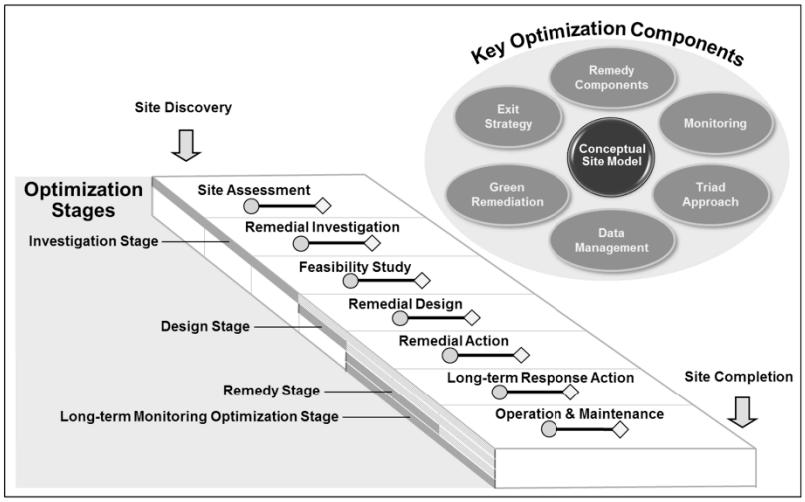
National Strategy Discusses Optimization

"Efforts at any phase of the removal or remedial response to identify and implement actions that improve the action's effectiveness and cost-efficiency. Such actions may also improve the remedy's protectiveness and long-term implementation which may facilitate progress towards site completion. To identify these opportunities, regions may use a systematic site review by a team of independent technical experts, apply techniques or principles from Green Remediation or Triad, or apply some other approach to identify opportunities for greater efficiency and effectiveness. Contractors, states, tribes, the public, and PRPs are also encouraged to put forth opportunities for the Agency to consider."

Unifying Methods Under "Optimization"

- National Strategy unifies historically freestanding optimization methods
  - Triad / IDR / RSE / LTMO / Green Remediation
- Rationale –
  - Eliminate redundant activities common to methods
  - Remove technical barriers between methods to ensure projects benefit from best-fit approaches
  - Leverage all best management practices
  - Simplify process and improve support to Regions
  - Increase access to technical resources
  - Enhance capabilities and conducting technical transfer

From Discovery to Completion



Broad Applicability of Optimization

Types of Sites	Types of Remedies Evaluated
• Wood treating • Industrial facility • Landfills • Dry cleaners • Mine	• P&T systems • AS/ SVE • Groundwater recirculation wells • NAPL recovery • Biosparging • *In situ* thermal remediation • *In situ* chemical oxidation • *In situ* bioremediation • Monitored natural attenuation • Sediment capping • Barrier walls • Constructed wetlands • Landfill gas collection • Surface water diversion/collection/treatment

Optimization can be applied to all site types and all remedy types

National Optimization Strategy

- Expands optimization to more Superfund remedial sites (20 to 30 sites per year)
- Expands effort to RI/FS and RD where appropriate
- Uses the optimization tools, BMPs, lessons learned, & expertise of OSRTI, Regions and other stakeholders
- Leverages Regional and OSRTI resources
- Develops Regional optimization programs/expertise
- Tracks optimization results for all sites

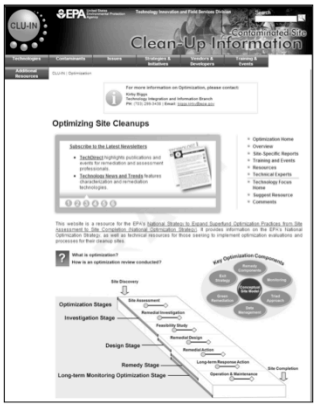
"National Strategy to Expand Superfund Optimization from Remedial Investigation to Site Completion"

- Strategy signed 9/28/12, distributed 10/2012
- Comprised of four elements
  - Planning and Outreach
  - Integration and Training
  - Implementation
  - Measurement and Reporting
- Developed by nationwide Workgroup
  - Led by Superfund HQ
  - Includes key Superfund HQ groups & Regional members
  - Reports to Leadership Steering Committee
- Posted on CLU-IN and EPA websites

Completed and Ongoing Implementation Activities

- Finalized Strategy
- Supported optimization at 32 sites during FY12
- Currently supporting optimization at 34 sites
- Tracking and reporting completed sites
  - Ground Water Remedy Optimization Progress Report: 2010 - 2011 (July 2012)
- Incorporating optimization into contracts and guidance as appropriate
- Developing training program
- Mining sites initiative

EPA Optimization Websites



www.cluin.org/optimization

www.epa.gov/superfund/cleanup/postconstruction/optimize.htm

National Optimization Strategy and Performing an Optimization Evaluation

Kirby Biggs
EPA Technology Innovation and Field Services Division

National Optimization Strategy

How to request an optimization study for your site

- Site Identification and selection
- How to initiate the optimization evaluation process
  - **RPM calls HQ contacts (Kirby Biggs)**
  - **By regional management**
  - **State requests (through Region)**
- Internal EPA Optimization Standard Operating Procedure

EPA Headquarters Optimization Leads

The following EPA Headquarter Optimization Leads can be contacted directly in regards to optimization review questions and support.

◆Kirby Biggs	biggs.kirby@epa.gov
◆Steve Dyment	dyment.stephen@epa.gov
◆Jenn Edwards	edwards.jennifer@epa.gov
◆Ed Gilbert	gilbert.edward@epa.gov
◆Tom Kady	kady.thomas@epa.gov
◆Chip Love	love.chip@epa.gov
◆Shahid Mahmud	mahmud.shahid@epa.gov (mining)
◆Gary Newhart	newhart.gary@epa.gov

EPA Regional Optimization Liaisons

The following EPA Regional Optimization Liaisons can be contacted directly in regards to optimization review questions and support.

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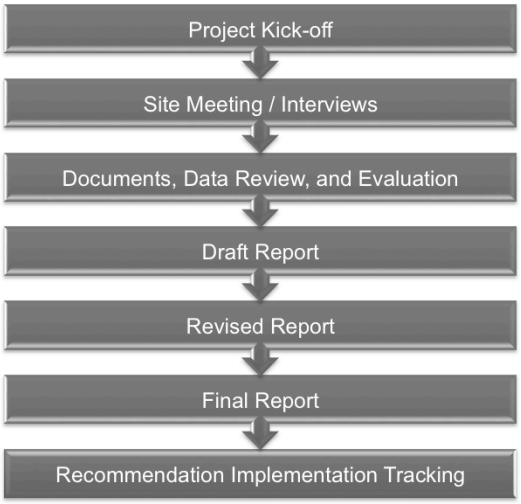
Optimization in Superfund Pipeline Stages

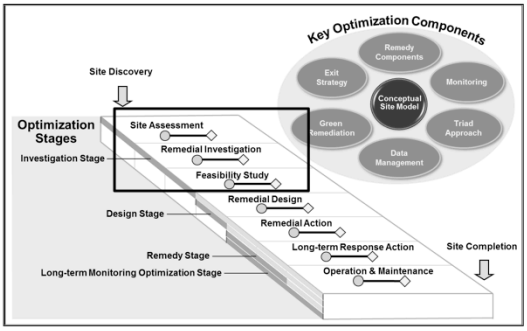
Optimization Evaluation Process



OPTIMIZATION DURING THE INVESTIGATION STAGE

Steve Dyment
EPA Technology Innovation and Field Services Division

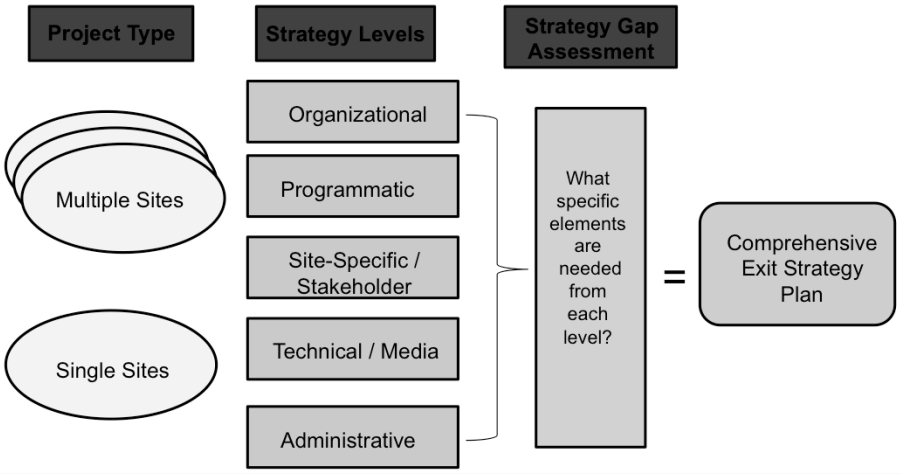
Any part of the remedial process before the remedy is selected but also appropriate for any remedy that is revisiting investigation and the CSM.



What is Reviewed

- Historical information and data
  - Geology / hydrogeology / chemistry / operations
  - Data quality / usability / net information value
  - 3-D visualization and analysis
- CSM status / alignment with project life cycle needs
  - Plume delineation; plume core & migration pathways
  - Source identification
- Technologies previously applied / may apply in future
  - Analytical, sampling and measurement tools
- Key stakeholder needs
- Exit strategy considerations

Comprehensive Exit Strategy Design



Frequent Review Findings

- Data
  - Numerous prior data collection efforts
  - Low data density = high spatial uncertainty
  - Existing data not fully leveraged
  - Non-existent or inadequate CSM
- Strategy & Technologies
  - Static vs. dynamic work strategies (DWS)
  - High cost, conventional methods
  - Scale of measurement ≠ heterogeneity
- Decision ability
  - End data users not adequately considered

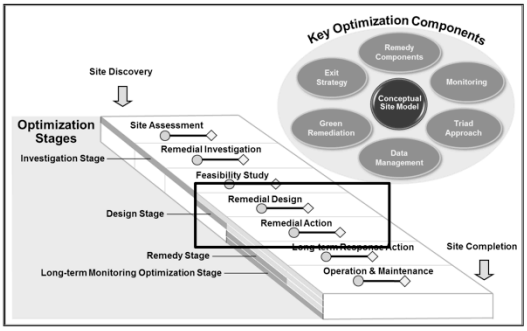
Frequent Optimization Recommendations

- Systematic project planning & best practices
- Improve / develop CSM using existing data
- Design investigations based on CSM data gaps
- Use high-resolution site characterization (HRSC) methods and real-time technologies
  - Perform demonstrations of methods applicability (DMA) as needed
- Dynamic work strategies for field efforts
- Sequence field efforts to maximize information and resources
- Plan for and collect collaborative data to support risk assessment, remedy selection and design
- Use 3-D visualization and analysis
  - Analyze site data
  - Communicate and maintain consensus with stakeholders
- Reduce environmental footprint of investigation efforts

OPTIMIZATION DURING THE DESIGN AND REMEDY STAGES

Doug Sutton
Tetra Tech

The period from when the remedy is selected through construction and initial implementation of the remedy.



Why?

- Concerns regarding protectiveness or cost
- Concerns regarding current CSM
- Innovative remedial approach
- Differences in opinion among members of site team
- Concerns or uncertainty regarding key conclusions or findings from site consultant
- Unexpected monitoring results

What is Frequently Reviewed

- Remedial Investigation and Feasibility Study Reports
- Decision documents
- Design submittals (including tech memos)
- Pilot test results
- Work plans for future work
- Implementation reports (such as construction, start-up, performance monitoring)
- And many other potential documents as appropriate

Frequent Review Findings

- Confirmation of work done to date
- Incomplete Conceptual Site Model
- Inconsistencies in groundwater modeling
- Overly generous cost estimates
- Valuable information gained in conducting remedy in phases
- Explanations for unexpected results during start-up or remedy implementation

Frequent Review Findings

- Alternative approaches or technologies are available for implementing selected remedy
  - Example 1 – Carefully designed permanent injection wells instead of direct-push injections
  - Example 2 – Pre-fabricated system instead of on-site building
  - Example 3 – Treatment and reinjection instead of discharge to POTW
  - Example 4 – Use of extracted groundwater instead of potable water for reagent blending, injection, and circulation

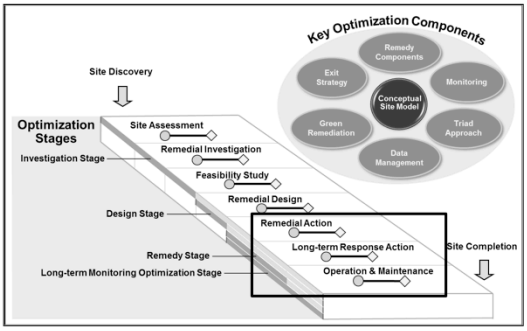
Frequent Optimization Recommendations

- Refinements to CSM through additional monitoring or testing
- Suggestions for improving numerical model
- Suggestions for reducing/streamlining costs and cost estimates
- Phase remedial components so later components benefit from results of earlier phases
- Consider specific alternative approaches or technologies

OPTIMIZATION DURING THE LONG-TERM REMEDIAL ACTION AND O&M STAGES

Mindy Vanderford
GSI Environmental, Inc.

The ten year period between the operational and functional (O&F) determination and the start of operations and maintenance (O&M) is defined as a long-term response action, or LTRA.



Why?

- Remedy not achieving goals in time-frame
- Cost issues
- Questions of long-term protectiveness
- Property re-development or transfer to state – expedited time frame
- Energy, efficiency and effort
- Exit strategies

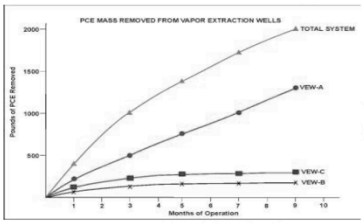
Goal: Improve Protectiveness, Efficiency (cost, carbon, effort) and Time to completion.

What is Frequently Reviewed

- CSM – all of it
  - Original CSM at time of design
  - Changes to CSM since design
- Remedies
  - Remedial Objectives
  - Original Remedial Design
  - Identify Performance Criteria
  - Performance data -- *Correlate treatment performance with cost*

What is Frequently Reviewed

- Changes in COC concentrations
- Rate of mass removal
- Effluent discharge
- Evaluate costs/ effort/carbon/
- Containment
- Monitoring network



What is Frequently Reviewed

- In Place Remedies…for example:
  - Pump and Treat
  - Soil Vapor Extraction
  - Monitored Natural Attenuation
  - *In Situ* Bioremediation
  - *In Situ* Oxidation
  - Caps, slurry walls, reactive barriers
  - Thermal desorption

What is Frequently Reviewed

- Extraction and monitoring well locations
- Amendment injection amount/location
- Groundwater extraction performance
- Re-injection, release, reuse
- Air stripping – GAC – Ion Exchange
- Chemical feed and storage
- Metals mobilization or precipitation
- Conditions since end of active remedy

Frequent Review Findings

- Improve CSM
  - Sources
  - Low and high permeability zones
  - NAPL
- Data management
  - Tracking and reporting performance
  - Spatial data
  - Historic data (paper → electronic)

Frequent Optimization Recommendations

- Remedy system components
  - Operational improvements
  - Update current system
  - Monitoring optimization (LTMO)
- Change Remedy Strategy
  - P&T to MNA
- Exit strategy
  - How close are we to cleanup?
  - What data do we need to show attainment?

Federal and State Links to Optimization Resources

- EPA's Remedy Optimization
  - www.epa.gov/superfund/cleanup/postconstruction/optimize.htm
- CLU-IN Optimization
  - www.cluin.org/optimization
- U.S. Army Corps of Engineers
  - www.environmental.usace.army.mil/rse_checklist.htm
- U.S. Army Environmental Command
  - www.aec.army.mil/usaec/cleanup
- U.S. Air Force Center for Engineering and the Environment
  - www.afcee.af.mil/resources/restoration/rpo/index.asp
- U.S. Naval Facilities Engineering Command
  - www.ert2.org/T2Opt/
- Federal Remediation Technologies Roundtable
  - www.frtr.gov/optimization/
- Interstate Technology Regulatory Council
  - www.itrcweb.org/teampublic_RPO.asp

Question and Answer Session

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