Ground Water Remediation Optimization: Benefits and Approaches

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Presentation Overview

- Introduction to New EPA Fact Sheet on Optimization of Ground Water Remediation
- Benefits of Optimization
- What Sites Might Benefit from Optimization
- Holistic Optimization Approaches
- Common Themes
- Detailed Optimization Activities
- Summary
New EPA Fact Sheet on Optimization of Ground Water Remediation

- **Focus:** Holistic Approach to Optimization
- **Purpose:** A Guide to Project Managers
  - Publicize and Promote Optimization Opportunities
  - Related to Other Fact Sheets
- **Form:** Short (~18 Pages), Informational Overview
- **Status:** Final Revisions in Progress
- **Future:** Available via Web at FRTR.gov/optimization and cluin.org/optimization
Benefits of Optimization

- “Market” Potential for Optimization is Large
  - Federal and Private Sectors
  - EPA Annual O&M Costs >$50M for Fund-Lead Projects
  - DOD Will Spend >$1B in O&M over Decades
  - Even Reductions in Time/Costs of 20% is Large Sum
  - Funds Available for other Uses in Society

- Improvement in Performance
  - Evaluation of Performance Assures Effectiveness
  - Shorter Time to Close-Out
What Sites Might Benefit from Optimization?

- Projects with High Operating Costs (>$100,000/Year)
  - Long Expected Durations
  - Large Number of Extraction Wells
  - Large Flow Rates
  - Complex Treatment Processes
  - Large Monitoring Networks (>25 Wells)
What Sites Might Benefit from Optimization?

- Systems with Performance Issues
  - Significant System Down-time
  - Questions Regarding Plume Capture, Remediation Progress
- Projects Due for Periodic Evaluation (5-Year Review) or Long Time Since Last Optimization
- See Screening Process Used for EPA Fund-Lead Sites: EPA-542-R-01-020
Data to Support Optimization

- Data to Be Collected by Operators
  - Well Flow Rates – For Each Injection and Extraction Well,
  - Water Levels (or Pressures) at Each Well for Specific Capacity
  - Contaminant Concentrations – at Each Extraction Well
  - Piezometric Levels – Points Inside and Outside of Plume
  - Well and Treatment System Run Times
  - Rehabilitation, Maintenance, and Repair Records
  - System Flow Rates, Influent, Effluent, Concentrations, Intermediate Concentrations Between Treatment Components

![Graph showing Total Dissolved Chromium](image-url)
Data to Support Optimization

- Data to Be Collected by Owner/Operators
  - Costs for Materials, Labor, Utilities, Waste/Effluent Disposal
  - Conceptual Site Model
Holistic Optimization Approaches

- Remediation System Evaluation (RSE) Process
  - Developed by USACE HTRW CX
  - Used by EPA at >30 Sites

- Remedial Process Optimization – Air Force

- Navy – Optimization of Remedial Action Operation

- Private Sector – Many

- EPA Fact Sheet Discusses These
Common Themes

- Periodic Review of System Performance Required
  - Conditions Change, Technologies Change, Should Revisit System to Assess Implementation and Current Conditions

- Independent Review by Experts
  - Not Previously Involved in Project
  - Experienced Optimization Team Members
  - Professional, Constructive, and Tactful Conduct

- Optimization Considers Both Performance / Effectiveness and Potential Cost Efficiencies - Balance
Common Themes, Continued

- Process Should
  - Assure Clear and Achievable Goals, Including Decision Logic for Making Interim Decisions (e.g., Changes in System, Monitoring, Treatment, etc.)
  - Include Way to Evaluate Progress toward Meeting Goals

- Encouraging Optimization and Tracking Implementation Progress of Recommendations
Follow-on Optimization Activities

- Detailed Engineering
  - Pilot / Bench Testing to Optimize Processes or Test Replacement Techniques
  - Detailed Design
- Re-evaluate Risk, Assure Appropriate Clean-up Goals
- Modeling Optimization
  - Minimize Cost or Time Subject to Constraints
  - Flow – Capture Optimization
  - Flow and Transport Optimization – Cleanup Optimization
- Long-Term Monitoring Optimization
  - Frequency, Network
  - Analytical and Sampling Methods
Summary

- Much to Gain from Optimization
- Expensive, Complex, Problem Sites Benefit Most, but Other Sites Can Benefit as Well
- Require Contractor to Collect Necessary Data
- Various Methods to Perform Holistic Optimization, but These Have Commonalities
  - Periodic, Independent Expert Review
  - Tactful Approach Required
  - Consider Both Performance and Cost
  - Evaluate Path Forward / Exit Strategy
  - Mechanism to Track Optimization Recommendations and Implementation
- Follow-On Activities Include Detailed Engineering, Ground Water Modeling, LTM Optimization