# Ground Water Remediation Optimization: Benefits and Approaches

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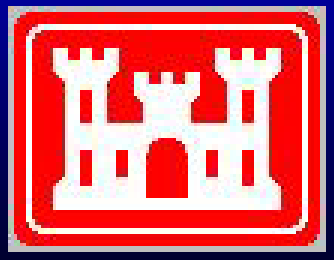
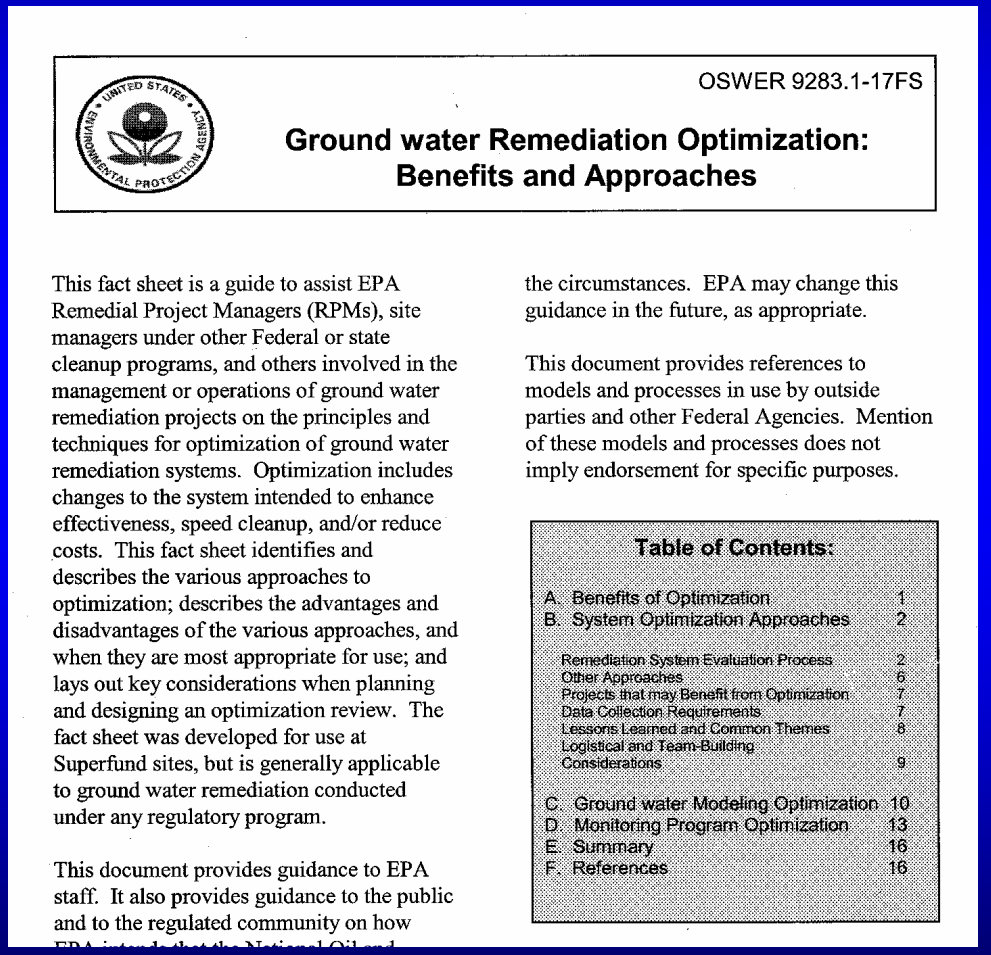


# Presentation Overview

- 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



OSWER 9283.1-17FS

**Ground water Remediation Optimization: Benefits and Approaches**

This fact sheet is a guide to assist EPA Remedial Project Managers (RPMs), site managers under other Federal or state cleanup programs, and others involved in the management or operations of ground water remediation projects on the principles and techniques for optimization of ground water remediation systems. Optimization includes changes to the system intended to enhance effectiveness, speed cleanup, and/or reduce costs. This fact sheet identifies and describes the various approaches to optimization; describes the advantages and disadvantages of the various approaches, and when they are most appropriate for use; and lays out key considerations when planning and designing an optimization review. The fact sheet was developed for use at Superfund sites, but is generally applicable to ground water remediation conducted under any regulatory program.

This document provides guidance to EPA staff. It also provides guidance to the public and to the regulated community on how

the circumstances. EPA may change this guidance in the future, as appropriate.

This document provides references to models and processes in use by outside parties and other Federal Agencies. Mention of these models and processes does not imply endorsement for specific purposes.

**Table of Contents:**

# 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?

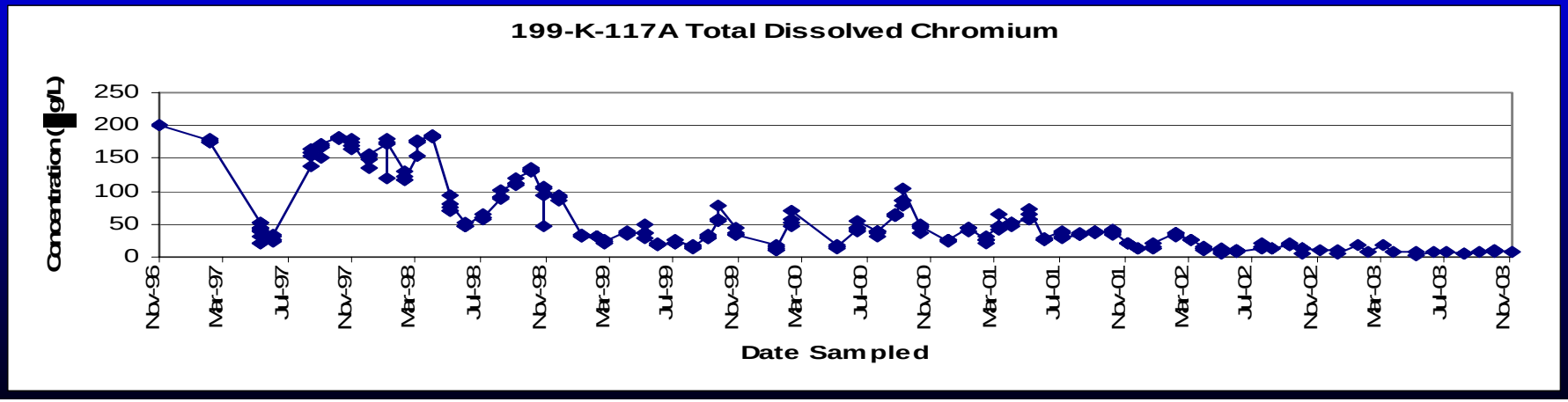
- Projects with High Operating Costs (>$100,000/Year)
  - Long Expected Durations
  - Large Number of Extraction Wells
  - Large Flow Rates
  - Complex Treatment Processes
  - Large Monitoring Networks (>25 Wells)

# 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



# Data to Support Optimization

- Guide Contract Clause Available at **http://www.environmental.usace.army.mil/library/guide/rsechk/rsechk.html**
- 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