Superfund Optimization: Tools for State Implementation

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Office of Superfund Remediation and Technology Innovation

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Today’s Presentation

♦ Optimization introduction
♦ State perspectives
♦ Standard optimization process
♦ Optimization tools for States
♦ Results
♦ Concluding remarks
SUPERFUND OPTIMIZATION: OVERVIEW
Superfund Optimization: Overview

♦ **What:** a systematic site review to identify opportunities to improve remedy protectiveness, effectiveness and cost efficiency, and to facilitate progress toward site completion

♦ **How:** a team of *independent technical* experts

♦ **When:** any phase of the cleanup process
  - Initial focus on operating pump and treat remedies
  - Long term monitoring optimization
  - Desire to move optimization lessons forward into the process
  - Early (pipeline) stage “optimization” often more of an active technical support activity vs. review/evaluation
  - Multiple site types, technologies
Superfund Optimization: Overview

♦ Why: Drivers

» Early success
  › Proven utility
  › Support function, not an audit function
  › Technical focus
  › Active training and outreach
  › Cost to site team/Regions

» National Superfund Optimization Strategy (2012)
» Superfund Task Force (2017)

» Resources
  › Staffing/technical resources available to RPMs
  › Site costs

» Emphasis on site completion
» Beyond Superfund-RCRA Corrective Action, UST
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Third-Party Optimization Guidelines

- Positive and forward-looking
- Collaborative between site team and optimization team
- Include all relevant stakeholders’ interests; willingness to engage
- Balance effectiveness and cost
- Provide concrete findings and recommendations with realistic cost estimates
- Recommendations are not requirements, but all recommendations should be considered and evaluated
- Recommendations will often need further evaluation before implementation
- Third party optimization team should have extensive experience and expertise applicable to project
- Training is essential
SUPERFUND OPTIMIZATION:

THE PROCESS
Progress Toward Institutional Practice in Waste Programs

♦ Standardized processes applied to
  » COI, site engagement and kickoff
  » Onsite visits and interviews
  » Report format and development/review/QC process
  » Optimization Report Inventory and Tracking Tool (ORITT) – tool for tracking metrics
  » Optimization Project Log (OPL) – tool for program/project management

♦ Identifying and applying process improvements to reduce cost and time
  » Streamlined standardized optimization report template
  » “Portfolios”: multiple reviews conducted during singular travel events
Optimization Reviews

- Optimization reviews result in site-specific reports with recommendations that fall within one of six standard recommendation categories:
  - Remedy effectiveness
  - Cost reduction
  - Technical improvement
  - Site closure
  - Reuse/redevelopment
  - Footprint reduction and climate resiliency

- There are three prevalent optimization concepts applied during third-party optimization of sites regardless of the remedial stage
  - Active site and remedy management
  - CSM development/revision
  - Alternative technologies/approaches
  - These concepts are also applicable to site teams evaluating their own sites
EPA Optimization Process

- Kickoff call
- Document exchange/review
- Site visit
- Draft report
- Final report
- Tracking

- Introductions
- Site tour
- Optimization goals
- CSM (prepared ahead of time)
- Remedy effectiveness/protectiveness
- Extraction/injection systems
- Above-ground components
- Costs
- Footprint reduction
- Site closure
- Debrief
The Draft and Final Optimization Report

- The draft report is typically issued 45-90 days after the site visit or equivalent.
- This product is circulated among the stakeholders for comments. A conference call is most often arranged to ensure the accurate resolution of comments.
- The final report is issued after the comments are received and resolved. The final report is issued by the RPM to all stakeholders for the implementation of recommendations.
- The site moves to the Optimization Report Inventory and Tracking Tool (ORITT) for recommendation follow-up for the periodic Progress Report.
Individual optimization reviews do not require a large level of effort

- Approximately 100 - 400 hours of senior LOE (depending on site size, documentation, complexity and the scope of the optimization)
- Junior staff can provide support logistics and perform directed data evaluations
- Acquisition factors to consider in the expertise necessary for optimization (we need senior experts with significant site experience). Optimization necessitates:
  - High ratio of senior LOE to junior LOE
  - Higher rates for senior experts
  - Adequate workload to maintain availability of senior experts
  - Contract scope to conduct optimization

Example: Illustrative allocation and amount of hours for an optimization effort at a complex site

Two experts each spending the approximately 100 hours as follows:

- 15-20 hours of initial site document review and data analysis (dependent on site complexity, previous optimization work)
- ~25 hours of travel for site visit
- ~30 hours of further document review and data analysis
- ~30 hours for report preparation and finalization

Junior and non-technical staff spending approximately 20-30 total hours in technical and production support
Conceptual Site Model: The Life Cycle CSM

- **Newly defined**
  - Geology and Hydrogeology
  - Intended Reuse
  - Decision Criteria
  - Pathway-Receptor Network
  - Potential Remedies
  - Completion Strategy

- **Supplemented by new information**
  - Previous Investigations and Actions
  - New operations data

- **“New” past use found**
  - Past Use

- **Contaminant reductions**
  - Remedy performance
**Optimization of the CSM:** Using available information to develop or update a CSM and identifying critical data gaps; revise the CSM and fill critical data gaps based on new information. Make key site decisions based on an up-to-date CSM.

♦ **Investigation Stage:**
  
  » Development of preliminary CSM
  
  » Outcome: Guides systematic planning, work plan development, data management, dynamic/active strategies

♦ **Feasibility Study Stage:**
  
  » Incorporate RI information
  
  » Outcome: Influence and refine alternative development
Design Stage

» Updating the CSM based on pre-design investigations and pilot study results
» Outcome: Designing a remedy based on an up-to-date CSM

RA or LTRA Stage

» Updating the CSM based on data from remedy implementation
» Outcome: Modifying a remedy or revisiting a remedial approach based on an up-to-date CSM

CSM Lifecycle document:

Evaluation of Innovative Technologies in Remedial Operations and Strategies

Concept: Considering current operations and alternative technologies/approaches

» Use of innovative/alternative tools during site characterization
» Probability of alternative or technology efficacy given site-specific CSM
» Use of innovative/alternative remedy components, reagents, or delivery mechanisms
» Use of innovative/alternative modeling
» Use of innovative/alternative modeling tools to optimize extraction or injection networks or to optimize monitoring programs
SUPERFUND OPTIMIZATION:
TOOLS FOR IMPLEMENTATION
In 2018 the Superfund Program released three “Technical Guides” developed in a great part through the lessons learned at optimization and optimization related technical support projects.

- The guides highlight BMPs to help focus and streamline the site characterization process by presenting more efficient scoping, investigation and data management approaches. The streamlining may reduce both time and costs during the remedial investigation/feasibility study (RI/FS) and throughout the Superfund process.

- Data Management Tech Guide
- Smart Scoping BMP Tech Guide
- Strategic Sampling Tech Guide
Starting Points

♦ CLUIN clu-in.org/optimization
  » Information on the EPA’s National Optimization Strategy, as well as technical resources for those seeking to implement optimization reviews and processes for their sites.

♦ State Toolkit being built on EPA SharePoint (under construction)
  » Special contract resources, templates and other files those seeking to implement optimization reviews and processes
Selected EPA Optimization Resources

- **Remediation Optimization: Definition, Scope and Approach**
- **Optimization Review Guides**
  - Investigation-Stage
  - Design-Stage
  - Remedy-Stage
  - LTM-Stage
- **Site-specific reports**
- **Summary Reports on Implementation Progress**
- **15th Superfund Remedy Report**
  - [https://clu-in.org/asr/](https://clu-in.org/asr/)
Federal and State Links to Optimization Resources

- **EPA Home Page: Remedy Optimization**
  - [www.epa.gov/superfund/cleanup/postconstruction/optimize.htm](http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm)

- **TIFSD CLU-IN Optimization Page**
  - [www.cluin.org/optimization/](http://www.cluin.org/optimization/)

- **U.S. Army Corps of Engineers**

- **U.S. Army Environmental Command**

- **U.S. Air Force Civil Engineer Center**

- **U.S. Naval Facilities Engineering Command**

- **Federal Remediation Technologies Roundtable**
  - [www.frtr.gov/optimization/](http://www.frtr.gov/optimization/)

- **Interstate Technology Regulatory Council**
  - [www.itrcweb.org/Team/Public?teamID=4](http://www.itrcweb.org/Team/Public?teamID=4)
OPTIMIZATION RESULTS:
LESSONS LEARNED IN
SUPERFUND’S OPTIMIZATION PROGRAM

SUPERFUND OPTIMIZATION PROGRESS REPORT:
2011-2015

https://semspub.epa.gov/work/HQ/196740.pdf
2011-2015 – 645 Recommendations

- Remedy effectiveness 273
- Cost reduction 152
- Technical improvement 158
- Site closure 107
- Green remediation 32
- Total (some rec in multiple groups) 722
Superfund Phase of Optimization Events
Number of Superfund Optimization Reviews and Technical Support Events = 72

- Remedial Action, 37, 51%
- Pre-Remedial Action, 25, 35%
- Operations & Maintenance, 10, 14%
- Remedial Investigation/Feasibility Study, 15, 21%
- Remedial Design, 10, 14%
Number of Implemented Tools and Techniques
Total Number of Optimization Events = 80

- CSM Improvements: 54 (68%)
- Streamlined or Improved Monitoring: 48 (60%)
- Improved System Engineering: 31 (39%)
- Change in Remedial Approach: 29 (36%)
- Use of Strategic Sampling: 13 (16%)
- Improved Data Management: 12 (15%)
- Use of Combined Remedies: 6 (8%)
Closing Remarks

♦ EPA’s optimization program is a mature effort (20+ years) and fully integrated in the Superfund program across regions and project lifecycles.

♦ We are acting on findings: 64% of the recommendations at optimized projects are already implemented, in progress or planned; 15% more under consideration.

♦ Seeing benefits in six main areas: Remedy effectiveness, Cost reduction, Technical improvement, Site closure, Reuse, Climate Resiliency & Footprint Reduction.

♦ Going forward, we see continuing support and integration, as evidenced by Superfund Task Force Study Recommendations and the Superfund Remedial Action Framework.
Thank You!

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