United States Environmental Protection Agency

EPA-540-R-25-001
Office of Land and Emergency Management
August 2025

Superfund Optimization Progress Report

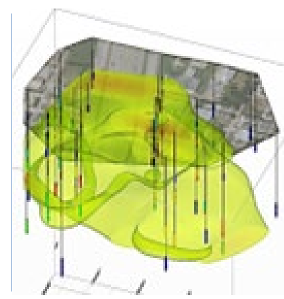

PHOTO CREDIT:

Top: Treatment units at groundwater pump and treatment plant. Photo courtesy of EPA Region 6 from the 2021 Sixth Five-Year Review Report for Bayou Bonfouca Superfund Site.

Center Left: South Fork Coeur d'Alene River at Elizabeth Park near Kellogg, Idaho, in the Bunker Hill Mining & Metallurgical Complex Superfund Site. Photo courtesy of EPA Region 10 from the 2019 Coeur d'Alene Basin Environmental Monitoring Program – Surface Water Annual Data Summary.

Center: High density sludge treatment plant at the Leviathan Mine Superfund site. Photo courtesy of EPA Region 9 from the 2023 Community Involvement Plan.

Center Right: 3DVA of trichloroethene concentrations in groundwater at the Sol Lynn Industrial Transformers Superfund Site. Photo courtesy of EPA OSRTI from the 2022 Optimization Review.

Bottom: Groundwater treatment system effluent pipe located in the OU-3 floodplain at the Ciba-Geigy Corp. (McIntosh Plant) Superfund Site. Photo courtesy of EPA Region 2 from the 2021 Fifth Five-Year Review Report.

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NOTICE AND DISCLAIMER

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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA)'s optimization program has continued to make cleanups more efficient and effective. The program has spurred Superfund cleanups forward by leveraging the use of independent third parties to assess sites at any stage of the cleanup process to apply and promote best practices, including site strategies.

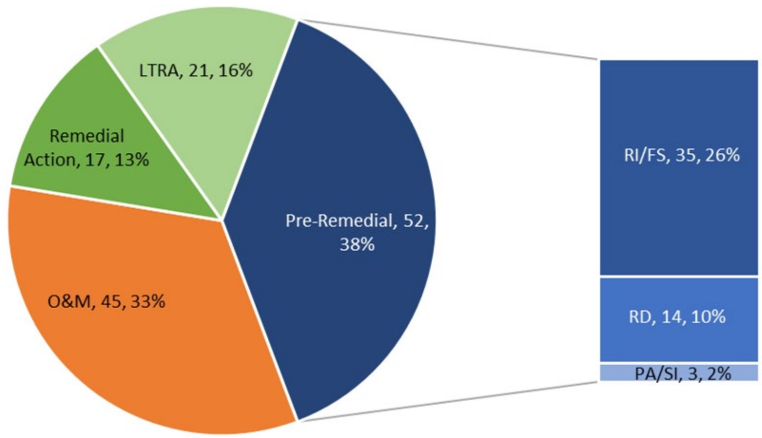
This report provides a summary of the optimization reviews and optimization-related technical support (technical support) projects completed during fiscal year (FY) 2018 through FY 2022. The report discusses the application of the optimization program to all phases of the Superfund program and provides key results through implementation of best practices including project highlights. For optimization reviews, the report provides a summary of the types of recommendations made, the implementation status of those recommendations, and project highlights. For technical support projects, the report provides a description of types of direct support provided, discusses remedy vulnerability assessments and provides project highlights.

In accordance with the 2012 National Strategy, EPA continued to implement the optimization program, completing 160 projects (74 optimization reviews and 86 technical support projects) at 135 sites from FY 2018 through FY 2022. Although 32 were *completed* per year on average, additional projects were supported. EPA expanded the optimization program to support 75 or more projects in a typical year. Benefits

Superfund Optimization Program
Optimization Review Systematic site review of the • Conceptual Site Model (CSM) • Remedial Performance and Progress • Remedy Protectiveness • Remedy Effectiveness • Costs to identify opportunities for efficiencies and improved effectiveness.
Optimization-Related Technical Support Focused technical or strategic site planning support to improve overall understanding of the site's status and enhance implementation of best practices. Technical • Incremental Sampling • High-Resolution Site Characterization (HRSC) • Mining Site Fluid Hazard Consultation • CSM Development or Update • Remedy Vulnerability Assessments • Three-Dimensional Visualization (3DVA) • Technical Reviews and Engineering Assessments Strategic/Project Planning • Real-Time Measurement Tools & Dynamic Work Strategies • Systematic Project Planning (SPP) • Smart Scoping • Preliminary Scoping • Acquisition Assistance Pilot
Site Strategy A high-level planning and project management tool, which documents a site's overall assessment and remediation strategy by: • Prioritizing the site's high-level goals • Outlining key Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial and enforcement activities needed to achieve these goals • Identifying key issues potentially impeding assessment and remediation activities and project team recommendations

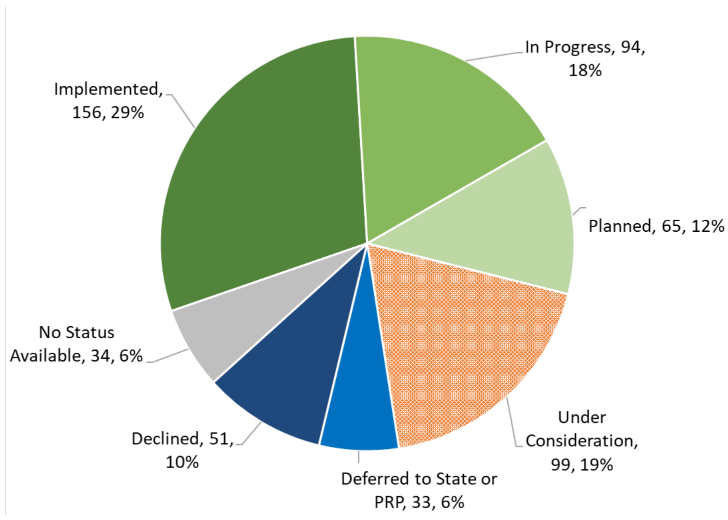
realized from expanding the program to a larger number of sites include increasing remedy effectiveness, improving technical performance, reducing costs, moving sites to completion, and lowering the environmental footprint of remediation activities.

The optimization reviews and technical support projects can improve approaches in pre-remedial actions, such as preliminary assessment/site investigation (PA/SAI), remedial investigation/feasibility studies (RI/FS), and remedy design (RD); remedial actions, including long-term response actions (LTRA); and operations and maintenance (O&M), including long-term monitoring. Currently, support is spread nearly evenly among the pre-remedial action phase (38%), remedial action and LTRA phase (29%) and O&M phase (33%).



Optimization Reviews – EPA's continued success with the optimization program is reflected in the site project follow-up, which confirmed implementation of recommendations for 60 of the 74[1] reviews performed since the last progress report in October of 2020. In addition, this report accounts for updates to 26 earlier reviews where implementation of recommendations had been ongoing since the last progress report.

For the 60 optimization reviews completed during this timeframe where a status was received, 59% were implemented, in progress or planned, with another 19% under consideration.

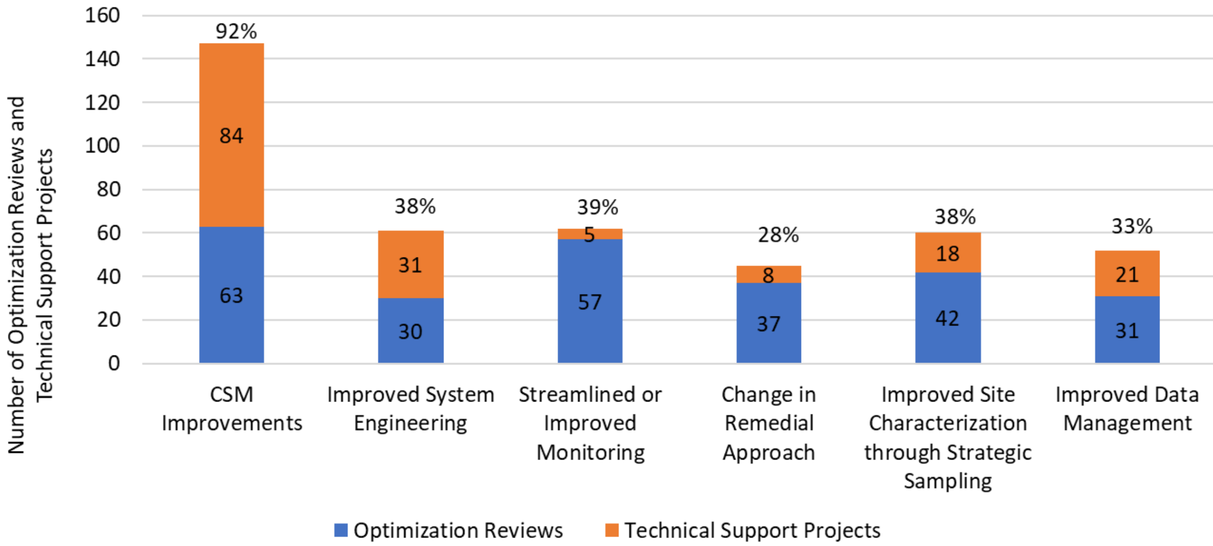


Optimization-Related Technical Support – As part of the optimization program, EPA also provided optimization-related technical support (technical support) with 86 projects completed between FY 2018 and FY 2022. These projects support the application of best practices and help expand optimization to earlier stages of the Superfund pipeline. Examples of the types of support provided include SPP, CSM development, demonstrations of method applicability, remedy vulnerability

[1] One of the optimization reviews was for the East and West Shasta Mining District and included an individual analysis of 12 mines.

assessments, advanced data management techniques, strategic sampling techniques, HRSC, and 3DVA. For technical support projects, EPA tracks the start and end dates, remedial phase, scope of project, best practices applied, and direct outcomes.

Key Results from Applying Best Practices – EPA's review of the recent optimization review recommendations and expected benefits of technical support projects, highlights six key results. The key results are shown below along with the percentage of the projects demonstrating that outcome. Note that a project may demonstrate multiple outcomes, for example a project may both improve the CSM and improve data management.



1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has conducted optimization activities at Superfund sites since 1997 and periodically reports on the progress of implementing optimization recommendations[2] (EPA, 2012a). EPA began its optimization efforts as a pilot program focused on groundwater pump and treat (P&T) remedies at Superfund (Fund-lead) sites by conducting remediation system evaluations and long-term monitoring optimizations. In August 2004, EPA developed the *Action Plan for Ground Water Remedy Optimization* [3] ("Action Plan") (EPA, 2004) to further implement important lessons learned from the pilot phase and fully integrate optimization into the Superfund cleanup process, where appropriate. As the program matured, further recognition of the benefits of optimization prompted EPA to expand and formalize its optimization program. In 2012, EPA issued the *National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion*[4] ("the National Strategy") (EPA, 2012b) to support sites at any phase of the Superfund pipeline. In July 2017, EPA issued the *Superfund Task Force Recommendations* (EPA, 2017a), which included Strategy 4**: Use Best Management Practices, Systematic Planning, Remedy Optimization, and Access to Expert Technical Resources to Expedite Remediation** and Recommendation 7,[5] promoting the use of optimization projects.

Contents of Report

[2] All previous Optimization Progress Reports can be found at https://www.epa.gov/superfund/cleanup-optimization-superfund-sites#summary

[3] Action Plan for Ground Water Remedy Optimization

[4] National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion

[5] Superfund Task Force Report Recommendation 7: Promote Use of Third-Party Optimization Throughout the Remediation Process and Focus Optimization on Complex Sites or Sites of Significant Public Interest

This *Superfund Optimization Progress Report August 2025* summarizes support provided and insights into the implementation of optimization review recommendations coupled with expected results from optimization-related technical support (technical support) projects to describe how sites are advancing in the cleanup process through the application of best practices.

1.1 Purpose and Scope

The purpose of this report is to: (1) document implementation of site-specific recommendations from optimization reviews and beneficial outcomes from technical support projects; (2) describe how the optimization program applies and promotes EPA's best technical practices for site cleanup; and (3) provide a summary and analysis of the status of implementing the National Strategy.

This report summarizes optimization support conducted through the EPA Headquarters (EPA HQ) optimization program. Similar work and technical support projects are conducted by other programs and regions. That work is not included in the data and analysis provided here. Optimization reviews and optimization-related technical support projects are collectively referred to in this report as projects.

Optimization Reviews result in site-specific reports with recommendations that fall within one of five categories: remedy effectiveness, cost reduction, technical improvement, site closure, and energy and material efficiency. After completing the optimization review, the optimization team follows up with the site Remedial Project Manager (RPM) to determine the implementation status of optimization recommendations for the site. The implementation status is then tracked, and follow-up continues until all recommendations have been implemented, declined, or in some cases, deferred to the state.

Optimization-Related Technical Support Projects generally provide direct site support to apply optimization best practices. Technical support projects can be done at all stages of the Superfund pipeline and may precede or follow an optimization review. Technical support projects can include developing a strategic sampling approach, conducting systematic project planning (SPP), conducting a focused technical review of a specific aspect of a site, and visualizing and analyzing data to help identify data gaps in the conceptual site model (CSM). Tracking these technical support projects captures efforts to optimize pre-remedial action stages of the cleanup process. It allows EPA to report on the application of lessons learned from later-stage optimizations to earlier stages of the cleanup process as described in the National Strategy. For optimization-related technical support projects, EPA tracks the start and end dates, remedial phase, scope of project, best practices applied, and direct outcomes.

This report focuses on the implementation of optimization recommendations from FY 2018 through FY 2022. Information is provided on the implementation of recommendations for 60 of the 74 optimization reviews where an optimization was completed since the last progress report, and which are being reported on for the first time (Table A-1 in Appendix A). Status updates are also provided for 26 reviews where implementation of recommendations has continued since the last progress report (Table A-2 in Appendix A).

In addition to the 74 optimization reviews, this report includes information and analysis on 86 technical support projects completed since the last progress report (Table A-3 in Appendix A).

Highlights documenting the key results from conducting optimization projects and how best practices were applied during the project are also included in the report. Most projects (135 projects) were conducted at sites on the National Priorities List (NPL); some were conducted at non-NPL sites (25 projects) such as those from the Resource Conservation and Recovery Act (RCRA) Corrective Action and Brownfields programs.

1.2 Optimization Program

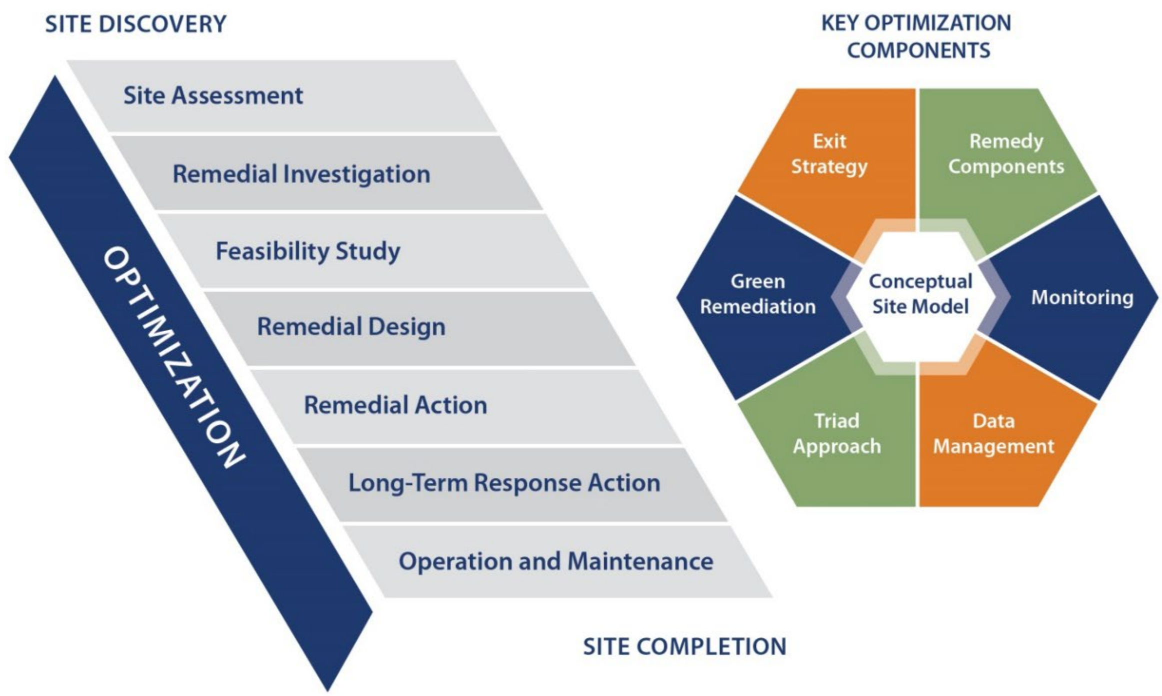
Sites are selected for optimization reviews and technical support projects collaboratively, based on input from EPA RPMs, regional management, Regional Optimization Liaisons (ROLs), EPA HQ staff and managers, and stakeholders. The optimization teams consist of an EPA HQ lead, the ROL, and a team of technically qualified individuals from within EPA, the U.S. Army Corps of Engineers (USACE), or an EPA contractor with the advanced qualifications and extensive experience necessary to conduct the optimization. The site teams generally consist of the RPM, regional technical support staff such as a hydrogeologist, state personnel, tribes, potentially responsible parties (PRPs), contractors, and other stakeholders such as community representatives.

There are several compelling reasons why an RPM might seek an optimization. Uncertainty about the current CSM can prompt a need for clarity, especially in complex site conditions with multiple sources or contaminant plumes. Rising investigative costs or an expanding scope of investigation can also drive the need for optimization. Additionally, if a site is not progressing to the next phase in the Superfund pipeline, or if there are concerns about the performance, effectiveness, or cost of a planned or existing remedy, optimization can provide valuable insights. An independent assessment of a remedial design or proposed site activities can be helpful, as can recommendations for implementing innovative strategies or technologies. When the goals of the remedy are not being met as anticipated, independent expertise can help assess cleanup progress and suggest changes. Optimization can also explore opportunities to reduce monitoring points and costs, expedite the remediation timeframe for property redevelopment, and enhance efficiency by reducing energy and effort. Finally, developing or refining the site or remedy completion strategy can be a significant motivator for seeking optimization.

2.0 SUMMARY OF PROGRESS ON EXPANDING THE OPTIMIZATION PROGRAM

Optimizations projects are conducted at any phase of the Superfund pipeline. Optimization teams usually include an evaluation of the CSM for each site and make recommendations related to investigation activities when needed. This practice continues as EPA has learned that **a continual focus on life-cycle CSMs and discussion of the overall site strategy are valuable in assisting site teams in improving site remedy performance and progress, no matter the phase of the Superfund pipeline.** Figure 1 depicts the key components of optimization and the remedial pipeline phases at which optimization can be applied.[6,7]

Figure 1: Key Optimization Components and Superfund Pipeline Activities



Source: Adapted from EPA 2012b.

Projects conducted during the remedial action phase evaluate all aspects of implementation and operation of the **remedy components** in the context of remedial goals, technical performance, and costs. **Monitoring** is conducted after a remedy has been selected and implemented, and it is used to evaluate the degree to which the remedial measure achieves its objectives. Optimization projects evaluate data from the monitoring program and may identify data gaps. **Data management** refers to the strategy and methods for collecting, processing, evaluating and communicating data. Optimization reviews can make recommendations for improved data management while a technical support project may provide direct support for data management. **Green remediation** refers to the practice of considering all environmental effects of remedy implementation and incorporating options

[6] See CFR, title 40, sec 300, Subpart E, for details regarding the phases of the Superfund pipeline

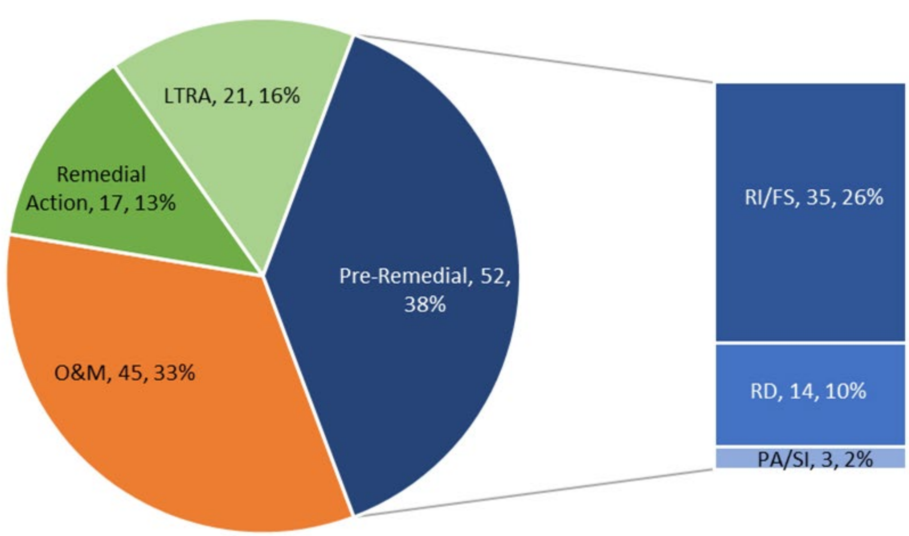
[7] Information about the seven key components can be found at www.epa.gov/superfund/cleanup-optimization-superfund-sites

to minimize the environmental footprint of the cleanup activities. An optimization review can make recommendations to reduce the environmental footprint of cleanup activities, and an environmental footprint analysis can be conducted as part of a technical support project. A site **exit strategy** is a formal plan to guide a site from characterization through remediation to closure or reuse. An optimization review can make recommendations focused on moving the site forward toward site closure, and technical support projects, such as SPPs, can help develop a strategy for moving the site through all phases of the cleanup.

Figure 2 illustrates the Superfund phase of the optimization review and technical support projects completed during the reporting period. Of the 160 projects completed from FY 2018 to FY 2022, 135 were completed at NPL sites, and 25 projects were completed at sites not on the NPL such as RCRA or Brownfields sites. EPA continues to provide optimization support across all phases of the Superfund pipeline. In the previous reporting period (FY 2015 through FY 2017), significant efforts were made to support projects in the early phases of the Superfund process to demonstrate the effectiveness of applying best practices at those stages. After demonstrating these best practices and providing extensive training and technical directives, the focus shifted back to providing support throughout the entire Superfund pipeline. Currently **support is spread nearly evenly among the pre-remedial action phase (38%), remedial action and long-term response action (LTRA) phase (29%) and O&M phase (33%).** Pre-remedial action phase support often involved providing direct technical support focused on applying optimization best practices. For the 52, pre-remedial action projects, 45 were technical support projects.

Figure 2: Superfund Phase of Optimization Reviews and Technical Support Projects

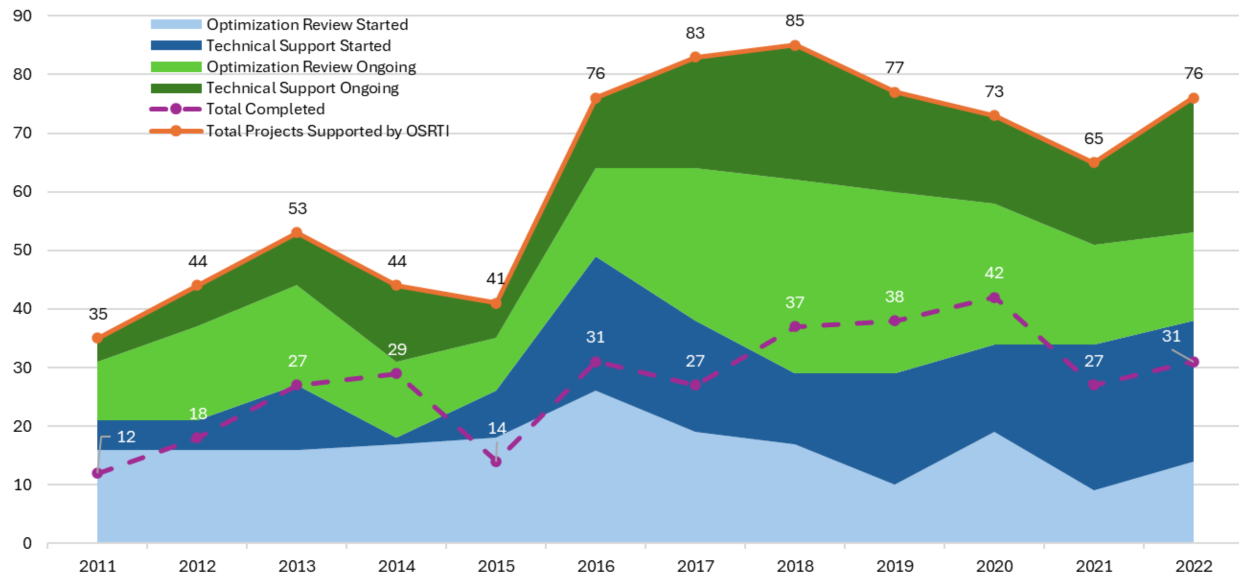
Number of Superfund Optimization Reviews and Technical Support Projects = 135



- 25 sites are not Superfund sites and are not included in the percentages reported in Figure 2.

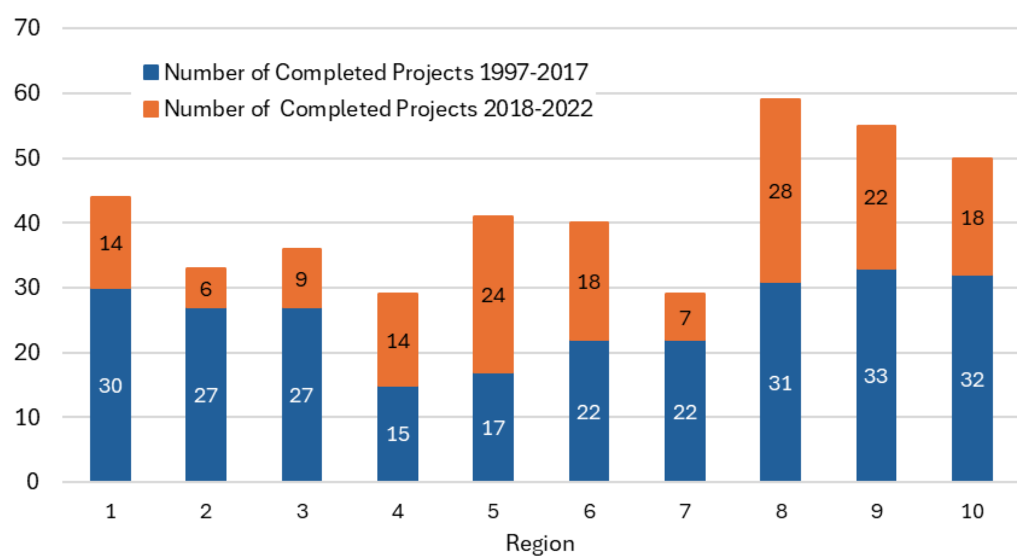
EPA's optimization program has expanded to support 75 optimization reviews and technical support projects on average per year during FY 2018 to FY 2022, up from 67 projects on average from FY 2015 to FY 2017. Figure 3 shows the workflow of optimization reviews and technical support projects from FY 2011 through FY 2022. EPA increased the support offered to the regions by expanding the EPA project managers available to assist with the support and increasing the availability of contractor support.

Figure 3: Optimization Review and Technical Support Project Workflow



EPA has completed a total of 416 optimization review and technical support projects from FY 1997 through FY 2022 in all 10 regions, completing 32 projects per year on average from FY 2018 to FY 2022 (Figure 4). The full list of projects is provided in Appendix B.

Figure 4: Completed Optimization Review and Technical Support Projects FY 1997–FY 2022



3.0 KEY RESULTS FROM APPLYING BEST PRACTICES

EPA's understanding of best practices has grown through the years, and EPA synthesized the lessons learned into three technical guides: *Smart Scoping for Environmental Investigations*, *Strategic Sampling Approaches,* and *Best Practices for Data Management*[8] (EPA, 2018a, 2018b, and 2018c). **Best practices work together to evolve the CSM and improve the efficiency of site characterization and cleanup. Evolving the CSM over the site's life-cycle results in better, more defensible site decisions and improved remedy performance.** The guides summarize and highlight the best practices to help focus and streamline the site characterization process by presenting more efficient scoping, investigation, and data management approaches. The streamlining of these activities may reduce both time and costs during the remedial investigation/feasibility studies (RI/FS) and throughout the Superfund process.

Optimization is itself a best practice that encourages site teams to improve all activities conducted to characterize and remediate sites. Under the optimization program, optimization reviews typically recommend best practices the site team can subsequently apply, such as recommending additional contaminant source definition, while technical support projects typically assist site teams with using specific best practices, such as conducting SPP.

3.1 Key Results

EPA has identified key results achieved by site teams when they applied best practices directly during technical support projects or results expected by implementing recommendations from optimization reviews. The key results are described in Table 1 and include (1) CSM improvements, (2) improved system engineering, (3) streamlined or improved monitoring, (4) change in remedial approach, (5) improved site characterization through strategic sampling, and (6) improved data management.

Table 1: Description of Key Results

Key Results	Description
Conceptual Site Model Improvements	Improving the CSM can be achieved through additional characterization of sources and environmental media, such as groundwater, or by analyzing existing data with new tools, such as 3-dimensional visualization and analysis (3DVA). CSM improvements are best achieved through smart scoping, the use of strategic sampling approaches and improved data management.
Improved System Engineering	Improved system engineering includes modifying one or more engineered components of a remedial system to improve overall system performance. Improved system engineering can include adaptively scaling remedies or using a more targeted approach that applies technologies to a specific and well-defined area. Smart scoping, strategic sampling approaches, CSM improvement, and improved data management can facilitate adaptively scaling remedies.

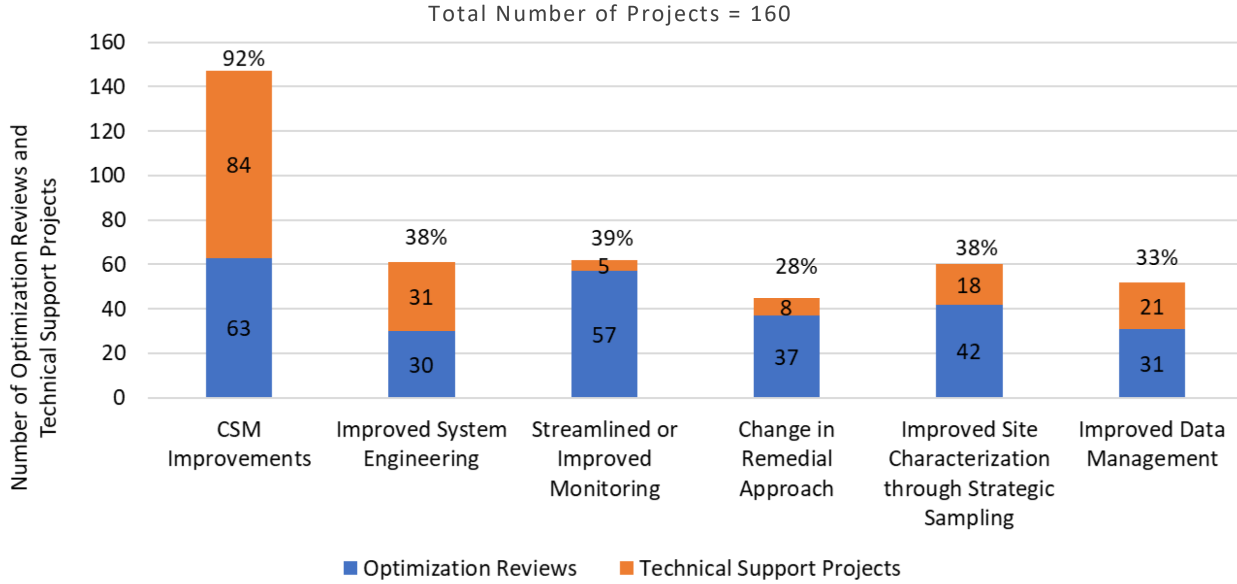
[8] Smart Scoping for Environmental Investigations Technical Guide: https://semspub.epa.gov/src/document/11/100001799; Strategic Sampling Approaches Technical Guide: https://semspub.epa.gov/src/document/11/100001800; Best Practices for Data Management Technical Guide: https://semspub.epa.gov/src/document/11/100001798

Key Results	Description
Streamlined or Improved Monitoring	Streamlined or improved monitoring involves adjustments to monitoring frequency, monitoring locations, chemicals of concern analyzed, as well as the analysis of monitoring results over time. Streamlined or improved monitoring also addresses data management practices.
Change in Remedial Approach	Changes in remedial approach include adding or changing remedies to better address remaining contamination or newly identified areas of contamination. The recommendations provide improvements in remedy effectiveness, cost reductions, and the achievement of site closure in a shorter period of time.
Improved Site Characterization Through Strategic Sampling	Specific strategic sampling approaches apply to several types of characterization activities conducted on various environmental media and help improve the technical understanding of site conditions. These approaches include high-resolution site characterization for groundwater and incremental sampling for contaminated soil for improved characterization of source volumes and locations. Strategic sampling approaches can often lead to other beneficial results such as CSM improvements, the use of combined remedies, and adaptively scaling remedies.
Improved Data Management	Aspects of improved data management include improving data management planning, data acquisition, data processing, data analysis (using 3DVA), data preservation and storage, and data publication and sharing.

Figure 5 shows the number of optimization reviews and technical support projects conducted from FY 2018 through FY 2022 that achieved or can achieve each of the key results. Each optimization review or technical support project may have more than one key result. For example, a 3DVA project may result in a CSM improvement and improved data management. Nearly all projects provide CSM improvements and one-third or more can achieve additional key results.

Figure 5. Key Results Achieved Through Completing 74 Optimization Reviews and 86 Technical Support Projects from FY 2018 to FY 2022

Total Number of Projects = 160



Examples of optimizations showcasing these key results and the best practices employed to reach the results are provided in Sections 3.1.1 through 3.1.4.

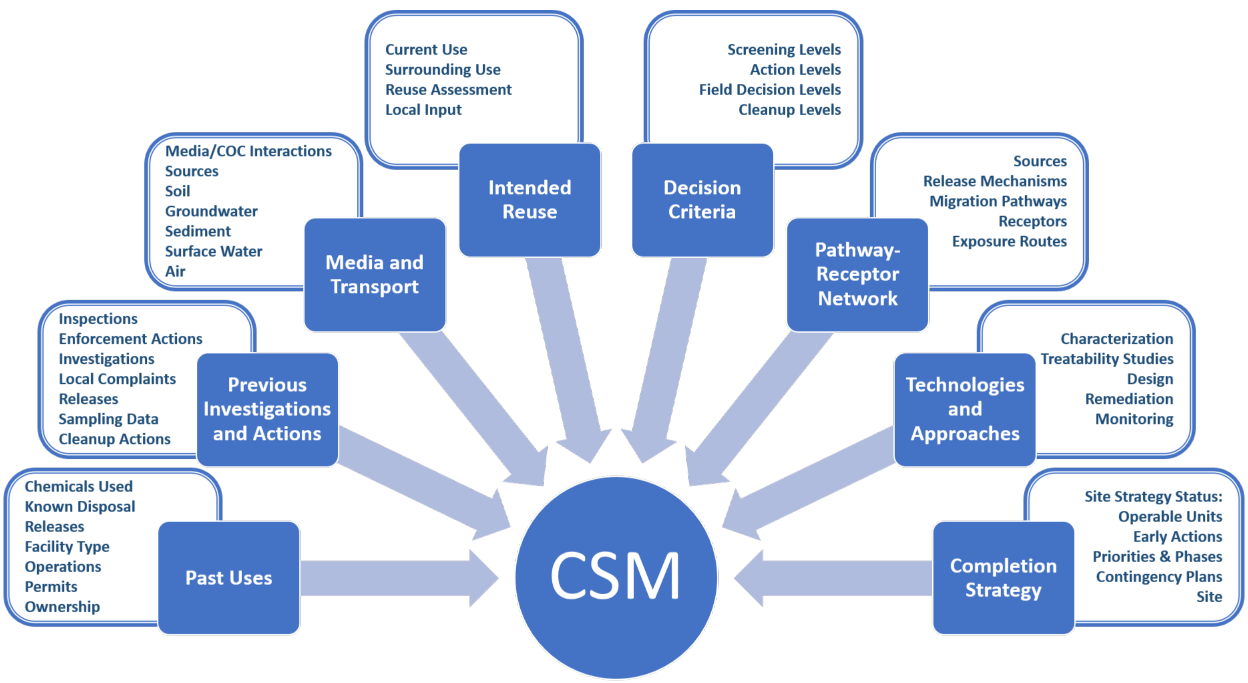
3.1.1 CSM Improvements

Smart scoping practices can be used during all phases of the Superfund pipeline. Use of these practices can support the development of a robust CSM, which, in turn, helps improve response action development, selection, and implementation.

The EPA has identified eight components that constitute a comprehensive CSM (Figure 6). A comprehensive CSM is not "one" thing but is composed of several important elements that should be considered to move the project forward to completion. A comprehensive CSM addresses all eight components and multiple elements within each component.

Smart scoping best practices implemented at sites covered in this report include project life-cycle CSM, SPP, dynamic work strategies and adaptive management, demonstration of method applicability (DMA), high-resolution site characterization (HRSC), and 3DVA.

Figure 6: Conceptual Site Model Components



Environmental Sequence Stratigraphy

Understanding the relationship between hydrogeology and the other CSM components can be especially important at sites with complex geology (e.g., fractured rock or intermixed gravels/sands/silts/clays) where contaminant sources may occupy only a small area of the subsurface and flow occurs through thin zones. **Environmental sequence stratigraphy (ESS) applies geologic principles in these settings to help improve the understanding of groundwater flow and**

contaminant distribution and develop more effective remediation strategies. ESS refers to the application of both the concepts of sequence stratigraphy and facies models to the types of datasets collected for environmental groundwater investigations, which are typically at the outcrop scale (tens to hundreds of feet vertically, hundreds to thousands of feet laterally) (EPA, 2017b). The application of ESS to contaminated groundwater sites can be broadly subdivided into three general phases:

- Phase 1 – Synthesize the geologic and depositional setting based on regional geologic work and identify facies models which are applicable to the site.
- Phase 2 – Review the existing CSM and site lithology data in light of Phase 1 findings and format existing lithology data to highlight vertical grain-size patterns (sequences) as a basis for correlations honoring stratigraphic "rules of thumb."
- Phase 3 – Construct a hydrostratigraphic CSM consisting of maps and cross sections that depict the hydrostratigraphic units present as a basis to integrate and interrogate hydrogeology (e.g., water levels, pump test, slug test) and chemistry data (e.g., constituents, concentrations).

ESS technical support was provided for the **Puchack Well Field** in Pennsauken Township, NJ in Region 2 (Table 2).

Table 2: Puchack Well Field Superfund Site – Highlight Summary

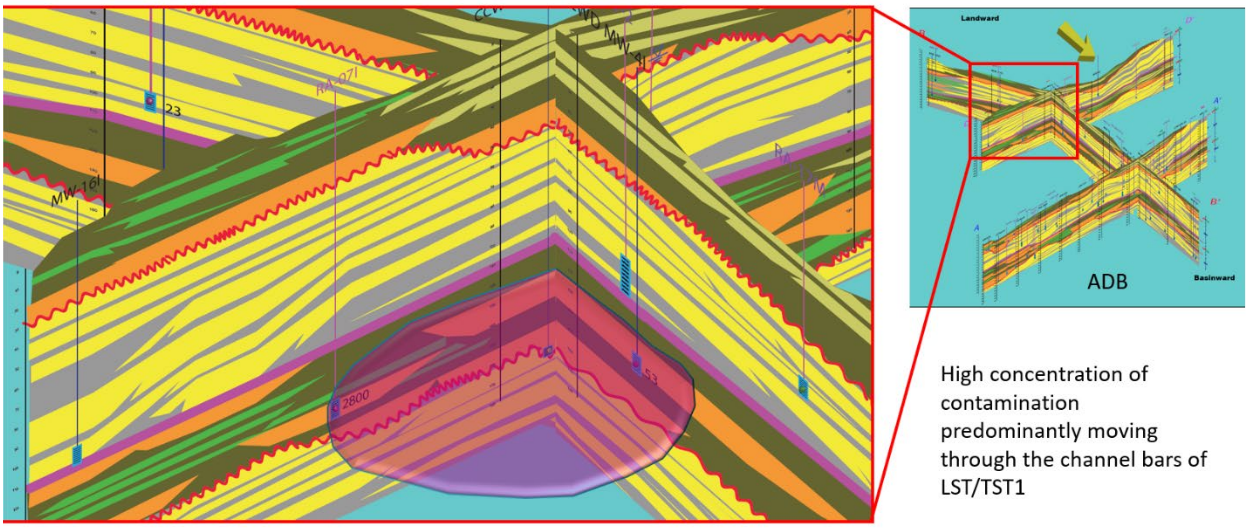
Phase	Challenge	Tool/Analysis	Recommendations	Outcomes
Remedial Design	Improve understanding of media and transport	Environmental Sequence Stratigraphy	Incorporate the improved understanding of the main conduits of water and contamination transport within the depositional cycles into the remedial design	Conceptual site model improvements

The main purpose of the ESS was to better understand the heterogeneity of the subsurface beneath the site to support the EPA Region 2 Site Team in designing and implementing an appropriate remedial action. The analysis focuses on vertical and lateral changes in depositional trends (i.e., depositional environments) and evaluated facies changes and their correlation (three-dimensionally) across the study area. The information developed an interpretation and description of the three-dimensional hydrostratigraphy underlying the site through 1) a network of cross sections depicting the stratigraphic framework, and 2) a series of maps representing hydrostratigraphic units.

This project combined a regional sequence stratigraphic understanding from academic studies with continuous geophysical logs to develop a high-resolution stratigraphic framework of the Turonian Magothy Formation beneath the Puchack Well Field. Data for the investigation, including boring and geophysical logs, plume maps and GIS maps of the Site were provided by the EPA Region 2 Site Team. Gamma logs from a total of 30 boreholes from the Puchack Field were utilized in conjunction with borehole information from those locations.

The ESS analysis determined that the previously designated aquifer units as Upper, Lower, Middle and Intermediate could not be applied with consistency throughout the site because of internal heterogeneity of channel bars and delta mouth bars. Rather, the Upper Cretaceous Magothy aquifers at the Puchack Site can be better understood in terms of two repeated episodes of delta mouth bar progradation followed by fluvial channel bar deposits under estuarine conditions. Fluvial channel bar sands and delta mouth bar sands are the two main conduits of water and contamination transport within these depositional cycles (Figure 7).

Figure 7: High Contamination Flow-Paths at Puchack Well Field Superfund Site



Systematic Project Planning

SPP is an efficient method for comprehensive planning, design, and implementation for all stages of hazardous waste site investigation and cleanup projects; it also supports the iterative decision-making process (i.e., learning by doing) established in adaptive management plans. SPP is a process that lays a scientifically defensible foundation for proposed project activities. It usually includes identification of key decisions to be made, the development of a CSM in support of decision-making, and an evaluation of decision uncertainty along with approaches for managing that uncertainty in the context of the CSM.

The overall goal of an SPP Meeting is to gather all the site stakeholders for a multiday meeting to discuss and review the CSM, address technical issues, and develop steps forward, including future site investigations, data quality objectives (DQOs), and an exit strategy toward site closure.

The **Sulphur Bank Mercury Mine Site** is an example of a site that received both an optimization review and several technical support projects to assist the site as it moved through the Superfund cleanup process. The support to the site team spans from 2013 to 2024. In 2020, an SPP was conducted with Region 9 (Table 3).

Table 3: Sulphur Bank Mercury Mine Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
Feasibility Studies	• Disagreement by stakeholders on the proposed interim remedy	• Systematic Project Planning Develop a site strategy • Update conceptual site model	• Continue to update the CSM and site strategy as needed	• CSM improvements

The site operated as a sulfur mine and then as a mercury mine from 1856 to 1957. Open pit mercury mining left a large flooded open pit, called the Herman Impoundment, filled with contaminated water that leaches mercury into nearby Clear Lake. In addition, there are 2 million cubic yards of mine wastes and tailings on the site.

In 2020, Region 9 requested facilitation assistance to resolve an informal dispute about the proposed interim remedy raised by the Elem Indian Colony tribe. EPA facilitated a series of meetings with Region 9, the California Regional Water Quality Board, the California Department of Toxic Substances Control, and the tribes following the SPP process to understand stakeholder concerns, identify issues with the CSM, and develop a site strategy that would have the support of all stakeholders. As a result of the support, stakeholders resolved their dispute agreeing to a schedule and path forward for the interim remedy and cleanup process. The SPP work was completed in 2021.

Three-Dimensional Visualization and Analysis

The EPA has found that **understanding subsurface heterogeneity at a much higher resolution is critical for evaluating contaminant fate and transport, and in designing and implementing more effective and targeted remedial actions.** Obtaining a correct geologic interpretation is foundational to depicting the subsurface. Visualization software has been successfully used to perform 3DVA that integrates three important subsurface parameters — geology, hydrogeology, and contaminant chemistry — into a single spatially correct format. The EPA has used 3DVA successfully to better understand subsurface structure and characteristics and to reconcile technical CSM discrepancies.

EPA OSRTI continued to perform 3DVA-based remedial progress monitoring for Region 9 at the **Newmark Groundwater Contamination** Superfund Site in San Bernardino, California (Table 4).

Table 4: Newmark Groundwater Contamination Superfund Site – Highlight Summary

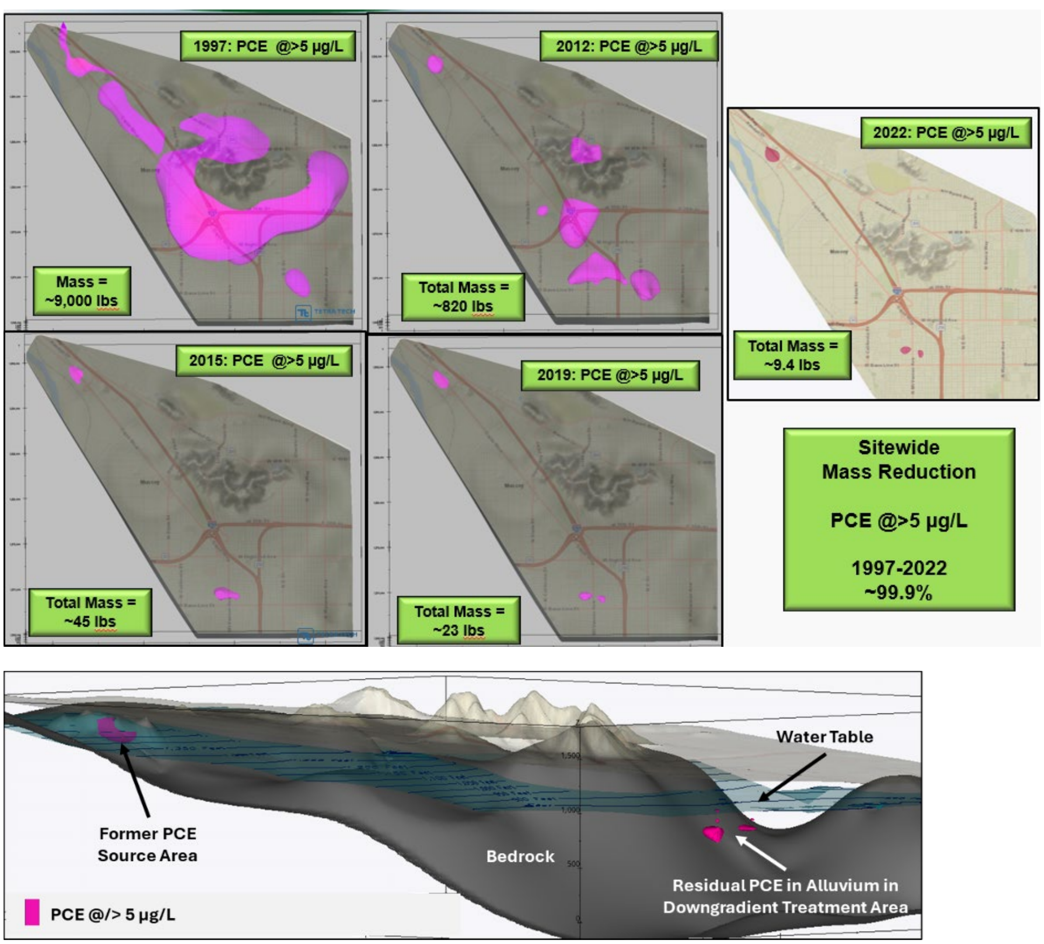
Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
Remedial Investigation	• Achieving site conditions to support issuance of third and final Proposed Plan and Record of Decision	• 3DVA • Evaluation of 30 years of site-wide groundwater monitoring data	• Perform periodic 3DVA-based remedial progress monitoring	• 3DVA demonstrated 99.7% reduction in site-wide tetrachlorethylene (PCE) mass between 1997 and 2022 • Plume footprint also substantially reduced

3DVA was originally used in 2012 to develop a CSM and identify potential sources of contamination at the site to support the design of an anticipated site-wide RI of the site's Newmark and Muscoy Operable Units (OUs). 3DVA efforts demonstrated that existing site data were enough to characterize the OUs; therefore, the RI field efforts were determined to be unnecessary.

Four 3DVA-based remedial progress monitoring efforts have been completed to date for the site: the initial 3DVA evaluation of existing groundwater data (1997–2012 time period); and three remedial progress monitoring updates (for the 2012–2015, 2015–2019, and 2019–2022 time periods). Key findings of the 3DVA evaluations included identification of: (1) the separation of a single plume into two separate plume lobes (Newmark and Muscoy plumes), (2) PCE-contaminated groundwater in the source area was not a continuing source of contamination for the Newmark and Muscoy plume lobes, and (3) there had been a significant reduction in site-wide contamination.

The 2019–2022 3DVA effort demonstrated that site-wide, dissolved phase PCE mass at concentrations at and above the 5 micrograms per liter had reduced approximately 99.9% from approximately 9,000 pounds in 1997 to approximately 10 pounds in 2022 (Figure 8). These results provided the basis for Region 9 to subsequently complete an RI and Focused Feasibility Study report, identify a final remedial alternative, develop and present a Proposed Plan, and issue the third and final record of decision (ROD) for the site in 2024.

Figure 8: PCE Mass Reduction at Newmark Groundwater Contamination Superfund Site



3.1.2 Improved System Engineering, Streamlined or Improved Monitoring, and Improved Site Characterization Through Strategic Sampling

Improved system engineering includes modifying one or more engineered components of a remedial system to improve overall system performance. Improved system engineering can include adaptively scaling remedies or using a more targeted approach that applies technologies to a specific and well-defined area. Smart scoping, strategic sampling approaches, CSM improvement, and improved data management can facilitate adaptively scaling remedies.

Streamlined or improved monitoring recommendations involve adjustments to monitoring frequency, monitoring locations, and chemicals of concern analyzed as well as the analysis of monitoring results over time. Streamlined or improved monitoring also addresses data management practices.

Strategic sampling is broadly defined as the application of focused data collection across targeted areas of the CSM to provide the appropriate amount and type of information needed for decision-making. **Strategic sampling throughout a project's life cycle may help inform the evaluation of remedial alternatives or a selected remedy's design, improve remedy performance, conserve resources, and optimize project schedules.** In addition, strategic sampling approaches assist with source definition and identify unique contaminant migration pathways, such as the vapor intrusion pathway. Strategic sampling approaches also target early action opportunities to mitigate potential threats as well as the data needs for technology applications over the longer term, including targeted pilot studies.

A 2019 optimization review was conducted at the Eagle Picher Carefree Battery Superfund Site in Socorro, New Mexico (Table 5).

Table 5: Eagle Picher Carefree Battery Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
Remedy Design	• Groundwater plume not sufficiently defined • Data gaps • Site uncertainty	• Additional source delineation • Additional characterization of plume • Soil coring using high-quality piston coring	• Characterize the plume through vertical groundwater quality profiling • Characterize downgradient dissolved-phase plume • Add monitoring wells • Consider shallow reinjection • Confirm treatment effective without pre-treatment	• Conceptual site model improvements • Improved system engineering • Streamlined or improved monitoring • Improved site characterization through strategic sampling

The site consists of the former Eagle Picher facility and a 360-acre groundwater contamination plume area, which extends approximately 9,000 feet south of the facility boundary. Trichloroethene

(TCE) is the main contaminant of concern with 1,4-dioxane present within the TCE plume boundary. The ROD for OU 1 was issued in September 2014 selecting a phased focused P&T, hydraulic containment, and institutional controls remedy using advanced oxidation process to treat 1,4-dioxane.

Forty-nine wells were used in the RI for groundwater elevation measurements and water quality monitoring, however, some areas have minimal plume interpretation, both horizontally and vertically, as the groundwater sampling network is sparse. The plume may have become detached from the former source area; however, this conclusion is based on data from very few wells. There is also a lack of data regarding the contamination in clay layers of the aquifer, and the relatively low-resolution data collected during the investigation at the site was not sufficient to determine the presence or absence of dense non-aqueous phase liquid on the property. The intended P&T remedy presents a significant risk that the aquifer will not be restored as intended in a reasonable period of time.

The optimization review team recommended that characterization of the plume and what sustains it be improved through vertical groundwater quality profiling coupled with injection logging to provide details on both concentration and K distributions. Profiling is recommended along three transects where data gaps exist. Following the recommended groundwater quality profiling, a soil coring and HRSC effort would provide a better understanding of the role diffusive mass flux out of low K zones is playing as a mechanism of sustaining the dissolved plume.

The optimization team also recommended improving the groundwater monitoring network by installing additional monitoring wells to fill existing data gaps with respect to both plume concentrations and distribution of hydraulic head. The exact location and depths for the wells along the transects would be determined based on the profiling results.

Additionally, the team recommended implementing shallow reinjection rather than deep injection to improve cost-effectiveness, if the pumping remedy was indeed implemented, and to confirm that the proposed HiPOx treatment for extracted groundwater from the site will be effective without pre-treatment.

Currently, remedial design for groundwater contamination is ongoing with remedial action anticipated to commence once the discharge options of treated water are reviewed and finalized.

3.1.3 Change in Remedial Approach

A **change in remedial approach includes adding or changing remedies to better address remaining contamination or newly identified areas of contamination.** The recommendations provide improvements in remedy effectiveness, cost reductions, and the achievement of site closure in a shorter period.

An optimization review was conducted at the **Lawrence Aviation Industries Superfund Site** in Port Jefferson Station, Suffolk County, New York, in 2020 (Table 6).

Table 6: Lawrence Aviation Industries Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
Remedy Design	• Verify and improve the understanding of the capture zones for both P&T systems • Evaluate potential for additional source areas	• Evaluation of in situ chemical oxidation (ISCO) remedy effectiveness • Additional source control • Analysis of capture zone	• Additional monitoring • Supplemental investigation • Technical Improvements to the P&T System • Reposition Extraction and injection wells closer to source areas	• Conceptual site model improvements • Change in remedial approach • Improved system engineering • Streamlined or improved monitoring

The site has a history of contamination due to poor waste handling practices by the titanium sheeting manufacturer. The site, which ceased production in 2003, has undergone various remedial activities since the early 2000s. Initial investigations revealed the presence of chlorinated volatile organic compounds (CVOCs), oils, hydrofluoric acid, metals, and polychlorinated biphenyls (PCBs) in the aquifer. Completed remedial activities include the removal of 550 tons of impacted soil and ISCO injections. Two P&T systems are currently operating to manage the contamination.

The optimization review identified several challenges, including the need to verify and improve the understanding of the capture zones for both P&T systems and evaluate potential additional source areas. The review also assessed the effectiveness of historical ISCO injections and considered actions to address potential source areas more aggressively before transferring the site to state operation and maintenance. Improving the performance of the existing P&T systems and conducting a groundwater system vulnerability and resiliency analysis were also key focus areas.

The review team made several recommendations to address these challenges. They suggested adjustments to the ongoing monitoring program and supplemental investigation activities to refine the CSM.

Significant progress in remediation of the hotspot area will require a more focused approach over the current passive approach. Optimized mass reduction could include groundwater extraction in the hotspot. If coupled with groundwater reinjection, the remedial timeframes could be significantly reduced while also overcoming the aluminum fouling issue. The team recommended adjustments to the current P&T system to optimize groundwater extraction rates and reduce treatment costs while maintaining capture and mass removal. The team also suggested a strategic dynamic flushing (SDF) scheme to enhance flushing and promote cleanup of both high and low advection zones. This approach aims to shorten the cleanup timeframe by decades and is recommended for both the on-site and downgradient plumes. The review also emphasized the importance of updating the CSM as new site characterization data becomes available.

Since the optimization review, the Lawrence Aviation Industries P&T system was upgraded in August 2021 with the installation of extraction well EW-3 closer to the source area. An alternative to the SDF recommendation was implemented to allow better access to the hot spot source areas.

Demolition of 15 site buildings to their concrete pads commenced in October 2023 and proceeded through summer 2024. Following demolition, activities designed to address the hot spot source areas began, including an investigation of potential sources of contamination under the buildings, closing subsurface structures, and cleanup of residual soil and groundwater contamination on-site. The site cleanup activities will also result in improved site safety and security, allowing for a proposed solar farm to be installed in the former footprint of the site buildings.

3.1.4 Improved Data Management

Best practices for improved data management includes efficiently managing the large amount of data generated throughout the data life cycle. Thorough, up-front RI/FS planning and scoping combined with decision support tools and visualization can help reduce RI/FS cost and provide a more complete CSM earlier in the process. In addition, **data management plays an important role in identifying data gaps during the RI/FS, remedial design, and remedial action phases. Following advanced data management techniques ensures the utility and maximum usability of the data as a site moves through the cleanup life cycle.** Improved data management actions are a common recommendation during optimization reviews. Here are some example recommendations made by the optimization review teams:

- **Tulalip Landfill** – Recommend that all site elevation data be converted to a single vertical datum to simplify comparison of leachate elevation levels, groundwater potentiometric levels, land surface elevations, and sea level to assess vertical hydraulic gradients and cyclic tidal inundation of wetlands.
- **Intel Magnetics** – Recommend reviewing the document repository for completeness including historical boring logs, groundwater elevation measurements, historical well coordinates, and sampling data. The absence of a full record of groundwater elevations prevents assessment of changes in groundwater flow that may have resulted in migration of contamination. Understanding potential groundwater flow changes may support determinations of plume stability and contaminant migration going forward. The optimization team suggests the creation of a single database with all available site data so that evaluation of the remedial options can be assessed accurately.
- **Bunker Hill Mining and Metallurgical Site, Lake Coeur d'Alene** – Recommend that each regulatory body or stakeholder group that collects data for monitoring water quantity and quality, waste discharge, and biological resources, develop a data maintenance plan that outlines how data will be stored, documented, and disseminated. The optimization team further recommends the development of a basin-wide data repository. Multiple stakeholders have collected data for the basin; however, these data are documented in separate reports or have been saved in separate repositories and formats over several decades. The data are difficult to access for evaluation.

3.2 Overview of Progress Implementing Optimization Review Recommendations

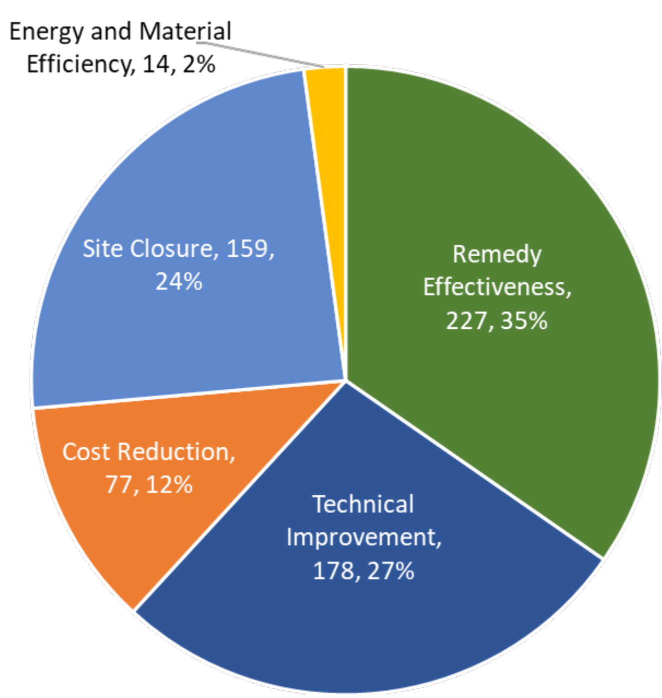
A total of 74 optimization reviews were completed from FY 2018 to FY 2022; a list of the 74 sites is provided in Table A-1 of Appendix A. Updates were also received for 26 optimization reviews completed in previous years, they are shown in Table A-2 of Appendix A. EPA worked closely with regional staff including RPMs and ROLs to collect information on the status of the recommendations for each of the optimization reviews. Sources of information for this report included information from RPMs, site-specific optimization reports, optimization recommendation follow-up recorded in past annual reports, and follow-up information provided in the most recent data collection effort.

3.2.1 Recommendation Categories

Optimization reviews typically identify several opportunities for improvements. **These improvements are organized into five recommendation categories: remedy effectiveness, cost reduction, technical improvement, site closure, and energy and material efficiency.** The number of recommendations in each category relative to the total number of recommendations for the optimization reviews are shown in Figure 9.

Figure 9: Recommendations by Category

Total Number of Recommendations = 655



Example Recommendations

Remedy Effectiveness: Assess capture of the northwest lobe of the plume through installation of a deeper monitoring well near existing well LC-166D.

Technical Improvement: Install variable-frequency drives and replace fans associated with groundwater treatment system air strippers for improved operation of those systems.

Cost Reduction: Hydraulic containment can likely be maintained at lower pumping rates; the lower volume of pumped water can reduce costs associated with water treatment and managing aluminum fouling.

Site Closure: Optimize mass reduction using groundwater extraction in the hotspot, coupled with groundwater re-injection. Remedial timeframes would be significantly reduced.

Energy and Material Efficiency: Well redevelopment and lowering of pumps should increase well yield, reducing the need to cycle pumps that may cause premature failure.

It is important to note that recommendations were only counted in the primary category they represent, but many recommendations could be counted in multiple categories. For example, a recommendation could both improve remedy effectiveness and move a site toward closure.

Implementing recommendations from optimization reviews can result in improved: (1) understanding of the site conditions, (2) designs for remedies, or (3) operations of remediation systems, among other benefits. Site-specific recommendations depend on the type of optimization review conducted and the phase of the Superfund pipeline.

Remedy Effectiveness – Thirty-five percent of optimization recommendations (227 of the 655) fall into the remedy effectiveness category. Examples of remedy effectiveness recommendations include the following:

- Improvements in the CSM through additional characterization of sources and environmental media.
- Changes in remedial approach to address subsurface contamination.
- Changes in management approach and reporting.
- Improvements to the performance of an existing remedial system.
- Identification and reduction of risk to human and ecological receptors.

Cost Reduction – Optimization recommendations pertaining to cost reduction covered many aspects of system operation, including the use of specific treatment technologies, operator and on-site laboratory labor, reporting, and project management. Cost savings for this report were estimated as one-time cost savings or multiple year annual cost savings, depending on site-specific findings. It should be noted that short-term investments were often required to realize longer-term cost savings. In addition, cost savings in the form of cost avoidance were often realized but sometimes difficult to quantify. Optimization reviews continued to identify many opportunities to reduce on-site labor through system automation and reductions in monitoring requirements without affecting remedy performance. Such reductions were identified as possible following system shakedown, when a remedy was put through initial tests and improvements, and then designated as operational and functional. Furthermore, cost savings were realized through decommissioning of select treatment components, which had become inefficient or unnecessary because of successful cleanup results or overly conservative estimates applied during the design phase. Simplifying or improving performance of treatment systems under such conditions resulted in cost savings associated with reduced material costs, decreased energy usage, and reduced labor cost for operating, maintaining and monitoring. Further, improvements in remedy effectiveness, movement toward site completion, or energy and material efficiency also resulted in cost reduction or cost avoidance; however, the benefits may not have been as readily quantified. Examples of cost reduction recommendations include the following:

- Reducing labor costs through automation of systems operation.
- Reducing project management costs by streamlining contractor management and addressing technical issues to reduce oversight costs and needs for management of vendors.

- Reducing laboratory and reporting costs through streamlined monitoring; including reducing the frequency of sampling and analysis, focusing on key analytes only, and decommissioning on-site laboratories that are no longer providing benefit.
- Reducing operating costs by streamlining treatment systems.
- Reducing costs for supporting systems operations such as facility or road maintenance and snow removal.

Technical Improvement – Technical improvement recommendations covered a wide range of items to improve overall site operations; however, they most commonly related to improving the performance of existing remedial systems. Such recommendations were generally straightforward to implement, required minimal capital investment, and were not typically contingent on the implementation of other recommendations. Some recommendations for technical improvement were not implemented because they addressed an existing component that was likely going to be changed based on remedy effectiveness recommendations. Examples of technical improvement recommendations include the following:

- Decommissioning or reconfiguring components of the treatment train.
- Inspecting and then cleaning, repairing, or replacing faulty or underperforming equipment.
- Rehabilitating fouled extraction or injection wells.
- Considering use of more efficient pumps and blowers.

Site Closure – Optimization reviews continue to identify opportunities to accelerate progress toward achieving final cleanup goals and eventual site completion. These recommendations most commonly involve developing a clear and comprehensive completion strategy and evaluating changes to the remedial approach for situations where the current remedy may no longer be the most effective approach.

When considering site closure for groundwater sites, EPA's *Groundwater Remedy Completion Strategy* (EPA, 2014) and related guidance documents provide an approach and statistical tool for assessing when monitoring results indicate that cleanup levels are achieved, and aquifer restoration is accomplished. A completion strategy "…is a recommended site-specific course of actions and decision-making processes to achieve groundwater RAOs [Remedial Action Objectives] and associated cleanup levels using an updated conceptual site model, performance metrics and data derived from site-specific remedy evaluations" (EPA, 2014).

The completion strategy decision-making process supported the assessment of remedial performance and evaluation of whether a remedial action was working as anticipated or if the remedy selected in the decision document may need to be modified to achieve RAOs and associated cleanup levels. Such modifications often included addressing additional source material or residual subsurface contamination. Implementing the Task Force recommendation to establish dynamic site strategies during RI/FS scoping and throughout the RI/FS process moved sites to completion more readily. Examples of site closure recommendations include the following:

- Further characterization of sources.
- Targeted treatment of remaining sources.

- Development of a completion strategy including performance metrics for determining achievement of RAOs.

Energy and Material Efficiency – Optimization reviews continued to identify opportunities to accelerate progress toward achieving energy and material efficiency and reductions in site environmental footprints. It should be noted that recommendations for other optimization categories—remedy effectiveness, cost reduction, and technical improvement—often included opportunities for reductions in environmental footprint. EPA also provided technical support conducting environmental footprint analyses during the design phase to identify energy and material efficiency best practices and to ensure remedy components were adaptively scaled when implemented. Examples of energy and material efficiency recommendations include the following:

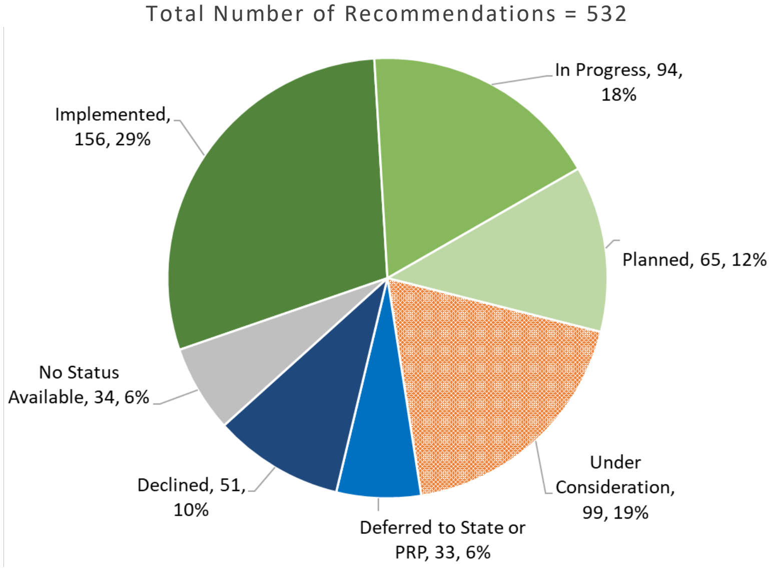
- Utilizing local labor for site management and sampling to avoid air emissions associated with travel.
- Considering opportunities for converting sites to renewable energy such as solar, wind, or use of renewable energy credits.
- Streamlining the treatment train.
- Downsizing pumps and blowers.

3.2.2 Recommendation Implementation Status

EPA received feedback from RPMs on 60 of the 74 optimization reviews completed during the reporting period. Those 60 reviews included 532 recommendations. The implementation status of the recommendations is provided in Figure 10.

Figure 10: Status of New Optimization Recommendations

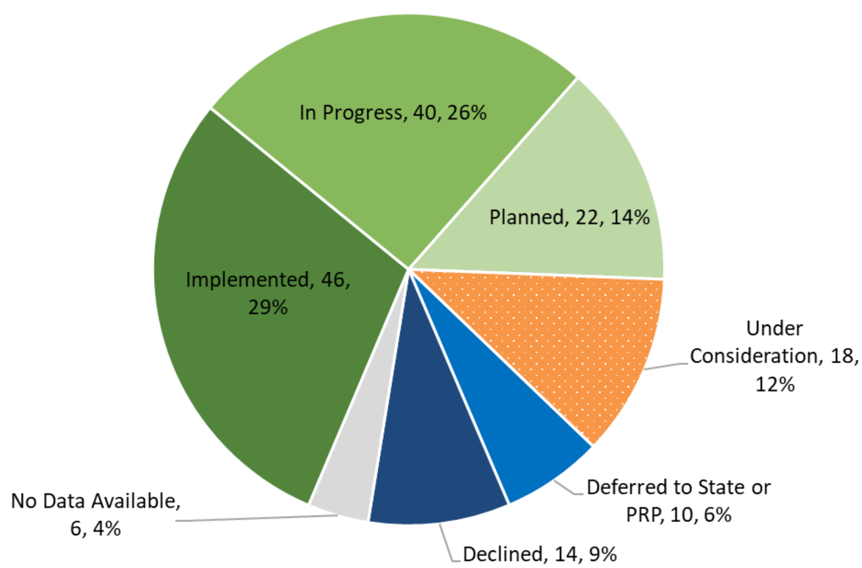
Total Number of Recommendations = 532



For the 60 sites where updates were received, overall, 59% of optimization recommendations have been implemented, are in progress, or are planned, and another 19% are under consideration. Only 10% of optimization recommendations were declined. Recommendations can be declined for a number of reasons, including changed site conditions or selection of one option when several are offered. A small number of recommendations (6%) were deferred to the state or PRP for action. Recommendations are deferred to the state or PRP when site activities are their responsibility. In these cases, the recommendations are provided as suggestions for improvements to be addressed at the discretion of the state or PRP. No information was provided for 6% of the recommendations, labeled as no status available. These results demonstrate that optimization review teams continue to evaluate site conditions and put forth reasonable recommendations for making improvements and that site teams are open to suggestions for improvement.

EPA conducts additional follow-up for optimization reviews conducted in previous reporting periods, where the recommendations were still under consideration. In reviewing the updates received for 26 optimization reviews with 156 recommendations from the previous report, EPA found that **69% were implemented, in progress or planned and another 12% were still under consideration** (Figure 11).

Figure 11: Status of Updated Optimization Recommendations
Total Number of Recommendations = 156



Examples of optimization reviews conducted during the reported period are provided to showcase the challenges, recommendations and outcomes of the review.

The optimization review at the **Crossley Farms Superfund Site** in Berks County, Pennsylvania, conducted in 2022, highlighted several challenges and outcomes Table 7).

Table 7: Crossley Farms Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
LTRA	• Future operation of existing extraction and treatment system • Uncertainty in influent concentration and extraction rates as well as mass loading to treatment system	• Analysis of groundwater data	• Evaluate performance of combined Hot Spot and Valley Plume remedy for five years • If monitoring over five-year period suggests insufficient improvement, then add one or more extraction wells • Optimize the hot spot extraction system to control the source	• Conceptual site model improvements • Improved system engineering

Contamination at the site is the result of historical disposal of solvents that were brought to the property in the 1960s and 1970s, including the CVOCs, TCE, and tetrachloroethene. TCE is the primary contaminant of concern. The site has three OUs addressing private drinking wells, groundwater, and potential vapor intrusion. The active remedy involves a groundwater extraction and treatment system (GETS) for the Valley Plume area, with construction completed in 2012 and a 10-year LTRA period starting in 2014. However, the effect of groundwater extraction from the hot spot area on the Valley Plume extraction wells remains uncertain.

The optimization review team recommended evaluating the combined Hot Spot and Valley Plume remedy's performance over five years to determine if future optimization is needed. They suggested increasing monitoring frequency from annual to semi-annual at specific wells and including detailed extraction rate data in future reports. Additionally, the team noted that changes in influent concentrations and mass loading to the treatment plant could not be predicted, advising against making financial or contractual decisions based on specific concentration or mass loading assumptions until after three to five years of operation.

Further recommendations included reducing the frequency of volatile organic compound (VOC) sampling for influent and between GETS components, complying with state air emissions regulations, and synchronizing the replacement of vapor-phase granular activated carbon in the influent tank's headspace treatment train. The Hot Spot Treatment Area is currently under construction, with a hydraulic study to follow. The state is anticipated to take over the system by 2026, with the Hot Spot remedy expected to operate indefinitely.

In 2021, an optimization review was conducted at the **Woolfolk Chemical Works Superfund Site** in Fort Valley, Peach County, Georgia (Table 8).

Table 8: Woolfolk Chemical Works Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendations	Outcomes
Remedial Action	• Improve understanding of distal portion of the plume • Uncertainty about vertical distribution of contaminants	• Data gap analysis	• Incorporate the improved understanding of the main conduits of water and contamination transport within the depositional cycles into the remedial design	• Conceptual site model improvements • Strategic sampling

The site includes an 18-acre former facility and a pesticide plume in groundwater extending beyond the facility. The site is divided into five OUs, with OU1 addressing contaminated groundwater from the former facility. A groundwater P&T system operated intermittently from 1998 to 2014 but was terminated due to inefficacy. The review focused on characterizing and delineating the pesticide plume and evaluating VOC impacts related to vapor intrusion (VI).

Challenges with OU1 included data gaps and uncertainties in the distal portion of the plume. These challenges involved poor understanding of stratigraphy, groundwater elevation, flow direction, and pumping rates at private wells. Additionally, there were uncertainties about the vertical distribution of contaminants, the chemical signature differences between plume portions, and the extent of VOC contamination in the Surficial Zone.

The optimization team recommended several actions, including installing point-of-entry systems with granular activated carbon for households using well water with detected pesticides. They also suggested evaluating risks associated with pesticide-contaminated water for irrigation, installing additional monitoring wells, and conducting quarterly sampling for one year. Other recommendations included a direct-push technology investigation at specific locations, preparing an updated CSM report, and identifying and controlling remaining sources to restore groundwater downgradient of the source areas.

Currently, recent groundwater sampling results are pending, and additional monitoring wells are being installed with rotosonic drilling. The goal is to install 36 monitoring wells, establish quarterly sampling, and update the CSM report. VI sampling was conducted in February 2023.

3.3 Summary of Technical Support Projects and New Initiatives

In addition to formal optimization reviews, EPA provides technical support that results in optimization principles being applied more broadly. During this reporting period FY 2018 to FY 2022, 86 technical support projects were completed. The list of projects is included in Table A-3 of Appendix A.

Technical support projects can occur in early phases of the Superfund pipeline before there is a full remedial system operating, or later in the pipeline to support specific actions such as further source identification or plume delineation. Technical support projects may be conducted as a follow-on support to an optimization review. Technical support projects frequently involve collaboration among RPMs, hydrogeologists, risk assessors, chemists, and their State and Tribal counterparts.

Technical support projects provide direct support to the site team using best practices such as SPP, preliminary scoping, DMAs, strategic sampling design, HRSC, CSM development, mapping and three-dimensional visualization and analysis (3DVA), and advanced data management techniques. Activities can include comprehensive project planning, and management and implementation activities which are intended to help move projects forward and improve site decision-making. Section 3.1 of this report presented several site examples of technical support projects using best practices such as ESS for Puchack Well Field, SPP for Sulphur Bank Mercury Mine and 3DVA for Newmark Groundwater Contamination Site. Technical support projects frequently develop products for the site team such as work plans, quality assurance project plans, decision logic diagrams, sampling designs and technical memorandums. Below are some additional examples of technical support projects completed during this reporting period.

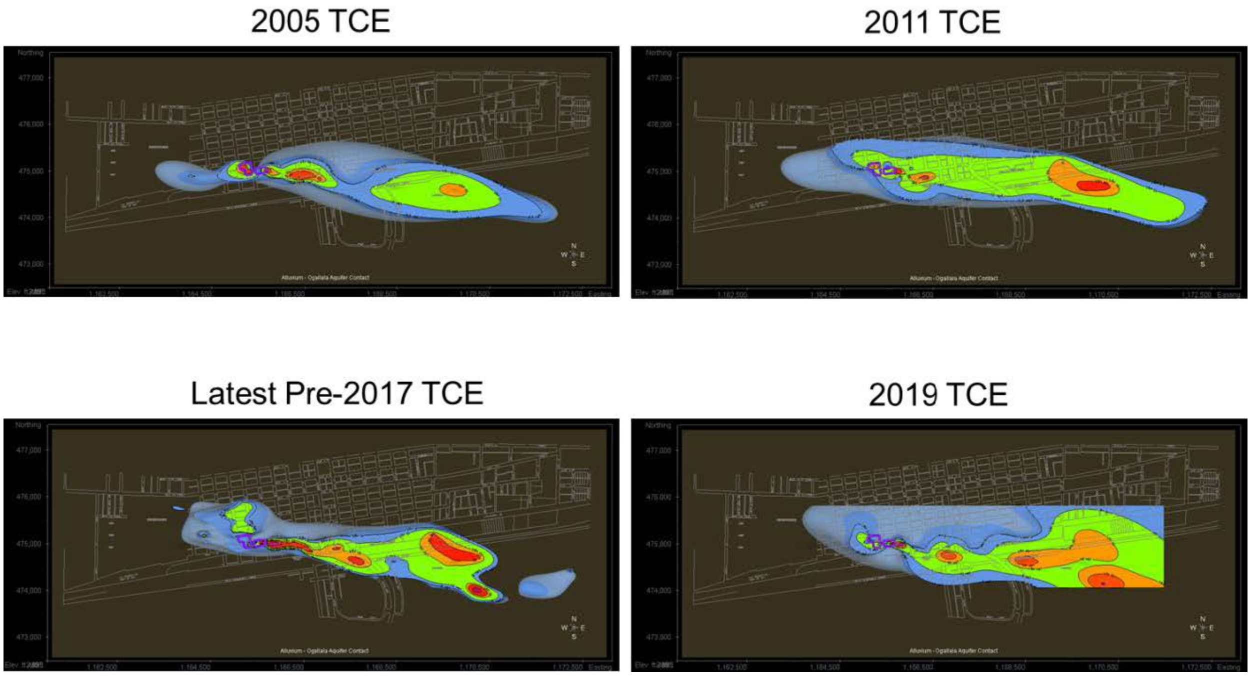
A 3DVA was developed for the **Ogallala Groundwater Contamination Site** in Ogallala, Nebraska (Table 9).

Table 9: Ogallala Groundwater Contamination Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
RI	Groundwater contamination from volatile organic compounds (VOCs) and solvents	3DVA using Earth Volumetric Studio (EVS)	Use 3DVA for decision making	Reduced uncertainty in technical decision making

The EPA has been addressing long-term groundwater contamination from VOCs and solvents resulting from historical industrial activities. Challenges at this site include widespread contamination across 16 acres and the potential for contaminant migration within the Ogallala Aquifer. 3DVA performed with Earth Volumetric Studio (EVS) modeled contaminants in soil, groundwater, and soil vapor across the site. The analysis revealed that dissolved-phase TCE plumes have remained relatively stable over time, with contamination primarily migrating through permeable zones of the Ogallala Aquifer (Figure 12). High soil vapor concentrations were spatially correlated with silt and clay zones, indicating a likelihood of slow back diffusion. The 3DVA has significantly reduced uncertainty in site conditions, enhancing technical decision-making for regulators and stakeholders and will be used to support future site investigations and remedial actions.

Figure 12: TCE Concentration Over Time at Ogallala Groundwater Contamination Superfund Site



Region 4 requested assistance with a technical review of the proposed incremental sampling work plan for the **Ward Transformer Site** in Raleigh, NC (Table 10).

Table 10: Ward Transformer Superfund Site – Highlight Summary

Phase	Challenge	Tool/Analysis	Recommendation	Outcomes
Remedial Investigation	• PCB contamination of soils and downstream watershed • Quality control and data representativeness	• Technical review assistance • Systematic Project Planning • Incremental Sampling Methodology	• Collect co-located confirmation sampling • Use EPA's DQO process	• Ensure attainment of remedial goals

Ward Transformer is a PRP-led site that was a former electrical equipment manufacturing and reconditioning facility whose operations have led to the release of PCBs to the on-site soils and downstream watershed. The site is currently undergoing remedial action via excavation of PCB contaminated sediments and floodplain soils along affected reaches with the goal of alleviating downstream fish consumption advisories in Lake Crabtree and Briar Creek Reservoir. The optimization team assisted in the evaluation of the post-remediation verification sampling plan proposed by the PRP to ensure that attainment of the post-remedial goal is accurately assessed.

The optimization team supported Region 4 with three SPP sessions to develop a confirmation sampling plan utilizing incremental sampling to assess attainment of the clean-up goal for soils and sediments contaminated with PCBs in OU1. The SPP sessions were designed to build consensus between Region 4 and the North Carolina Department of Environmental Quality (NCDEQ) on the project objectives and cover the critical steps of the DQO Process. OSRTI previously assisted Region 4 and NCDEQ with a technical review of the PRP's proposed confirmation sampling plan for which there are concerns regarding the adequacy of the quality assurance/quality control and data representativeness. After multiple iterations of technical review, Region 4 and NCDEQ plan to collect co-located confirmation samples as part of oversight activities to ensure attainment of the cleanup goal is achieved.

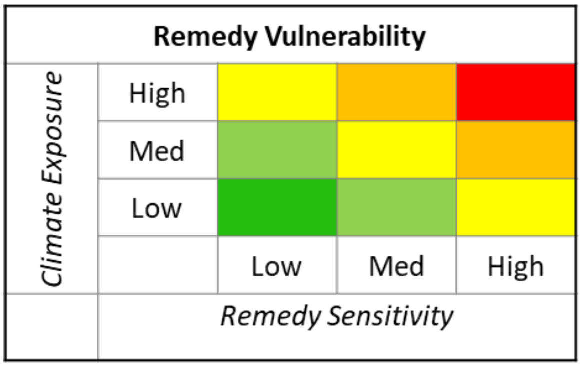
New Initiative: Remedy Vulnerability Assessments

During this reporting period the optimization program began offering technical support to ensure long-term protectiveness of remedies to extreme weather impacts such as hurricanes and wildfires. Starting in 2014, EPA offered a course on Building Resilient Remedies at the National Association of Remedial Project Managers (NARPM) Training Program to discuss lessons learned from sites that had been impacted by weather hazards. While these courses were informative, RPMs expressed a need for additional assistance in proactively evaluating their sites for weather vulnerabilities. Through a series of interactive sessions with RPMs throughout the country, OSRTI identified the specific needs of the RPMs and began establishing a methodology for providing that assistance. Through that course, and through lessons learned from optimization, EPA offered assistance to the regions in identifying sites that may have vulnerabilities and identifying adaptive measures that could be considered to build resilience.

In 2023, EPA issued a paper in collaboration with the Superfund Engineering Forum, on how to ensure resilience in the Superfund cleanup process.[9] The issue paper documented the lessons learned in conducting vulnerability assessments at Superfund sites and outlined the standard process for conducting assessments. EPA Regions, individually and with the support of the optimization program, have developed screening processes, tools and reports to incorporate identification of vulnerabilities into site decision making, and to identify sites that may require additional assessment under the optimization program. All optimization reviews conducted starting in 2021 include extreme weather considerations and recommend further assessment if necessary. Sensitivities associated with site remedies, proposed remedies, or current contaminated media are evaluated against the weather exposures identified for the site. The qualitative intersection between exposure and remedy sensitivities, as determined by remedy experts applying professional judgement, identifies site-specific vulnerabilities (Figure 13).

[9] *Conducting Climate Vulnerability Assessments at Superfund Sites*

Figure 13: Qualitative Depiction of Remedy Vulnerability



Three vulnerability assessments were completed during this reporting period, and an additional 14 assessments were started during the reporting period. Examples of the types of vulnerabilities that were the focus of the vulnerability assessments are included in Table 11. EPA will further report on the outcomes of the vulnerability assessments in the next reporting period.

Table 11: Examples of Remedy Vulnerabilities and the Associated Impacts to Remedy Protectiveness

Vulnerability	Potential Impacts to Remedy Protectiveness
Increases in precipitation amount associated with 100-year storm event exceed system capacity	Leachate treatment system designed with the capacity for a historic 100-year storm event may no longer be protective during such events
Increases in streamflow that erode unarmored portions of a cap	Migration of contaminants in the stream from cap erosion
Changes in the water table that alter the direction of groundwater flow, impacting plume capture	Migration of groundwater plume to residential drinking water aquifers, or beneath residential buildings introducing vapor intrusion concerns
Increased stress on vegetative caps from increased summer temperatures	Loss of vegetative cover causing exposure of contaminants after storm events or reduced viability of evapotranspiration (ET) covers dependent upon transpiration by vegetation
Desiccation of an unsubmerged sediment cap due to sustained drought conditions	Failure of desiccated and cracked sediment cap after storm event
Increased fluctuations in river and pond levels that cause extended periods of exposed contaminated sediment	Changes in contaminated media properties that impact contaminant migration; for example, increases in mercury methylation
Changes in pond water temperature impacting benthic community	Increased uptake of contaminants by the local biota, resulting in exposure to humans and fauna that consume fish and wild plants
Increases in wildfire hazard and heavy precipitation events increase landslide susceptibility and potential for debris flows, threatening critical infrastructure	Groundwater pump and treat system used for containment is damaged and requires lengthy repairs or replacement, resulting in loss of plume capture

3.4 Site Strategies

The site strategy is a high-level planning and project management tool, which documents a site's overall assessment and remediation strategy by: (1) prioritizing the site's high-level goals; (2) outlining key Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial and enforcement activities needed to achieve these goals; and (3) identifying key issues (e.g., factors potentially impeding assessment and remediation activities) and project team recommendations. It also provides a framework for the designation of OUs and a narrative for Superfund Enterprise Management System (SEMS) planning data.

A site strategy should be forward-looking and document potential opportunities for undertaking early and interim response actions. It should also inform decision-making under constrained resources; ensure transparent understanding of strategies by regional and headquarters management; and support transfer of sites between RPMs. The geographic area covered by the site strategy is normally the entire NPL site, including all OUs. For portions of complex sites, project teams may also develop a stand-alone site strategy in addition to a site-wide strategy.

EPA launched the site strategy support initiative in 2020, assisted by the optimization program. EPA developed site strategy templates, training, and tracking tools and offered RPMs assistance in developing site strategies. In 2022, EPA developed the *Site Strategy Primer* (EPA 2022) during the reporting period, the optimization program assisted with the development of over 180 site strategies. Nation-wide nearly 300 site strategies were underway by the end of FY 2022.

During the course of creating a site strategy, sometimes the site strategy team will determine whether the site could benefit from an optimization review. This was the case for Mouat Industries, where a site strategy was developed in FY 2022 followed by an optimization review in FY 2023. Occasionally, an optimization review is conducted at a site that does not yet have a site strategy, and the site strategy is then completed before proceeding with the optimization recommendations, as was the case with Woolfolk Chemical Works.

4.0 SUMMARY OF PROGRESS ON IMPLEMENTING THE NATIONAL OPTIMIZATION STRATEGY

EPA has continued to successfully implement the National Strategy and expand the optimization program and its many benefits to reach a larger number of sites across all stages of the Superfund pipeline. Four main elements form the basis of development and implementation of the National Strategy. They include:

- Element 1 – Planning and Outreach.
- Element 2 – Integration and Training.
- Element 3 – Implementation.
- Element 4 – Measurement and Reporting.

4.1 Planning and Outreach

EPA has continued to increase its success in planning and outreach to continuously identify sites or site projects that would benefit from an optimization review. This collaborative process between EPA HQ and the regions, facilitated by ROLs and Superfund and Technology Liaisons (STLs), includes regions identifying sites that may benefit from an optimization review and requesting technical support from the EPA HQ team. Other government stakeholders (such as states, tribes, and local governments) and communities are also requesting optimization reviews and technical support projects through their respective EPA Regions. In addition, an increasing number of requests are being generated from the optimization material presented at CERCLA Education Center (CEC) and NARPM Training Program courses and EPA HQ and regional presentations at outside conferences and training programs. Support may be provided by EPA HQ, regions, or resources from other EPA offices, such as the Office of Research and Development.

The use of optimization practices helps to address stakeholder concerns and provide information on the protectiveness and efficacy of remedies and may instill more confidence in communities that remedies are and will remain protective. EPA's optimization website[10] contains detailed information on the optimization program and is accessible to the public.

4.2 Integration and Training

EPA continues to collect, synthesize, and share optimization lessons learned through: (1) CEC and Environmental Response Training Program courses; (2) NARPM and On-Scene Coordinator Academy training programs; (3) CLUIN Webinars[11]; (4) periodic meetings of the National Optimization Team composed of EPA HQ staff, ROLs, and STLs; and (5) presentations at conferences and training programs sponsored by other entities within EPA (Brownfields, Federal Facilities, and RCRA corrective action programs) and outside of EPA (such as Battelle conferences, Northeast Waste Management Officials' Association conferences, and Association of State and Territorial Solid Waste Management Officials events).

Since the National Strategy was issued, over 800 participants have received training on optimization, optimization best practices, incremental sampling and groundwater HRSC. Participants have included EPA staff as well as external partners including states, other federal agencies and private firms. For 2018 through 2022, there have been six deliveries of the Best Practices course with a total of 138 students attending; a training course on incremental sampling was developed and delivered to 29 attendees in 2022, and the groundwater HRSC course was delivered eight times with 235 students attending. A course on building resilient remedies was offered at NARPM in 2019 and 2022 with 96 students attending. For NARPM 2023, six optimization "lightning sessions" were conducted. These session offerings were intended to provide individual RPMs with the opportunity to meet with technical experts from the optimization program to evaluate challenges that the RPMs are facing at their sites. The sessions serve as initial assessments to identify whether a formal optimization review or technical support project, provided by the optimization team, would be valuable to address the site challenges.

EPA's understanding of best management practices for site characterization has grown through implementation of the National Strategy. EPA synthesized the lessons learned from conducting optimization reviews and technical support projects into three technical guides*: Smart Scoping for Environmental Investigations*, *Strategic Sampling Approaches,* and *Best Practices for Data Management*. EPA issued these three technical guides in November 2018 on topics related to optimization to facilitate additional technology transfer of these best management practices. EPA

[10] https://www.epa.gov/superfund/cleanup-optimization-superfund-sites

[11] https://clu-in.org/training/

has also developed standard operating procedures such as project engagement forms, checklists, and documentation to facilitate the scoping and conducting of optimization reviews.

4.3 Implementation

The primary goals of implementation are to extend optimization to all phases of the Superfund pipeline and to build capacity for integrating optimization concepts throughout the pipeline. EPA accomplishes this goal not only by executing training and integration efforts, but also by increasing the amount of optimization reviews conducted with site teams in all regions and introducing site team members to optimization concepts that then become incorporated as standard operating practice. Initially, all optimizations were done for sites in the remedial action or O&M phase of the Superfund pipeline. In FY 2018 through 2022, 38% of all optimizations were done in pre-remedial action phases including PA/SI, RI/FS, and remedial design phases (Figure 2, Section 2.0).

For the new optimization reviews, 59% of optimization recommendations were implemented, are in progress, or are planned. Another 19% are still under consideration and only 10% were declined. A small number of recommendations (6%) were deferred to the state or PRP for action, and 6% do not have status information available (Figure 10, Section 3.2).

Prior to implementing the National Strategy, EPA completed approximately seven optimization projects per year. In late 2010, EPA initiated the development of the National Strategy to increase the capacity for conducting optimizations. Since implementing the National Strategy, EPA now completes approximately 32 projects per year on average (Figure 4, Section 2.0). In addition to the number of completions per year, the capacity to support ongoing optimization events has increased to an average of 75 or more optimizations per year, with 76 events supported in FY 2022 (Figure 3, Section 2.0). EPA also continued with the implementation of the Task Force Recommendation 7,[12] promoting the use of optimizations. To prioritize allocation of optimization resources, EPA has established criteria to prioritize site attributes tied to Task Force recommendations, such as human exposure not under control; large and complex, such as sites with remedies greater than $50 million; stakeholder interests or concerns; projected completion dates within 5–15 years, where optimization may accelerate closure. EPA continues to implement projects to advance optimization practices and related tools in all phases of cleanup.

4.4 Measurement and Reporting

To more accurately track optimizations and be able to provide data and information regarding the program, EPA uses two tracking tables: the Optimization Project Log (OPL) and the Optimization Report Inventory and Tracking Tool (ORITT). In OPL, EPA lists all optimization projects (technical support projects and optimization review events) by site name and records key information about each event including:

- Event type (technical support or optimization review).
- Project lead, regional contact, and contractor support.

[12] Superfund Task Force Report Recommendation 7: Promote Use of Third-Party Optimization Throughout the Remediation Process and Focus Optimization on Complex Sites or Sites of Significant Public Interest

- Site type, media, and contaminant groups addressed.
- Current project status (anticipated, in progress or complete).
- Major project milestone dates (scoping call, kickoff call, site visit, drafts, and final reports).
- FY start and completion dates.

OPL is updated each week. Summary reports on the current status of all events supported during the current fiscal year are provided to EPA management.

In 2018, two SharePoint sites were developed for the optimization program. The first is a project file storage area for use by the headquarters optimization team. The site allows RPMs and other stakeholders to share background documents and data with EPA project leads and their contractor support for use in conducting the optimization projects. These background files are stored for easy access and knowledge of materials used to support the optimization effort. In addition, draft and final documents are stored on this SharePoint site. The second SharePoint site is available to all EPA staff and includes a digital engagement form that can be filed out by any RPM seeking optimization support for a site. An updated SharePoint site is under development and will include a Power BI dashboard showing data visualizations of all historical projects and details of projects being supported in the current fiscal year. The dashboards can be manipulated by the user in real time, such as focusing on projects conducted in one region or in one year. Currently, an Excel dashboard is available on MS Teams for headquarters personnel only.

In 2019, the optimization program began participating in the EPA Lean Management System. As part of that effort, tracking sheets referred to as the flow board were developed to provide information on each ongoing optimization review as well as tracking candidates and issues noted. The flow board identifies project leads, significant project milestones, and provides projected dates for future milestones. Every other week, the headquarters optimization team meets in a “huddle” for 20 minutes to quickly provide any updates and identify any projects that are lagging. The flow board displays the status of the projects as a visual management tool.

ORITT houses recommendation data from all optimization reviews that have been completed to date. EPA records the names and category of recommendations and the implementation status of the recommendations. EPA is currently pursuing development of an enhanced ORITT system to be developed in SEMS.

5.0 REFERENCES

EPA. 2004. Action Plan for Ground Water Remedy Optimization. OSWER 9283.1-25. August.

EPA. 2012a. Groundwater Remedy Optimization Progress Report: 2010–2011. OSWER Directive No. 9283.1-38. July.

EPA. 2012b. Memorandum: Transmittal of the National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion. From: James. E. Woolford, Director Office of Superfund Remediation and Technology Innovation. To: Superfund National Policy Managers (Regions 1–10). OSWER Directive No. 9200.3-75. September 28.

EPA. 2014. Groundwater Remedy Completion Strategy. OSWER Directive No. 9200.2-144. May. http://semspub.epa.gov/src/document/HQ/100000021

EPA. 2017a. Superfund Task Force Recommendations. July. https://www.epa.gov/sites/production/files/2017-07/documents/superfund_task_force_report.pdf

EPA. 2017b. Best Practices for Environmental Site Management: A Practical Guide for Applying Environmental Sequence Stratigraphy to Improve Conceptual Site Models. EPA 600-R-17-293. September. https://semspub.epa.gov/src/document/HQ/100001009.pdf

EPA. 2018a. Smart Scoping for Environmental Investigations Technical Guide. EPA 542-G-18-004. November. https://semspub.epa.gov/src/document/11/100001799

EPA 2018b. Strategic Sampling Approaches Technical Guide. EPA 542-F-18-005. November. https://semspub.epa.gov/src/document/11/100001800

EPA 2018c. Best Practices for Data Management Technical Guide. EPA 542-F-18-003. November. https://semspub.epa.gov/src/document/11/100001798

EPA 2022. Site Strategy Primer. EPA 542-F-22-001. August.

APPENDIX A

OPTIMIZATION REVIEWS AND TECHNICAL SUPPORT PROJECTS COMPLETED FY 2018 – FY 2022 AND UPDATES

Table A-1: New Optimization Reviews Included in This Progress Report (FY 2018–FY 2022)

State	Optimization Reviews	FY Complete	Pipeline Phase	Total Optimization Reviews
Region 1				**3**
MA	Alto Tronics	2020	RCRA	
MA	Charles George Reclamation Trust Landfill	2018	O&M	
NH	Savage Municipal Water Supply	2018	O&M	
Region 2				**4**
NY	Crown Cleaners of Watertown Inc.	2019	Remedial Action	
NY	Lawrence Aviation Industries, Inc.	2020	LTRA	
NY	Marathon Battery Corp.	2019	O&M	
NJ	Myers Property	2018	Remedial Action	
Region 3				**6**
PA	Avco Lycoming (Williamsport Division)	2022	O&M	
PA	Crossley Farm	2022	LTRA	
VA	Greenwood Chemical Co.	2021	O&M	
MD	Ordnance Products, Inc.	2021	LTRA	
WV	Vienna Tetrachloroethene	2018	LTRA	
PA	Watson Johnson Landfill	2019	Remedial Action	
Region 4				**6**
AL	American Brass Inc.	2020	LTRA	
AL	Ciba-Geigy Corp. (McIntosh Plant)	2020	Remedial Action	
GA	Marzone Inc./Chevron Chemical Co.	2021	LTRA	
AL	Olin Corp. (McIntosh Plant)	2020	Remedial Action	
GA	Peach Orchard Rd PCE Groundwater Plume Site	2021	LTRA	
GA	Woolfolk Chemical Works, Inc.	2022	Remedial Action	
Region 5				**12**
IN	ArcelorMittal Indiana Harbor East	2020	RCRA	
WI	Better Brite Plating Co. Chrome and Zinc Shops	2020	O&M	
IN	Galen Myers Dump/Drum Salvage	2019	O&M	
OH	GE Aircraft Engines	2022	RCRA	
MI	Grand Traverse Overall Supply Co.	2022	LTRA	
MI	Grand Traverse Overall Supply Co.	2022	LTRA	
MN	Long Prairie Ground Water Contamination	2018	O&M	
OH	Ormet Corp.	2019	O&M	
MN	Perham Arsenic Site	2018	O&M	
IN	Pike and Mulberry Streets PCE Plume	2022	Remedial Design	
OH	Reilly Tar & Chemical Corp. (Dover Plant)	2019	O&M	
MN	St. Regis Paper Co.	2019	O&M	
Region 6				**16**

State	Optimization Reviews	FY Complete	Pipeline Phase	Total Optimization Reviews
LA	Bayou Bonfouca	2019	O&M	
NM	Eagle Picher Carefree Battery	2021	Remedial Design	
TX	Garland Creosoting	2022	LTRA	
TX	Geneva Industries	2019	O&M	
NM	Grants Chlorinated Solvents	2021	LTRA	
TX	Hart Creosoting Company	2018	LTRA	
TX	Hart Creosoting Company	2020	LTRA	
TX	Jasper Creosoting Company	2018	LTRA	
TX	Jasper Creosoting Company	2020	LTRA	
AR	Koppers Inc	2021	RCRA	
AR	Mid-South Wood Products	2019	Remedial Action	
AR	Mountain Pine Pressure Treating	2018	O&M	
OK	Oklahoma Refining Co.	2019	Remedial Design	
TX	Sol Lynn/Industrial Transformers	2022	RI/FS	
TX	State Road 114 Groundwater Plume	2021	LTRA	
TX	Texarkana Wood Preserving Co.	2022	LTRA	
Region 7				**2**
IA	Des Moines TCE	2019	Remedial Action	
NE	Ogallala Ground Water Contamination	2019	O&M	
Region 8				**7**
MT	Burlington Northern (Somers Plant) (BNSF Railway)	2018	O&M	
MT	Calumet Montana Refining LLC (CMR)	2020	RCRA	
MT	Flying J Petroleum, Inc.	2020	RCRA	
CO	French Gulch	2022	Not on NPL	
CO	Raytheon Company - Boulder	2021	RCRA	
CO	Summitville Mine	2018	LTRA	
CO	Suncor Energy (USA) Inc - Commerce City Refinery	2022	RCRA	
Region 9				**4**
CA	East and West Shasta Mining Districts	2020	Not on NPL	
CA	Intel Magnetics	2019	LTRA	
CA	Leviathan Mine	2020	RI/FS	
CA	Pemaco Maywood	2022	O&M	
Region 10				**14**
ID	Bunker Hill Mining & Metallurgical Complex	2020	Remedial Action	
WA	Colbert Landfill	2018	O&M	
WA	Commencement Bay, South Tacoma Channel	2018	O&M	
WA	Commencement Bay, South Tacoma Channel	2018	O&M	

State	Optimization Reviews	FY Complete	Pipeline Phase	Total Optimization Reviews
WA	Fort Lewis Logistics Center	2019	Remedial Action	
OR	Fremont National Forest/White King and Lucky Lass Uranium Mines (USDA)	2021	O&M	
WA	Grain Handling Facility at Freeman	2019	RI/FS	
WA	Northside Landfill	2018	O&M	
OR	Reynolds Metals	2018	O&M	
OR	Teledyne Wah Chang	2020	O&M	
WA	Tulalip Landfill	2018	O&M	
OR	United Chrome Products, Inc.	2018	O&M	
WA	USDA FS Wenatchee NF: Holden Mine	2021	Remedial Design	
WA	Western Processing Co., Inc.	2022	O&M	
TOTAL				**74**

Table A-2: Updated Optimization Reviews Included in This Progress Report (FY 2015–FY 2017)

State	Site	FY Complete	Pipeline Phase	Total Optimization Reviews
Region 1				**4**
VT	Jard Company	2017	RI/FS	
RI	Peterson/Puritan Inc.	2016	O&M	
NH	Somersworth Sanitary Landfill	2017	O&M	
MA	Sullivan's Ledge	2016	O&M	
Region 2				**0**
Region 3				**4**
DE	Dover Gas Light Co., OU2	2015	RI/FS	
PA	Hellertown Manufacturing Co.	2017	O&M	
VA	Saunders Supply Co.	2016	O&M	
PA	Valmont TCE Site (Former - Valmont Industrial Park)	2016	LTRA	
Region 4				**1**
NC	Charles Macon Lagoon and Drum Storage	2016	O&M	
Region 5				**1**
MI	Clare Water Supply	2017	O&M	
Region 6				**8**
TX	Conroe Creosoting Co.	2015	LTRA	
TX	Garland Creosoting	2016	LTRA	
NM	McGaffey & Main Groundwater Plume	2015	Remedial Action	
NM	North Railroad Avenue Plume	2015	LTRA	
TX	Odessa Chromium #1	2016	O&M	
AR	Ouachita Nevada Wood Treater	2015	LTRA	
TX	Sprague Road Ground Water Plume	2016	LTRA	
TX	West County Road 112 Ground Water	2016	RI/FS	
Region 7				**1**
NE	Parkview Well	2017	LTRA	
Region 8				**2**
CO	Gold King Mine Release	2017	Not on NPL	
CO	Standard Mine	2016	Remedial Action	
Region 9				**1**
CA	Klau/Buena Vista Mine	2017	RI/FS	
Region 10				**4**
ID	Bunker Hill Mining & Metallurgical Complex	2016	Remedial Action	
ID	Bunker Hill Mining & Metallurgical Complex	2017	Remedial Action	
WA	Moses Lake Wellfield Contamination	2015	RI/FS	
OR	Northwest Pipe and Casing/Hall Process Company	2016	O&M	
TOTAL				**26**

Table A-3: New Technical Support Projects Included in This Progress Report (FY 2018–FY 2022)

State	Technical Support Projects	FY Complete	Pipeline Phase	Total Optimization Projects
Region 1				**11**
MA	Baird & McGuire	2018	O&M	
MA	BJAT LLC	2021	RI/FS	
ME	Callahan Mining Corp	2018	Remedial Action	
CT	Century Brass	2019	RCRA	
VT	Elizabeth Mine	2020	O&M	
VT	Elizabeth Mine	2021	O&M	
VT	Jard Company	2020	RI/FS	
RI	Peterson/Puritan Inc.	2022	Remedial Design	
RI	Picillo Farm	2019	O&M	
NH	Savage Municipal Water Supply	2021	Remedial Design	
MA	Silresim Chemical Corp.	2022	O&M	
Region 2				**2**
NY	Crown Cleaners of Watertown Inc.	2019	Remedial Action	
NJ	Puchack Well Field	2019	Remedial Design	
Region 3				**3**
PA	Clearview Landfill	2019	RI/FS	
MD	Sauer Dump	2022	RI/FS	
VA	Saunders Supply Co.	2018	O&M	
Region 4				**8**
SC	Burlington Industries Cheraw	2020	RI/FS	
AL	Ciba-Geigy Corp. (McIntosh Plant)	2022	O&M	
NC	Kerr-Mcgee Chemical Corp - Navassa	2019	RI/FS	
AL	Olin Corp. (McIntosh Plant)	2022	Remedial Design	
NC	Ore Knob Mine	2018	RI/FS	
MS	Rockwell International Wheel & Trim	2020	RI/FS	
MS	Rockwell International Wheel & Trim	2021	RI/FS	
NC	Ward Transformer	2022	Remedial Action	
Region 5				**12**
MN	Baytown Township Ground Water Plume	2020	O&M	
MN	Baytown Township Ground Water Plume	2022	O&M	
MI	Bendix Corp./Allied Automotive	2021	O&M	
IL	Evonik Corporation	2021	RCRA	
IL	Hartford Area Hydrocarbon Plume	2021	RCRA	
IL	Heart of Chicago	2018	Not on NPL	
IN	NIPSCO Bailly Generating Station	2021	RCRA	

State	Technical Support Projects	FY Complete	Pipeline Phase	Total Optimization Projects
MI	Ott/Story/Cordova Chemical Co.	2022	O&M	
WI	Penta Wood Products	2022	RI/FS	
MI	Prairie Ronde Realty Company	2021	RCRA	
MN	St. Regis Paper Co.	2022	PA/SI	
OH	Wright-Patterson Air Force Base	2020	O&M	
Region 6				**2**
OK	Oklahoma Refining Co.	2020	Remedial Design	
OK	Wilcox Oil Company	2019	RI/FS	
Region 7				**5**
KS	Chemical Commodities, Inc.	2021	O&M	
MO	Newton County Mine Tailings	2020	Remedial Action	
NE	Ogallala Ground Water Contamination	2020	O&M	
NE	PCE Southeast Contamination	2018	RI/FS	
MO	Washington County Lead District - Old Mines	2021	RI/FS	
Region 8				**21**
CO	American Tunnel Mine	2019	Not on NPL	
MT	Barker Hughesville Mining District	2019	RI/FS	
CO	Boston and Colorado Smelter	2019	Remedial Design	
CO	Buckskin and Mosquito Creek Mining District	2020	Not on NPL	
CO	Captain Jack Mill	2019	Remedial Action	
CO	Colorado Smelter	2018	RI/FS	
CO	French Gulch	2019	Not on NPL	
CO	Gold King Mine Release	2018	Removal Assessment	
MT	Idaho Pole Co.	2018	O&M	
MT	Idaho Pole Co.	2019	O&M	
UT	Jacobs Smelter	2019	Remedial Design	
MT	Libby Asbestos Site	2018	RI/FS	
MT	Libby Asbestos Site	2019	RI/FS	
CO	Lowry Landfill	2018	Remedial Design	
CO	Marshall Landfill	2018	O&M	
CO	Nelson Tunnel/Commodore Waste Rock	2018	RI/FS	
CO	Nelson Tunnel/Commodore Waste Rock	2020	RI/FS	
CO	Nelson Tunnel/Commodore Waste Rock	2021	RI/FS	
CO	Nelson Tunnel/Commodore Waste Rock	2019	RI/FS	
CO	Nelson Tunnel/Commodore Waste Rock	2019	RI/FS	
CO	Summitville Mine	2021	LTRA	
Region 9				**18**
CA	Argonaut Mine	2020	RI/FS	

State	Technical Support Projects	FY Complete	Pipeline Phase	Total Optimization Projects
CA	Argonaut Mine	2018	RI/FS	
NV	Carson River Mercury Site	2022	RI/FS	
CA	Central Basin	2019	PA/SI	
AZ	Cove Mesa Aggregated Uranium Mines	2018	Not on NPL	
AZ	Cove Mesa Aggregated Uranium Mines	2019	Not on NPL	
CA	DTSC Brownfields Support	2018	Not on NPL	
CA	Lava Cap Mine	2019	RI/FS	
CA	Montrose Chemical Corp.	2020	Remedial Action	
CA	Montrose Chemical Corp.	2018	Remedial Action	
AZ	Navajo Forest Product Industries	2021	PA/SI	
CA	New Idria Mercury Mine	2022	RI/FS	
CA	San Fernando Valley (Area 4)	2022	RI/FS	
CA	Selma Pressure Treating Co.	2018	LTRA	
CA	Sulphur Bank Mercury Mine	2021	RI/FS	
CA	Sulphur Bank Mercury Mine	2020	RI/FS	
NM	Tronox NE Churchrock Quivira Mines	2022	Not on NPL	
CA	West Oakland Lead Data Evaluation	2020	Not on NPL	
Region 10				**4**
OR	Black Butte Mine	2021	RI/FS	
OR	Formosa Mine	2019	Remedial Design	
WA	Hamilton/Labree Roads GW Contamination (HRIA)	2020	Remedial Design	
ID	Henry Mine	2022	RI/FS	
TOTAL				**86**

APPENDIX B

COMPLETED OPTIMIZATION REVIEWS AND TECHNICAL SUPPORT PROJECTS FY 1997 – FY 2022

Table B-1: Completed Optimization Reviews and Technical Support Projects (FY 1997-FY 2022)

State	Site	FY Complete	Total Optimization Projects
Region 1			**44**
MA	Alto Tronics	2020	
MA	Baird & McGuire	2002	
MA	Baird & McGuire	2013	
MA	Baird & McGuire	2018	
NY	BCF Oil Refining, Inc.	2009	
MA	BJAT LLC	2016	
MA	BJAT LLC	2021	
ME	Callahan Mining Corp	2018	
CT	Century Brass	2019	
MA	Charles George Reclamation Trust Landfill	2018	
MA	Charles George Reclamation Trust Landfill	2017	
ME	Eastern Surplus	2012	
VT	Elizabeth Mine	2016	
VT	Elizabeth Mine	2016	
VT	Elizabeth Mine	2020	
VT	Elizabeth Mine	2021	
VT	Ely Copper Mine	2017	
VT	Ely Copper Mine	2017	
MA	Engelhard Corporation Facility	2005	
MA	Fairmont Line- Modern Electroplating	2013	
MA	Groveland Wells No. 1 & 2	2002	
MA	Groveland Wells No. 1 & 2	2013	
MA	Groveland Wells No. 1 & 2	2014	
VT	Jard Company	2017	
VT	Jard Company	2020	
NH	Kearsarge Metallurgical Corp.	2010	
NH	Ottati & Goss/Kingston Steel Drum	2014	
RI	Peterson/Puritan Inc.	2016	
RI	Peterson/Puritan Inc.	2022	
RI	Picillo Farm	2017	
RI	Picillo Farm	2019	
CT	Ridson Corporation	2004	

State	Site	FY Complete	Total Optimization Projects
NH	Savage Municipal Water Supply	2001	
NH	Savage Municipal Water Supply	2018	
NH	Savage Municipal Water Supply	2021	
MA	Silresim Chemical Corp.	2002	
MA	Silresim Chemical Corp.	2014	
MA	Silresim Chemical Corp.	2022	
NH	Somersworth Sanitary Landfill	2009	
NH	Somersworth Sanitary Landfill	2017	
MA	Sullivan's Ledge	2016	
MA	Sullivan's Ledge	2016	
NH	Sylvester	2009	
MA	W.R. Grace & Co., Inc. (Acton Plant)	2017	
Region 2			**33**
NJ	A-Z Automotive	2004	
NJ	Bog Creek Farm	2002	
NY	Brewster Well Field	2002	
NJ	Ciba-Giegy Corp.	2012	
NY	Circuitron Corp.	2005	
NY	Claremont Polychemical	2002	
NY	Crown Cleaners of Watertown Inc.	2019	
NY	Crown Cleaners of Watertown Inc.	2019	
NY	Eighteen Mile Creek	2016	
NJ	Ellis Property	2006	
NY	Fulton Avenue	2013	
NY	GCL Tie and Treating Inc.	2007	
NJ	Higgins Farm	2004	
NJ	King of Prussia	2012	
NY	Lawrence Aviation Industries, Inc.	2020	
NY	Marathon Battery Corp.	2019	
NY	Mattiace Petrochemical Co., Inc.	2001	
NJ	MetalTec/Aerosystems	2012	
NJ	MetalTec/Aerosystems	2015	
NY	Morgan Terminal	2004	
NJ	Myers Property	2018	
NJ	Passaic River- Diamond Alkali	2011	

State	Site	FY Complete	Total Optimization Projects
NJ	Puchack Well Field	2019	
NY	Richardson Hill Road Landfill/Pond	2012	
NJ	Rockaway Borough Well Field, OU 2	2014	
NJ	Sherwin-Williams/Hilliards Creek	2017	
NJ	Shorco South	2004	
NY	Sidney Landfill	2012	
NY	SMS Instruments, Inc.	2004	
NY	South Buffalo Brownfields Opportunity Area	2012	
VI	Tutu Wellfield	2011	
NJ	Unimatic Manufacturing Corp Site	2016	
NJ	Vineland Chemical Co., Inc.	2011	
Region 3			**36**
PA	A.I. W. Frank/Mid-County Mustang	2006	
PA	Avco Lycoming (Williamsport Division)	2022	
PA	Butz Landfill	2006	
PA	Clearview Landfill	2019	
PA	Clearview Landfill	2014	
PA	Crossley Farm	2006	
PA	Crossley Farm	2022	
PA	Croydon TCE	2006	
PA	Cryochem, Inc.	2006	
DE	Dover Gas Light Co., OU2	2015	
PA	Fischer & Porter Co.	2014	
PA	Former Honeywell Facility	2003	
VA	Fort Eustis (U.S. Army)	2013	
VA	Greenwood Chemical Co.	2003	
VA	Greenwood Chemical Co.	2006	
VA	Greenwood Chemical Co.	2021	
PA	Havertown PCP	2004	
PA	Havertown PCP	2006	
PA	Hellertown Manufacturing Co.	2002	
PA	Hellertown Manufacturing Co.	2006	
PA	Hellertown Manufacturing Co.	2017	
PA	Millcreek Dump	2010	
PA	North Penn - Area 1	2006	

State	Site	FY Complete	Total Optimization Projects
PA	North Penn - Area 6	2012	
MD	Ordnance Products, Inc.	2021	
VA	Peck Iron and Metal	2013	
PA	Raymark	2002	
PA	Raymark	2006	
MD	Sauer Dump	2022	
VA	Saunders Supply Co.	2006	
VA	Saunders Supply Co.	2016	
VA	Saunders Supply Co.	2018	
DE	Standard Chlorine of Delaware, Inc.	2007	
PA	Valmont TCE Site (Former - Valmont Industrial Park)	2016	
WV	Vienna Tetrachloroethene	2018	
PA	Watson Johnson Landfill	2019	
Region 4			**29**
FL	Alaric Area GW Plume	2010	
AL	American Brass Inc.	2020	
FL	American Creosote Works, Inc. (Pensacola Plant)	2006	
NC	Benfield Industries, Inc.	2007	
SC	Burlington Industries Cheraw	2020	
NC	Cape Fear Wood Preserving	2005	
NC	Celanese Corp. (Shelby Fiber Operations)	2009	
NC	Charles Macon Lagoon and Drum Storage	2016	
FL	Chemko Technical Services, Inc. Facility	2005	
AL	Ciba-Geigy Corp. (McIntosh Plant)	2020	
AL	Ciba-Geigy Corp. (McIntosh Plant)	2022	
SC	Eliskim Facility	2003	
SC	Elmore Waste Disposal	2001	
NC	FCX, Inc. (Statesville Plant)	2002	
NC	Kerr-Mcgee Chemical Corp - Navassa	2019	
GA	Marzone Inc./Chevron Chemical Co.	2021	
MS	Mississippi Phosphates Corporation	2016	
MS	Mississippi Phosphates Corporation	2016	
AL	Olin Corp. (McIntosh Plant)	2020	
AL	Olin Corp. (McIntosh Plant)	2022	
NC	Ore Knob Mine	2018	

State	Site	FY Complete	Total Optimization Projects
GA	Peach Orchard Rd PCE Groundwater Plume Site	2021	
MS	Rockwell International Wheel & Trim	2020	
MS	Rockwell International Wheel & Trim	2021	
FL	Taylor Road Landfill	2007	
TN	Velsicol Chemical Corp. (Hardeman County)	2013	
NC	Ward Transformer	2022	
GA	Woolfolk Chemical Works, Inc.	2008	
GA	Woolfolk Chemical Works, Inc.	2022	
Region 5			**41**
IN	ArcelorMittal Indiana Harbor East	2020	
MN	Baytown Township Ground Water Plume	2011	
MN	Baytown Township Ground Water Plume	2020	
MN	Baytown Township Ground Water Plume	2022	
MI	Bendix Corp./Allied Automotive	2021	
WI	Better Brite Plating Co. Chrome and Zinc Shops	2020	
MI	Clare Water Supply	2007	
MI	Clare Water Supply	2007	
MI	Clare Water Supply	2017	
OH	Delphi VOC Site	2003	
IN	Douglass Road/Uniroyal, Inc. Landfill	2004	
IL	Evonik Corporation	2021	
IN	Galen Myers Dump/Drum Salvage	2019	
OH	GE Aircraft Engines	2022	
MI	Grand Traverse Overall Supply Co.	2022	
MI	Grand Traverse Overall Supply Co.	2022	
IL	Hartford Area Hydrocarbon Plume	2021	
IL	Heart of Chicago	2018	
OH	Lincoln Fields Co-Op Water Assn Duke Well	2015	
MN	Long Prairie Ground Water Contamination	2018	
MN	MacGillis & Gibbs Co./Bell Lumber & Pole Co.	2001	
WI	Moss-American Co., Inc. (Kerr-McGee oil Co.)	2011	
IN	NIPSCO Bailly Generating Station	2021	
WI	Oconomowoc Electroplating Co., Inc.	2000	
OH	Ormet Corp.	2019	
MI	Ott/Story/Cordova Chemical Co.	2002	

State	Site	FY Complete	Total Optimization Projects
MI	Ott/Story/Cordova Chemical Co.	2022	
MI	Peerless Plating Co.	2006	
WI	Penta Wood Products	2006	
WI	Penta Wood Products	2022	
MN	Perham Arsenic Site	2018	
IN	Pike and Mulberry Streets PCE Plume	2022	
MI	Prairie Ronde Realty Company	2021	
OH	Reilly Tar & Chemical Corp. (Dover Plant)	2019	
IN	Reilly Tar & Chemical Corp. (Indianapolis Plant)	2004	
MN	St. Regis Paper Co.	2019	
MN	St. Regis Paper Co.	2022	
WI	Stoughton City Landfill	2008	
MI	Wash King Laundry	2006	
MI	Wash King Laundry	2011	
OH	Wright-Patterson Air Force Base	2020	
Region 6			**40**
LA	American Creosote Works, Inc. (Winnfield Plant)	2008	
AR	Arkwood, Inc.	2016	
LA	Bayou Bonfouca	2001	
LA	Bayou Bonfouca	2019	
TX	Conroe Creosoting Co.	2015	
LA	Delatte Metals	2009	
NM	Eagle Picher Carefree Battery	2021	
TX	East 67th Street Ground Water Plume	2014	
TX	Garland Creosoting	2016	
TX	Garland Creosoting	2022	
TX	Geneva Industries	2019	
NM	Grants Chlorinated Solvents	2008	
NM	Grants Chlorinated Solvents	2021	
TX	Hart Creosoting Company	2018	
TX	Hart Creosoting Company	2020	
NM	Homestake Mining Co.	2011	
NM	Homestake Mining Co.	2008	
TX	Jasper Creosoting Company	2018	
TX	Jasper Creosoting Company	2020	

State	Site	FY Complete	Total Optimization Projects
TX	Jones Road Ground Water Plume	2014	
AR	Koppers Inc	2021	
NM	McGaffey & Main Groundwater Plume	2012	
NM	McGaffey & Main Groundwater Plume	2015	
AR	Midland Products	2001	
AR	Mid-South Wood Products	2019	
AR	Mountain Pine Pressure Treating	2018	
NM	North Railroad Avenue Plume	2015	
TX	Odessa Chromium #1	2016	
OK	Oklahoma Refining Co.	2019	
OK	Oklahoma Refining Co.	2020	
AR	Ouachita Nevada Wood Treater	2015	
TX	Sandy Beach Road Ground Water Plume	2014	
TX	Sol Lynn/Industrial Transformers	2022	
TX	Sprague Road Ground Water Plume	2016	
TX	State Road 114 Groundwater Plume	2014	
TX	State Road 114 Groundwater Plume	2021	
OK	Tar Creek (Ottawa County)	2014	
TX	Texarkana Wood Preserving Co.	2022	
TX	West County Road 112 Ground Water	2016	
OK	Wilcox Oil Company	2019	
Region 7			**29**
NE	10th Street Site	2010	
NE	10th Street Site	2014	
KS	57th and North Broadway Streets Site	2006	
KS	Ace Services	2007	
KS	Ace Services	2013	
MO	Big River Mine Tailings/St. Joe Minerals Corp.	2016	
KS	Chemical Commodities, Inc.	2021	
NE	Cleburn Street Well	2001	
IA	Des Moines TCE	2019	
NE	Eaton Corp-Kearney	2006	
IA	Fairfield Coal Gasification Plant	2012	
IA	General Motors S.C.	2012	
NE	Hastings Ground Water Contamination	2013	

State	Site	FY Complete	Total Optimization Projects
MO	Lee Chemical	2012	
MO	Missouri dioxin reassessments	2014	
MO	Missouri Tannery Sludge	2010	
MO	Newton County Mine Tailings	2020	
IA	Nichols Groundwater Contamination, (Cropmate)	2014	
NE	Ogallala Ground Water Contamination	2013	
NE	Ogallala Ground Water Contamination	2019	
NE	Ogallala Ground Water Contamination	2020	
NE	Parkview Well	2017	
NE	PCE Southeast Contamination	2018	
IA	Railroad Avenue Groundwater Contamination	2014	
MO	Rt. 66 Park (Under MO Dioxin Reassessment site)	2014	
MO	Strecker Dioxin Site (Under MO Dioxin Reassessment)	2014	
MO	Valley Park TCE	2013	
MO	Washington County Lead District - Furnace Creek	2016	
MO	Washington County Lead District - Old Mines	2021	
Region 8			**59**
CO	American Tunnel Mine	2017	
CO	American Tunnel Mine	2019	
MT	Barker Hughesville Mining District	2017	
MT	Barker Hughesville Mining District	2019	
SD	Batesland (Former Mobil Gas Station)	2013	
CO	Bonita Peak Mining District	2017	
CO	Boston and Colorado Smelter	2019	
CO	Buckskin and Mosquito Creek Mining District	2020	
MT	Burlington Northern (Somers Plant) (BNSF Railway)	2009	
MT	Burlington Northern (Somers Plant) (BNSF Railway)	2015	
MT	Burlington Northern (Somers Plant) (BNSF Railway)	2018	
MT	Calumet Montana Refining LLC (CMR)	2020	
CO	Captain Jack Mill	2016	
CO	Captain Jack Mill	2016	
CO	Captain Jack Mill	2019	
CO	Central City, Clear Creek	2007	
CO	Colorado Smelter	2018	

State	Site	FY Complete	Total Optimization Projects
MT	Flying J Petroleum, Inc.	2020	
UT	Former Old Hilltop (Hilltop Station)	2013	
CO	French Gulch	2013	
CO	French Gulch	2019	
CO	French Gulch	2022	
SD	Gilt Edge Mine	2013	
CO	Gold King Mine Release	2016	
CO	Gold King Mine Release	2017	
CO	Gold King Mine Release	2017	
CO	Gold King Mine Release	2018	
MT	Idaho Pole Co.	2009	
MT	Idaho Pole Co.	2009	
MT	Idaho Pole Co.	2010	
MT	Idaho Pole Co.	2018	
MT	Idaho Pole Co.	2019	
UT	Intermountain Waste Oil Refinery (IWOR)	2011	
UT	Jacobs Smelter	2010	
UT	Jacobs Smelter	2019	
MT	Libby Asbestos Site	2018	
MT	Libby Asbestos Site	2019	
MT	Lockwood Solvent Ground Water Plume	2014	
MT	Lockwood Solvent Ground Water Plume	2014	
CO	Lowry Landfill	2016	
CO	Lowry Landfill	2018	
CO	Marshall Landfill	2018	
CO	Nelson Tunnel/Commodore Waste Rock	2018	
CO	Nelson Tunnel/Commodore Waste Rock	2021	
CO	Nelson Tunnel/Commodore Waste Rock	2020	
CO	Nelson Tunnel/Commodore Waste Rock	2019	
CO	Nelson Tunnel/Commodore Waste Rock	2019	
UT	Ogden Railroad Yard	2013	
SD	Pine Ridge Oil	2013	
CO	Raytheon Company - Boulder	2021	
CO	Rico - Argentine	2016	
CO	Standard Mine	2014	

State	Site	FY Complete	Total Optimization Projects
CO	Standard Mine	2016	
CO	Standard Mine	2016	
CO	Summitville Mine	2002	
CO	Summitville Mine	2018	
CO	Summitville Mine	2021	
CO	Suncor Energy (USA) Inc - Commerce City Refinery	2022	
CO	Vasquez Boulevard And I-70	2017	
Region 9			**55**
CA	Applied Materials	2012	
CA	Argonaut Mine	2020	
CA	Argonaut Mine	2017	
CA	Argonaut Mine	2018	
NM	Bond & Bond/Nav 046 Site	2013	
CA	BP Carson Refinery	2006	
NV	Carson River Mercury Site	2014	
NV	Carson River Mercury Site	2017	
NV	Carson River Mercury Site	2022	
CA	Central Basin	2019	
AZ	Cove Mesa Aggregated Uranium Mines	2018	
AZ	Cove Mesa Aggregated Uranium Mines	2019	
AZ	Davis Chevrolet/Nav 185 Site	2013	
CA	DTSC Brownfields Support	2018	
CA	East and West Shasta Mining Districts	2020	
CA	Hunters Point Naval Shipyard	2013	
CA	Intel Magnetics	2013	
CA	Intel Magnetics	2019	
AZ	Iron King Mine – Humboldt Smelter	2014	
AZ	Iron King Mine – Humboldt Smelter	2014	
AZ	Iron King Mine – Humboldt Smelter	2013	
CA	Klau/Buena Vista Mine	2010	
CA	Klau/Buena Vista Mine	2017	
CA	Lava Cap Mine	2014	
CA	Lava Cap Mine	2017	
CA	Lava Cap Mine	2019	
CA	Leviathan Mine	2017	

State	Site	FY Complete	Total Optimization Projects
CA	Leviathan Mine	2020	
CA	McCormick & Baxter Creosoting Co.	2014	
CA	McCormick & Baxter Creosoting Co.	2017	
CA	Middlefield – Ellis – Whisman (MEW) Superfund Study Area	2012	
CA	Middlefield – Ellis – Whisman (MEW) Superfund Study Area	2012	
CA	Modesto Ground Water Contamination	2002	
CA	Montrose Chemical Corp.	2020	
CA	Montrose Chemical Corp.	2018	
AZ	Navajo Forest Product Industries	2021	
CA	New Idria Mercury Mine	2022	
CA	Newmark Ground Water Contamination	2007	
CA	Newmark Ground Water Contamination	2009	
CA	Newmark Ground Water Contamination	2014	
CA	Newmark Ground Water Contamination	2015	
CA	Newmark Ground Water Contamination	2016	
AZ	Painted Desert Inn/Nav 049 Site	2013	
CA	Pemaco Maywood	2011	
CA	Pemaco Maywood	2022	
CA	San Fernando Valley (Area 1)	2012	
CA	San Fernando Valley (Area 4)	2022	
CA	Selma Pressure Treating Co.	2002	
CA	Selma Pressure Treating Co.	2018	
CA	Sulphur Bank Mercury Mine	2015	
CA	Sulphur Bank Mercury Mine	2021	
CA	Sulphur Bank Mercury Mine	2020	
AZ	Telles Ranch/CRIT 002	2013	
NM	Tronox NE Churchrock Quivira Mines	2022	
CA	West Oakland Lead Data Evaluation	2020	
Region 10			**50**
OR	Black Butte Mine	2012	
OR	Black Butte Mine	2021	
WA	Boomsnub/Airco	2002	
ID	Bunker Hill Mining & Metallurgical Complex	2006	
ID	Bunker Hill Mining & Metallurgical Complex	2013	

State	Site	FY Complete	Total Optimization Projects
ID	Bunker Hill Mining & Metallurgical Complex	2014	
ID	Bunker Hill Mining & Metallurgical Complex	2016	
ID	Bunker Hill Mining & Metallurgical Complex	2017	
ID	Bunker Hill Mining & Metallurgical Complex	2017	
ID	Bunker Hill Mining & Metallurgical Complex	2020	
WA	Colbert Landfill	2011	
WA	Colbert Landfill	2018	
WA	Commencement Bay, South Tacoma Channel	2002	
WA	Commencement Bay, South Tacoma Channel	2008	
WA	Commencement Bay, South Tacoma Channel	2018	
WA	Commencement Bay, South Tacoma Channel	2018	
ID	Eastern Michaud Flats Contamination	2017	
OR	Formosa Mine	2019	
WA	Fort Lewis Logistics Center	2019	
WA	Fort Lewis Logistics Center	2011	
OR	Fremont National Forest/White King and Lucky Lass Uranium Mines (USDA)	2021	
WA	Frontier Hard Chrome, Inc.	2008	
WA	Grain Handling Facility at Freeman	2019	
WA	Hamilton/Labree Roads GW Contamination (HRIA)	2010	
WA	Hamilton/Labree Roads GW Contamination (HRIA)	2015	
WA	Hamilton/Labree Roads GW Contamination (HRIA)	2020	
ID	Henry Mine	2022	
WA	J.H. Baxter & Co.	2016	
WA	Keyport (official name: Naval Undersea Warfare Engineering Station (Four Waste Areas), Operable Unit 1/Area 1– Keyport Landfill, WA	2013	
AK	Kodiak USCG Integrated Support Command Base	2015	
OR	McCormick & Baxter Creosoting Co. (Portland Plant)	2002	
WA	Moses Lake Wellfield Contamination	2015	
OR	North Ridge Estates	2015	
WA	Northside Landfill	2018	
OR	Northwest Pipe and Casing/Hall Process Company	2007	
OR	Northwest Pipe and Casing/Hall Process Company	2016	
WA	Occidental Chemical Corporation	2004	
WA	Palermo Well Field Ground Water Contamination	2012	

State	Site	FY Complete	Total Optimization Projects
OR	Portland Harbor	2011	
OR	Reynolds Metals	2018	
OR	Teledyne Wah Chang	2020	
WA	Tulalip Landfill	2018	
OR	United Chrome Products, Inc.	2018	
OR	Univar	2017	
WA	Upper Columbia River	2013	
WA	USDA FS Wenatchee NF: Holden Mine	2021	
WA	US Navy Whidbey Island Naval Air Station, (Ault Field/OU 1)	2014	
WA	Western Processing Co., Inc.	2022	
WA	Wyckoff Co./Eagle Harbor	2005	
WA	Wyckoff Co./Eagle Harbor	2014	
TOTAL			**416**