UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

OSWER 9283.1-38

MEMORANDUM

SUBJECT: Groundwater Remedy Optimization Progress Report: 2010 - 2011

FROM: James E. Woolford, Director
Office of Superfund Remediation and Technology Innovation

TO: Superfund National Policy Managers, Regions 1-10

The purpose of this memorandum is to transmit the latest summary report on remedy optimization efforts in the Superfund program. The "Groundwater Remedy Optimization Progress Report: 2010 - 2011" (OSWER 9283.1-38) provides a summary and analysis of progress toward implementation of site-specific optimization recommendations.

Regional Superfund Division Directors should review the report and appendix to assess progress in their respective programs. This summary report generally represents the status of optimization recommendations that were implemented during calendar years 2010 and 2011, and demonstrates continued improvement in the pace at which remedial project managers address recommendations. I greatly appreciate your continued commitment to optimization as a means to achieve greater efficiencies in the Superfund program.

This report and all other documents related to the optimization effort can be found on the internet at http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm and http://www.clu-in.org/optimization. Questions or concerns should be directed to Jennifer Edwards at (703) 603-8762.

Attachments

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OSWER 9283.1-38
July, 2012

Groundwater Remedy Optimization Progress Report: 2010 - 2011

Office of Superfund Remediation and Technology Innovation

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1.0. Introduction

1.1 Purpose

The purpose of this report is to provide a summary and analysis of progress toward implementation of the site-specific recommendations resulting from independent optimization reviews at Superfund sites. The report summarizes successful implementation strategies, opportunities for improvement, barriers to implementation, and changes in project costs as a result of optimization.

The main body of the report is accompanied by an appendix containing a summary of optimization recommendations by region and site name. Regions are encouraged to review the appendix to assess progress in their respective programs. This summary report describes implementation of optimization recommendations during calendar years 2010 and 2011 at the 24 sites that have been subject to tracking. The report contains updated information for 14 sites where implementation has continued since the last summary report, as well as 10 sites subject to a more recent review which are being reported for the first time. The name, location, and review date for these sites are listed in *Exhibit 1*.

1.2 Project Background

The Office of Solid Waste and Emergency Response (OSWER) developed the pilot Fund-lead P&T optimization initiative as part of the *FY2000-FY2001 Superfund Reforms Strategy* (OSWER 9200.0-33; July 7, 2000). Optimization is intended to facilitate systematic review and modification of planned and operating remediation systems to promote continuous improvement, and to enhance overall remedy protectiveness and cost effectiveness. In the Superfund program, many optimization evaluations utilize the Remediation System Evaluation (RSE) process, a tool developed by the U.S. Army Corps of Engineers that EPA has further refined through application at Superfund sites.

The pilot phase of the optimization initiative demonstrated that this effort offers measurable benefits in the form of cost savings and improved remediation systems. In August 2004, the Office of Superfund Remediation and Technology Innovation (OSRTI) developed the *Action Plan for Ground Water Remedy Optimization* ("Action Plan") (OSWER 9283.1- 25; August 25, 2004) to further implement important lessons learned from the pilot phase and fully integrate optimization into the Superfund cleanup process, where appropriate. Among other actions, the Action Plan envisioned the development of routine progress reports concerning the implementation of recommended system changes. The Action Plan and these progress reports currently only apply to a subset of the sites that have received optimization reviews and technical support.

Since the creation of the Action Plan, the Superfund program has consistently developed additional tools and approaches that apply optimization concepts to sites earlier in the investigation and cleanup process. In 2010, OSRTI established a new national optimization workgroup and initiated the development of the *National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion.* The purpose of the Strategy is to expand and formalize optimization practices from site assessment to site completion as an operating business model for the Superfund program.

The Strategy encourages overarching process changes in program management and implementation, as well as site-level project management. These changes are intended to instill routine and frequent assessment of site cleanup progress, technical performance and costs; and refine business practices including acquisition strategies and contracts management. Finally, the Strategy emphasizes

incorporating optimization principles throughout the cleanup process from site assessment through site completion.

While the Strategy is still under development, many of the principles and actions envisioned by the document are already underway. Optimization reviews, followed by tracking and reporting on recommendations, will all continue and expand as part of Strategy implementation. OSRTI anticipates issuing the final Strategy in FY2012.

1.3 Sites Subject to Optimization Reviews

Sites selected to receive an optimization review may have concerns about annual operating costs, the age of the system, and concerns for remedy effectiveness or system efficiency. Groundwater remedies with the highest annual operating costs may offer the substantial opportunities for cost savings and increased efficiency. Optimization reviews may also be appropriate during the investigation stage, during design, and for remedial systems that have been operating for two to four years, in order to maximize early opportunities for improvements and cost savings. Sites with an ongoing Fund-financed long term response action (LTRA) continue to be a high priority for the program to promote smooth transfer to States for site operation and maintenance (O&M).

Regardless of annual operating costs or the age of the system, an optimization review may be valuable at sites where there are concerns about the effectiveness of the remedy or the efficiency of the remediation system. An optimization review may also help address recommendations in Five-Year Reviews that identify similar concerns. Often, requests for reviews are received directly from remedial project managers (RPM), regional management or others in the regions who may recognize the potential benefit of an optimization review at their site.

Exhibit 1. Sites included in this progress report

EPA Region	State	Site Name	Fiscal Year of Review [a]	Reporting Status [b]
1	--	*No sites for this reporting period*	--	--
2	NY	GCL Tie & Treating	2006	updated
	NJ	Vineland	2010	new
	VI	TuTu Wellfield	2011	new
3	PA	Mill Creek Dump Site	2009	new
4	NC	Cape Fear Wood Preserving	2004	updated
	FL	Alaric, Inc.	2009	new
	FL	American Creosote Works, Inc. (Pensacola)	2006	updated
	NC	Benfield Industries	2007	updated
5	MI	Ott/Story/Cordova Chemical Co.	2001	updated
	IN	Douglas Road/Uniroyal, Inc., Landfill	2004	updated
	IN	Reilly Tar & Chemical Corp. (Indianapolis)	2004	updated
	MI	Peerless Plating Co. Inc.	2005	updated
	MI	Wash King Laundry	2010	new
	MN	Baytown Township Ground Water Plume	2011	new
	WI	Moss-American	2011	new
6	--	*No sites for this reporting period*	--	--
7	KS	57th & North Broadway	2006	updated
	NE	10th Street Site	2009	new
8	CO	Central City, Clear Creek	2007	updated
9	CA	Modesto Ground Water Contamination	2001	updated
	CA	Pemaco Maywood	2011	new
10	WA	Boomsnub/Airco	2002	updated
	WA	Wyckoff Co./Eagle Harbor	2004	updated
	OR	Northwest Pipe & Casing	2007	updated
	WA	Colbert Landfill	2010	new

(a) Date refers to date of review; optimization reports may be finalized months later, following multiple-party review. All final reports may be accessed at http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm.
(b) *Updated* sites were included in previous progress reports; progress at *new* sites is reported for the first time.

1.4 Monitoring Implementation Progress

Each site that receives an optimization review is subject to follow-up, typically in the form of annual conference calls between OSRTI and the region, for at least two years after the optimization recommendations are finalized. These follow-up discussions highlight the status of recommended changes and obstacles to implementation that require additional attention. Continuing oversight of implementation progress helps maximize the benefits of optimization, identify lessons learned, and provide technical assistance. Following the initial two years of conference calls, follow up continues in a less formal way until all recommendations have been appropriately considered by the site team.

Optimization reviews generate a number of suggestions, ideas, and recommendations which should be discussed and evaluated. Regions weigh many factors including, but not limited to, technical feasibility, short-term implementation issues, long-term benefits, public and State acceptance, and contractual requirements when determining whether to implement optimization recommendations. Disagreements

regarding the implementation of a particular recommendation are possible, and may be elevated to management for resolution.

If RPMs have questions regarding implementation of complex optimization recommendations, technical assistance is available from many sources, including Regional technical support staff, OSRTI staff, including the Environmental Response Team (ERT), the optimization review team, EPA's Office of Research and Development (ORD), the EPA laboratories through the Technical Support Project, and the U.S. Army Corps of Engineers.

2.0 Summary of Implementation Progress

2.1 Overview

Each optimization review results in an improved understanding of the operating remediation system and identifies a number of opportunities for improvements in efficiency and effectiveness. The optimization reports have traditionally highlighted recommendations in the following four categories:

- recommendations to improve remedy effectiveness
- recommendations to reduce operating costs
- recommendations for technical improvement
- recommendations to expedite site closure

Beginning in 2010, OSRTI began to consider opportunities for green remediation and environmental footprint reduction as a standard component of the optimization process. Recommendations in this new fifth category have been developed for a subset of sites in this report.

The annual follow-up discussions between OSRTI and the RPM assess progress with the implementation of each recommendation contained in an optimization report. *Exhibit 2* summarizes progress in each of the five categories of recommendations. The subsequent sections provide an analysis of implementation progress and highlights of site-specific progress. The data included in this report represents only the sites that are still subject to the follow-up process described above (all sites in *Exhibit 1*). Sites that completed the follow-up process, as documented in previous progress reports, are no longer included in the calculations.

Analysis during this latest reporting period shows that RPMs have made positive efforts to address 88% of all recommendations. More specifically, 69% of all recommendations are either implemented or in progress. While this is down from the previous reporting period (84%), it is largely a reflection of the influx of new sites that are in the earliest stages of implementation. The previous report had only one new site in the first year of implementation, while this reporting period includes 10 new sites (nearly half of the sites covered by this report).

Exhibit 2. Status of optimization recommendations

Types of Recommendations	Implementation Status					
	Implemented	**In progress**	**Planned**	**Declined**	**Deferred to PRP/State**	**Under Consideration**
Remedy Effectiveness (84 total)	57% (48)	15% (13)	7% (6)	7% (6)	1% (1)	12% (10)
Cost Reduction (90 total)	54% (49)	11% (10)	4% (4)	14% (13)	3% (3)	12% (11)
Technical Improvement (59 total)	66% (39)	8% (5)	3% (2)	12% (7)	0% (0)	10% (6)
Site Closure (28 total)	25% (7)	54% (15)	0% (0)	7% (2)	4% (1)	11% (3)
Green Remediation (9 total)	0% (0)	0% (0)	22% (2)	44% (4)	0% (0)	33% (3)
Overall Progress (270 total)	53% (143)	16% (43)	5% (14)	12% (32)	2% (5)	12% (33)

Note: Numbers in parentheses represent actual number of recommendations, used to calculate rounded percentages.

2.2 Implementation of Remedy Effectiveness Recommendations

A thorough review of remedy effectiveness is a fundamental element of OSRTI's optimization initiative. More than half (57%) of remedy effectiveness recommendations have been implemented, and another 15% are in progress. Recommendations to improve effectiveness predominantly suggest more rigorous evaluation of the extraction and subsurface portions of the remedy rather than the above-ground treatment portion.

As has historically been the case, the most common recommendations in this category generally relate to plume delineation, additional characterization of source areas, and supplementing the existing extraction scheme with additional groundwater or soil vapor extraction points. In more recent optimization reviews, there are an increasing number of recommendations related to institutional controls, vapor intrusion evaluations, and sampling for new contaminants (e.g., 1,4-dioxane).

Additional details on site-specific remedy effectiveness recommendations are available in the appendix to this report.

HIGHLIGHT: SUCCESS WITH REMEDY EFFECTIVENESS RECOMMENDATIONS

MILL CREEK DUMP SITE (ERIE COUNTY, PA): It was determined at the time of the RSE in 2009 that the plume was not vertically delineated, and there were an insufficient number of wells off-property to horizontally delineate the contamination or monitor concentration trends. A recommendation was made for additional characterization by using direct-push drilling to collect grab samples in order to further delineate the plume.

In August 2010, direct push sampling was conducted at 18 locations, with 35 samples collected. Results from this sampling indicate that most offsite locations sampled are not contaminated. Two locations at the northern edge of the site did have 1,1-Dichloroethene (DCE) and vinyl chloride contamination above the Record of Decision (ROD) screening levels. A MODFLOW model has been developed using findings from the above field investigations to assess plume capture and results are still being evaluated. In particular, it appears that some contamination is located offsite in an area that is cross-gradient to groundwater flow. Additional capture zone analysis will allow the site team to determine whether an offsite source exists, or if this contamination is caught in a stagnation zone caused by remedy pumping.

2.3 Implementation of Cost Reduction Recommendations

Optimization recommendations pertaining to cost reduction may cover many aspects of system operation, including the use of specific treatment technologies, operator and laboratory labor, and project management. A common recommendation for cost reduction typically calls for site managers to streamline groundwater or process monitoring once a system is operating at steady-state.

Optimization reviews continue to identify many opportunities to reduce onsite labor while positively affecting remedy performance. Such reductions may be expected following system shakedown or automation, when a remedy is operating at steady-state. Furthermore, some treatment components become inefficient or unnecessary as a result of changing site conditions, or due to conservative estimates during the design phase. Simplifying a treatment system under such conditions has resulted in cost savings associated with reduced materials and energy usage, as well as labor.

During this reporting period, an increasingly common recommendation with respect to cost reduction was to track routine and non-routine costs separately in order to more easily identify the trend in routine operating costs. Highlighting non-routine maintenance costs also allows the site team to identify areas of the treatment system that may need particular attention. Some other examples of common recommendations are:

- Reduce monitoring program and evaluate the sampling frequency
- Revisit and reduce reporting requirements
- Reduce project management and technical support

More than half (54%) of cost reduction recommendations have been implemented, with an additional 15% currently ongoing or planned. While EPA Regions and the states continue to report reduced operating costs and improved efficiencies, documenting precise cost savings and expenditures as a direct

result of optimization reviews continues to pose a challenge. This will be an area of particular focus for OSRTI during the next reporting period.

Additional details on site-specific cost reduction recommendations are available in the appendix to this report.

HIGHLIGHT: SUCCESS WITH COST REDUCTION RECOMMENDATIONS

10TH STREET SITE (COLUMBUS, NE): As part of the 2009 RSE, the optimization review team made a series of recommendations related to sampling and reporting for the groundwater and air sparging/soil vapor extraction systems. The recommendations focused on reducing sampling frequency in stable areas of the plume, and streamlining reporting across the two treatment systems. The review team also made recommendations to reduce project management and engineering support costs.

The site team thoroughly evaluated the recommendations related to sampling and reporting, then included reductions in a contract modification shortly after the RSE. Reductions included cutting back to semi-annual sampling and sampling at fewer wells. In 2010, estimated costs for monitoring and reporting were nearly $250,000. As a result of the site team's diligent efforts to implement the recommendations, actual monitoring and reporting costs at the site in 2011 and 2012 were $124,000 - a 50% cost reduction.

Project management and engineering support costs for the site were approximately $275,000 per year at the time of the review. The RSE team's recommendations on project management and engineering costs have been implemented, which has led to significant cost reduction of approximately $190,000. Project management and reporting costs are expected to stay steady at the reduced level going forward.

2.4 Implementation of Technical Improvement Recommendations

Technical improvement recommendations cover a wide range of items to improve overall site operations. As *Exhibit 2* demonstrates, 66% of these recommendations have been fully implemented. These recommendations are generally easy to implement, require minimal funding, and are not typically contingent on other recommendations. Therefore, RPMs implement the majority of these recommendations shortly after the optimization site visit highlights the potential for improvement.

Examples of technical improvement recommendations include the following:

- Reconfigure components of the treatment train,
- Inspect and then clean, repair or replace faulty equipment,
- Rehabilitate fouled extraction or injection wells, and
- Consider more efficient pumps and blowers.

The majority of the new sites in this reporting cycle had technical improvement recommendations related to data management and reporting. In some instances, annual reports were not being generated in

a timely manner, comprehensive site maps were missing, or key data elements (e.g., detection levels) were missing.

Additional details on site-specific recommendations for technical improvement are available in the appendix to this report.

2.5 Implementation of Site Closure Recommendations

Optimization reviews continue to identify opportunities to accelerate progress toward achieving final cleanup goals and eventual site closure. These recommendations most commonly involve developing a clear and comprehensive exit strategy and/or evaluating alternate remedial approaches in situations where the current remedy may no longer be the most effective approach.

Developing an exit strategy typically involves confirming that clear and appropriate cleanup goals were established in the record of decision, then determining the specific data and criteria to be used to evaluate whether goals are met such that some or all of the system can be shut down. If the intermediate goals and milestones are not met, RPMs may then consider alternatives to the current system. Such alternatives have often included in situ chemical oxidation or bioremediation, or excavation of additional source material. Additional recommendations related to site closure include the need to clearly document cleanup levels for select contaminants, and to confirm expectations with the state regarding transfer of responsibility for operation and maintenance.

As demonstrated in previous progress reports, exit strategy recommendations are often considered after effectiveness and cost reduction recommendations are implemented. The use of a supplemental or alternative remedial approach may require funding that was not previously budgeted, revised contracts, and updated decision documents (e.g., an amended record of decision).

This is the first reporting cycle during which the rate of implementation for site closure recommendations exceeds the rate of implementation for remedy effectiveness, cost reduction and technical improvement recommendations (see *Exhibit 2*). Nearly 80% of site closure recommendations are either implemented or in progress. While these recommendations require a considerable level of effort, RPMs are demonstrating increasing willingness to expend that effort in order to expedite site closure.

Additional details on site-specific recommendations for site closure are available in the appendix to this report.

HIGHLIGHT: SUCCESS WITH RECOMMENDATIONS TO EXPEDITE SITE CLOSURE

ADDITIONAL SOURCE AREA REMEDIATION: Optimization reviews continue to identify opportunities to more aggressively pursue source remediation in order to increase the efficiency and potentially reduce the duration of groundwater treatment systems. At the *Benfield Industries Site (Waynesville, NC)*, the optimization review team concluded that MNA may be the most appropriate and least expensive approach to long term groundwater remediation during the 2007 RSE. However, additional remediation at the remaining hot-spot source of contamination will likely be required in order to make MNA most effective.

The site team completed a draft MNA report in July 2011 and reviewers found that lines of evidence did not support an MNA remedy without addressing the remaining hot-spot contamination. The site team is currently working on a comprehensive plan to identify and address the remaining hot-spots, to be potentially followed by an updated decision document for MNA.

At the *10th Street Site (Columbus, NE)*, the optimization review team suggested that additional source material likely exists under the building of the onsite operating drycleaner. The contamination will serve as a continuing source to groundwater, but is difficult to characterize and address due to the location. In response to the recommendations, the site team collected soil and soil vapor samples under a total of three drycleaners in order to delineate the contamination, and produced a Focused Feasibility Study in 2011. The site team is currently evaluating whether building demolition is appropriate; an updated decision document is anticipated in 2012.

2.6 Implementation of Green Remediation Recommendations

As an element of the 2010 *Superfund Green Remediation Strategy*, OSRTI began to consider opportunities for green remediation and environmental footprint reduction as part of the optimization process. Green remediation was not found to be applicable at all sites reviewed since 2010, however five sites do have recommendations in this category.

The recommendations for green remediation primarily relate to utilizing local labor for site management and sampling (to avoid air emissions associated with travel), and to consider opportunities for renewable energy (solar, wind or renewable energy credits). Furthermore, several recommendations for remedy effectiveness, cost reduction and/or technical improvement will likely offer benefits for a reduced environmental footprint. For example, streamlining the treatment train and downsizing pumps/blowers should directly result in reduced energy usage.

None of the green remediation recommendations have been fully implemented to date, while a number of these items were declined after considering cost effectiveness of the changes. This will be an area of particular focus for OSRTI during the next reporting period.

Additional details on site-specific green remediation recommendations are available in the appendix to this report.

2.7 Sites Requiring No Further Follow-Up

As shown in *Exhibit 2*, RPMs continue to demonstrate a commitment to the implementation of optimization recommendations. In fact, the optimization process is now complete at a number of sites as a result of the successful implementation or thorough consideration of all optimization recommendations. OSRTI is no longer conducting annual follow-up discussions at the following sites, though assistance is still available to site managers in the event that any optimization-related issues arise:

- Cape Fear Wood Preserving
- Douglas Road/Uniroyal, Inc. Landfill
- Peerless Plating

Previous progress reports identified 29 additional sites that no longer require implementation tracking, for a total of 32 sites that have successfully completed the follow up process since it began as a result of the Action Plan in 2004.

2.8 Additional Optimization-Related Site Support

In addition to formal optimization reviews, OSRTI provides technical support in various other forms in order to apply optimization principles more broadly. The examples below demonstrate the wide applicability and flexibility of OSRTI's optimization support, including long term monitoring optimization, modeling and data visualization. The nature of the support provided to these sites varied according to the site-specific need, and therefore did not always result in traditional optimization recommendations to implement.

Newmark Ground Water Contamination Superfund Site

Following delivery of Triad training to California Department of Toxic Substance Control (DTSC) and EPA Region 9 personnel in late 2009, technical support for the Newmark Groundwater site was initiated in 2010. Initial support was focused on the development of a comprehensive life cycle conceptual site model (CSM) and use of 3-D visualization software to place large, complex, multi-faceted data sets into a spatially correct format. Given the size of the Newmark source operable unit (OU), estimated at 23 square miles, the CSM provided a platform for evaluation of performance of the existing interim remedy, a large scale pump and treat system, and optimization of activities necessary to complete a source OU remedial investigation (RI) and complete a final ROD.

The sheer volume of existing information, the variety of data owners, and the multitude of stakeholders (EPA, DTSC, City of San Bernardino, and 16 water purveyors) required significant effort to obtain, review, integrate, and analyze data into the updated CSM and visualization materials. The results of the preliminary CSM were presented to Region 9, DTSC, and other stakeholders in late 2011. Those stakeholder outreach efforts allowed use of the 3D visualization to provide independent evaluation and subsequent updates of the MODFLOW model used to manage water resources in the entire basin. The project team also conducted a review of available environmental databases (using Environmental Data Resources) and completed a site sorting strategy to provide Region 9 with a preliminary list of potential areas or sites of interest within the source OU where available chemical and geologic/hydrogeologic information would further strengthen the CSM and MODFLOW model.

The project team is currently providing additional support in the form of visualization of secondary contaminants to optimize RI planning. The RI is expected in fiscal year 2013 and the CSM and visualization components will be used to optimize the locations of intrusive work and leverage all existing data to support completion of the RI. The main focus of the RI is expected to be source area characterization and optimization of the existing treatment system.

Applied Materials Superfund Site

A review of the long-term monitoring strategy was conducted by EPA OSRTI with EPA Region 9 at the Applied Materials Building 1 Superfund site (the Site) located in Santa Clara, California in October 2011. The purpose of the review was to determine if there exists sufficient data to close the site, and, if closure is not an option, to recommend an efficient sampling strategy for long-term oversight. The Site is the location of a former semi-conductor wafer manufacturing facility that began operations in 1974. Primary contaminants of concern include chlorinated solvents in soil and groundwater. The Site has undergone extensive cleanup activities dating back to 1983 resulting in contaminant reductions to below cleanup levels in many areas of the Site. Currently, monitoring is conducted to evaluate low level groundwater contamination.

The optimization review found that extensive remediation efforts over the past 30 years have resulted in groundwater concentrations very close to cleanup goals at the Site; however, some localized sampling results occasionally exceed the cleanup goals and prevents a definitive statistical attainment of remedial action objectives. The optimization report further concluded that:

- The hydrogeology is well understood and consistent with site data;
- The primary contaminant source area appears exhausted and is not actively exporting mass to the tail of the plume;
- COC attenuation processes have been active, and concentrations are historically decreasing despite the cessation of active treatment;
- Site contamination was/is well delineated;
- Reduced sampling frequency is appropriate – annual or less frequent sampling is recommended; and
- A specific recommendation for data collection accelerating closeout of the site could not be made.

The site team implemented the recommendation to reduce groundwater monitoring frequency to annual sampling and will monitor regulatory developments with respect to further guidance on statistical requirements for site closeout. Furthermore, the site team is reviewing plans to use permeable diffusion bag samplers to help reduce some of the variability found in the groundwater samples.

Ciba-Geigy Corp. Superfund Site

Beginning in 2010, independent technical support was provided to EPA Region 2 during an optimization process initiated by the potentially responsible party (PRP) of the Ciba-Geigy Superfund Site in Toms River, New Jersey. The support was provided on an ad hoc basis over the period of approximately one year and included document review, participation in site meetings, and written technical input provided to the region.

The PRP's stated goals of optimization were to improve efficiencies, reduce natural resource usage, reduce carbon footprint and provide for future reuse of the property. The EPA optimization review team

provided independent technical input as the PRP developed a life cycle cost model and a plan for near term, intermediate and long term optimization activities. The review team's input primarily related to alternative groundwater treatment methods, suggestions to mitigate extraction well fouling, and consideration of appropriate cleanup levels for cis-1,2-dichloroethene. Due to the ad hoc nature of this optimization-related support, no specific recommendations were made for this site.

In a follow up call with the EPA site team in 2012, the RPM stated that the technical support was a valuable resource, serving as an independent evaluation of the PRP's proposed actions. Source area characterization and optimization of the existing treatment system are currently underway.

3.0 References

3.1 Internet Resources

USEPA Superfund Program, Remedy Optimization

- Optimization guidance and links to other related program areas
- http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm

USEPA, Hazardous Waste Clean-Up Information (CLU-IN) web site

- Site-specific optimization reports and recommendations
- http://www.clu-in.org/optimization

U.S. Army Corps of Engineers, Hazardous, Toxic and Radioactive Waste Center of Expertise

- RSE checklists and scope of work, provided by developers of the RSE tool
- http://www.environmental.usace.army.mil//ltm_rse.htm

3.2 Previous Optimization Progress Reports

Ground Water Remedy Optimization Progress Report: 2008-2009 (OSWER 9283.1-34; December 2010)

Ground Water Remedy Optimization Progress Report: 2006-2007 (OSWER 9283.1-31; July 2008)

2005 Annual Progress Report for Ground Water Remedy Optimization (OSWER 9283.1-28; December 2006)

2004 Annual Progress Report for Ground Water Remedy Optimization (OSWER 9283.1-27; August 2005)

Groundwater Pump and Treat Systems: Summary of Selected Cost and Performance Information at Superfund-financed Sites (EPA 542-R-01-021a; December 2001)

Superfund Reform Strategy, Implementation Memorandum: Optimization of Fund-lead Ground Water Pump and Treat (P&T) Systems (OSWER 9283.1-13; October 31, 2000)