



U.S. Environmental Protection Agency

Final Implementation of the National Strategy to Manage Post Construction Completion Activities at Superfund Sites

Purpose

The purpose of this document is to summarize the results of the Post-Construction Completion (PCC) Strategy, which was implemented from 2005 to 2011. The purpose of the strategy, which was a management framework of five goals with accompanying approaches and initiatives, was to provide greater assurance that remedies put in place under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remain protective over the long-term. Further, the strategy was intended to be a national strategy to manage the PCC aspects of Superfund sites generally rather than a specific strategy for managing an individual site. Incorporation of the PCC Strategy into site decision-making has resulted in improved post-construction procedures for National Priorities List (NPL) sites and Superfund Alternative (SA) sites. The PCC strategy and many of the referenced documents can be found at <http://www.epa.gov/superfund/cleanup/postconstruction/index.htm>. Since the elements of the PCC Strategy have become EPA's way of doing business for the Superfund program, EPA is now closing out the PCC Strategy with this final report. This report is organized by goals and objectives under each goal.

Goal 1: Ensure that remedies remain protective and cost effective.

The PCC phase of an NPL site cleanup typically involves Operation and Maintenance (O&M), including monitoring, of remedies. Engineered remedies that may require O&M include treatment, such as pump-and-treat (P&T), bioremediation, air sparging, and soil vapor extraction; and containment, which may involve vertical barriers (subsurface walls) and caps. Ensuring the cost effectiveness and protectiveness of these remedies often requires ongoing O&M, five-year reviews, monitoring, periodic repairs, and sometimes, replacement of remedy components. Other remedies, such as monitored natural attenuation (MNA), which principally involve monitoring, can include O&M, repair, or replacement of monitoring wells. Non-engineered remedies include institutional controls (ICs) to restrict land and groundwater use. All of these types of remedies may require managing and evaluating large volumes of monitoring data, as

well as tracking progress toward well-defined requirements. The PCC strategy addressed each of these aspects of post-construction activities.

To ensure that remedies remain protective and cost effective, the Agency developed a number of guidance documents, training courses, tools, and policies for improving remedy O&M, monitoring, performance, and tracking, which are listed below.

Objective 1.1 *Develop approaches for improving remedy O&M, monitoring, performance, and tracking.*

The Agency developed and implemented the Fund-lead Pump and Treat (P&T) optimization initiative to encourage systematic review and modification to existing P&T systems to promote continuous improvement and to enhance overall remedy and cost effectiveness. Optimization reviews are now routinely conducted at high priority, Fund-lead sites, which include coordination with State counterparts. Projects to support this initiative are described below.

Tools for improving remedy O&M:

- Capture zone guidance and training to improve the efficiency of pump and treat systems. (EPA/600/R-08/003, January 2008)
- O&M check list to ensure that all aspects of operation and maintenance activities are evaluated and addressed (OSWER Directive #9355.0-87, April 28, 2008)
- The Action Plan for Ground Water Remedy Optimization (OSWER Directive 9283.1-25, August 25, 2004), to ensure ground water remedies remain cost and technologically efficient. Supporting documents include:
 - Remediation System Evaluations (RSE) and the development of site-specific progress reports, which are routinely conducted at sites (see http://www.epa.gov/superfund/cleanup/postconstruction/action_plan.pdf)
 - Ground Water Remedy Optimization Progress Reports (see <http://www.epa.gov/superfund/cleanup/postconstruction/optimize.htm>)

Tools for managing and analyzing monitoring data:

- Incorporation of a Staged Electronic Data Deliverable (SEDD) format into all Superfund contracts, which allows for electronic generation and review of SEDD data files
- Development of a Decision Support Tools (DST) matrix, which contains software tools for environmental restoration activities, including monitoring (see <http://www.frtr.gov/decisionsupport/>)
- Development of Scribe, an environmental field data management tool that captures sampling, observational, and monitoring field data in a local database to aid project managers with primary decision support and which is compatible for all SEDD files

Tools to improve the five-year review (FYR) process (for those sites where hazardous substances remain above levels that allow unlimited use and unrestricted exposure):

- EPA Headquarters review of all five-year review documents to ensure remedy protectiveness determinations are done appropriately.

Supporting documents include:

- Recommended Evaluation of Institutional Controls: Supplement to the Comprehensive Five-Year Review Guidance (OSWER 9355.7-18, September 2011)
- Five-year review fact sheet (OSWER 9355.7-21, September 2009)

Technical assistance for remedy cost and performance, including:

- Case studies are conducted yearly and are published at <http://www.frtr.gov>.
- Technical Support Centers with experts in ground water and ecosystem protection have been established (see <http://www.epa.gov/nrmrl/gwerd/gw/index.html>).

PCC classroom and internet training to regions and states:

- See <http://www.epa.gov/superfund/partners/osrti/support1/training.htm>), e.g.,
 - Remedy Optimization
 - Five year Reviews
 - Restoration vs. Non-Restoration for Ground and Surface Water Remedies
 - Institutional Controls

Objective 1.2 Encourage improved regional management of PCC sites.

- Exit Strategy for establishing intermediate and final remedy cleanup levels, ways to measure progress toward cleanup levels, and how to verify that they have been achieved. Supporting documents include:

- Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites (OSWER 9283.1-34, July 2011) (<http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/gwroadmapfinal.pdf>)
- Tools to ensure that monitoring requirements at sediment sites are implemented (see <http://www.epa.gov/superfund/health/conmedia/sediment/documents.htm>):
 - Methods and Tools for the Evaluation of Monitored Natural Recovery of Contaminated Sediments (EPA/600/S-10/006/September 2010, see www.epa.gov/research)
 - Using Fish Tissue Data to Monitor Remedy Effectiveness ((OSWER 9200.1-77D, July 2008)
 - Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (OSWER 9355.0-85, December 2005)

Objective 1.3 Ensure proper consideration of PCC requirements in enforceable agreements with responsible parties and federal facilities.

- The model Remedial Design/Remedial Action and Institutional Controls enforcement documents have been revised to include PCC requirements in agreements with responsible parties and federal facilities.

Goal 2: Ensure that institutional controls required as part of the remedy are implemented and effective.

EPA defines institutional controls (ICs) as non-engineered instruments, such as administrative and/or legal controls, that help to minimize the potential for human exposure to contamination and to protect the integrity of a remedy by limiting land or resource use. ICs are frequently used in hazardous waste cleanups to ensure that remedies remain protective over the long-term. The most critical aspects of ICs that affect protection of human health and the environment typically are related to implementation, monitoring and enforcement. Durable and effective ICs are critical to long-term protectiveness and may enable more sites to return to productive use sooner. The fundamental challenge presented by ICs is that, although the Agency frequently relies on ICs to help ensure long-term protectiveness, the responsibility for implementation, monitoring, and enforcement is often under the jurisdiction of other levels of government and private parties. Consequently, the Agency and its stakeholders need to work together to ensure acceptable long-term effectiveness and durability of ICs. To this end, EPA developed the IC Tracking System (ICTS) to help ensure the long-term durability, reliability, and effectiveness of ICs throughout their life cycle.

To ensure the effectiveness of ICs, the Agency has undertaken a number of initiatives, including incorporating IC activities into the IC Tracking System (ICTS), effective communication with stakeholders, updating decision documents to include IC selection, and developing guidance. By incorporating these activities into the post-construction phase of site remediation, selecting, implementing, and evaluating ICs have become a routine part of conducting site remediation, and are supplemented by ongoing training. IC guidance can be found at <http://www.epa.gov/superfund/policy/ic/guide/index.htm>. These initiatives have been developed in coordination with the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), and are listed below.

Objective 2.1 Develop and ensure continued effectiveness of a national IC Tracking System (ICTS).

- The IC Tracking System (ICTS) is updated regularly to include ICs that have been established at NPL sites (see http://www.epa.gov/ictssw07/public/export/regionalReport/ALL_REGIONS_IC_REPORTS.HTM)

Objective 2.2 Ensure the effective implementation of ICs.

- Ensure the accuracy of reports on IC implementation Comparisons between site-wide ready-for-anticipated use measures and site IC's are conducted regularly for specific sites and shared with regional IC Coordinators on a regular basis.
- Ensure that ICs are successfully implemented at applicable sites
 - Conference calls with regional IC Coordinators are conducted monthly to report on site-specific IC issues

Objective 2.3 *Identify and implement process improvements to increase the reliability of ICs.*

- Institutional Controls Roundtable and Training, April 2006 (see <http://www.epa.gov/superfund/policy/ic/roundtable.htm>). Training on IC's, ICTS, FYR, and other PCC-related activities are conducted on a regular basis (see <http://www.epa.gov/superfund/policy/ic/roundtable.htm>)
- The EPA Office of Site Remediation Enforcement (OSRE) conducts training in the areas of IC's and ICTS.

Objective 2.4 *Undertake other activities targeted at improving the use of ICs.*

- Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites (Interim Final, OSWER 9355.0-89, November 2010)
- Guidance on calculating the full life-cycle costs of IC's (see http://www.epa.gov/brownfields/tools/tti_lucs.htm)
 - Local Government Planning Tool to Calculate Institutional and Engineering Control Costs for Brownfields Properties (EPA 560-F-10-230, July 2010)
 - An Introduction to the Cost of Engineering and Institutional Controls at Brownfields Properties (EPA 560-F-08-244, February 2009)
- Addressing Long-Term Stewardship: Case Studies (EPA 560-F-08-243, April 2008; http://www.epa.gov/brownfields/tools/lts_fs_04_2008.pdf)

Goal 3 **Assure adequate financing and capability to conduct post construction completion activities.**

Activities to ensure long term protectiveness at an NPL or SA site often include operating and maintaining leachate collection systems or ground water contamination treatment systems, or managing residual contamination. With the exception of active restoration of Fund-lead ground and surface water for a 10-year period (called the Long-Term Response Action, LTRA), the Agency is prohibited by CERCLA from conducting O&M activities at NPL sites. Consequently, the Superfund program relies upon state governments, responsible parties, and federal facilities for ensuring the O&M at sites. The Agency remains interested in making sure that long term financing will continue to be available to maintain protectiveness at these sites.

To help ensure that adequate resources are available to conduct PCC activities, the Agency revised financial assurance (FA) sections of model enforcement documents, developed guidance on FA mechanisms, provided financial assurance training to regional offices, and recommended PCC considerations for Superfund State Contracts. By incorporating these products into the PCC program, these established mechanisms and tools have become a routine part of ensuring O&M. More detailed information on these approaches is listed below.

Objective 3.1 ***Work to assure that Potentially Responsible Parties fulfill their O&M responsibilities.***

- Revisions to financial assurance sections of model RD/RA Consent Decree were completed in August 2005 and have been updated regularly as needed.
- Financial assurance (FA) tools and guidance for use in CERCLA settlements have been developed for letters of credit, payment bonds, performance bonds, trust agreements, and corporate guarantees (see http://cfpub.epa.gov/compliance/resources/policies/cleanup/superfund/index.cfm?action=3&sub_id=1203)
 - CERCLA Financial Assurance Sample Trust Agreement, September 1, 2006.
 - CERCLA Financial Assurance Sample Guarantee Agreement, March 1, 2006.
 - CERCLA Financial Assurance Financial Test Sample Letters, February 14, 2006.
 - CERCLA Financial Assurance Sample Payment Bond, July 1, 2005.
 - CERCLA Financial Assurance Sample Performance Bond, July 1, 2005.
 - CERCLA Financial Assurance Sample Letter of Credit, December 1, 2004.
- Superfund financial assurance training has been developed for regional staff and management, which is provided on a regular basis.

Objective 3.2 ***Help states develop capacity to assure Superfund state cost share and O&M and methods to creatively finance both.***

- The ASTSWMO report, "Analysis of State Operation and Maintenance Costs at Superfund Sites," evaluates state efforts to develop long-term O&M funding, identifies obstacles to funding, and evaluates future O&M workload for states and associated funding needs (see http://astswmo.org/Pages/Policies_and_Publications/CERCLA_and_Brownfields.htm)
- "Post Construction Completion Considerations in Superfund State Contracts" (August 2008), OSWER 9242.2-19, <http://www.epa.gov/superfund/cleanup/postconstruction/index.htm>) includes:
 - The SSC should specify that a state's O&M responsibilities generally should ensure that the remedy remains protective of human health and the environment and may include the repair and replacement of all damaged, worn, and obsolete equipment and structures.
 - The SSC should define the process and expectations for transfer of the remedy from EPA to the state for O&M upon completion of the LTRA phase.
 - The SSC should include a description of planned ICs, the specific IC instruments to be used, the objectives of the ICs, responsible entities, estimated costs, any performance standards, and milestones for implementing the ICs.

Goal 4 Support appropriate reuse of sites while assuring remedy reliability.

The Superfund Redevelopment Initiative (SRI) operates as a nationally coordinated effort to ensure that at every site, EPA and its partners have an effective process and the necessary tools and information needed to return the country's most hazardous waste sites to productive use. The benefits of reuse are most visible during the PCC phase, since remedies are often constructed to be compatible with expected future use. Through the current coordinated national effort, the Agency and its partners can better determine what the future use of a site is likely to be, so that protective remedies are selected consistent with practical and feasible planned reuse activities.

To support appropriate reuse of sites while assuring remedy reliability, EPA developed the "Return to Use" initiative, the "Ready for Reuse" guidance, and established reuse performance measures. The SR Initiative is now a routine activity, and can be followed at the Superfund Redevelopment website at <http://www.epa.gov/superfund/programs/recycle/index.html>.

Objective 4.1 *Reexamine sites to eliminate barriers to reuse wherever possible.*

- EPA established the "Return to Use" initiative in 2004, under which the Agency partners with communities and other stakeholders to address potential obstacles to reuse, such as modifying fences, removing barbed wire, and eliminating misleading signs (see <http://www.epa.gov/superfund/programs/recycle/activities/rtu.html>).

Objective 4.2 **Implement the Ready for Reuse guidance to answer questions about a site's suitability for reuse.**

- EPA established the Ready for Reuse (RfR) determination in February 2004, which is a redevelopment tool to provide information that a site is "ready for reuse" and will remain protective for that use, so long as any use limitations established by EPA continue to be met. Supporting documents include:
 - Ready for Reuse Determination Guidance (2/18/04) provides Headquarters and Regional staff with the information needed to make and document these determinations (see <http://www.epa.gov/superfund/programs/recycle/tools/rfr.html>)
- EPA established two measures to assess and report on a range of accomplishments and outcomes realized through cleaning up and redeveloping formerly contaminated sites (see <http://www.epa.gov/superfund/programs/recycle/effects/index.html#rau>).
 - *Sitewide Ready for Anticipated Use (SWRAU)* reflects the high priority that EPA places on land reuse and revitalization as an integral part of the Agency's cleanup mission for the Superfund program, as well as its attention to post-construction activities at NPL sites.
 - *Cross-Program Revitalization Measures (CPRM)* established a similar, consistent set of measures applied across all of the EPA Office of Solid Waste and Emergency Response cleanup programs to track the efforts the Agency was making in preparing sites to be returned to use.

- This measure resulted in guidance for documenting and reporting performance in achieving land revitalization (OSWER Directive 9200.1-74, October 2006).

Goal 5 Improve site records management to better ensure remedy reliability.

Many records associated with Superfund sites need to be preserved for the future. In those cases where wastes are left on site above levels allowing for unrestricted use and unlimited exposure, the records generally are critical for ensuring that the presence of these wastes is known. Any electronic systems should complement, and in certain cases replace, paper-based processes. To this end, the Agency has implemented the Superfund Enterprise Management System (SEMS), which is used by Headquarters and all 10 regional offices.

The Agency continues to work on a range of options to foster mutually agreeable data exchange formats and procedures between the Agency's and states' information systems. When electronic records are transferred from one organization to another, standardized authentication and chain of custody procedures may need to be established specific to digital media.

To help ensure that site records management is improved to better ensure remedy reliability, the Agency developed and deployed an enterprise content management system (ECMS) and migrated its records to a central repository. These established tools have become a routine part of keeping track of site information.

Objective 5.1 Develop a standard methodology nationwide for record keeping, including electronic record keeping, that conforms both to Superfund program needs and the Agency's enterprise content management architecture.

The Enterprise Content Management System (ECMS) was deployed on July 3, 2009, to capture email with attachments and apply records schedules to all captured content. The system is designed to allow for searching of Superfund e-mail records through both ECMS and SEMS by capturing appropriate metadata in SEMS and the record in ECMS E-mail Records. The system also allows for additional Superfund-specific metadata, such as site name, to be added to e-mail records.

Objective 5.2 Establish effective content "migration" strategies to assure accessibility to records in light of rapid and persistent changes in information technologies.

- The SEMS Central Repository Migration Sequencing Plan has been completed. Supporting documents include:
 - Superfund Cost Management Measures (OSWER Directive 9275.1-18, June 27, 2007; http://www.epa.gov/superfund/programs/reforms/docs/Progress_Summary.06.2007.pdf)

- Recommended Cost Management Activities Summary Report. June 2007.
(<http://www.epa.gov/superfund/programs/reforms/docs/CMM.attachment1.june.2007.pdf>)
- A regional migration to the SEMS Central Repository was completed in FY 2008.

Summary

The Agency has successfully implemented the PCC Strategy, and the various elements of the strategy have become a routine part of the Superfund site remediation process. The implementation of the PCC Strategy has incorporated elements of remedy performance, institutional controls, financing, redevelopment and reuse, and recordkeeping into the site remediation process, and routine training is available for these elements. Since the elements of the PCC Strategy have become EPA's way of doing business for the Superfund program, EPA does not intend to update or reissue the PCC Strategy