

## **U.S. Environmental Protection Agency**

### **National Strategy to Manage Post Construction Completion Activities at Superfund Sites**

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#### **Purpose of Strategy**

This document sets forth the Environmental Protection Agency's (Agency) National Strategy to Manage Post Construction Completion Activities at Superfund Sites (PCC Strategy). The PCC Strategy is a management framework of goals, with recommended approaches and initiatives, that is designed 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. It is intended to be a national strategy to manage the PCC aspects of Superfund sites generally, not a specific strategy for managing an individual site. The Agency anticipates undertaking the projects outlined in this strategy over the next five years.

Except where noted, the strategy is designed for both National Priorities List (NPL) sites and Superfund Alternative (SA) sites. Under existing guidance, the Agency considers SA sites to include sites that the Region has determined would meet the criteria for listing on the NPL, require long-term response, and have viable and agreeable potentially responsible parties.<sup>1</sup> Products developed under this strategy may also apply to other Superfund cleanups and cleanups under other programs.<sup>2</sup>

An Agency interoffice workgroup prepared this strategy, with input from regional workgroup members and stakeholders. The PCC Strategy collects ideas from the Agency and its stakeholders on PCC issues, highlights areas that warrant focused attention, and identifies

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<sup>1</sup>"Revised Response Selection and Settlement Approach for Superfund Alternative Sites," OSWER 9208.0-18, June 17, 2004, <http://www.epa.gov/compliance/resources/policies/cleanup/superfund/rev-sas-04-trans-mem.pdf>

<sup>2</sup>It should be noted that the Agency's Federal Facility Superfund program, the Department of Energy (DOE), and the Department of Defense have initiated efforts broadly labeled as "long-term stewardship" (LTS). DOE has created an Office of Legacy Management to manage post-closure responsibilities and ensure the future protection of human health and the environment. This office has control and custody for legacy land, structures, and facilities and is responsible for maintaining them at levels suitable for their long-term use. LTS components generally include: O&M, site surveillance and maintenance; implementation, monitoring and enforcement of land use controls; environmental monitoring; oversight and enforcement; information collection and dissemination; and periodic evaluation of remediation systems, including availability of new technology. In addition, the Agency has established a Long-Term Stewardship Task Force under the "One-Cleanup Program" initiative that has prepared a report entitled, "Long-Term Stewardship: Ensuring Environmental Site Cleanups Remain Protective Over Time."

potential approaches. The PCC Strategy builds on previous efforts of the Agency, its regions, and stakeholders to create a recommended “infrastructure” for PCC through guidance, fact sheets, training courses and other efforts.

Through five goals, the PCC Strategy provides information to regions, federal agencies, states, tribes, local governments, and stakeholders regarding the areas that may require continued focus. Under each of these goals, the PCC Strategy identifies potential initiatives or, in some cases, summarizes work that is already underway. Now that this strategy is final, the Agency is developing a schedule of the products that the Agency will continue to work on or initiate over the next five years, taking into consideration the potential beneficial impacts on the program, resources, and other program priorities. Note that, separate from this strategy, an overall workforce assessment for Superfund is being developed; consequently, PCC workforce issues will not be addressed in this strategy.

This document provides information to Agency staff, the public, and the regulated community on how the Agency intends to nationally manage PCC activities at Superfund sites. The document does not, however, substitute for the Agency's statutes or regulations, nor is it a regulation itself. Thus, it cannot impose legally-binding requirements on the Agency, states, or the regulated community, and may not necessarily apply to a particular situation based upon the circumstances.

### **Post Construction Completion History**

Until the late 1990's, the Superfund program was principally focused on getting NPL sites to the milestone of site Construction Completion (CC). The Construction Completion category of the NPL and Construction Completions List were first described in two Federal Register Notices.<sup>3</sup> Generally, a site qualifies for the construction completion list when any necessary physical construction is complete, whether final cleanup levels or other requirements have been achieved.

Achieving site Construction Completion has been the Superfund program's primary measure of accomplishment, and it is a Government Performance and Results Act (GPRA) target. Because of its prominence in the Superfund program, the term “Construction Completion” is sometimes mistaken to mean that site cleanup is complete. The reality is that, while physical construction is complete, in most cases, additional activities are needed to achieve remedial objectives. Many of the construction complete sites have remedies that only permit certain uses because of residual contamination remaining on the site. In addition, many of the sites with ground water contamination will require ongoing remediation over many years to achieve protective cleanup levels.

In the late 1990's, the Superfund program started to group the body of work that occurs after Site

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<sup>3</sup>FR Volume 55, No. 46, March 8, 1990; FR Volume 58, No. 29, March 2, 1993.

Construction Completion into what is now known as PCC. Since more than 62 percent of the final and deleted NPL sites were Construction Complete as of the end of FY2005, the management of PCC is becoming increasingly important. The main purpose of PCC generally is to ensure that response actions continue to provide for the long-term protection of human health and the environment. PCC typically encompasses several activities that may be undertaken at a site following the construction of a remedy. These activities may include, but are not limited to:

- **Long-Term Response Action (LTRA):** Generally applies to the first 10 years of Fund-financed ground and surface water restoration.
- **Operation and Maintenance (O&M):** Includes the activities required to maintain the effectiveness and integrity of the remedy. Also includes continued operation of ground and surface water restoration remedies after LTRA.
- **Five-Year Reviews:** Required by statute to assure protectiveness for any remedial action that leaves hazardous substances on a site above levels that allow for unlimited use and unrestricted exposures. Five-year reviews are also conducted as a matter of policy in other situations.
- **Institutional Controls (IC):** Using non-engineered instruments, such as administrative and/or legal controls, that typically minimize the potential for human exposure to contamination and/or protect the integrity of the remedy by limiting land or resource use.
- **Remedy Optimization:** Performing reviews to improve the performance and/or reduce the annual operating cost of remedies without compromising protectiveness.
- **NPL Deletion:** Removing sites or portions of sites from the NPL because no further response action is appropriate (not applicable to SA sites).
- **Reuse:** Working with the parties seeking to redevelop Superfund sites to ensure that their activities do not adversely affect the implemented remedy.

A complete description of each of these PCC components, along with guidance and fact sheets, is available at the Agency Superfund web site.<sup>4</sup> The PCC Strategy is also available there.

The remainder of this document describes the five goals in the PCC Strategy and their recommended implementation approaches. The goals and implementation approaches are not listed in any particular priority order, as they are all considered priorities for the PCC Strategy.

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<sup>4</sup><http://www.epa.gov/superfund/action/postconstruction/index.htm>

## Post Construction Completion Strategy by Goal

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

Section 121(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) states:

“The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.”

When remedies are selected, the statutory requirements of Section 121 are addressed in part by applying the nine criteria provided for in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).<sup>5</sup> At all stages of cleanup, especially the PCC phase after remedies have been constructed, the focus should be on assuring protectiveness and achieving results in a cost effective manner, consistent with the statute and the NCP.

The PCC phase of an NPL site cleanup typically involves the 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, that may involve vertical barriers (subsurface walls) and caps. To ensure 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), principally involve monitoring (but can include O&M, repair, or replacement of monitoring wells). All of these types of remedies may require managing and evaluating large volumes of monitoring data, and tracking progress toward well-defined requirements. Clear remedy requirements are important in order to assess ongoing performance and the need for operational changes.

Remedies are selected, designed, and constructed based on the best knowledge of site conditions and technology available at the time. It is expected that most remedies will have a dynamic nature over time. This can be related to factors such as additional characterization data, changing site conditions, engineering or operating issues, technological innovation, or regulatory changes (e.g., regulatory standards such as MCLs). These factors may warrant a reevaluation of previous documented decisions, such as the remedy, remediation objectives, methods for determining achievement of objectives, system design and operation, and monitoring frequency or locations. These decisions are typically documented in the ROD, remedial design, or Operations & Maintenance (O&M) Plan for the remedy.

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<sup>5</sup>NCP §300.430(f)(5)(i)

Existing program guidance allows for remedy changes when appropriate.<sup>6</sup> The guidance states that a Record of Decision (ROD) modification is generally appropriate where significant new information has become available that supports the need to alter the remedy. Other guidance also encourages the regions to take a close look at, and modify as appropriate, past remedy decisions where those decisions are substantially out of date with the current state of knowledge in remediation science and technology, and, thus, are not as effective from a technical or cost effectiveness perspective as they could be.<sup>7</sup> Remedy update types could include not only changes in the remediation technology, but also modification of the remediation objectives, or modification of the monitoring program. The objective of Goal 1 is to enable the program to assess changing conditions over time, and to modify remedy decisions and approaches as needed to maintain the protectiveness and cost-effectiveness of the remedy.

### **Recommended Implementation Approach**

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

To determine if an operating remedy continues to be both protective and cost effective may require periodic evaluation of its operation and performance with respect to cleanup standards. To assess progress toward achieving cleanup standards may require that the reliable and necessary data be collected, managed, and analyzed on a regular basis. Current program guidance is focused on five-year reviews<sup>8</sup> and a few specific remedies, such as monitored natural attenuation (MNA)<sup>9</sup> and pump-and-treat<sup>10</sup>. Five-year reviews are designed to assess the protectiveness of a remedy, but not necessarily whether it is operating efficiently or making sufficient progress to meet cleanup levels. Detailed evaluations (such as remedy optimization evaluations) for large systems may be necessary to properly optimize performance for the least cost.

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<sup>6</sup>“A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents,” OSWER 9200.1-23P, EPA 540-R-98-031, July 1999, <http://www.epa.gov/superfund/resources/remedy/rods/index.htm>

<sup>7</sup>“Superfund Reforms: Updating Remedy Decisions,” OSWER 9200.0-22, Sept. 27, 1996, <http://www.epa.gov/superfund/programs/reforms/reforms/3-2.htm>

<sup>8</sup>“Comprehensive Five-Year Review Guidance,” OSWER 9355.7-03B-P, EPA 540-R-01-007, June 2001, <http://www.epa.gov/superfund/resources/5year/index.htm>

<sup>9</sup>“Performance Monitoring of MNA Remedies for VOCs in Ground Water,” EPA 600-R-04-027, April 2004, <http://www.epa.gov/ada/pubs/reports.html>

<sup>10</sup>“Elements for Effective Management of Operating Pump and Treat Systems,” OSWER 9355.4-27FS-A, December 2002, [http://www.epa.gov/superfund/resources/gwdocs/per\\_eva.htm](http://www.epa.gov/superfund/resources/gwdocs/per_eva.htm)

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to provide tools to review and improve O&M (e.g., capture zone guidance and training, O&M check list).
- B. Continue implementation of the “Action Plan for Ground Water Remedy Optimization.”<sup>11</sup>
- C. Develop and implement tools to manage and analyze monitoring data.
- D. Clarify and supplement current guidance on establishing intermediate and final remedy cleanup levels, ways to measure progress toward cleanup levels, and how to verify that they have been achieved (i.e., “exit strategy”).
- E. Continue to provide tools to improve the five-year review process.
- F. Develop and implement tools to ensure that monitoring requirements at sediment sites are implemented.
- G. Continue implementation of long-term monitoring optimization efforts for monitoring systems.
- H. Continue to compile and prepare case studies of remedy cost and performance.
- I. Provide additional PCC classroom and internet training to regions and states.
- J. Focus technical support (e.g., Technical Support Centers) for remedial project managers on PCC activities.

## ***1.2 Encourage improved regional management of PCC sites.***

This effort is intended to help the regions, states, and other federal agencies create processes to manage more effectively the increasing number of PCC sites. Regional, state, and other federal agency staffs may be responsible for managing and overseeing multiple complex site cleanups in the PCC phase. Effective management of these cleanups may require expertise in data management, system performance evaluation, system optimization, and innovative technologies. Some regional offices already have created special procedures for PCC sites. For example, Region 10 staff members prepare short written updates of the status of PCC sites and brief an internal team on progress and issues. Region 8 has a team of staff assigned to manage PCC sites. Region 3 is working with Headquarters to create a regional optimization and evaluation team consisting of technical staff, senior managers, and others to track and manage LTRA sites.

The activities in PCC may lend themselves to the application of an Environmental Management Systems (EMS) approach.<sup>12</sup> An EMS typically involves a continual cycle of planning, reviewing and improving the processes and actions that an organization

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<sup>11</sup>“Action Plan for Ground Water Remedy Optimization,” OSWER 9283.1-25, August 25, 2004, [http://www.epa.gov/superfund/action/postconstruction/action\\_plan.pdf](http://www.epa.gov/superfund/action/postconstruction/action_plan.pdf)

<sup>12</sup><http://www.epa.gov/ems/>

undertakes to meet its business and environmental goals.

Priority efforts already underway and those that may be initiated in the future include:

- A. Document regional processes for managing PCC sites.
- B. Work with any regions that would like assistance to develop new procedures or improve their current procedures for managing PCC sites.
- C. Develop a conceptual model of the PCC process to determine how the EMS process may be applied.
- D. Pilot using an EMS approach for selected PCC sites.

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

Some of the model documents associated with Superfund may not have fully anticipated issues emerging in PCC. These issues should be contemplated and planned for throughout the remedial process, and could include considerations associated with financial assurance, O&M, institutional controls, and reuse. The model language may need to be revised to include PCC considerations that may not have been included in previous versions.

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to revise model enforcement documents.
- B. Continue to ensure language addressing operation and maintenance (including any engineered and institutional control portion of the remedy) is included in future Federal Facility Agreements.

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

The Agency generally 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.<sup>13</sup> ICs are frequently used in hazardous waste cleanups to ensure that remedies remain protective over the long-term. As the cleanup pipeline has matured, many of the early assumptions about the effective identification, evaluation, selection, implementation, monitoring, reporting and

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<sup>13</sup>“Institutional Controls: A Site Manager’s Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups,” OSWER 9355.074FS-P, September 2000, <http://www.epa.gov/superfund/action/ic/guide/index.htm>

enforcing of ICs have come into question. This has resulted in significant internal and external concern about the long-term reliability of certain remedies and associated ICs. The fundamental challenge presented by ICs is that, although the Agency frequently relies on ICs to ensure protectiveness, the responsibility for implementation, monitoring, and enforcement is often under the jurisdiction of other levels of government and private parties.

ICs normally are used specifically to ensure protection of human health and the environment, as well as to protect the integrity of the remedy. 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.

One key challenge for ICs is ensuring coordination and cooperation outside the Agency. The Agency, other federal agencies, states, tribes, local government, and industry need to work together to ensure acceptable long-term effectiveness and durability of ICs.

### **Recommended Implementation Approach**

Note that the Agency has separately developed a strategy to ensure institutional control implementation.<sup>14</sup> The approaches described below are consistent with the IC strategy.

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

An initial round of preliminary IC data entry for Agency analysis was completed in the summer of 2004 for all of the construction complete sites on the NPL. This initial effort likely will be augmented as the tracking system is developed further.

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to establish an approach and appropriate time line for population, continual updates, and maintenance of ICTS.
- B. Work further with federal facilities, states, tribes, local agencies and industry to establish the exchange of IC information.

#### ***2.2 Ensure the effective implementation of ICs.***

Priority efforts already underway and those that may be initiated in the future include:

- A. Use ICTS data and other site information to prioritize further evaluation of ICs at

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<sup>14</sup>“Strategy to Ensure Institutional Control Implementation at Superfund Sites,” OSWER 9355.0-106, September 29, 2004, <http://www.epa.gov/superfund/action/ic/strategy.htm>



- applicable sites.
- B. Continue to develop an approach for ensuring that ICs are successfully implemented at applicable sites.
  - C. Continue to evaluate and address IC issues at applicable sites.
  - D. Develop approaches to update decision documents to reflect selection and implementation of ICs.

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

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to improve PCC processes (e.g., remedial design, five-year reviews, O&M plans) to better ascertain overall IC effectiveness.
- B. Develop policy on how to critically evaluate the effectiveness of ICs both at the remedy evaluation stage and post implementation.
- C. Continue to provide training so that Agency staff, and external partners better understand ICs, ICTS, and related topics.
- D. Continue to educate, inform, and involve additional parties (e.g., local governments, communities) to support efforts to identify and resolve IC issues.

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

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to develop guidance, "A Guide to Preparing Institutional Control Implementation Plans and Assurance Plans at Superfund, Brownfield, Federal Facilities, Underground Storage Tanks, and Resource Conservation and Recovery Act Cleanups."
- B. Develop guidance, "Calculating the Full Life-Cycle Costs of ICs."
- C. Continue to work with Common Ground Alliance or other groups to develop a best practices guide for residual contamination, sub-surface remedy components, and excavation restrictions.
- D. Continue to support "one call" demonstration pilots.<sup>15</sup>

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<sup>15</sup>One call is a state system to notify excavators of the location of underground facilities. The "one call" pilots are designed to study the inclusion of the location of subsurface remedy components and contamination and use restrictions to the one call notification system.

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

Obtaining adequate financing for PCC activities at a site can be essential to ensure the long term protectiveness at that site. These activities may include operating and maintaining leachate collection systems or ground water contamination treatment systems. In other cases, the activities may be more passive and may simply require adequate financing to be confident that residual contamination (that is contained or requires land use restrictions) is managed in a way that ensures the long term effectiveness of the remedy.

With the exception of active restoration of ground and surface water for a 10-year period (LTRA), the Agency is limited by CERCLA with regard to conducting O&M activities at NPL sites. Thus, Superfund relies upon state governments, responsible parties, and federal facilities for ensuring the O&M at sites. Nonetheless, the Agency is keenly interested in making sure that implementation of the remedy at sites is supported by the community, the state, the federal facility and responsible parties, and that all these players can be confident that long term financing will continue to be available to maintain protectiveness at these sites.

Two factors may point to the need to further address financing of long term activities at sites: (1) the budgetary constraints facing local, tribal, state, and federal governments may affect their capability to maintain and oversee remedies at sites, and (2) as more sites are entering the PCC phase of cleanup, the potential scopes of O&M costs are increasing.

State governments are required by CERCLA to assure that long term O&M is conducted at Fund-financed sites. They are not required to provide all required O&M funding from state funds prior to the start of O&M. This statutory feature can complicate long term O&M planning at sites, since a stable long-term funding source often is needed to continue O&M. The Agency and its partners, the state and local governments, have just begun to identify a full complement of funding mechanisms for financing sites. Innovative approaches and collaborative efforts need to be explored and developed to promote a variety of ways to achieve reliable long-term O&M funding.

**Recommended Implementation Approach:**

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

Priority efforts already underway and those that may be initiated in the future include:

- A. Continue to revise model financial assurance provisions in enforcement agreements and orders.
- B. Continue to develop sample letters of credit, bonds, and trusts.
- C. Develop approaches to implement different financial assurance mechanisms.

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

Priority efforts already underway and those that may be initiated in the future include:

- A. With support of states, evaluate current state efforts to develop long-term O&M funding. Identify obstacles to funding and share findings.
- B. Revise model Superfund State Contract to better describe PCC considerations that may not have been included in previous versions.
- C. Identify future O&M workloads for states, and associated funding needs.

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

The Superfund Redevelopment Program is designed to improve consideration of potential reuse so that communities affected by some of the nation's worst hazardous waste sites can return them to safe and productive uses. Likewise, other federal agencies envision reusing contaminated properties and, in some cases, transferring properties outside of the federal government. While cleaning up sites and making them protective of human health and the environment, the Agency is working with communities and other partners to consider anticipated future land use in the cleanup process. The benefits of reuse are most visible during the PCC phase, when remedies have been 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 planned reuse, where practical and feasible.

**Recommended Implementation Approach**

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

Restrictions on site access and use are necessary at some, but not all, of the construction complete and deleted NPL sites. In some cases, fences, warning signs, or other access and use controls, may be modified over time as we learn more specifically what is necessary to protect the engineered remedy, human health, and the environment. Furthermore, at some of these sites, public perception and a misunderstanding of the remedy may be precluding productive reuse. Under a new initiative, known as "Return to Use,"<sup>16</sup> the Agency intends to systematically look at sites where real or perceived barriers may exist and work to overcome those barriers. This can be done by sharing information or, when necessary, making modifications to the remedy through the administrative process (e.g., ROD Amendment or Explanation of Significant Difference) to change the way it is implemented.

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<sup>16</sup><http://www.epa.gov/superfund/programs/recycle/rtu/index.htm>

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

Some Superfund sites are on prime land. The location of industry and facilities that have prompted contamination problems is often at the nexus of transportation, utility and employment centers. The locations of these properties often warrant beneficial reuse, and such reuse may serve to provide active management of residual wastes over the long term. The "Ready for Reuse"<sup>17</sup> determination is designed to give possible developers a user-friendly report on the environmental status of sites and portions of sites that are ready for specified uses. This effort will be accomplished concurrent with or in addition to the five-year review and does not require NPL site deletion or partial deletion.

The Agency will continue its ongoing efforts to delete and partially delete sites as soon as they qualify for deletion. Sites typically can be fully or partially deleted from the NPL after all appropriate response actions have been implemented. It is important to note that sites may be "Ready for Reuse" long before NPL deletion. Ground water restoration remedies, for example, may take many years to achieve cleanup levels; however, it may be possible to allow for reuse of surface lands once site construction is complete even if the site is still on the NPL.

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

Many records associated with Superfund sites are needed for long into 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. Agency strategies for identifying, capturing, managing and providing access electronically are currently being designed, and the Superfund Program is playing a leading role. Any electronic systems should complement, and in certain cases replace, paper-based processes. The Agency is moving toward capturing and preserving records online through the Superfund Document Management System (SDMS). SDMS is already in use in all 10 regional offices and will soon become available for Headquarters use.

The Agency is working on a range of options that are designed to foster mutually agreeable data exchange formats and procedures between the Agency's and states' information systems. The Agency is prepared to address any concerns states may have directly and in an open dialogue to achieve results that do not place undue burdens on those submitting records, or on internal systems management. 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.

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<sup>17</sup>"Guidance for Preparing Superfund Ready for Reuse Determinations," OSWER 9365.0-33, February 18, 2004, <http://www.epa.gov/superfund/programs/recycle/rfrguidance.pdf>

## **Recommended Implementation Approach**

### ***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 Agency is embarking on a major information technology investment known as the "Enterprise Content Management System (ECMS)." This is a very significant undertaking to electronically manage nearly all Agency information, including records. OSRTI is a key partner in the ECMS project and intends to link SDMS to ECMS. Most Superfund records initially will be captured into SDMS. The aim of the linkage between SDMS and ECMS is to fundamentally transform the manner in which information is managed by the Agency. OSRTI is currently working to develop a strategic plan for records management. SDMS can already offer much of what will become ECMS.

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

Among the challenges facing records production, capture, and management in this age is maintaining methods and practices that keep pace with rapidly evolving information technologies. When records are captured into digital systems it becomes critical to ensure that the content -- often irreplaceable -- is refreshed often enough to preserve its accessibility and use. Among the strategies for preserving access is reducing the complexity of what must be managed in the first place. For text documents, it is generally feasible to save the document into an Adobe Acrobat Portable Document Format (PDF). This single step can greatly ease the task of migrating content from one hardware platform, and software version, to the next. Additional standards are pending for other records formats, such as tabular data, geographic information systems outputs, web pages, and audio-visual. Another effective strategy for reducing file format complexity is modifying contract language to submit deliverables in specified formats, such as PDF. Guidance is currently being drafted to address both strategies discussed. Additional measures will be determined as we move forward toward implementation of electronic content in the Agency.