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Transitioning Fund-Financed Site Remedies from EPA to the States: A Guide for Project Managers

ASTSWMO CERCLA Post Construction Focus Group
August 2017, Updated May 2025

In Memoriam

This paper is dedicated to the memory of our focus group member, colleague and friend, Joe Coyne. Joe was a passionate and dedicated public servant who was universally loved and respected by all who had the privilege to work with him. With his quick wit, kind spirit and contagious laugh, Joe was truly the heart and soul of our focus group.

Acknowledgements

This document was originally prepared by the ASTSWMO CERCLA Post Construction (CPC) Focus Group, with assistance from the U.S. Environmental Protection Agency under the Cooperative Agreement RT-83500901. In May of 2025, the CPC Focus Group reviewed and updated the document with assistance from the U.S. Environmental Protection Agency under the Cooperative Agreement RT-84054301.The views expressed in this document are those of ASTSWMO and its members and do not necessarily reflect the policy or legal position of EPA.

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I. EXECUTIVE SUMMARY

The Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA or Superfund), addresses the remediation of uncontrolled or abandoned hazardous substance sites. Often, remediation activities are conducted by potentially responsible parties (PRPs) with federal and State oversight. Where no viable PRP(s) exists, U.S. Environmental Protection Agency (EPA) generally serves as the lead agency, implementing the requirements of the National Contingency Plan (NCP). These sites are understood to be Fund-financed sites,[1] and the EPA and the State wherein the site is located share remedy implementation costs. Under CERCLA, the State is required to assume operation and maintenance (O&M) responsibilities at Fund-financed sites. Oftentimes, the costs associated with O&M are not fully understood until late in the process, leading to uncertainty by the State on its long-term financial obligations. This is especially true for sites that involve surface water and/or groundwater restoration. While decisions made during the feasibility study (FS) and record of decision (ROD) set the stage for anticipated long-term costs to be incurred by the State, remedy design (RD) and construction phases will have a profound economic impact on a State's long-term O&M costs. To facilitate successful remedy transfer, it is important to engage in effective and early communication and planning between the EPA and the State.

Upon remedy transfer, it becomes the State's responsibility to ensure that the remedy is maintained so that it remains protective of human health and the environment. Because transition from the remedial action (RA) phase of a remedy to O&M is often complicated, inadequate preparation and communication between the agencies may result in inefficiency and confusion. The CERCLA Post Construction Focus Group (CPCFG) contacted various States for examples of challenges that arose during transition from the RA phase to the O&M phase. Based on State feedback, it became apparent that identification of potential issues early in the CERCLA process for NPL sites could help facilitate a more successful transition into O&M. This paper will: 1) provide examples of challenges experienced by various States during the transition of sites from the EPA to a State and 2) present NPL site examples that illustrate opportunities for possible solutions to aid in facilitating more successful transitions.

There are opportunities throughout the CERCLA process for EPA and the State to engage in planning for the eventual transfer of O&M responsibilities. The site-specific Superfund State Contracts (SSCs) and Cooperative Agreements (CAs) between EPA and individual States are the primary mechanisms used to define expectations and delineate roles and responsibilities, while providing opportunities for dispute resolution. These agreements should also be used to identify the mutually agreed-upon roles and responsibilities during the transition process and should

[1] While the focus of this paper is on Fund-financed sites, much of the information is applicable to all National Priorities List (NPL) sites or NPL-caliber sites, regardless of funding source.

include methods to assess (and reassess, as necessary) any issues that may arise. Clear dispute-resolution processes should also be established early to help facilitate resolution of disagreements over the functional operation of a remedy prior to its transfer to a State.

Because it will ultimately become the State's responsibility to implement O&M, States may consider taking a more proactive role during development and implementation of the remedial design (RD) and remedial action (RA). It is important for States to have meaningful involvement at the beginning of the CERCLA process (e.g. RI/FS) for NPL sites, so States have a solid understanding of the potential issues and costs associated with O&M while also identifying opportunities to minimize inefficiencies.

Tools that can be used to leverage effective and efficient transition into O&M include:

- SSCs & CAs
- Feasibility study
- Optimization reviews and implementation
- Five-year reviews
- Site-specific administrative documents (e.g. access agreements, transfer agreements)
- Comprehensive O&M plans and manuals
- Accurate cost estimates
- Equipment ownership agreements
- Clear project documentation (e.g. administrative record, site file, etc.)

Successful project transitions necessitate early identification of O&M costs. In certain situations, it may be appropriate to utilize third party remedy optimization reviews as part of any Long-Term Response Action (LTRA) to help streamline transitions. States should ensure that decision-making and communication processes are thoroughly negotiated and identified in SSCs and CAs.

II. INTRODUCTION

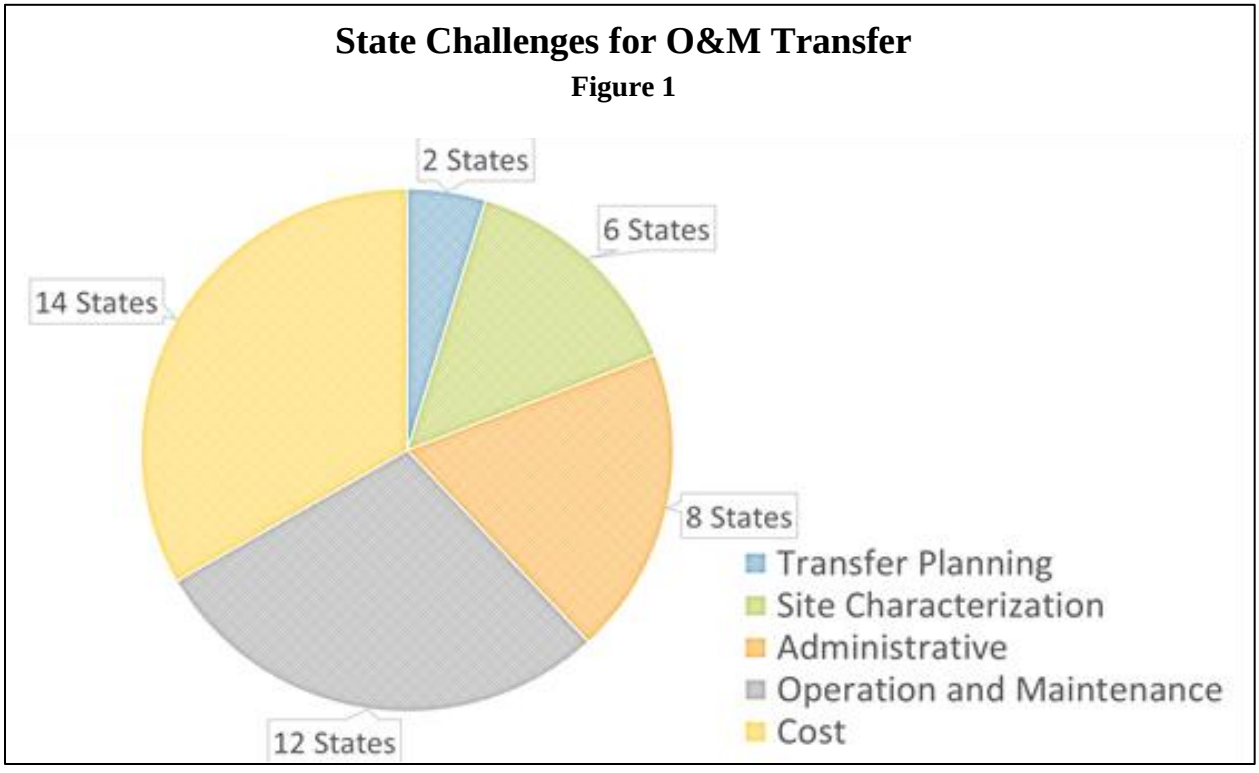
Under CERCLA (or Superfund), as amended, EPA is given the authority to seek out those parties responsible for a release and assure their cooperation in the cleanup. Through various enforcement tools, EPA obtains private party cleanup through orders, consent decrees, and other small party settlements. Once a response action has been completed, EPA also recovers costs from financially viable individuals and companies. However, when no PRPs can be identified or when the PRPs have demonstrated an inability to pay, the cleanup is funded by EPA and State dollars. These sites are considered "Fund-financed" sites, wherein EPA and States share remedy implementation costs.

At a Fund-financed remedial action, remedy construction costs are split, with typically 90% of the cost coming from federal sources and the remaining 10% from the State. After completion of the RA/LTRA, CERCLA requires that the State assume responsibility for and fully fund O&M of the selected remedy to ensure it remains protective of human health and the environment.

In 2024, the ASTSWMO CPCFG completed a research effort to identify challenges in the transfer of Superfund O&M responsibilities from EPA to states. The majority of states indicated that cost-related issues (e.g., inadequate funding for O&M, inaccurate cost estimates or timeframes) were the largest challenge when transferring a site into O&M. States also indicated that there are challenges with system O&M (e.g., system modification repair requirements, cap maintenance issues), and with "administrative" items (e.g., communication of transfer timing, site access, establishing institutional controls, and permitting). Some states also noted challenges with inadequate site characterization prior to site transfer, and difficulty in obtaining sufficient technical documents (O&M plans) necessary for the transfer. Figure 1 illustrates the top two challenges that the states identified when preparing for an O&M transfer.

State Challenges for O&M Transfer

Figure 1



This document is intended to further identify issues that have arisen during the transition of Fund-financed NPL sites from the EPA to the State for O&M and to provide recommendations for processes that can be implemented to prevent complications from arising during future

transitions. Case Studies depicting challenges that have arisen during or following transition of O&M responsibilities to the State are included as text boxes in Section VII to depict the advantages of early State engagement.

III. BACKGROUND

CERCLA Section 104 requires that EPA consult with the affected State(s) before determining the appropriate RA and prior to implementing an RA, EPA and the State must first enter into a contract or cooperative agreement. These contracts or agreements help to provide mutual assurances that EPA or the State will fulfill their respective obligations. As stated in Section 104 of CERCLA, the State's responsibilities include:

- Providing a 10 percent cost share on the remedial response (could be 50% or more for State-operated facilities);
- Conducting and paying for all O&M activities; and
- Accepting transfer of all real property acquired by EPA to conduct the RA.

Because the State is responsible for fully funding O&M activities, the State should proactively participate in the selection and development of a remedy involving O&M obligations. This is especially true for sites with a containment remedy because in many cases they must be operated in perpetuity and for surface and/or groundwater that may take longer than standard duration used for cost estimating to achieve the remedial action objectives (RAOs).

Decisions made during remedy design and construction phases can have a profound economic impact on the State's long-term O&M costs. Therefore, State involvement should begin early in the CERCLA process. State involvement during various phases in the CERCLA process can be defined in one or more of three common mechanisms: Superfund Memorandum of Agreements (SMOAs), SSCs or CAs.

A SMOA is a nonbinding, written document executed by an EPA Regional Administrator and the head of a state agency that establishes the nature and extent of EPA and State interaction during the removal, pre-remedial, remedial, and/or enforcement response process. The SMOA is not a site-specific document although attachments may address specific sites. The SMOA generally defines the roles and responsibilities of both the lead and the support agencies.

The lead agency is the agency that provides the on-scene coordinator or remedial project manager (RPM) who is responsible for planning and implementing response actions under the NCP. The EPA, Department of Defense (DOD), Department of Energy (DOE), another federal

agency, or a State (or political subdivision of a State) operating pursuant to a contract or cooperative agreement executed pursuant to section 104(d)(1) of CERCLA may be the lead agency for a response action. The lead agency will consult with the support agency if one exists, throughout the response process. Depending on whether EPA or the State is the lead agency, a site-specific SSC or CA is required.

A site-specific SSC is a joint, legally binding agreement between EPA and the State that provides a mechanism for assuring the transfer of State cost-sharing funds to EPA when EPA is leading a response action. A CA transfers funds from EPA to the State when the State is taking the lead for a site-specific response. CERCLA allows a State to be authorized to lead cleanup efforts at a site in situations where the State possesses the technical and management capabilities to carry out the response action.

When EPA is the lead agency implementing a Fund-financed response, State involvement is particularly important. Transition from the RA to O&M can be complicated and can result in various issues arising between the agencies involved. If these issues are identified early and a process for issue resolution has been previously identified, transition into O&M can be more successful.

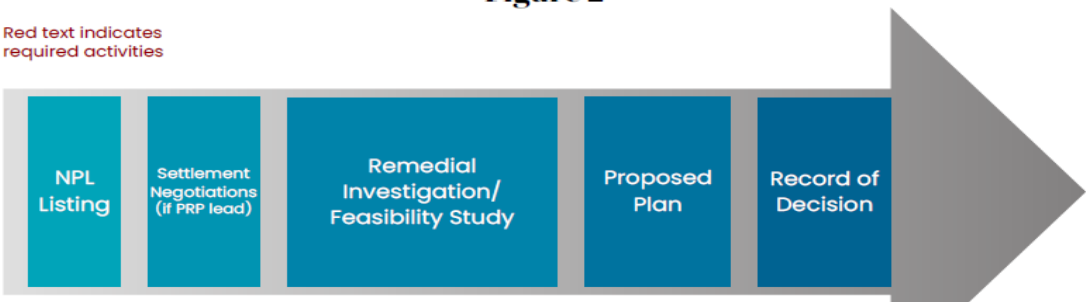
To help ensure a smooth transition from EPA to the State, it is critical that State Project Managers coordinate closely with the EPA RPM and actively participate in the development and completion of the Remedial Investigation and Feasibility Study (RI/FS), Record of Decision (ROD), RD, RA/LTRA, and the Operational and Functional (O&F) determination. Early participation and good communication between the EPA and State should help prevent unanticipated O&M costs, delays and/or unnecessary expenses associated with treatment or containment systems that may require coordination to address needed repairs or upgrades. Further, consistent and effective communication will allow the parties to collaboratively develop a course for correcting ineffective or inefficient remedies. To minimize the possibility of such issues arising, the EPA and State should reassess the future transition and long-term O&M costs during each phase of the Superfund process, as appropriate. Suggestions for State involvement during each of these phases are discussed in the next section.

State involvement and obligations in CERCLA response actions vary depending on the site-specific funding source and who is serving the role of lead agency. A general schematic detailing EPA and State involvement in the Superfund process is shown in Figures 2 through 4.

EPA/State Superfund Involvement
NPL Listing to Record of Decision

Figure 2

Red text indicates required activities



- EPA/State negotiate document review timeframes and deliverables
- State may participate and enter into third party agreements

- State provides:
  - Review
  - Comments
  - ARARs
- State assists with scoping to ensure ARARs are identified early and site characteristics/ objectives are understood
- RI/FS is first time RA and O&M costs are presented; State may perform its own cost analysis and present value evaluation for RA and O&M

- State reviews and submits comments to EPA
- Prior to State concurrence with proposed remedy, State should evaluate circumstances that would cause State to consider declining entering into SSC with EPA

- State review and comment
- State provides final ARARs
- State provides written concurrence

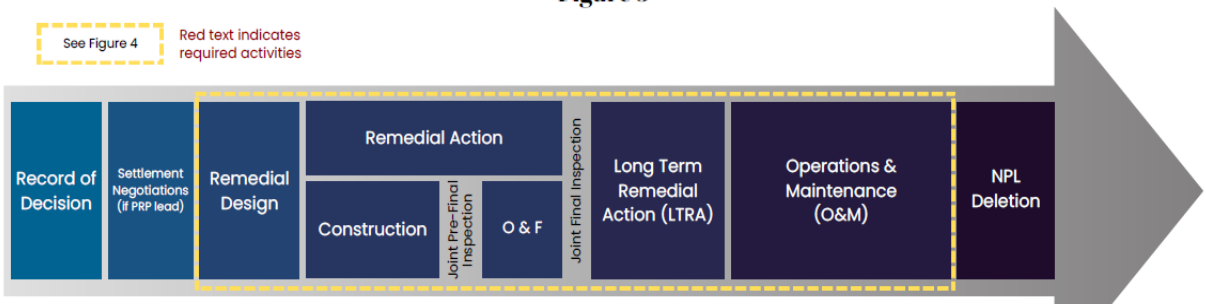
Notes:
1. The Superfund Remedial Process is the same for both the Fund Lead Sites and PRP funded sites, except for Settlement Negotiations with PRP funded sites, and SSC development in Fund Lead Sites. PRP funded sites can become Fund Lead Sites anytime in the process.
2. Activities depicted above may differ upon State specific language in Superfund MOA.

EPA/State Superfund Involvement
Record of Decision through NPL Deletion

Figure 3

See Figure 4

Red text indicates required activities



- EPA/State negotiate document review timeframes and deliverables
- State may participate and enter into third party agreements

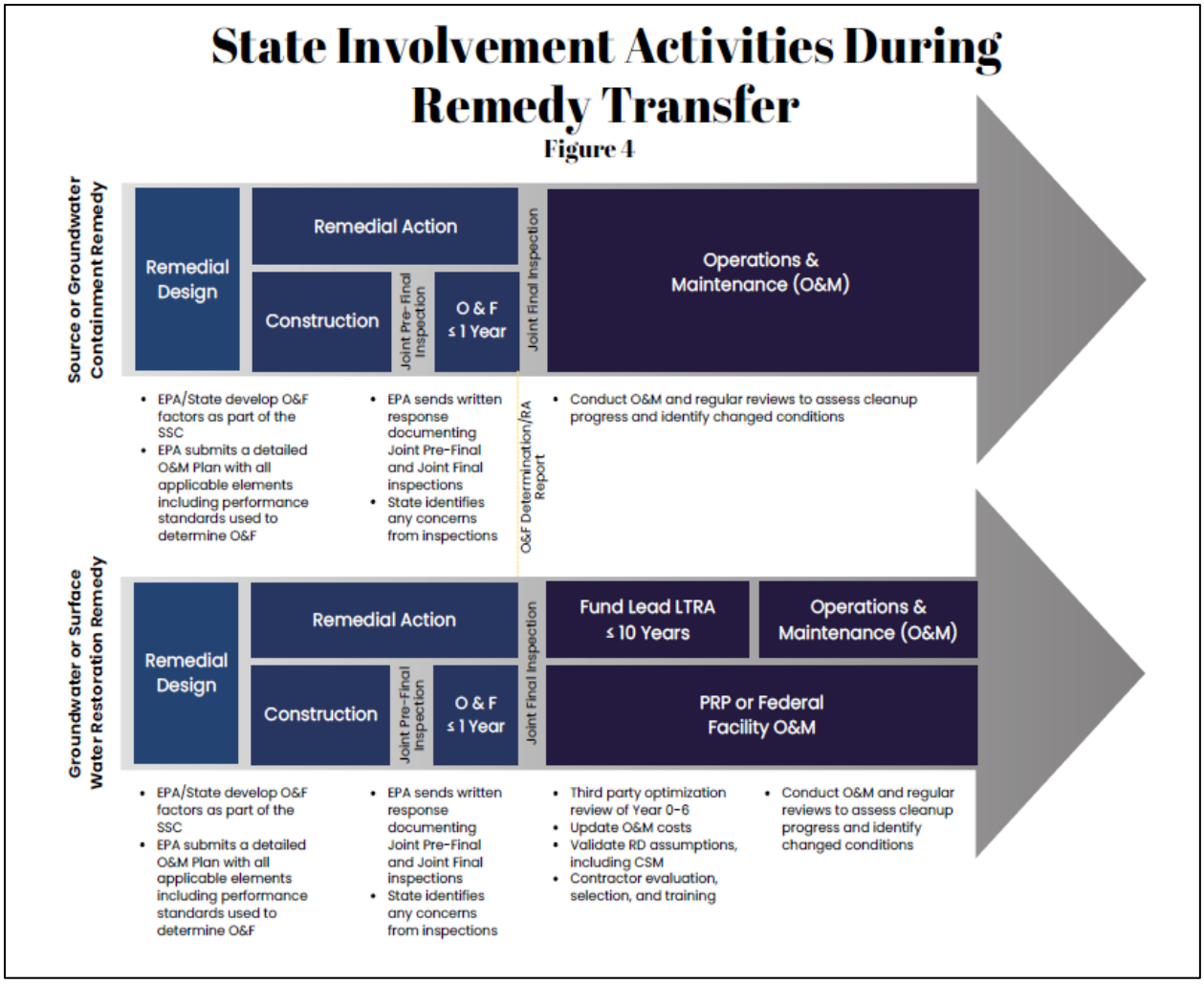
- EPA drafts SSC during design process
- SSC must be signed by State for EPA to spend Superfund funds on RA
- State should consider and evaluate SSC and include a remedy completion strategy in all SSCs that contain LTRA
- State should evaluate potential O&M responsibilities

- Formal O&F determination is a critical milestone - it governs when EPA turns remedy over to State for O&M
- State is strongly encouraged to consider optimizations for all remedies

- Lead agency (EPA or State) conducts five year reviews during LTRA and O&M phase
- State should be in substantial agreement before concurring with O&F Determination
- State should actively seek re-use of site for O&M responsibility prior to transfer

- State should evaluate O&M optimization continuously

- State provides concurrence



IV. RECOMMENDATIONS FOR IMPROVING TRANSITIONS THROUGHOUT THE SUPERFUND PROCESS

A. Superfund Agreements

The SMOA is the first agreement that may be executed between the EPA and the State and is not site-specific. As a result, the SMOA is an ideal vehicle for memorializing ground rules that apply to agency interactions. To ensure effective communication and coordination, the SMOA should contain specificity regarding the expectations, roles and responsibilities of the lead and support agencies. In addition, the SMOA should identify which draft documents, proposed timelines and other decisions will be provided in advance to the support agency for its review and concurrence, prior to finalization. Section 300.505 of the NCP identifies what should be in a SMOA. The SMOA is considered a "living" document and as such, can be modified if necessary.

Site-specific SSCs or CAs can also be used to document the specific expectations, roles and responsibilities for the site transfer. These agreements should also be used to identify the mutually agreed-upon steps in the transition process and should include ways to identify issues and processes to resolve any conflict on the functional operation of a remedy prior to its transfer to a State (e.g. clear dispute resolutions processes included within the SMOA or SSC). They should also provide general procedures for dispute resolution. Project managers are encouraged to review recently published ASTSWMO guidance on SSCs, found at: Superfund State Contracts Reference Guide (ASTSWMO April 2016)

The NCP (Sections 300.515(g) and (h)) requires:[2]

- The nature and extent of State involvement during the RD and RA be specified in site-specific SCCs or CAs;
- A joint inspection be conducted at the conclusion of RA construction; and
- The lead agency allows the support agency the opportunity to review and provide input on documents.

EPA and the State should begin negotiating the SSC early in the RD phase as 40 CFR, Part 35, Subpart O requires it be finalized prior to EPA expending money on the RA. The SSC should address remedy transfer, operator training, site access, O&M Plan and Manual, as-built drawings, etc. The SSC should be finalized as soon as the final RA cost estimates (including the cost of construction management services) are available. The SSC needs to address the State's obligation to conduct the CERCLA O&M requirements. EPA and the State may also utilize a state transfer agreement to help support the SSC or CA document. A transfer agreement is not enforceable but may assist in the orderly transfer of O&M responsibilities. While not always available during the SSC negotiations, the O&M plan is another important document for the State to review. The O&M plan provides information that will help determine how the State can provide 100% of O&M costs. An O&M plan differs from an O&M manual in that an O&M plan should define the administrative, financial, and technical requirements for inspecting, operating, and maintaining the RA, including institutional controls (ICs), whereas the O&M manual is normally prepared by the construction contractor and should provide a detailed description of the O&M components. The O&M Plan and cost estimates are developed by EPA during the remedial design and updated during RA and even O&M. Since these documents contain the information necessary for a State

[2] *See also*: Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017.

to understand the scope of the O&M activities the State should ensure that provisions for providing the O&M plan are in the SSC.[3]

As EPA initiates the remedial design on Fund-Lead sites, the State should initiate good faith negotiation of SSC components since the remedial action will not be funded until an SSC or CA is finalized. To avoid unnecessary delays, States should ensure that EPA provides:

- A complete RA cost estimate with appropriate contingency amount for potential cost escalation (State input and ultimate concurrence is needed to finalize the SSC).
- A determination of whether and to what extent the State will be involved in RA construction management (so that the State may provide input on technical and cost related issues).
- A determination of when and how the remedy will be declared O&F, including a clear list of the performance metrics or other functional requirements that will be used to make the O&F determination.
- An adequately detailed description of the O&M requirements, anticipated costs, and timeframes to achieve RAOs.

Alternatively, it may be appropriate for the State to take the lead role in implementing RD and RA. By having the State serve as the lead, the State Project Manager will become intimately familiar with the operation and maintenance of the remedy and will know what resources and funding are necessary to fulfill the O&M obligation.

B. Remedial Investigation/Feasibility Study

The RI/FS Phase is one of the earliest parts of the CERCLA process. During the RI, the nature and extent of contamination is determined, and risk assessments are performed. The State should review the draft RI to ensure adequate characterization of the site has occurred and to minimize the potential that unexpected sources are identified after the selection of the remedy.[4]

The FS develops RAOs, including preliminary remediation goals (PRGs), and develops, presents and evaluates remedial alternatives that will meet the RAOs. CERCLA Section 121(f) defines how States are involved with the development of cleanup levels. During the FS, Applicable or Relevant and Appropriate Regulations (ARARs) are identified and RAOs are developed based on the risks posed by the contamination and to ensure protection of human health and the environment.

[3] *See also*: Issuance of 2015 Model Superfund State Contract Provisions, OSWER 9242.3-18, November 16, 2015, updated January 2022.
[4] *See*: Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER 9355.3-01, October 1988.

Remedial alternatives are generated and then screened to determine whether the options can attain RAOs and comply with ARARs. Remedies that meet the threshold criteria of overall protection of human health and the environment and compliance with ARARs are further weighed against the remaining evaluation criteria of:

- Long-Term Effectiveness and Permanence,
- Reduction of Toxicity, Mobility or Volume Through Treatment,
- Short-Term Effectiveness,
- Ability to Implement,
- Cost,
- State Acceptance, and
- Community Acceptance.

CERCLA Section 121(b) requires that the evaluation of alternative remedies involving treatment technologies need to consider several factors including long-term maintenance costs and the potential for future RA costs if the alternative RA in question were to fail.

The State should review the remedial alternatives in the FS and weigh potential O&M activities and costs associated with each of the alternatives. Because the State is responsible for the O&M, the State should be aware that often remedies with lower RA costs may result in higher O&M costs.[5] Since O&M activities generally begin several years after the development of the FS, the assumptions used to develop the O&M cost estimates should be clearly defined and the appropriate discount rate applied.[6] The State should also verify that the O&M timeframes are realistic. If the State is going to be responsible for implementing the O&M, it is important that they are involved in the cost estimate development for the FS and that any uncertainties are specifically identified so that they may be revisited and addressed when more information becomes available. It is important to recognize that, due to the length of time it takes to move from remedy selection to O&M, the initial cost estimate developed during the FS may no longer be accurate (normally expected to be anywhere from +50% to -30%). In addition, long-term estimates are typically limited to 20 - 30 years in the future and may not account for remedies that must be operated for a longer period of time. For those reasons, O&M costs should be regularly updated as new information becomes available and to account for inflation.

[5] *See*: The Role of Cost in the Superfund Remedy Selection Process, OSWER 9200.3-23, September 1996.
[6] *See*: Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002, OSWER 9355.0-75, July 2000.)

During the FS phase, the State should consider the practicability of ensuring the ICs are implementable.[7] For example, in certain instances where the IC includes the requirement for a deed restriction, EPA and the State should identify and engage with the property owner early in the process to ascertain the property owner's willingness to restrict the property (if there is no unilaterally-enforceable mechanism available in the State) in the way intended by the future RD. Because ICs are only effective if they are enforceable, an evaluation of the practicability of the IC may need to be revisited at various points of the process, particularly if remedy components are modified or property ownership changes. An IC is more likely to be enforceable (and therefore effective) in those States that have adopted statutes or regulations that require compliance with ICs (e.g. States that have adopted a Uniform Environmental Covenants Act program).

C. Record of Decision

The ROD selects the remedy, establishes the RAOs, and identifies the cleanup levels that will be achieved by the remedy.[8] Concurrent with finalizing the ROD, the State and EPA project managers should discuss, at the earliest practicable opportunity, whether the remedy requires an LTRA action.[9] The ROD should include clear performance goals and measures. While the criteria to determine when a remedial action is complete and ready for O&M is not defined in the ROD, it should nevertheless be defined and documented by EPA. Similarly, long-term monitoring obligations and O&M requirements should be sufficiently detailed so that the EPA and the State are clear on their respective roles and responsibilities in the future.

If applicable, the ROD should recognize potential contingencies to allow an opportunity to modify the remedy through, for example, a future Explanation of Significant Differences (ESD). An ESD may be issued to document that a specific trigger identified in the ROD has been met and that the remedy will switch to the contingency. If appropriate, the State and EPA may agree to include a contingency remedy and defined triggers to switch to such a contingency. For example, the ROD could include a contingency for a site that includes in-situ treatment as the selected remedy, followed by monitoring. If successful, specifying such a contingency may significantly reduce long-term O&M costs for the State.

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[7] *See*: Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, December 2012; Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77; and Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, OSWER 9355.0-74FS-P, September 2000.

[8] *See*: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, OWSER 9200.1-23P. July 1999; and A Guide to Selecting Superfund Remedial Actions, OSWER 9355.027FS. April 1990.

[9] *See*: Code of Federal Regulations, title 40, section 300.435(f): National Contingency Plan (NCP) Guidelines on Long Term Response Actions (LTRA) & Operation & Maintenance (O&M)

D. Remedial Design

Implementation of the remedy occurs during the RD/RA phase. Coordination between the EPA and State regarding the development of the remedy design and the O&M Plan and Manual is critical during the RD phase. It is important that the agencies consider the entire cost of the remedy, including LTRA and O&M, to most appropriately balance the distribution of costs among the different phases of the project. If ICs are included as part of the remedy, it is important that they are identified in sufficient detail to ensure they can be appropriately implemented and enforced.[10]

O&M requirements should be considered during design development, particularly for remedies with extensive O&M obligations, such as those remedies involving groundwater or surface water restoration. Examples of O&M design elements may include incorporation of:

- Native species used for revegetation, including drought-tolerant and other adaptable plants and grasses
- Leadership in Energy and Environmental Design (LEED) principals and certification
- Durable construction materials and energy-efficient equipment designed for the anticipated remedy duration (beyond 30 years, as applicable)
- Spare equipment installed or on the shelf
- Adequate clearances around equipment
- Housekeeping pads under certain components and adequate drainage
- Access to all appurtenances (e.g. lighting fixtures, overhead ventilation equipment)
- Equipment that uses like spares or maintenance parts
- Sufficient storage space for spare components
- Adequate clearance for ingress/egress of oversized equipment
- Adequate storage space for maintenance supplies (e.g. oil, grease, cleaning chemicals, tools)
- Ancillary equipment required for O&M (e.g. drum dollies, pallet jacks, bridge cranes, hoists, pressure sprayers, drum vacuums)
- Local electrical disconnects to allow for minimal disruption during service and repairs
- Adequate weather protection (e.g. prevention of freezing of plumbing or heat and sun damage)

Repeated design reviews can provide an excellent opportunity for the State to provide input on the design details (to the extent that releasing draft documents is permitted). Under ideal

[10] *See*: Policy on Management of Post-Removal Site Controls, OSWER 9360.2-02, December 1990.

circumstances, EPA and the State should agree to conduct a review as part of an iterative process performed at key design phases (i.e. preliminary, intermediate, and pre-final). By using this approach, the focus of the review can change as the design develops and adjustments could be suggested early in the process without causing major redesign cost.

Generally, the engineer developing the design documents provides a draft O&M Plan as part of the preliminary design, intermediate design and final design deliverables. At this stage, the O&M Plan may contain the following descriptions:[11]

- Designation of the government agency or unit responsible for O&M
- Identification of the available State funding mechanisms for O&M activities, if applicable
- Milestone dates for State assumption of O&M responsibilities
- Criteria for determination of O&F
- Description and duration of O&M activities
- Summary of O&M staffing needs (including training and certification requirements)
- Summary of O&M performance standards
- Contingency plan for handling abnormal occurrences (e.g. severe weather events, loss of power/backup power, etc.)
- Safety requirements for O&M activities
- Equipment and material requirements
- Estimates of annual O&M costs
- Reporting requirements
- Conditions for O&M termination, if appropriate

During the RD, a cost estimate is developed for the RA, LTRA, and O&M costs. The final RA cost estimate is expected to be accurate within +15%/-5%; the O&M cost estimate information is included in the draft O&M Plan.[12] The State should revisit the RD and O&M cost estimates (including contingencies) for completeness and accuracy during the RA.

E. Remedial Action

States should review the RA Statement of Work to ensure that it contains all the necessary components/details (e.g. ICs, O&M Plan, O&M Manual) to ensure that the remedy will be implemented as intended. The Remedial Action Plan should clearly describe the performance

[11] *For US EPA's guidance on suggested O&M Plan elements, please see:* Section 5.0 (Operation and Maintenance) of the Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017

[12] *See*: Recommended Annual O&M/Remedy Evaluation Checklist, OSWER 9355.0-87, April 2008; and Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, June 1995.

measures that will be used to determine that the remedy is operational and functional. The Remedial Action Plan should also include a schedule for transition from RA through the O&F phase to O&M to facilitate a smooth transition. During the RA phase, the O&M Plan is updated by the design contractor and should describe the administrative and technical details of inspecting, operating and maintaining the treatment system, any long-term monitoring, and any ICs. FYRs may also be completed during the remedial action phase, prior to transition to O&M.[13]

If changes to the remedy are needed, the project managers may need to consider a reevaluation of the O&M Plan, O&M Manual, ICs,[14] remedy completion strategy, conceptual site model (CSM), etc. so that any necessary updates or modifications can be incorporated.

During RA, the construction contractor implements the design, as detailed by the RD. Any changes to the design anticipated at this point will likely result in additional costs and time delays and therefore should be minimized. According to the Guidance for Superfund Remedies in Post Construction (EPA, 2017), "The responsibilities for completing the O&M manual typically are shared between the designer and the RA contractor. During each phase of the RD, the RD contractor normally submits a draft O&M manual. The RA contractor generally completes the O&M manual during the RA. The RA contractor normally submits the O&M manual upon completion of the RA." The O&M Manual is a technical document that should contain all the data and specifications, manufacturers, process parameters, operation procedures, maintenance requirements and schedules, and staffing and training needs. For less complex remedies, the O&M Plan and the O&M Manual could be combined, upon agreement, by EPA and the State. To minimize future misunderstandings, the O&M manual should, at a minimum, consider the following[15]:

- How the designer intends the facility to operate
- Potential operating problems, including common or anticipated remedies and useful life analysis of significant components that include replacement costs, and equipment warranty information
- Quality Assurance Plan
- Safety considerations that minimize threats to workers who will be implementing the O&M

[13] *See*: Recommended Annual O&M/ Remedy Evaluation Checklist, OSWER 9355.0-87, April 2008; and Recommended Annual O&M/Remedy Evaluation Checklist for Contaminated Sediment Remedies, OSWER 9355.0-118,September 2008.

[14] *See*: Recommended Evaluation of Institutional Controls: Supplement to the 'Comprehensive Five-Year Review Guidance, OSWER 9355.7-18, September 2011.

[15] *For more detailed guidance on O&M Manual elements, please see*: Section 5.4 of the Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017

At the end of the RA construction, the agencies need to ensure that the as-built drawings are accurate and complete, and the O&M Manual and Plan are updated and reflect the most current O&M cost estimates. At this point, the State should review and provide comments on the RA report, as necessary.

F. Operational and Functional

The NCP 40 CFR§300.435(f)(2), states, "A remedy becomes 'operational and functional' either one year after construction is complete, or when the remedy is determined concurrently by EPA and the State to be functioning properly and is performing as designed, whichever is earlier. The O&F period begins when EPA and the State conduct a joint inspection at the completion of construction to determine that the remedy has been constructed as specified in the RD (remedial action completion).[16] The joint inspection marks the beginning of the O&F period, which can last for up to one year. The EPA RPM should send the State a letter formally documenting the date of the joint inspection, the determination that RA construction is complete, and that the O&F period has started.[17] The O&F period allows for continued adjustments or corrections to occur to ensure that the remedy is fully functional prior to the start of O&M. During this time, the State should review cost and operational data to identify any aspects of the remedy that may need to be changed or updated to evaluate remedy effectiveness or efficiency, as needed. EPA may grant extensions to the one-year period, as appropriate." This period is often referred to as "shakedown," when the contractor makes minor repairs or adjustments as necessary to ensure the remedy is operating as designed. If the State and EPA cannot come to an agreement on the determination that the remedy is O&F, the dispute resolution procedures identified in the SMOA or SSC can be initiated.

O&M begins as soon as O&F is determined for Fund-financed remedies that do not include groundwater or surface water restoration. The date of O&F determination is documented in a letter from EPA to the State.

G. Long Term Response Action (LTRA)

The NCP states: "For Fund-financed remedial actions involving treatment or other measures to restore ground-or surface-water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period of up to ten years after the remedy becomes operational and functional will be considered part of the remedial action." (40 CFR §300.435(f)(3).) The ten-year period between the O&F determination

[16] Remedial Action Completion is not the same as the Construction Completion Milestone as defined in the NCP.
[17] *See*: Operational and Functional Determination and the Transfer of Fund-Lead Vapor Intrusion Mitigation Systems to the State, OSWER 9200.2-72, April 2009.

and the start of O&M is referred to as LTRA and federal funding (generally 90% federal contribution, 10% State contribution) is provided throughout this period. LTRA applies to Fund-financed remedies when the RAOs include groundwater and surface water restoration. Groundwater pump and treat and MNA are examples of LTRA remedies commonly used to attain aquifer restoration.[18] Remedies that do not include a groundwater or surface water restoration objectives (e.g. groundwater containment remedies and groundwater monitoring only remedies) do not have an LTRA phase and instead move directly from an O&F determination to O&M. A general schematic of EPA and State involvement activities at remedies that are eligible for LTRA is shown in Figure 4.

Independent third-party remedy optimization reviews at a limited group of sites each year have become a useful tool to evaluate Superfund sites. An optimization is defined in EPA's National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion (OSWER 900.3-75, September 2012) as "*Systematic site review by a team of independent technical experts, at any phase of a cleanup process, to identify opportunities to improve remedy protectiveness, effectiveness and cost efficiency; and to facilitate progress toward site completion.*"

An objective of the strategy is to incorporate optimization principles and practices in early pipeline stages to reduce the need for optimization at the later stages. However, optimization reviews can be conducted at any time on operating systems. They may be of greater effectiveness early in the LTRA period. Optimization reviews should be scheduled to allow time to complete the review and design and implement any recommended revisions prior to the start of O&M. While the State pays 10% of LTRA costs, optimization reviews are typically conducted by EPA Headquarters and are often fully funded by EPA. However, the limited size of this program constrains the number of reviews available. If construction modifications are required, then cost sharing between the States and EPA will be evaluated.

It is important to note that the LTRA timeframe should not be affected by a change in the remedy that would achieve RAOs more efficiently or in a less costly manner. Also, the LTRA time period does not change with a new or updated ARAR when there is no fundamental change to the remedy. However, EPA may agree to recalculate the LTRA 10-year time period in certain situations that impact the remedy effectiveness. These situations may include the discovery of new contaminants and responding to condition changes resulting from a natural disaster (see EPA 2017). EPA considers minor adjustments to groundwater restoration remedies to be routine

[18] *See*: Groundwater Remedy Completion Strategy, OSWER 9200.2-144, May 2014; and Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration, OSWER 9234.2-25, September 1993.

and may be required to ensure effective and efficient operations. For this reason, implementation of such adjustments should be made, if possible, prior to transition into O&M.[19]

H. Summary

In addition to the phase-specific considerations mentioned above, transition planning needs to occur throughout the Superfund process. Based on experiences from some States, it is more advantageous to be actively engaged throughout the various phases of remedy implementation. This can be accomplished by:

- Conducting remedy optimization reviews that may result in increased effectiveness or efficiency, as appropriate[20]
- Properly documenting remedy changes in a ROD amendment, ESD, or memo to the file as appropriate (see EPA 1999*)*
- Planning/programming for O&M funding and contracting support
- Ensuring appropriate rights of entry, lease agreements, covenants, etc. have been executed, which will allow the State and its contractors long-term access
- Ensuring required ICs have been implemented, are effective, and have clear enforcement authority and associated responsibilities as described in an Institutional Control Implementation and Assurance Plan (ICIAP) or O&M Plan. It is recommended the ICs are in place before transfer
- Inspecting all remedial system equipment and identifying any repair or replacement needs
- Ensuring that EPA conducts any necessary training for the State and its contractors to ensure familiarization with the treatment system components
- Ensuring that EPA provides detailed cost information to allow the State to budget adequately for O&M responsibilities
- Ensuring property and equipment ownership is clear and transferred appropriately; have EPA retain ownership of or properly dispose of any inoperable or unnecessary equipment
- Updating all manuals, as-builts, monitoring plans,[21] and sampling and analysis plans as needed
- Exchanging monitoring and sampling data collected during the O&M for incorporation into 5-Year Reviews

[19] *See*: *See*: A Cost Comparison Framework for Use in Optimizing Ground Water Pump and Treat Systems, EPA 542-R-07-005, May 2007.
[20] *See*: Roadmap to Long-Term Monitoring Optimization, EPA 542-R-05-003, May 2005.
[21] *See*: Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation, OSWER 9355.4-28, January 2004.

V. Keeping these items in mind while moving through the RA/LTRA process will ultimately lead to a smoother transition into the O&M phase.

VI. O&M

Once a remedy has been transferred from the EPA to the State, continued communication between the two parties is still critical because EPA retains the responsibility for O&M oversight, for determining when O&M is complete and conducting FYRs to evaluate remedy effectiveness.[22] FYRs may be performed by the state through a CA, but EPA retains responsibility for determining the remedy's protectiveness.

During the O&M period, the State is generally required to submit routine reports summarizing O&M activities to the EPA RPM, who is responsible for oversight to ensure the State is performing the O&M properly. These reports should include data collection information, a summary of sampling results, results from routine inspections, listing of major repairs and equipment change outs, regular updates of the O&M manual and as-built drawings, and a breakdown of actual costs for the reporting period.[23] The State Project Manager should conduct periodic site inspections and ongoing monitoring and review of O&M reports. In addition, opportunities for States and/or EPA to conduct further optimization studies of the selected remedies should be considered throughout the O&M period. According to the "National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion" (EPA 2012a), one of the overarching goals of the Strategy is to "apply optimization practices earlier and throughout the remedial pipeline." The State should communicate frequently with the EPA RPM during their O&M oversight about optimization study opportunities.

In addition, opportunities for remedy optimization may be identified during a FYR.[24] Remedy optimization opportunities typically identify modifications to the operating remedy which may improve remedy performance or reduce remedy costs. The types of sites that are particularly good candidates for optimization include those where annual O&M costs exceed the cost of the study by an order of magnitude or those sites where a remedy has not performed as designed and therefore, the State has identified that additional measures may be required. Any optimization program should have a follow-up component to track the progress the site is making with respect to implementing the recommendations from an optimization evaluation.[25] All

[22] *See*: Comprehensive Five-Year Review Guidance, OSWER 9355.7-038-P, June 2001.
[23] *See*: O&M Report Template for Ground Water Remedies, OSWER 9283.1-22FS, April 2005.
[24] *See*: Five-Year Reviews, Frequently Asked Questions (FAQs) and Answers, OSWER 9355.7-21, September 2009.
[25] *See:* Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017.

stakeholders should be included at the outset of optimization reviews, during implementation and during follow-up tracking.[26]

As stated in Section 1.2 of the "Comprehensive Five-Year Review Guidance" (EPA 2001b), FYRs are typically required when hazardous substances remain on-site above levels which permit unrestricted use and unlimited exposure. Although FYRs may occur while the remedy is being implemented or during LTRA and therefore, under EPA's oversight and control, the FYRs will continue once the State assumes O&M obligations. During O&M, the costs of maintaining ICs and engineering controls to eliminate and mitigate the exposure to hazardous substances remaining on the site must be borne by the State.

At the time of the FYR, the State and EPA should be familiar with the RAOs as specified in the ROD, the RA design and construction, the current O&M status, the implementation of ICs, as well as data supporting the effectiveness of the remedy. The EPA, when serving as the lead Agency for the 5YR, is expected to give the State adequate opportunity to participate in the FYR process, as referenced in Section 2.1.2 of the "Comprehensive Five-Year Review Guidance" (EPA 2001b). In addition, the specific amount of time that the support agency will have to review the FYR report should be documented in the agreement document (e.g., MOA, SSC, or CA). The goal should be to resolve any concerns of support agencies before drafting the final report. Communication among team members, agencies, and organizations is critical to ensure that all parties remain informed throughout the entire FYR process. If it appears that the RA will not achieve the cleanup levels selected in the ROD, decisions related to other cleanup approaches and optimization studies should involve all stakeholders.[27] Any changes that significantly or fundamentally alter the selected remedy require an ESD or ROD Amendment.[28]

Re-engagement of EPA may become necessary for a variety of reasons including paying for remedy repairs or modifications due to latent defects, identification of a new contaminant of concern, or identification of a change in ARARs that necessitates a more stringent cleanup level.[29] Any of these situations may require a new ROD, or a modification of the existing ROD. If the Governor of the State declares a state of emergency and formally requests from the President that the Federal Emergency Management Agency (FEMA) respond to the disaster, and if the

[26] *See*: National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion, OSWER 9200.3-75, September 2012.
[27] *See*: Optimization Strategies for Long-Term Groundwater Remedies, EPA 542-R-07-007, May 2007.
[28] *See:* A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, OWSER 9200.1-23P. July 1999
[29] *See also:* Section 5.5 of Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017

disaster impacts the remedy, FEMA may provide funds for repair/replacement of the remedial system.

Ideally, optimization of the remedial system occurs before transfer, but as noted above, it may also be beneficial post-transfer. It may also be necessary to modify the RAOs or even the remedy. If, for example, after a FYR, it becomes apparent that the remedial system will not achieve the cleanup levels in a timely manner, modifications to the RAOs or remedy should be considered and appropriately addressed in a decision document (i.e. ROD amendment, ESD).

Although O&M may continue for decades, once the RAOs are achieved, a Final Close Out Report (FCOR) is prepared by EPA unless delegated to the State. As noted in OSWER 9320.2-22 "Close Out Procedures for NPL Sites" (EPA, 2011), the FCOR documents compliance with statutory requirements and provides a consolidated record of all removal and remedial activities for the entire site. The FCOR describes how the cleanup was accomplished and provides the overall technical justification for site completion. This information is readily available from the previous documents such as the RI/FS, RODs, RDs, RA reports, O&M reports, and FYRs. The State has an opportunity to review and comment on the report prior to final signature. In addition, the region sends the FCOR draft to EPA Headquarters (HQ) for review and comment. Once all comments are appropriately addressed, the document is signed by the Regional Administrator or other appropriate official.

VII. GUIDANCE/REGULATIONS REGARDING TRANSFERS

See APPENDIX A

VIII. TRANSITION TOOLS AND ASSOCIATED CASE STUDIES

Case studies were solicited to evaluate how previous O&M transitions from EPA to the State have taken place and the experiences gained, and lessons learned during the transitions. Both positive and negative experiences were represented in the case studies. States may become particularly invested in remedies which involve ground or surface water restoration through the long-term operation and maintenance of systems designed for treatment or containment. Common examples of long-term treatment systems are ground water pump-and-treat processes and chemical precipitation of mining-impacted water. Active systems may need to operate for extended periods of time beyond the originally contemplated time periods by the remedy and as such, may be very costly to operate and maintain. While other types of remedial actions (e.g. engineered cover or "cap" systems) may also require O&M in perpetuity, the associated costs are generally orders of magnitude lower. Several of the case studies indicated concern by the State over the condition of the remedy at the time of transfer. In some cases, States reported

that the equipment and facilities may be aging, energy inefficient, and/or difficult to maintain as they approach the end of their design life. In other cases, clean soil covers, or "cap" systems may be eroded or have vegetation die-off. To ensure long-term remedy protectiveness, it is therefore important to consistently evaluate the effectiveness of the engineered controls.

The review of the solicited case studies found that there may be tools that can be useful to facilitate a successful O&M transition. Below is a discussion of the relevant tools with reference to the associated case study.

A. Remedy Effectiveness and Longevity

Case Study (Remedy Effectiveness & Longevity) - Need to Identify State Expectations Early

At a dig and haul remedial site, the State clearly verbalized what would need to occur before accepting responsibility for the site for long term O&M. IN this instance no restoration plan was developed for the site. The State refused to take on O&M responsibility until erosion issues were corrected. EPA extended the O&F period and corrected the erosion problems. Had the project included a restoration plan including the management of erosion, this delay could have been prevented.

Past State experience with the effectiveness of the remedy at the time of transfer indicate that improvements can be made. In many cases, the selected remedy is not operating optimally or is no longer effective in attaining the Remedial Action Objectives. States should verify with EPA that the remedy in place is not only performing as designed but performing in the most effective manner possible.[30] For LTRA sites moving to O&M, the remedial systems have been in place for nearly 10 years. By the time the site is moving into O&M, it is expected that the baseline conditions developed at the time of the ROD will have changed (e.g. reduced concentrations of groundwater contaminants; some remedial systems, such as SVE, may have been removed; etc.) and that the remedial system components have gone through some wear and tear.

It is necessary for the State to continue to remain involved throughout the LTRA period to ensure the remedial system is performing adequately and optimally. A Remedy Completion Strategy which provides a roadmap to facilitate effective transition to O&M and ultimately, to shutdown of the system upon remedy completion, if applicable, should be completed prior to the transition of the site. Pre-transfer optimization reviews should be performed, as appropriate, and implementation of recommendations should be agreed to and completed prior to transfer. It is highly recommended that an additional opportunity for optimization should be undertaken (generally by year six or seven) of LTRA to confirm the effectiveness of the remedy. The State and

[30] *See*: Close Out Procedures for NPL Sites, OSWER 9355.2-22. May 2011.

EPA should, to the greatest extent possible, take steps prior to transfer to ensure that the remedy is effective and optimal.

Prior to the time of transfer, a detailed review of the site and system conditions should be performed by State personnel and their contractor. This is necessary to familiarize themselves with the current conditions such that they have significant input into any optimization reviews and subsequent implementation of recommendations by EPA.

Case Study (Remedy Effectiveness & Longevity) - Lack of an Effective Remedy leads to Additional State Costs

At a fund lead NPL site, the effectiveness of ground water extraction/treatment/re-injection system was poor at transfer. The State had to verify via soil sampling areas that had been required by the ROD to be remediated and to determine whether there were source areas left on site.

B. Clear Communication and Expectation for Remedy Transfers

Case Study - Need to Identify Transfer Expectation Early and within Decision Documents

At one NPL site, a release to groundwater resulted in a contaminant plume approximately five miles long. The PRP installed a groundwater extraction and treatment system to address on-site groundwater contamination but was unwilling to address off-site groundwater contamination. The PRP ultimately declared bankruptcy, and the site was listed on the NPL.

The EPA and State originally planned two separate LTRA periods: one for OU1 (including on-site groundwater contamination, which would be restored by the existing groundwater extraction and treatment system), and one for OU2 (off-site groundwater contamination, which would be restored by a separate groundwater extraction and treatment system that had not yet been constructed). This decision was not formally documented in the site record and following remedy selection for OU2 (Year 6 of LTRA for OU1), EPA indicated that there would only be a single LTRA period for both OUs.

The LTRA period for the OU1 treatment system was set to transfer to the State while the remedy for OU2 was still undergoing design. The State was able to present this issue, and it was determined that it was appropriate to define two separate LTRA periods because the portion of the aquifer that the proposed OU2 system would address was two to five miles downgradient of the OU1 system and was in a lower aquifer unit, and was therefore not benefitting from the existing treatment system at OU1 due to the significant distance and separation in the subsurface.

Case Study – LTRA Lessons Learned

One State has established several "lessons learned" prior to remedy transfer: (1) Ensure that cost projections shared by EPA include projected annual costs for O&M of each component and not total costs. (2) Ensure that the O&M Plan, O&M Manual, Sampling Plan, Monitoring Plan, and/or QAPP are updated before the transfer with adequate time for State review. Ensure plans include an

expectation on O&M reports prepared by the State, any necessary design documents or as-built drawings, and an inventory of equipment and real property. Request working copies of all plans in their native file format. (3) If there is real property, understand the process for transfer of real property to the State. (4) Develop or update the Remedy Completion Strategy for the site. (5) Ensure that institutional control mechanisms are current and include all use restrictions at the site. Perform an institutional control inspection to ensure compliance with all use restrictions at the site. (6) Adjust the sampling schedule for the monitoring well network. Decommission any monitoring wells and/or system components that are not part of the sampling schedule. Re-survey monitoring wells, if needed. Update well registration from EPA to State ownership. (7) Complete a site visit/inspection with owners/operators. Include EPA contractors, State contractors, and all other stakeholders (e.g., City). Perform any maintenance or equipment replacement that results from the inspection. (8) Request that EPA's contractor provide training to the State contractor that will be operating the system. (9) Ensure that any leases to storage areas are transferred to the State. (10) Update site access agreements to include the State and its contractor(s). (11) Identify any permits that are needed. (12) Update placards on equipment (e.g., vapor mitigation systems) from EPA to State contact. (13) Ensure State is aware of warranties on any equipment. (14) Establish roles and responsibilities for making changes during O&M.

C. Optimization Reviews and Implementation

Case Study (Optimization Reviews & Implementation) - Successful RSE Leads to Cost Savings

Prior to transition from LTRA to O&M, a RSE was performed on an active treatment system. The State suggested some improvements, which the RSE team agreed with. Funding was made available to implement improvements, although they occurred after the transition to O&M. Estimated 25% reduction in O&M costs realized.

Case Study (Optimization Reviews & Implementation) - Coordination on Remedy Effectiveness During LTRA.

The site remedial action included in-situ enhanced bioremediation (ISEB) to address chlorinated solvents in groundwater. A chemical oxidation pilot study that was completed during the remedy implementation. It was determined during LTRA that the chemical oxidation injection changed the groundwater geochemistry and impaired the ISEB remedy. EPA and the state worked to identify this issue during the LTRA period and agreed to paus the transfer until groundwater conditions are again suitable for the indented ISEB remedy.

A technical capability review of the remedy, known as a Remediation System Evaluation/Remedial System Optimization (RSE/RSO) should be done prior to the transfer if there are active remedial systems in place.[31] This evaluation will help identify whether the system is performing as designed, currently and for the future, or if any upgrades could improve efficiency

[31] An RSE/RSO may need to be funded by the State.

and/or effectiveness. For example, a pump and treat system would be reviewed to determine appropriateness of extraction well location, pump placement and extraction rates. This information will inform whether the treatment system is functioning in an energy-efficient manner and whether any components need replacing or alternatively, whether certain components can be eliminated based on current groundwater conditions which could result in a reduction in other costly components (e.g. more automation and less man-power required). Part of this review would be an update of the conceptual site model and an update of a remedy completion strategy, and timeframes anticipated in other remedial documents. Any recommendations that are determined by the agencies to be appropriate should be implemented by EPA prior to the transfer.

While EPA may only consider funding one RSE/RSO during the LTRA, States should consider conducting and additional State-Funded RSE/RSO during the LTRA period. As RSE/RSOs can take 1-2 years from initiation to full implementation, it is recommended that the State initiate the process prior to year 6, and a follow up optimization in year 8 of the LTRA. The information to be obtained and evaluated is identified in the RSO guidance provided in Appendix A. Some issues that may need to be evaluated by EPA or the States may include the following: condition of remedial equipment, need for removal of unused equipment, energy use and potential related upgrades of building, pumps etc., and operational issues that have resulted in significant system downtime. An agreement between EPA and the State should be established to address any significant items of concern. A checklist of remedial effectiveness issues that may be pertinent to the site can be found in Appendix B.

D. Five-Year Reviews

Case Study (Five Year Reviews) - Series of 5 Year Reviews Leads to Identifying Remedy Erosion with Agreement to Use O&M PRP Fund to Address

One of the earliest NPL Sites included a remedy for burial and capping of waste. The site is situated along a river which was eventually causing erosion into the unit and release of paint waste. During a five-year review the issue was identified. While an established PRP O&M fund was not contemplated to address the issues, the fund was able to offset the remedial action needed to stop the release.

While this case study was for a PRP-lead site, it illustrates how new releases discovered during a five-year review may necessitate consideration of new funding mechanisms for any necessary remedial actions. For this reason, it is important for States to participate and provide input on issues that will impact the O&M; recommendations should be followed up on and implemented in a timely manner (before transfer to O&M whenever feasible). If a State is in a lead agency role, it may take on the responsibility of conducting five-year reviews. This enables the State to obtain

direct knowledge of a remedy's specific weaknesses and to provide the ability for long-term planning to restore or keep a remedy functioning properly.

E. Property Transfer

Case Study - Transfer of Real Property

At one NPL site, EPA acquired four properties to complete the remedial action. Because the remedial action included the acquisition of real property, the state was required to provide assurance under the Superfund State Contact that it would accept transfer of the interest upon completion of the remedial action. This created two issues: (1) the state did not have a process for taking possession of real property and would need to work through a different state agency to acquire these properties; and (2) amended and/or new Environmental Covenants were needed to include appropriate use restrictions for future redevelopment of the site.

Three of the properties had existing Environmental Covenants that needed revision, and one did not have an Environmental Covenant at all. EPA and the state determined that new Environmental Covenants could not be placed on the properties because EPA (after acquiring the properties) could not be listed as a Grantor and the State (after accepting possession once the remedial action was completed) could not be a Holder in perpetuity. Therefore, the only option to ensure the proper use restrictions were in place was to amend the existing Environmental Covenants, which was a challenge because one of the previous property owners was deceased and the other signatories were difficult to find.

While EPA was ultimately able to contact the original signatories and successfully amend the three existing Environmental Covenants, one property was transferred to the state without an Environmental Covenant. In order to ensure future protection at the site, the state listed a condition during auction of the property requiring that the new owner execute the Environmental Covenant upon sale of the property.

Case Study (O&M and Property Transfer) - Local Government Property transfer and O&M

Following completion of a soil remedy (cap and containment), the source property and O&M responsibilities were transferred to the county through a Memorandum of Agreement (MOA). The MOA was executed by the state and county and requires the county to perform O&M and take title to the property. The MOA outlines the responsibilities and provides that the state would be responsible for the O&M if the county is not able to continue performing the O&M. The county will be able to reuse the commercial property, and the state is no longer funding the O&M.

F. Site-Specific Administrative Needs

Permits, licenses etc.: Some sites require that site-specific permits or licenses be issued for operating the remedial system. For example, a point source discharge or a proprietary

programmable logic control system may be in place. These items will need to have the associated permit or license updated and/or transferred to allow the State to utilize the permits or license. Other documents that need to be updated to include the State as an agent may include access agreements, if not done during pre-transfer, and maintenance contracts. See Appendix (X) for a full list of documents that may need to be transferred or obtained.

Contracts: At least three months prior to the transfer date, the State should have finalized a contract with its consultant/contractor to perform the O&M. Because State contracting processes can be lengthy, States should begin communicating with internal contracting staff at least one year prior to the transfer date. Earlier contacts with contracting staff would allow States sufficient time to finalize contracting arrangements. This is necessary to streamline and communicate historical actions and current conditions as well as to allow a smooth flow of information to the contractor regarding current and future operational needs. This information may include: an overview of the remedial system, well integrity, locations and accessibility, unusual or updated sampling issues, and general site information. Contract mechanisms, which provide the ability to retain the contractor used by EPA may be helpful but are not required. In some instances, it may be beneficial to change the on-site contractor to get a fresh view of the project. The State should consider the remedy at the site and determine which O&M contractor would be the most effective.

Closing Documents: If the transition involves the transfer of real property, title insurance may be required prior to the deed transfer. A property survey and/or appraisal may also be required. If vehicles are included in the transaction, motor vehicle titles will also need to be transferred. Other assets, such as water rights, may also be involved. Following the real estate closing, the transferred deeds will need to be recorded with the appropriate recording entity (e.g. county clerk, recorder or register). The State must maintain appropriate insurance to cover the property, structures and certain equipment.[32]

G. Cost Considerations

It is important that an updated O&M plan and O&M Manual be updated prior to transfer to give the States ample opportunity to understand the scope of required O&M activities and to obtain accurate cost estimates. Additionally, costs expended by EPA for LTRA need to be available to States to further identify future financial obligations. Knowing the potential costs is essential for a State to appropriately allocate funding for a site. Federal costs are not confidential and the previous 5 years (for LTRA) of costs should be provided to the State to allow the State an opportunity to determine the trend in expenditures and allow the State to budget for adequate

[32] *For additional guidance on suggested transitional documentation, see*: Section 4, Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017.

resources. Also, the SSC requires a 10% cost share and therefore costs are shared with the State in order for EPA to be reimbursed. If not available otherwise, payment related to the SSC can be referenced to determine recent Federal expenditures.

More detailed O&M funding requirements should be provided by EPA to the State 1-2 years prior to transfer date to allow funding to be set aside for contractual services. During the last year of LTRA or RA, EPA should update the expected expenditures, especially if changes have been made to the site systems. Note that prior to initiating a remedial action at a Fund-Lead site, the NCP requires States to assume responsibility for O&M activities. The SSC indicates that funding is available from the State to provide for O&M. Therefore, being aware of and adjusting the expected State O&M expenditures based on the current EPA LTRA expenditures will assist the States in fulfilling this requirement.

H. Equipment

Case Study - Installed Equipment Could Not Function as Designed

EPA installed and was operating a ground water pump and treat system that also included equipment to serve as a backup water supply to local citizens. The equipment could not perform this function. Control logic was extremely complex and had to be overhauled. After 2 years of effort to keep the system running, the State will be performing a full RSO including review of the conceptual site model and appropriate extraction points, extraction rates and treatment equipment. The site runs through a large valley with contamination from many source areas.

Determine who owns the equipment to be left on-site. If equipment/material left on-site is not useable, have EPA remove any excess or unusable equipment before the State takes over the site. Determine how compatible are the current systems that are being used with what the State taking over normally uses.

I. Documentation

Case Study (Documentation)- Reviewing and Understanding Transfer Expectations Means Careful Review of Site Documentation

Two Fund lead sites transferred to States without a full understanding of the documentation related to equipment/software license ownership. Both sites included advanced pump and treat systems and documentation was not fully understood by the State prior to the transfer. In one case, the EPA contractor uninstalled software stating it was their proprietary information. The State had to expend resources to re-establish key logic control software. In another case, needed copies of databases of information utilized for future use (i.e., compliance monitoring, statistical trend analyses, etc.) were not compatible when a new contractor took over the site. Also, drawings, O&M Plans and

spreadsheets were not in an easily editable format for future use once the site transferred to the State.

Case Study (Documentation) - Need to Identify RPs Early and Ability to Use an Environmental Covenant

A challenge at one site included waste being managed on site with the State requiring some type of monitoring and institutional controls for the foreseeable future. The former owners are deceased and as such an environmental covenant is nearly impossible to place on the site.

It is important that the State be sure to request and receive documentation before the time of transfer. The State should also ensure that all documentation needed, including the RA report, O&M reports, and as-builts have been provided in both paper and electronic format.[33] All environmental covenants or IC documents should be finalized and properly executed, and copies of the final IC documents should be provided to the State when completed. If necessary, it is important that States properly update access agreements (or create new ones) to facilitate access for State personnel and their contractors.

IX. SUMMARY

Early and continued involvement by the States throughout the Superfund RI/FS and RD/RA/LTRA phases can ensure that common problems encountered during O&M transition are minimized. Additionally, early and more extensive State involvement in the RD/RA phase will allow States to adequately prepare for an effective O&M transition. Careful consideration of O&M needs throughout a project will help ensure successful transition so that States are not left with ineffective and costly O&M.

[33] *For a list of suggested documentation see*: Section 4.5 of the Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105, February 2017.

APPENDIX A

Guidance and Regulations Regarding Transfers

Title of Guidance Document	Date		Document Number	Weblink to Document	Description of Guidance/Document
Guidance for Management of Superfund Remedies in Post Construction	2/1/2017	EPA, 2017	OLEM 9200.3-105	https://semspub.epa.gov/work/HQ/196829.pdf	The document provides practical information on the timing of O&M planning, the transition of a remedy from construction to O&M, performance of O&M functions and oversight responsibilities. It includes highlights on when and how States should be involved so they are prepared when they take over O&M. The document includes recommended activities, such as, O&M, LTRA and ICs that the State and EPA should consider when drafting an SSC. It provides guidance to RPMs for transferring LTRA projects from EPA to States and practical information on planning the transfer of remedy from LTRA to O&M, including roles, responsibilities, documentation and recordkeeping.
Superfund State Contracts Reference Guide	4/1/2016	ASTSWMO 2016		https://astswmo.org/files/policies/CERCLA_and_Brownfields/2016_SSC_Guidance_FINAL.pdf	This document was designed to assist States with the preparation, negotiation, and implementation of their State Superfund Contracts. It outlines the components of the SSCs as well as potential state considerations for each item.
2015 Model Superfund State Contract Provisions	11/1/2015	EPA, 2015d		https://semspub.epa.gov/src/document/11/177107	This is an older Superfund guidance but is still the most current USEPA document containing model clauses that can be used as the basis for the generation of a draft Superfund State Contract.

National Contingency Plan (NCP) Guidelines on Long Term Response Actions (LTRA) 40 CFR 300.435(f)	7/1/2015	EPA, 2015c		http://www.law.cornell.edu/cfr/text/40/300.435	This document leads you to the appropriate citations in the National Contingency Plan or NCP which provide guidelines regarding Operation and Maintenance.
National Contingency Plan (NCP) Guidelines on Long Term Response Actions (LTRA) 40 CFR 300.435(f)(3)	7/1/2015	EPA, 2015b		http://www.law.cornell.edu/cfr/text/40/300.435	This document leads you to the appropriate citations in the National Contingency Plan or NCP which provides guidelines regarding Long Term Response Actions.
400CFR 300.505 EPA/State Superfund Memorandum of Agreement (SMOA)	7/1/2015	EPA, 2015a		https://www.law.cornell.edu/cfr/text/40/300.505	This 40CFR reference contains information concerning EPA and a state establishing a Superfund Memorandum of Agreement (SMOA) and what the SMOA may contain.
Groundwater Remedy Completion Strategy	5/1/2014	EPA, 2014	OSWER 9200.2-144	https://semspub.epa.gov/src/document/11/100000021	Groundwater remediation is a component of more than 90 percent of active Superfund sites and achieving groundwater remedial action objectives (RAOs) can take years or even decades (EPA, 2013b). The purpose of this guidance is to help focus resources on the information and decisions needed to effectively complete groundwater remedies and to ensure that these remedies protect human health and the environment.

Institutional Controls: A Guide to Preparing, Institutional Control Implementation and Assurance Plans at Contaminated Sites	12/1/2012	EPA, 2012c	EPA-540-R-09-002 OSWER 9200.0-77	https://www.epa.gov/sites/default/files/documents/iciap_guidance_final_-_12.04.2012.pdf	This document provides guidance to the EPA Regions for developing Institutional Control Implementation and Assurance Plans (ICIAPs) at contaminated sites where the response action includes an institutional controls (ICs) component. An ICIAP is a document designed to systematically: (a) establish and document the activities associated with implementing and ensuring the long-term stewardship of ICs: and (b) specify the persons and/or organizations that will be responsible for conducting these activities.
Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites	12/1/2012	EPA, 2012b	EPA-540-R-09-001 OSWER 9355.0-89	https://www.epa.gov/sites/production/files/documents/final_pime_guidance_december_2012.pdf	This guidance identifies and addresses many of the common issues that may be encountered when using ICs pursuant to several of the Agency's cleanup programs, including CERCLA. It also provides an overview of the Agency's policy regarding the roles and responsibilities of stakeholders involved in various aspects of the IC life cycle, namely the planning, implementing, maintaining, and enforcing of ICs.
USEPA National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion	9/1/2012	EPA, 2012a	OSWER 9200.3-75	https://semspub.epa.gov/src/document/11/174096	This document presents USEPA's National Strategy to expand and formalize optimization on practices from site assessment to site completion as an operating business model for the Superfund Remedial Program.
Final Implementation of the National Strategy to Manage Post Construction Completion Activities at Superfund Sites	2/16/2012		OSWER 9355.0-105A	https://semspub.epa.gov/work/HQ/174124.pdf	This document summarizes the results of the Post-Construction Strategy, which was implemented from 2005 to 2011. It outlines the goals and objectives of the strategy and documents the successful implementation of the strategy.

Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance"	9/1/2011	EPA, 2011	OSWER 9355.7-18	https://semspub.epa.gov/work/HQ/175441.pdf	This guidance supplements OSWER's 2001 Comprehensive Five-Year Review Guidance and provides recommendations for conducting FYRs for the IC component of remedies in a manner similar to the review of engineering or other remedy components.
Close Out Procedures for NPL Sites	5/1/2011	EPA, 2011	OSWER 9320.2-22	https://semspub.epa.gov/src/document/11/176076	This document describes a recommended process for accomplishing and documenting remedial action completion, construction completion, site completion, and site deletion. The guidance Is Intended for those site that are or were on the National Priorities List.
Five-Year Reviews, Frequently Asked Questions (FAQs) and Answers	9/1/2009	EPA, 2009b	OSWER 9355.7-21	https://semspub.epa.gov/src/document/11/174052	The purpose of this frequently asked questions document is to clarify EPA's Comprehensive Five-Year Review Guidance (June 2001).
Operational and Functional Determination and the Transfer of Fund-lead Vapor Intrusion Mitigation Systems to the State	4/1/2009	EPA, 2009a	OSWER 9200.2-72	https://semspub.epa.gov/src/document/11/176118	This document presents guidance for making the operational and functional (O&F) determination for vapor intrusion mitigation systems which identifies the point of time where these systems transfer to the State of O&M.

Recommended Annual O&M/Remedy Evaluation Checklist for Contaminated Sediment Remedies	9/1/2008	EPA, 2008c	OSWER 9355.0-118	https://www.epa.gov/sites/default/files/2015-09/sediment_checklist.doc	Designed to help the Remedial Project Manager capture data routinely collected during O&M in a way that can better evaluate the efficiency and effectiveness of the remedial action. This checklist will also be helpful when evaluating a sediment remedy prior to transferring the site to the state for O&M.
Recommended Annual O&M/Remedy Evaluation Checklist	4/1/2008	EPA, 2008a	OSWER 9355.0-87	https://www.epa.gov/sites/default/files/2015-09/recommended_annual_om_checklist.doc	Designed to help the Remedial Project Manager capture data routinely collected during O&M in a way that can better evaluate the efficiency and effectiveness of the remedial action.
Optimization Strategies for Long-Term Groundwater Remedies	5/1/2007	EPA, 2007c	EPA 542-R-07-007	https://www.epa.gov/sites/production/files/2015-04/documents/opt_strat_long_term_gw_remed_542r07007.pdf	This document discusses the principles and techniques for optimizing long-term groundwater remedies, with particular emphasis on optimizing pump and treat(P&T} systems. The ideas contained in this document are based on professional experience in designing and operating long-term groundwater remedies and on lessons learned from conducting optimization evaluations called Remediation System Evaluations (RSEs) at sites with P&T systems.
A Cost Comparison Framework for Use in Optimizing Ground Water Pump and Treat Systems	5/1/2007	EPA, 2007b	EPA 542-R-07-005	https://www.epa.gov/sites/production/files/2015-04/documents/cost_comparison_framework_542r07005.pdf	This guidance provides a framework for comparing costs of remedial alternatives or modifications (in conjunction with the optimization of long-term groundwater remedies, including pump and treat (P&T) systems. States should be closely involved and provide input on any remedial alternatives or optimizations being considered for long-term groundwater remedies and this guidance may help with understanding how US EPA recommends that those cost estimates be compared.

Directive on Paying for Remedy Repairs or Modifications during the State-Funded Period of Operation and Maintenance (O&M)	4/26/2007		OSWER 9375.2-12	https://semspub.epa.gov/work/HQ/174118.pdf	This document has been superseded by the Guidance for Management of Superfund Remedies in Post Construction (2017) (OLEM 9200.3-105). This document includes guidance on when it may be appropriate for the Agency to pay for remedy repairs or modifications once a State has assumed responsibility for O&M at a Fund Lead site.
USEPA /US ACE Roadmap to Long Term Monitoring Optimization	5/1/2005	EPA, 2005b	EPA 542-R-05-003	https://www.cluin.org/download/char/542-r-05-003.pdf	This roadmap focuses on optimization of established long term monitoring programs for groundwater. Tools and techniques discussed concentrate on methods for optimizing the monitoring frequency and spatial distribution of wells.
O & M Report Template for Ground Water Remedies	4/1/2005	EPA, 2005a	EPA 542-R-05-010 OSWER 9283.1-22FS	https://semspub.epa.gov/work/HQ/175846.pdf	This document provides a recommended report template that can be used to present information on the operations and maintenance (O&M) of a groundwater remedy, particularly for those remedies including pump and treat (P& T).
Guidance for Monitoring at Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation	1/1/2004	EPA, 2004	OSWER 9355.4-28	https://clu-in.org/download/char/oswerdirective9355jan04.pdf	This guidance presents a six-step framework for developing and documenting a Monitoring Plan that will support management decisions. The framework includes the identification of monitoring objectives and development of monitoring hypotheses to focus the monitoring program, and the development of decision rules (exit criteria) that include action levels and alternative actions for terminating or continuing the site activity and/or its monitoring program.

Elements for Effective Management of Operating Pump and Treat Systems	12/1/2002	EPA, 2002	542-R-02-009 OSWER 9355.4-27FS-A	https://www.epa.gov/sites/production/files/2015-04/documents/factsheet_for_pt.pdf	This document summarizes key aspects of effective management for operating pump and treat (P&T) systems based on lessons learned from conducting optimization evaluations at Superfund-financed P&T systems. The lessons learned, however, are relevant to almost any P&T system. Therefore, the document may serve as a resource for managers, contractors, or regulators of any P&T system.
Comprehensive Five Year Review Guidance	6/1/2001	EPA, 2001b	OSWER 9355.7-038-P	https://semspub.epa.gov/src/document/11/128607	This guidance is intended to assist EPA Headquarters (HQ), Regional staff, and support agencies responsible for conducting five-year reviews under CERCLA. This guidance generally is intended to promote consistent implementation of the five-year review process.
Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups	9/1/2000	EPA, 2000b	EPA 540-F-00-005 OSWER 9355.0-74FS-P	https://www.epa.gov/sites/production/files/2016-01/documents/icfactfinal.pdf	This document was written for EPA site managers at Superfund and RCRA sites. However, many of the concepts are directly applicable to States, Federal Facilities, Tribes, local agencies and private individuals that contemplate the use of ICs.
A Guide to Developing and Documenting Cost Estimates during the Feasibility Study	7/1/2000	PEA, 2000a	EPA 540-R-00.002 OSWER 9355.0-75	https://semspub.epa.gov/work/05/918808.pdf	The purpose of this guidance is to provide a reference for developing and documenting cost estimates of remedial action alternatives during the Feasibility Study (FS). States should review the O&M cost estimates for all remedial alternatives from the FS and this guidance may help with understanding how those cost estimates are prepared.

A Guide to Preparing Superfund PPs, RODs and Other Remedy Selection Decision Documents (aka ROD Guidance)	7/1/1999	EPA, 1999	EPA 540-R-98-031 OSWER 9200.1-23P	https://www.epa.gov/sites/production/files/2015-02/documents/rod_guidance.pdf	Provides recommended formats and content for Superfund remedial action decision documents; clarifies rotes and responsibilities of the EPA, Federal Facilities, States, and Tribes in developing and issuing decision documents; clarifies roles and responsibilities of stakeholders in the remedy selection process and explains how to address changes made to proposed and selected remedies.
The Role of Cost in the Superfund Remedy Selection Process	9/1/1996	EPA, 1996	EPA 540/F-96/018 OSWER 9200.3-23FS	https://semspub.epa.gov/work/11/174446.pdf	This fact sheet describes the role of cost in the selection of remedial actions as established by the Superfund statute (CERCLA) and the Superfund regulations (the National Oil and Hazardous Substances Contingency Plan (NCP), and as expanded upon in EPA guidance.
Remedial Design/Remediation Action Handbook	6/1/1995	EPA, 1995	EPA 540/R-95/059 OSWER 9355.0-048	https://semspub.epa.gov/src/document/11/156935	This Handbook focuses on how an RPM can use project management principles to implement effectively a selected remedy In accordance with the Record of Decision {ROD). It is not a conventional engineering manual, but rather a general reference document for issues that arise during the RD/RA process. For purposes of this guidance document, Chapter 4 is the most important part to focus on as it contains information on O&M issues that can be helpful to the state in preparing for eventual transfer off the system oversight/maintenance.
Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration (interim Final)	9/1/1993	EPA, 1993	EPA/540/R-93/080 OSWER 9234.2-25	https://clu-in.org/download/contaminantfocus/dnapl/Policy_and_Guidance/TI_guidance.pdf	This document outlines EPA's approach to evaluating the technical impracticability of attaining required groundwater cleanup levels and establishing alternative, protective remedial strategies where restoration is determined to be technically impracticable.

Policy on Management of Post-Removal Site Control	12/1/1990	EPA,1990b	OSWER 9360.2-02	http://nepis.epa.gov/Exe/ZyPDF.cgi/9100UHNE>PDF?Dockey=9100UHNE.PDF	This memorandum transmits the OSWER policy on management of post removal site control for fund-financed removal activities and communicating decisions to States on the use of institutional controls.
A Guide to Selecting Superfund Remedial Actions	4/1/1990	EPA, 1990a	OSWER 9355.027FS	https://semspub.epa.gov/src/document/11/174406	This factsheet describes statutory requirements for CERCLA remedies, and the process EPA has established.
Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA	10/1/1988	EPA, 1988	EPA/540/G-89/004 OSWER 9355.3-01	https://rais.ornl.gov/documents/GUIDANCE.PDF	This guidance was produced to assist Regional and State remedial personnel, contractors, and other parties involved in conducting remedial investigations and feasibility studies.

APPENDIX B

Checklist for Transitioning Remedies to the States

This Checklist is intended to guide project managers through the transition process and ensure a site is ready to be handed to a State. The State Project Manager should review this checklist seeking to answer the following questions with sufficient depth to understand the ongoing site remedy and associated costs. The project manager should seek to check all the boxes to ensure everything has been accounted for before the hand off of the site.

Site Name _____ Date _____

State Project Manager _____

Superfund Memorandum of Agreement (SMOA) / Superfund State Contracts (SSC) / Cooperative Agreements (CA)

- ☐ Roles and responsibilities, contained in the SMOA, SSC, or CA have been defined.
- ☐ Document identifies requirements, including timelines, for EPA and State review of each other's key documents.

Remedial Investigation (RI) / Feasibility Study (FS)

Review NCP nine evaluation criteria for remedy selection carefully. Nine criteria can be found here: *https://www.law.cornell.edu/cfr/text/40/300.430* *or* *https://semspub.epa.gov/work/HQ/174406.pdf*

- ☐ Long-term effectiveness and performance criteria adequately address operation and maintenance (O&M) requirement.
- ☐ Nature and extent are adequately characterized to develop and evaluate potential remedial alternatives.
- ☐ Cost estimates adequately address O&M requirements, including maintaining Institutional Controls (ICs) and engineering controls (ECs), and contingencies.
- ☐ Consideration has been given to cleanup work that can be done on the front end to reduce the cost for O&M.
- ☐ Consideration has been given to the practicability of instituting the ICs being considered in the FS.
- ☐ Project manager has considered potential future site use during this stage, so that the site will be "ready for anticipated use" once it is remediated.

Record of Decision

☐ Remedial Action Objectives (RAOs) address the unacceptable risk identified in the RI.

☐ Record of Decision (ROD) contains clear and precise, as well as specific RAOs.

☐ Performance measures for interim actions have been incorporated (if appropriate).

☐ ROD contains a clear timeline for remedy transition to O&M.

Remedial Design (RD) / Remedial Action (RA)

☐ State project manager has been actively involved with EPA in the development of the remedy and the development of the O&M Plan and Manual.

☐ Design contractor created an O&M Plan that clearly describes the administrative and technical details of inspecting, operating and maintaining the treatment system(s), and all ICs in a readily sharable and searchable electronic format.

☐ O&M Plan clearly describes the performance measures that will be used to determine that the remedy is operational and functional (O&F) in a readily sharable and searchable electronic format.

☐ O&M Plan includes a schedule for transition from RA to O&M.

☐ Construction contractor created an O&M Manual that contains all technical information, data and specifications, manufacturer information, process parameters, operation procedures, maintenance schedules and requirements, and staffing and training needs in a readily sharable and searchable electronic format.

☐ Final RA cost estimate (including contingencies) is within +15% to -5% of actual final costs.

☐ Project manager has considered possibilities for earning state credit or in-kind contributions to offset state cost share.

☐ Project manager has planned for any necessary real property transfer, including access agreements.

☐ State and EPA conducted a joint inspection at the conclusion of the construction phase to determine the remedy has been constructed properly.

☐ Neither party has any concerns with the construction.

Operational & Functional (O&F) Phase

☐ EPA RPM sent the state a letter formally documenting the date of the O&F start.

☐ State identified punch list items that may need changing or updating after the joint inspection and communicated those to EPA.

☐ Assumptions made during the RD, including the conceptual site model, have been verified.

☒ State and EPA conducted a joint inspection at the conclusion of the O&F period to determine if the remedy is operational and functional.

☐ EPA sends a letter documenting the O&F determination.

Long-Term Response Action (LTRA) Phase

☐ An independent third-party remedy optimization review has been conducted to evaluate the operating systems early in the LTRA period.

☐ PM began early planning/programming for O&M funding and contracting support, in addition to training for state and its contractors.

As such, contractual discussions between the state and their potential contractors should take place at least six months prior to transfer.

☐ All necessary and appropriate rights of entry, lease agreements and other agreements are in effect and include state personnel and their contractors.

☒ If not, they will be in effect prior to transfer.

☐ All permits (e.g., for discharge) are up to date.

☐ All remedial system equipment has been inspected.

☐ No equipment requires repairs prior to transfer.

☐ Required ICs have been implemented and are effective.

☐ The state has copies of all IC and environmental covenant documentation.

☐ Equipment ownership and warranties are clear and transferable to the state.

☐ Placards or signage are updated with the state's contact information.

☐ Real property is transferred to the state.

☐ All inoperable or unnecessary equipment has been disposed of properly.

☐ Monitoring wells are inspected, surveyed, rehabilitated, and/or decommissioned.

☐ All necessary upgrades will be completed prior to transfer and equipment is designed to last (as appropriate) in consideration of the O&M period.

☐ O&M Plans, O&M Manuals, Monitoring Plans, Sampling and Analysis Plans, QAPPs, and Remedy Completion Strategies are updated and provided to the state in their native file format.

☐ All LTRA cost estimates have been updated.

☐ State project manager selects a new contractor(s) and determines if cross training is necessary.

☐ State employees/contractors will be allowed at least a month transition period (last month of federal lead), if they are not already running the system.

Operation & Maintenance Phase

☐ The OSWER 9355.0-87 "Recommended Annual O&M/Remedy Evaluation Checklist" was utilized.

☐ None of the following situations occurred that would lead to the US EPA coming back into the lead role:

- Remedy failure
- Identification of a new pathway (e.g., vapor intrusion)
- Identification of a new contaminant or a change in ARARs

Please note that EPA will consider paying for repairs or modifications during O&M if:

a) there is a latent design or construction defect or

b) if a new contaminant or ARAR is identified that requires a fundamental change to the remedy.

c) If there is a declared State of Emergency that impacts the remedy, funds may be requested from FEMA for repair/replacement of the remedial system.

APPENDIX C: Acronyms / Glossary

ARAR	Applicable or Relevant and Appropriate Requirements	Standards, criteria, or limitations under federal or more stringent state environmental laws, including RCRA, that may be required during a Superfund remedial action, unless site-specific waivers are obtained.
CA	Cooperative Agreement	A cooperative agreement is a form of grant. Like other grants, it provides funding to a recipient. Cooperative agreements are used in those circumstances where EPA plans to be substantially involved in the project.
CCL	Construction Completion List	EPA has developed a construction completion list (CCL) to simplify its system of categorizing sites and to better communicate the successful completion of cleanup activities. The inclusion of a site on the CCL has no legal significance.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCI-A), commonly known as Superfund, was enacted by Congress on December I, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System	The CERCI-A Information System is an EPA database of information about Superfund sites. This information is intended for use by EPA employees for management of the Superfund program.
CPCFG	CERCLA Post Construction Focus Group	The mission of the CERCLA Post Construction Focus Group is to promote facilitation and maintenance of reliable, effective, and protective remedies constructed at contaminated sites, to include identification of the resources necessary following remedy construction, and to communicate State program strategies effectively among interest parties.
CSM	Conceptual Site Model	A conceptual site model is a written and/or illustrative representation of the conditions and the physical, chemical and biological processes that control the transport, migration and potential impacts of contamination (in soil, air, ground water, surface water and/or sediments) to human and/or ecological receptors.
DOD	Department of Defense	A department of the federal executive branch entrusted with formulating military policies and maintaining American military forces. Its top official is the civilian secretary of defense.
DOE	Department of Energy	A department of the federal executive branch responsible for developing policies for effective use of the nation's energy resources. The Department of Energy is involved in energy conservation, regulating oil pipelines, and encouraging research on new sources of energy.
EPA	U.S. Environmental Protection Agency	Born in the wake of elevated concern about environmental pollution, EPA was established on December 2, 1970, to consolidate in one agency a variety of federal research, monitoring, standard-setting and enforcement activities to ensure environmental protection. Since its inception, EPA has been working for a cleaner, healthier environment for the American people.
ESD	Explanation of Significant Differences	Changes to the remedy selected in the ROD that occur during the RD/RA process must be described in an Explanation of Significant Differences (ESD) or ROD Amendment pursuant to NCP part 300.435(c)(2) and 300.825(a).
FCA	Facility Condition Assessment	Evaluation of the facility condition generated as the result of the Facility Condition Inspection. This includes the development of the Facility Condition Index which provides a numerical indicator or rating of the condition of a facility based on the ratio of cost of deficiencies to current plant value.
FCOR	Final Close Out Report	Once all cleanup goals have been achieved, this report documents compliance with statutory requirements and provides a consolidated record of all remedial activities for all operable units at an installation.
FEMA	Federal Emergency Management Agency	The Federal Emergency Management Agency (FEMA) is an agency of the United States Department of Homeland Security, initially created by Presidential Reorganization Plan No. 3 of 1978 and implemented by two Executive Orders on April I , 1979. The agency's primary purpose is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities.
FYR	Five Year Review	EPA as required by statute and, as a matter of policy, reviews the remedies at certain sites every five years. Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act(CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site be subject to a Five-year Review. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) defines this to mean contamination left at levels that do not allow for unlimited use and unrestricted exposure.
IC	Institutional Control	Non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.
LTRA	Long-Term Response Action	For fund-financed remedial actions involving treatment or other measures to restore groundwater or surface water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period up to 10 years after the remedy becomes operational and functional be considered part of the remedial action. 40 CFR S 300.435(f)(3)

MNA	Monitored Natural Attenuation	MNA refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. These include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater.
MOA	Memorandum of Agreement	An agreement between a state's director and its EPA Regional Administrator outlining the nature of the responsibilities to enforce a regulatory program and defining the level of coordination and oversight between EPA and the state agency.
MOU	Memorandum of Understanding	A Memorandum of Understanding (MOU) is a formal agreement that sets out arrangements for shared activities, cooperation and data/information exchange between two or more parties.
NCP	National Contingency Plan	The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan (NCP), is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The National Contingency Plan is the result of our country's efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans.
NPL	National Priorities List	Sites are listed on the National Priorities List (NPL) upon completion of Hazard Ranking System (HRS) screening, public solicitation of comments about the proposed site, and final placement of the site on the NPL after all comments have been addressed. The NPL primarily serves as an information and management tool. It is a part of the Superfund cleanup process and is updated periodically.
O&F	Operational and Functional	A remedy becomes "operational and functional" either one year after construction is complete, or when the remedy is determined concurrently by EPA and the state to be functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year O&F period, as appropriate. 40 CFR S 300.435(f)(2)
O&M	Operations and Maintenance	Operations and maintenance (O&M) activities protect the integrity of the selected cleanup plan for a Superfund site. O&M measures are initiated by a State after remedial action objectives and remediation goals in the ROD have been reached and is determined to be operational and functional (O&F) based on the State and Federal agreement. 40 CFR S This excludes ground- or surface-water actions covered under 40 CFR S 300.435(f)(4).
PCC	Post-Construction Completion	Activities that occur after the remedy is constructed to maintain and evaluate the effectiveness of the remedial action. These activities include operation and maintenance and O&M, long-term response actions (LTRAs); institutional controls (ICs); five-year reviews optimization of remedies; and deletion from the NPL.
pp	Proposed Plan	The Proposed Plan is a document used to facilitate public involvement in the remedy selection process. The document presents the lead agency's Preferred Alternative to address contamination and risks at the site, presents alternatives that were evaluated, and explains the reasons the lead agency recommends the Preferred Alternative.
PRP	Potentially Responsible Party	A potentially responsible party (PRP) is a party who may eventually be held liable under CERCLA for the release of contamination.
QAPP	Quality Assurance Project Plan	A QAPP is a written document that outlines the procedures a monitoring project will use to ensure that samples, data, and subsequent reports are of high enough quality to meet project objectives. EPA requires all EPA funded monitoring programs to have an approved QAPP before sampling begins.
RA	Remedial Action	Remedial Action (RA) follows the remedial design phase and involves the actual construction and implementation phase of a cleanup remedy.
RAO	Remedial Action Objective	Cleanup objectives that are expected to be achieved by the remedial action.
RD	Remedial Design	Remedial Design (RD) is the phase in Superfund site cleanup where the technical specifications for cleanup remedies and technologies are designed.
RD/RA	Remedial Design/Remedial Action	The RD/RA is based on the specifications described in the record of decision (ROD).
RG	Remedial Goal	The final cleanup level, which is based on the consideration of site-specific exposure factors, technical factors, and uncertainty factors and ARARs.
RI/FS	Remedial Investigation/Feasibility Study	After a site is listed on the NPL, a remedial investigation/feasibility study (RI/FS) is performed at the site. The RI serves as the mechanism for collecting data, while the FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. The RI and FS are conducted concurrently. Data collected in the RI influences the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations.
ROD	Record of Decision	The Record of Decision (ROD) is a legal document that selects the remedy that will be used to clean up a site. The ROD is based on information generated during the RI/FS.
RPM	Remedial Project Manager	The EPA official is responsible for overseeing on-site activities including the remedial action.

RSE	Remedial System Evaluation	Optimization support during a Long-term Response Action (LTRA) or Operation and Maintenance (O&M).
RSO	Remedial System Optimization	Efforts at any phase of the removal or remedial response to identify and implement specific actions that improve the effectiveness and cost-efficiency of that phase. Such actions may also improve the remedy's protectiveness and long-term implementation which may facilitate progress towards site completion.
SAP	Sampling and Analysis Plan	SAP is a plan for a project that needs to be characterized. The plan includes sample locations, sample frequency, parameters measured, field and laboratory protocols, etc.
SARA	Superfund Amendments and Reauthorization Act	The Superfund Amendments and Reauthorization Act (SARA) amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCI-A) on October 17, 1986. SARA reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program.
SPO	State Project Officer	Along with the Remedial Project Manager, the SPO has the authority to make joint project decisions that do not alter the scope or cost of response actions taken pursuant to the Superfund State Contract. The EPA Project Manager WII report modifications to schedules or activities to the SPO.
SSC	Superfund State Contract	SSC is a contract between EPA and the State that includes assurances from the State to provide all future maintenance of the removal and remedial actions, availability of a hazardous waste disposal facility, and payment of "cost share" (generally 10% of the costs of the RA).