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Operation and Maintenance in the Superfund Program

Adequately addressing operation and maintenance (O&M) issues throughout the life of a Superfund remedy is critical to the successful implementation of the Superfund program. O&M measures are designed to maintain the remedy at a site to ensure that the remedy remains protective of human health and the environment. This fact sheet provides an overview of O&M throughout the phases of the Superfund pipeline and presents guidance for Remedial Project Managers (RPMs). If the appropriate O&M approach differs because of site status (Fund-lead, Potentially Responsible Party (PRP)-lead, etc.), it is noted. Although many portions of this fact sheet may apply to Federal Facilities, this fact sheet does not address specific Federal Facilities procedures. Users of the *Remedial Design/Remedial Action (RD/RA) Handbook* are encouraged to place this fact sheet in the O&M Appendix. Complete citations for all documents referred to in this fact sheet are listed at the end under *Additional Guidance*.

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A. OVERVIEW

Operation and maintenance (O&M) is a vital component of a Superfund remedy, and is receiving increased attention as more and more Superfund remedies move into the post-construction phase. This fact sheet provides guidance to RPMs and others who have O&M responsibilities. It provides practical information on the timing of O&M planning, the transition of a remedy from construction to the O&M stage, the performance of O&M functions, RPM oversight responsibilities, record keeping, troubleshooting, and termination of O&M.

B. KEY O & M DEFINITIONS

What is operation and maintenance (O&M) in the Superfund program?

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR§300.435(f)(1), defines O&M as the measures "initiated after the remedy has achieved the remedial action objectives and remediation goals in the ROD (Record of Decision), and is determined to be operational and functional, except for ground- or surface-water restoration actions covered under 40 CFR§300.435(f)(4)." A remedy is a remedial action (RA) described in a ROD. A ROD may contain several remedies, each with differing O&M requirements and time frames for completion. O&M measures are designed to maintain the remedy at a site to ensure that the remedy remains protective of human health and the environment.

What is the operational and functional (O&F) determination?

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. EPA may grant extensions to the one-year period, as appropriate." This period is often referred to as "shakedown," when the construction contractor makes minor adjustments as necessary to ensure the remedy is operating as designed.

Formal O&F determinations are made for Fund-financed remedies because the O&F milestone governs when the Regions turn these remedies over to the States for O&M. For Fund-financed remedies, EPA and the State conduct a joint inspection at the conclusion of construction to determine that the remedy has been constructed properly. The joint inspection also marks the beginning of the one-year O&F period described above. At a minimum, the attainment of O&F is documented in the Interim or Final Remedial Action Report. It may also be documented by a letter to the interested parties. A letter is also suggested to document the joint inspection and the start of the one-year O&F period.

The term O&F is also sometimes applied to Potentially Responsible Party (PRP)-lead remedies. It signifies the end of the shakedown period, when the remedy is determined to be operating as designed. Since the PRP will continue to be responsible for and operate the remedy after the O&F determination is made, the determination is often not as formal as for Fund-lead remedies.

How are O&M for ground- and surface-water restoration remedies defined in the Superfund program?

Ground- and surface-water restoration remedies, including monitored natural attenuation, would logically go directly from remedial action into O&M upon construction of the treatment plant and monitoring system and O&F determination. The operation of treatment plants and monitored natural attenuation remedies to achieve cleanup goals is typically termed O&M.

However, the NCP, 40 CFR§300.435(f)(3), makes an exception for Fund-financed remedies. It states that, for Fund-financed remedial actions involving treatment or other measures to restore ground- or surface-water quality to a level that ensures protection of human health and the environment, the operation of such treatment or other measures for a period up to ten years after the remedy becomes O&F will be considered part of the remedial action. Activities required to maintain the effectiveness of such treatment or measures following the ten-year period, or after the remedial action is complete, whichever is earlier, will be considered O&M.

What are long-term response actions (LTRA) and PRP long-term responses (PRP LR)?

Fund-financed remedies involving treatment or other measures to restore ground- or surface- water quality to a level that ensures protection of human health and the environment, including monitored natural attenuation, are a special case, as described above. EPA has established the definition long-term response action (LTRA) for the period up to ten years when the Fund continues to operate the remedy. If cleanup goals have not been achieved upon completion of the ten years, the remedy transitions into O&M and operation becomes the responsibility of the State until cleanup goals are achieved.

A parallel definition has been established for PRP-lead remedies involving treatment or other measures to restore ground- or surface-water quality to a level that ensures protection of human health and the environment, including monitored natural attenuation. Operation of the PRP-lead remedy is a PRP long-term response (PRP LR). For the purposes of this fact sheet, a remedy in LTRA or PRP LR is considered to be in O&M, and the concepts described here apply.

What remedies require O&M ?

Remedies requiring O&M include, but are not limited to, actions that typically require five-year reviews (e.g., landfill caps; gas collection systems; and ground-water containment). O&M measures also may include requirements for maintaining institutional controls.

Some treatment remedies must be operated for an extended period to reach RA cleanup goals. Examples are bio-remediation, soil vapor extraction, and incineration. Industry often calls this operation period O&M. In the Superfund program, however, the remedy remains in RA and never goes into O&M.

Typical O&M activities are shown in **Highlight 1** and include inspection; sampling, monitoring and analysis; routine operation and maintenance; and reporting.

Who is responsible for O&M Activities?

For PRP-lead remedies, the PRP continues to operate and maintain the remedy during O&M. EPA, through the RPM, is responsible for oversight to ensure that O&M is being performed adequately. EPA and the State may require the PRP to submit periodic reports, maintain certain records, and host site visits from EPA. These requirements can be included in the consent decree (CD). An exception is when EPA conducts O&M using funds from a PRP special account.

For Fund-financed remedies, CERCLA § 104(c) requires States to pay for or ensure payment of all future maintenance. Although States are responsible for the O&M, EPA retains responsibility for determining when O&M is complete and conducting five-year reviews. EPA may require the State to submit periodic reports, maintain certain records, and host site visits from EPA. These requirements can be included in the Superfund State Contract (SSC), or cooperative agreement (CA).

EPA may use the Fund only for oversight of O&M activities, not for conducting O&M, except in the case of LTRA.

When is O&M completed?

In some cases, the State or PRP may have to perform O&M indefinitely for remedies that contain wastes on-site, or include institutional controls. However, for remedies involving ground-water restoration, there may be a point where all work is completed, cleanup goals have been achieved, and no additional monitoring or institutional controls are necessary. In those cases, O&M may be terminated. See also Section H, Termination of O&M.

Highlight 1 – Typical O&M Activities Performed by the O&M Site Manager or O&M Contractor

Inspection
- Review sampling records for compliance with discharge permits and deviations;
- Observe site conditions such as landscape, drainage, erosion, and integrity of structures and fences; and
- Inspect wells, piping, treatment facilities, and other mechanical and electrical systems and equipment.
  (Refer to the Comprehensive Five-Year Review Guidance for a detailed site inspection checklist)

Sampling, Monitoring and Analysis
- Sample and monitor leachate, groundwater, and surface water;
- Sample gas collection system and air; and
- Sample influent/effluent of treatment systems.

Routine Operation and Maintenance
- Operate treatment plant;
- Maintain site including maintenance of cap integrity, drainage systems, roads, and erosion control;
- Maintain institutional controls, fencing, site access and security measures; and
- Maintain treatment plant, wells, pumping systems, pollution control devices, and other operating mechanical and electrical equipment.

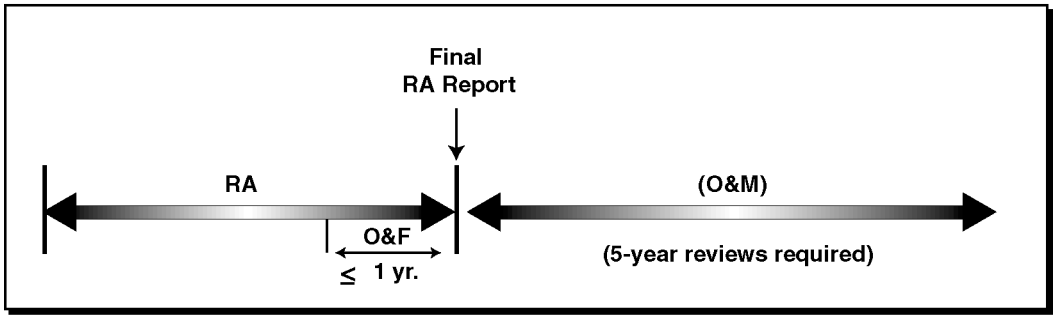
Reporting
- Provide routine reports; and
- Provide special reports.

Highlight 2 shows the various remedy pipelines and how O&M applies.

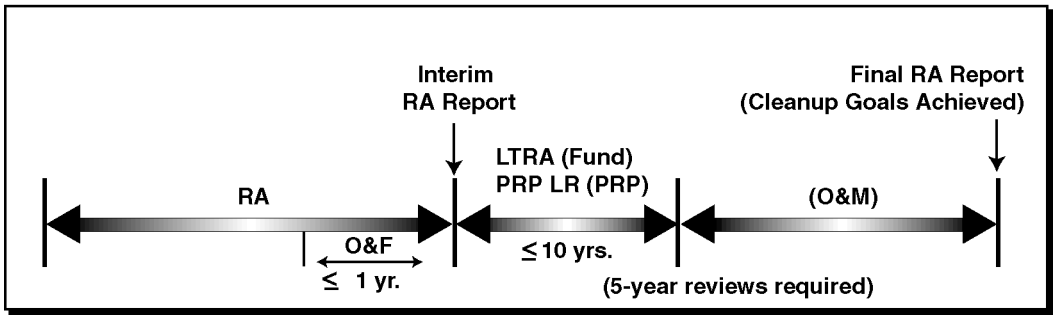
Highlight 2

Treatment or Off-site Disposal Remedies Pipeline

Containment Remedies Pipeline



Ground Water and Surface Water Restoration Pipeline



C. O&M CONSIDERATIONS DURING REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS)

O&M planning should start in the early stages of the Superfund remedial pipeline. Early preparation helps to:

- Clarify State and PRP financial and performance requirements;
- Facilitate compliance with five-year review requirements;
- Aid transition to O&M;
- Reduce the time needed to finalize SSCs and CAs;
- Ensure that cash-out settlements involving O&M will be accepted by the State; and
- Ensure that the remedy can be operated and maintained.

Highlight 3 is a checklist of O&M considerations that an RPM can use to prepare for future O&M.

Highlight 3 – Checklist of O&M Considerations During a Superfund Project

Project Phase	O&M Considerations
Remedial Investigation/ Feasibility Study	• Specify O&M activities for each screened alternative requiring O&M; • Estimate the costs for all O&M activities; and • For Fund-lead remedies, review O&M requirements with State officials.
Remedial Design	• Ensure that the RD statement of work addresses O&M; • Consult with the State to develop an O&M Plan for the selected remedy; • Ensure that the design contains specifications for the O&M Manual; • Perform operability review (assistance available from USACE or contractors); • Ensure SSC/CA (for Fund-lead remedies) or CD (for PRP-lead remedies) includes language on O&M responsibilities; and • Review RA and O&M cost estimates for completeness and accuracy.
Remedial Action	• Ensure that the RA statement of work and design specifications require training of O&M staff before the remedy is turned over; • Update O&M Plan; • Coordinate review and submission of the O&M Manual by the RA contractor; • Draft the RA Report at the completion of construction, including a section on required O&M activities; • Coordinate the smooth transition to O&M through good communications with State officials; • Conduct a joint EPA/State inspection; • Document date of inspection and beginning of O&F period in a letter sent to the State; • Notify State of impending O&F period deadline; and • Make an O&F determination and document it in the Interim or Final RA Report as well as a letter to the State.
O&M, LTRA or PRP LR	• Conduct periodic site inspections; • Conduct ongoing monitoring/review of O&M reports; • Conduct optimization studies of selected remedies; and • Conduct five-year reviews.

During the RI/FS phase, a detailed analysis of the remedial alternatives is conducted using the nine criteria of the NCP. "Long-term effectiveness and permanence" is the criterion whereby O&M requirements are evaluated. The O&M requirements for each alternative in the detailed analysis should be as specific as possible.

O&M costs are considered for the first time during the FS and should be included in the cost estimates for the remedial alternatives. A combination of capital and O&M costs are considered when evaluating alternatives. EPA's *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* encourages the use of realistic O&M time frames rather than assuming O&M continues for 30 years. For O&M time frames longer than 30 years, a "no discounting" scenario should be included.

The expected O&M components, when factored into the comparison of alternatives, may have a major effect on the remedy ultimately selected. For example, the O&M for a certain type of waste containment cell may be more costly than a treatment alternative in the long term, although the cost of constructing the containment cell (capital cost) may be less expensive than the treatment. The treatment remedy may be the preferred alternative because it is more permanent and it would be more cost-effective.

By thoroughly describing O&M requirements in the remedy selection process, the affected parties will more likely understand what will be expected of them in the future (particularly where remedies require long-term O&M). For a Fund-lead remedy, understanding the O&M requirements allows the State and other interested parties to be better prepared to offer comments on EPA's proposed plan. It also allows the State an opportunity to begin developing their own plan for their future commitment to conducting O&M.

For a cash-out or PRP-lead remedy, adequately portraying the expected O&M costs is imperative to ensure that funds are available for the expected duration of the O&M.

D. O&M CONSIDERATIONS DURING REMEDIAL DESIGN (RD)

This section lists submittals relevant to O&M and suggests how the RPM may focus the review.

RD Statement of Work (SOW)

The SOW should address how O&M requirements are to be planned for in the RD, including identification of costs. The SOW should spell out that all design submittals must address O&M.

RD Submittals

When reviewing the design documents for the O&M portion of the remedy, permanence and durability of the design configuration, equipment, and materials should be considered, especially for remedies that will be operated for a long period of time. Ease and efficiency of performing O&M is also critical, particularly for remedies that include equipment or machinery. A remedy that has equipment in hard to reach places, inadequate instructions to the O&M operator, or hard to find replacement parts, may discourage the party who is responsible for performing O&M.

For Fund-lead remedies, State review of the RD is critical since the State will be assuming O&M responsibilities for the finished remedy. States should also be given the opportunity to review PRP-lead designs. The *Remedial Design/Remedial Action Handbook* includes a checklist for reviewing the RD.

O&M Cost Estimates for a Fund-Lead Remedy

As part of the design for a Fund-lead action, the RPM receives an O&M cost estimate. This estimate, which is refined as the design becomes more complete, normally includes the costs of the operating labor, materials, energy, purchased services, administrative costs, insurance, and contingency. The RPM should ensure that the estimate is sufficiently detailed with contingencies clearly noted. The State also should be encouraged to actively review the estimate to avoid surprises during SSC/CA negotiations.

O&M Plan

The O&M Plan is a document that is primarily used for Fund-lead actions. The NCP, 40 CFR §300.510(c), provides that the State and EPA should consult on a plan for O&M before the RA begins. To avoid communications problems, it is recommended that a written plan be developed and incorporated as part of the SSC or CA. An O&M Plan will help ensure the proper transition of responsibility for O&M of Fund-lead remedies from EPA to the State.

The O&M Plan should define the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the remedial action. The plan should also detail information on maintaining, as appropriate, institutional controls.

The designer can be tasked with the more technical portions of the O&M Plan preparation; however, input is needed from the State and EPA to complete the administrative parts of the plan. An O&M Plan should generally contain the elements of **Highlight 4**.

Highlight 4 – Typical O&M Plan Elements

- Designation of the organizational unit of the government responsibility for O&M
- Identification of the available State funding mechanisms for O&M activities
- 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
- Safety requirements for O&M activities
- Equipment and material requirements
- Estimates of annual O&M costs
- Reporting requirements
- Conditions for O&M termination
- Description of site use and disposition of facilities following completion of O&M
- Strategy for modifying existing site health and safety plan (HASP) and quality assurance project plan (QAPP)
- Access and property issues

The RPM and the State should jointly review and discuss the O&M Plan. The review should consider whether the plan provides for reliable, cost-effective O&M of the remedy from both an administrative and technical perspective, and ensure that it will be acceptable to the State. For Fund-lead remedies, the O&M Plan is an essential step in obtaining State assurances for assumption of O&M responsibilities. Of particular importance in the development of the plan is agreement on the performance measures that will be used to determine that a remedy is O&F.

At PRP-lead sites, the PRPs are responsible for constructing, operating, and maintaining the remedy. In rare circumstances, the PRP may arrange to transfer O&M responsibilities to another organization and provide sufficient funds to carry them out. In these cases, the RPM may request that an O&M Plan be developed to address funding mechanisms such as the establishment of an O&M trust fund and describe what responsibilities the PRPs may have for oversight. The plan would also address O&M activities themselves as well as any monitoring and reporting requirements.

O&M Manual

The design specifications should provide a detailed description of the O&M components and require that the construction contractor prepare an O&M manual. The O&M Manual will serve as a guide to the purpose and function of the equipment and systems that make up the remedy.

The O&M Manual prepared by the construction contractor should provide technical information and data, manufacturer's information, protocols, process parameters, operation procedures, staffing, training, and maintenance schedules. **Highlight 5** shows the typical sections of the O&M Manual. The O&M Manual should be written in a user-friendly style that is easily understood by operating personnel. An O&M Manual should be easy to modify to reflect operating and maintenance needs.

Highlight 5 – Typical O&M Manual Sections

- Remedy description, including design philosophy and operation and control of the facilities
  - Operation and managerial responsibility
  - Process system operations and protocols
- Personnel
  - Staffing requirements
  - Staffing qualifications and certifications
- Permits, standards, and approvals
- Records
  - Format and delivery requirements
  - Operation and inspection logs
  - Monthly and annual reports
  - Maintenance records
  - Operating costs and record keeping
  - Personnel records
- Community Involvement Notices of operational status
  - Site tours
  - Response to complaints
- Laboratory testing requirements
- Maintenance
  - Equipment record system
  - Equipment replacement instructions
  - Planning and scheduling
  - Warranty provisions
  - Contract maintenance
  - Monitoring of institutional controls
- Emergency operating and response program
  - Emergency equipment inventory
  - System vulnerabilities
  - Fire, police, and emergency response

Relationship between the O&M Manual and the O&M Plan

The O&M Manual is an engineering-type submittal and is purely technical in nature. The manual is routinely prepared for all remedies requiring O&M. An O&M Plan, on the other hand, is more of an administrative description of how the State will undertake its obligation to conduct O&M at a Fund-lead remedy. For a Fund-lead remedy, the RPM and the State may elect to have all of the information placed in the O&M Manual. In other cases, both parties may want a plan that contains only the administrative roles and responsibilities of the State.

E. O&M CONSIDERATIONS DURING RA

During the RA phase, the O&M Plan should be updated to reflect actual remedial activities. For a remedy where the State will assume O&M responsibilities, the State and EPA should have frequent discussions about the O&M Plan, the transition to O&F, the joint EPA/State inspection, the O&M Manual, and any remedy, cost, or schedule changes.

As the construction contractor constructs the remedy, all variations from the design plans and specifications are noted on the construction plans. These marked-up plans are called "as-builts." The as-builts are critical items that are important to proper performance of O&M, and they should be delivered to the party responsible for the O&M. The RPM should ensure that this arrangement is made when EPA transfers O&M to the State for a Fund-lead action.
The construction contractor is responsible for preparing the O&M Manual. The contractor should include equipment and material information as constructed, manufacturer's information, warranty information, and any changes made during construction. The designer and State should be tasked to review the completed O&M manual before the O&M period begins.

Although the O&M Manual should be complete at this stage, it may be revised during the O&M phase to reflect changes in equipment or procedures. Significant changes that may affect remedy implementation, such as frequency of sampling and monitoring, should be discussed with EPA before the changes are made. Minor changes, such as a new pump brand substantially equivalent to the previously specified brand, generally would not require discussions with EPA.

F. TRANSITION FROM RA TO O&M

PRP-Lead O&M Transfer

Since the PRPs will continue to be responsible for a remedy as it transitions into O&M, the transition is not as formal as it is for Fund-lead remedies. EPA should meet with the PRP prior to the completion of the RA to reiterate O&M requirements, reporting obligations, and future responsibilities. Additionally, EPA may conduct an inspection at a PRP-lead site upon completion of the construction, according to the terms of a CD.

Fund-lead O&M Transfer

EPA initiates discussions with the State regarding the transition of a remedy from RA to O&M. A schedule for the transition should be developed as part of the O&M Plan. This schedule should include adequate time for a State to arrange for O&M.

EPA/State Joint Inspection

For a Fund-lead RA, the lead and support agencies should conduct a joint inspection at the conclusion of RA construction, as provided for in the NCP, 40 CFR§300.515(g). A joint inspection allows EPA and the State to determine whether the remedy has been constructed in accordance with the ROD and the RD. The joint inspection may be conducted independently of, or concurrently with, the construction contract inspection.

EPA and the State are strongly encouraged to sign a memorandum following the joint inspection to document the date of inspection and the agreement of all parties that the O&F period has commenced. This focus on a written agreement will draw attention to the significance of this determination in terms of establishing a final date for transferring the remedy to the State.

O&F

As stated previously, the O&F period is either one year, or when determined concurrently by EPA and the State to be functioning properly and performing as designed, whichever is earlier. During the O&F period, minor adjustments may be made to the remedy as it undergoes testing and shakedown. Additionally, this one-year period allows time for the State to arrange for O&M services and to receive training on the remedy. These activities should be reflected in the schedule contained within the O&M Plan.

The date that the O&F determination is made is documented in the final RA Report. For a ground- or surface-water restoration remedy that will go into LTRA, (or PRP LR) the date is documented in an interim RA Report. A letter to the State documenting the O&F determination also should be prepared.

LTRA

For remedies involving treatment or other measures to restore ground- or surface-water quality to a level that ensures protection of human health and the environment, including monitored natural attenuation, EPA continues to operate the system for a period of up to ten years after the O&F determination has been made. Prior to the transfer to the State at the end of LTRA, EPA should meet with the State and conduct an inspection of the treatment system to develop a list of repairs, replacements, or adjustments that might be necessary. EPA may need to replace remedy components nearing the end of their useful life before transfer to the State.

Change in Ownership Agreements

Initiatives to reuse Superfund sites increase the likelihood that developers may buy remediated Superfund property. When this occurs, the PRPs that have agreed to clean up the site may retain ultimate responsibility for implementing the O&M program at the site. It is the responsibility of such PRPs to ensure that institutional controls will be properly maintained. It also should be the responsibility of the PRPs to ensure that all O&M requirements will continue to be met. These restrictions and requirements remain in force subsequent to any property transfer. Agreements transferring ownership of the property typically describe how the parties will handle such restrictions and requirements.

There may be situations where PRPs may transfer properties to the State. Under these circumstances, arrangements should be made between the PRP and the State to ensure that the PRP's O&M responsibilities are met. This can be accomplished through the establishment of a trust with sufficient funds to meet O&M requirements for the intended life

of the O&M program, or through other funding mechanisms and O&M contracts.

G. EPA OVERSIGHT DURING O&M

The RPM is responsible for ensuring that O&M is performed by the State or PRP for the life of the expected O&M. RPM responsibilities during O&M generally include:

- Ensuring reports are submitted,
- Reviewing reports for required elements,
- Reviewing data (sampling, performance, discharge, etc.),
- Performing inspections, and
- Fulfilling five-year review requirements.

The level of RPM involvement may vary depending on the complexity of the site. Further, the level may decrease over time as the States or PRPs demonstrate their capabilities to carry out the work.

Reporting Requirements during O&M

The State or PRP should submit reports on O&M activities to EPA on a routine basis. For a Fund-lead remedy, the State and EPA should agree on reporting requirements and incorporate O&M documents that define those requirements into the SSC or CA. This includes routine reports and special reports (described below). Reporting requirements for a PRP-lead remedy, as described in the O&M Manual and other O&M documents, should be made part of the CD. EPA should review the reports on an ongoing basis.

Because the due dates of the deliverables from the States/PRPs may vary over time (quarterly, yearly, or even longer), it is suggested that a tracking system be developed so that the RPM would be notified of an impending report as well as the action taken as a result of EPA's review. This is particularly critical given that RPMs will change over time and the level of activity at a site during O&M should be much reduced compared to the construction phase.

Routine Reports

Routine reports summarizing O&M activities should be prepared by the State or the PRP and submitted to the RPM. Typically, the frequency of reporting is greater at the start of O&M (e.g, quarterly) and reduced (e.g., semi-annually) as the States or PRPs demonstrate capabilities. Routine reports should include sections on data collection, summary of sampling results, discharge and emissions calculations, results from routine inspections, listing of major repairs and equipment change outs, breakdown of actual costs for the reporting period, budget for the next reporting period, regular updates of the O&M Manual and as-builts, community complaints and responses, and verification of the integrity of institutional controls.

Special Reports

O&M safety, contingency, and emergency plans should include provisions for responding to and reporting accidents involving site personnel, operating emergencies, and other unusual events such as fires, floods, or weather damage. The terms of the SSC or CA for a Fund-lead remedy, or the CD for a PRP-lead remedy, should require that these special reports be made available to EPA and other interested parties in a timely manner.

Troubleshooting during O&M

If a constructed remedy experiences problems during O&M, the level of EPA involvement is dependent upon the cause. Possible causes include:

- Latent design or construction defect;
- Insufficient or improper maintenance of the remedy during the O&M period;
- Cleanup levels that cannot be achieved with existing technology;
- Equipment life expectancy that has been exceeded; and
- Acts of nature (e.g., earthquakes, floods, hurricanes).

For a Fund-lead remedy, if the remedy experiences problems resulting from the design or construction, EPA may require the designer or construction contractor to repair the remedy or provide restitution in some manner. If the remedy failure is due to inadequate performance of O&M by the State or PRP, then they are responsible for the appropriate corrective action. If the equipment life expectancy has been exceeded, then the State or PRP should make the necessary changes as part of their O&M obligation.

There is always a risk that an act of nature could damage the remedy. In areas prone to earthquakes or floods, measures should have been taken in the design and construction process to minimize potential future damage. If the remedy is damaged by some sort of natural disaster, then the State or PRP should be prepared to make the necessary repairs. If the area has been declared a disaster under the Stafford Act, then Federal disaster funds may be available.

EPA Inspections during O&M

On-site inspections (both routine and unannounced) are a part of RPM oversight responsibilities. During a site inspection, the RPM should observe the general condition of the remedy and note any signs of disrepair or improper maintenance. Basic conditions, such as functioning lights and doors and well-kept grounds, may reflect a well-maintained and effective remedy. The RPM should review on-site records and reports for compliance with other requirements. For example, the RPM should ensure that operating logs, as well as discharge (air and water) reports and sampling reports, are maintained and up to date. The O&M Manual, O&M Plan and the site-specific health and safety plan should be examined to ensure that they are complete and up to date. The *Comprehensive Five-Year Review Guidance* contains a detailed site inspection checklist.

Five-Year Reviews

For sites undergoing five-year reviews, the routine and special reports submitted to EPA throughout the O&M period may be useful information to have in evaluating the remedy. These reports may assist the RPM in considering the adequacy of O&M, the frequency of repairs, trends in monitoring data, costs at the site, and how these factors relate to determining protectiveness of the remedy.

The RPM may also find annual O&M budget reports useful for analyzing O&M activities and costs. For example, the magnitude of O&M activities performed may increase unexpectedly over time or may be significantly lower than had been estimated at the time of remedy selection. The RPM can consider whether the increased cost and effort were necessary to ensure that the remedy is functioning properly, whether it was in response to deteriorating facilities, or whether a pattern of decreased activity and cost is an early indicator of deteriorating care of the site.

Additional information on the five-year review process can be found in the *Comprehensive Five-Year Review Guidance.*

H. TERMINATION OF O&M

For some remedies, the State or PRP should conduct long-term O&M to preserve the integrity of the remedy. Under certain circumstances (in cases where ground-water restoration has been completed or a Technical Impracticability Waiver is granted), a remedy may be eligible for O&M termination. Prior to the termination of the O&M, EPA approval is required.

I. ADDITIONAL GUIDANCE

Recent documents can be found on *http://www.epa.gov/superfund/pubs.htm.* For copies of older documents, please call the Superfund Document Center, 703-603-9232.

- *Close Out Procedures for National Priorities List Sites*, OSWER Directive 9320.2-09A-P, January 2000, EPA/540/R-98/016.
- *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P, June 2001.
- *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, OSWER Directive 9355.0-75, July 2000, EPA 540-R-00-002.
- *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, OSWER Directive 9355.3-01, October 1988, EPA/540/G-89/004.
- *Guidance for Evaluating the Technical Impracticability of Ground-water Restoration (Interim Final)*, OSWER Directive 9234.2-25, September 1993, EPA/540/R-93/080.
- *A Guide to Selecting Superfund Remedial Actions*, OSWER Directive 9355.027FS, April 1990.
- *Policy on Management of Post-Removal Site Control*, OSWER Directive 9360.2-02, December 3, 1990.
- *Remedial Design/Remedial Action Handbook*, OSWER Directive 9355.0-04B, June 1995, EPA 540/R-95/059, PB95-963307.