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Integrating Water and Waste Programs to Restore Watersheds

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Acknowledgments

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Preface

The concept for the manual came from the January 27, 2004, joint Office of Water and Office of Solid Waste and Emergency Response Division Directors meeting held in Tampa, Florida. Discussion at the meeting indicated that although geographic opportunities exist for water and waste program coordination, a framework was needed to improve collaboration and make it more routine. Division Directors agreed that the first step in developing a framework would be to create a compendium of success stories, and to use these successes to create conceptual collaboration models. The models would be applied to other projects and afford guidance in similar future situations.

To implement the Division Directors agreement, Region VIII was asked to develop a manual for watershed cleanup that would help regional water and waste program managers collaborate in implementing watershed cleanup projects. The manual is based on several regional success stories.

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Executive Summary

The goal of this manual is to enhance coordination across United States Environmental Protection Agency (EPA) waste and water programs to streamline requirements, satisfy multiple objectives, tap into a variety of funding sources, and implement restoration activities more efficiently, showing measurable results. It provides a road map to conducting cross-programmatic watershed assessments and cleanups in watersheds with both EPA water and waste program issues and presents innovative tools to enhance program integration. Water and waste programs typically work independently to accomplish their goals; however, given the overlap in activities and limited resources, it benefits both programs to work together to develop project funding, perform necessary assessments and studies, prioritize projects, conduct cleanups, and monitor results. This manual provides guidance on how to integrate assessment and cleanup activities to optimize available tools and resources and help restore contaminated waters efficiently and effectively.

This manual is targeted primarily at project managers in EPA water and waste programs who are working on assessment or cleanup projects in watersheds contaminated by hazardous materials or waste. This manual complements other watershed assessment, cleanup, and community involvement guidance documents by presenting the authorities, resources, and processes used in hazardous materials and waste contaminated watersheds.

This manual describes the interrelationships between programs and agencies involved in watershed assessment and cleanup and suggests potential opportunities for program integration. It uses case studies to illustrate important points.

Chapter 1 presents a brief background on cleanup programs, elements of a successful watershed cleanup, and the potential roles of the watershed cleanup project manager. The remainder of the document reviews these steps in greater detail to demonstrate how to develop and implement an effective watershed cleanup program.

Chapter 2 lists the primary programs and stakeholders likely to have lead roles in watershed cleanup, and summarizes regulatory roles, authorities, and processes. Identifying programs and agencies with interests in the watershed is essential to the process of building a multiprogram Watershed Cleanup Team with a holistic approach.

Chapter 3 presents the resources available for watershed assessment and cleanup, and includes an expanded list of agencies, programs, and other stakeholders that may be involved in watershed cleanup. Watershed-based cleanups may be accomplished through a variety of funding and other resources available for investigation, cleanup, monitoring, and community involvement. This chapter specifically addresses applicability of funds, accessing the funds, and project requirements for using the funds. It also discusses nonfinancial resources available through government and nongovernmental agencies, such as scientific resources, contracting resources, facility and staffing resources, and analytical resources.

Chapter 4 discusses issues related to data integration and watershed assessment. This chapter discusses two primary opportunities for coordination—preliminary data compilation and streamlined collection of additional data. ***The Comprehensive Preliminary Watershed Assessment*** is presented as a tool for preliminary data compilation. This tool focuses the efforts of the Watershed Cleanup Team on the most important watershed issues and helps identify the primary stakeholders and watershed cleanup goals. It is an effective tool that will help project managers understand watershed conditions and develop a preliminary watershed conceptual model.

Streamlining watershed assessment involves coordinated and collaborative data collection. To ensure that all opportunities for integration are utilized to save resources while reducing the waste of duplicative sampling efforts, coordinated assessment activities are performed independently by programs, agencies, and stakeholders. The sampling and analysis plans (SAPs), which include the field sampling plan (FSP) and the quality assurance project plan (QAPP), are reviewed by the Watershed Cleanup Team in advance. Collaborative assessment is conducted when Watershed Cleanup Team partners combine efforts to perform additional assessment and sampling. Collaborative assessment requires development of a common approach and consistent methods that consider the multiple programs involved.

To integrate data compilation and collection, managers must consider the data requirements of the various programs. Chapter 4 presents issues that involve compilation of existing data and the collection of additional data, such as data quality, data evaluation, data management, and the benchmarks against which the data are compared. It also presents the Triad approach to sampling used by several EPA programs. To provide personnel from different programs with an understanding of other program efforts, the chapter ends with a summary of typical program-specific assessment procedures and requirements.

Chapter 5 discusses integrated watershed cleanup topics such as the ***Watershed Feasibility Assessment, "Three-Rs" approach***, Superfund-Restoration integration, total maximum daily load (TMDL)-Restoration integration using point source trading, Supplemental Environmental Projects, and Watershed Cleanup Team task assignments. It also discusses integrated monitoring. The chapter continues with a summary of program requirements for determining remediation and restoration actions and for long-term monitoring of watershed conditions. It concludes with additional topics that managers must consider in watershed cleanup such as wetlands and other applicable or relevant and appropriate requirements (ARARs).

This document proposes that federal and state programs and local watershed groups use the ***Watershed Feasibility Assessment (WFA)*** to review and prioritize cross-programmatic cleanup opportunities. The WFA provides critical information regarding significant point and nonpoint sources that have been identified and quantifies their associated loads to surface water. The analysis suggests potential remediation alternatives and assigns costs associated with specific load reductions. The WFA may not fulfill all the requirements of the various programs (such as a Superfund Feasibility Study (FS), Engineering Evaluation/Cost Analysis (EE/CA), or TMDL Load Allocations), but it would provide the framework for these documents. To facilitate cleanup at each individual location, managers would perform fine-tuned assessment and design in subsequent steps according to specific program requirements.

The ***"Three-Rs"*** are remediation, restoration, and reuse. The Watershed Cleanup Team should cooperatively set remediation, restoration, and reuse goals and ensure the goals are met by project implementation by using applicable authorities and available funding mechanisms.

In summary, coordinating the efforts of agencies and programs yields significant opportunities for streamlining and reducing the final cost of watershed cleanup, restoration, and redevelopment, resulting in cleaner watersheds for beneficial use.

List of Acronyms

AEA ..... *Atomic Energy Act*
AMD ..... *Acid Mine Drainage*
AML ..... *Abandoned Mine Land*
ARARs ..... *Applicable or Relevant and Appropriate Requirements*
ATSDR ..... *Agency for Toxic Substances and Disease Registry*
BEDI ..... *Brownfields Economic Development Initiative*
BFPP ..... *Bona Fide Prospective Purchaser*
BEACH ..... *Beaches Environmental Assessment Closure and Health*
BIA ..... *Bureau of Indian Affairs*
BLM ..... *Bureau of Land Management*
BMPs ..... *Best Management Practices*
BOD ..... *Biological Oxygen Demand*
BOM ..... *Bureau of Mines*
BOR ..... *Bureau of Reclamation*
BTAG ..... *Biological Technical Assistance Group*
CAA ..... *Clean Air Act*
CARE ..... *Community Action for a Renewed Environment*
CCC ..... *Commodity Credit Corporation*
CERCLA ..... *Comprehensive Environmental Response, Compensation, and Liability Act*
CERCLIS ..... *CERCLA Information System*
CFP ..... *Consolidated Funding Process*
CLP ..... *EPA Contract Laboratory Program*
CLU-IN ..... *Clean-Up Information*
CMI ..... *Corrective Measures Implementation*
CMS ..... *Corrective Measures Study*
CRDL ..... *Contract Required Detection Limit*
CRP ..... *Conservation Reserve Program*
CRQL ..... *Contract Required Quantitation Limit*
CSP ..... *Conservation Security Program*
CTIC ..... *Conservation Technology Information Center*
CWA ..... *Clean Water Act*
CWI ..... *Clean Water Initiative*
CWRP ..... *Corporate Wetlands Restoration Partnership*
DOC ..... *Department of Commerce*
DoD ..... *Department of Defense*
DOE ..... *Department of Energy*
DOI ..... *Department of Interior*

DQA.....*Data Quality Assessment*
DQI.....*Data Quality Indicators*
DQO.....*Data Quality Objectives*
ECARP.....*Environmental Conservation Acreage Reserve Program*
EE/CA.....*Engineering Evaluation/Cost Analysis*
EFC.....*Environmental Finance Center*
EJ.....*Environmental Justice*
EPA.....*U.S. Environmental Protection Agency*
EPIC.....*Environmental Photographic Interpretation Center*
EQIP.....*Environmental Quality Incentives Program*
ERAMS.....*Environmental Radiation Ambient Monitoring System*
ERRS.....*Emergency and Rapid Response Services*
ERT.....*Environmental Response Team*
ESA.....*Endangered Species Act*
ESAT.....*Environmental Services Assistance Team*
ESD.....*Explanation of Significant Differences*
FIFRA.....*Federal Insecticide, Fungicide, and Rodentcide Act*
FISRWG.....*Federal Interagency Stream Restoration Working Group*
FLM.....*Federal Land Management Agency*
FRP.....*Federal Response Plan*
FSA.....*Farm Service Agency*
FSP.....*Field Sampling Plan*
FWPCA.....*Federal Water Pollution Control Act*
GIS.....*Geographic Information System*
GPS.....*Global Positioning System*
GRTS.....*Grants Reporting and Tracking System*
HABS.....*Historic American Building Survey*
HAER.....*Historic American Engineering Record*
HEP.....*Habitat Evaluation Procedures*
HRS.....*Hazard Ranking System*
HSI.....*Habitat Suitability Indices*
HUD.....*Housing and Urban Development*
LERRDs.....*Lands, Easements, Rights-of-way, Relocations, and Disposal Sites*
LWOG.....*Left Hand Watershed Oversight Group*
MCL.....*Maximum Contaminant Level*
MCLG.....*Maximum Contaminant Level Goal*
MDN.....*Mercury Deposition Network*
MNR.....*Monitored Natural Recovery*
MOA.....*Memorandum of Agreement*
MOS.....*Margin of Safety*
MOU.....*Memorandum of Understanding*
MS4.....*Municipal Separate Storm Sewer System*
NAD.....*National Assessment Database*
NAGPRA.....*Native American Graves and Repatriation Act*
NASQAN.....*National Stream Quality Accounting Network*
NAWQA.....*National Water Quality Assessment*
NCP.....*National Oil and Hazardous Substances Pollution Contingency Plan*
NEPA.....*National Environmental Policy Act*

NFS .....*National Forest Service*
NFWF .....*National Fish and Wildlife Foundation*
NHD .....*National Hydrography Dataset*
NLFWA .....*National Listing of Fish and Wildlife Advisories*
NOAA .....*National Oceanic and Atmospheric Administration*
NOx.....*Nitrogen Oxides*
NPDES.....*National Pollutant Discharge Elimination System*
NPL .....*National Priorities List*
NPS .....*Nonpoint Source*
NRCS.....*Natural Resources Conservation Service*
NRDA.....*National Resources Damage Assessment*
NTCRA.....*Non-Time Critical Removal Action*
NTTS .....*National Total Maximum Daily Load Tracking System*
NWIS.....*National Water Information System*
O&M.....*Operations and Maintenance*
OPA .....*Oil Pollution Act of 1990*
ORD.....*EPA Office of Research and Development*
OSC.....*On-Scene Coordinator*
OSM .....*Office of Surface Mining*
OSRTI.....*Office of Superfund Remediation and Technology Innovation*
OSWER.....*Office of Solid Waste and Emergency Response*
OU.....*Operable Unit*
PA.....*Preliminary Assessment*
PCS.....*Permit Compliance System*
PRGs.....*Preliminary Remediation Goals*
PRP.....*Potentially Responsible Party*
QAPP.....*Quality Assurance Project Plan*
QA/QC.....*Quality Assurance/Quality Control*
RA .....*Remedial Action*
RACs.....*Response Action Contracts*
RAMS .....*Restoration of Abandoned Mine Sites*
RAS .....*Routine Analytical Services*
RBCs.....*Risk Based Concentrations*
RCRA.....*Resource Conservation and Recovery Act*
RD .....*Remedial Design*
REAC.....*Response Engineering and Analytical Contract*
RFA.....*RCRA Facility Assessment*
RFI.....*RCRA Facility Investigation*
RGI.....*Regional Geographic Initiative*
RI/FS.....*Remedial Investigation/Feasibility Study*
RNRF.....*Renewable Natural Resources Foundation*
ROD.....*Record of Decision*
RPM.....*Remedial Project Manager, also Regional Project Managers*
RTDF .....*Remediation Technologies Development Forum*
SAP.....*Sampling and Analysis Plan*
SARA.....*Superfund Amendments and Reauthorization Act of 1986*
SAS .....*Special Analytical Services*
SCDM.....*Superfund Chemical Data Matrix*

SDWA ..... *Safe Drinking Water Act*
SDWIS ..... *Safe Drinking Water Information System*
SEP ..... *Supplemental Environmental Project*
SI ..... *Site Inspection*
SMIC ..... *Surface Water and Water Quality Models Information Clearinghouse*
SRF ..... *State Revolving Fund*
SRI ..... *Superfund Redevelopment Initiative*
SSAs ..... *Site-Specific Assessments*
SSLs ..... *Soil Screening Levels*
SSRC ..... *Superfund Sediment Resource Center*
START ..... *Superfund Technical Assessment and Response Team*
STORET ..... *Storage and Retrieval of Water-Related Data*
SWP ..... *Source Water Protection*
SWPPP ..... *Stormwater Pollution Prevention Plan*
TAC ..... *Toxics Advisory Committee*
TAG ..... *Technical Assistance Grant*
TBA ..... *Targeted Brownfields Assessments*
TCRA ..... *Time Critical Removal Action*
TMDL ..... *Total Maximum Daily Load*
TRI ..... *Toxics Release Inventory*
TOSC ..... *Technical Outreach Services for Communities*
TSC ..... *Technical Support Center*
TSCA ..... *Toxic Substances Control Act*
TSDF ..... *Treatment, Storage, and Disposal Facilities*
TSS ..... *Total Suspended Solids*
UAA ..... *Use Attainability Analyses*
UIC ..... *Underground Injection Control*
UPA ..... *Unified Phase Assessment*
USACE ..... *U.S. Army Corps of Engineers*
USCG ..... *U.S. Coast Guard*
USDA ..... *U.S. Department of Agriculture*
USFS ..... *U.S. Forest Service*
USFWS ..... *U.S. Fish and Wildlife Service*
USGS ..... *U.S. Geological Survey*
UST ..... *Underground Storage Tank*
VCP ..... *Voluntary Cleanup Program*
VOC ..... *Volatile Organic Compound*
WATERS ..... *Watershed Assessment, Tracking, and Environmental Results*
WFA ..... *Watershed Feasibility Assessment*
WLA ..... *Wasteload Allocation*
WPS ..... *West Page Swamp*
WQBELS ..... *Water Quality-Based Effluent Limits*
WQS ..... *Water Quality Standards*
WQSDB ..... *Water Quality Standards Database*
WQX ..... *Water Quality Exchange*

Introduction

Purpose

The purpose of this manual is to help the EPA better integrate assessment and cleanup activities when addressing the unique challenges presented by contaminated watersheds. This manual will help staff make the best use of the resources and authorities offered by EPA's existing waste and water programs. The contamination in a watershed typically comes from many sources, differing geographically and over time. Although many federal and state programs address such contamination, they often operate independently and with little interaction. EPA's principal regulatory programs that control ongoing source activity—the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), and the Clean Air Act (CAA)—are media-centric, as are most states' delegated versions of those programs. EPA's response programs for addressing past contamination—principally the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Oil Pollution Act (OPA)—are project-specific and often consult with their regulatory counterparts only at discrete points in the cleanup process as required by regulations. These communication and coordination difficulties can be especially acute when trying to clean up a contaminated watershed, whose sources often include ongoing point source and nonpoint source discharges as well as historical disposal activities. Moreover, the cleanup of contaminated watersheds typically involves many stakeholders, including private and commercial interests, various federal and state government agencies acting in their roles as land managers or trustees as well as regulators, and local land use planning and redevelopment authorities.

The goal of this manual is to draw together the many resources within EPA's varied programs and to describe ways to integrate the use of available tools and resources. EPA believes this approach will result in more efficient and effective cleanup and restoration of contaminated watersheds.

Target Audience

This manual is targeted primarily at project managers in EPA water and waste programs who are working on assessment or cleanup projects in watersheds contaminated by hazardous substances (broadly defined). The manual is intended to complement and summarize other watershed assessment, cleanup and community involvement guidance documents, not to replace them.

Organization

This manual describes the interrelationships between programs and agencies involved in watershed assessment and cleanup, and it suggests potential opportunities for program integration. This introductory chapter presents a brief background on cleanup programs, elements of a successful watershed cleanup, and potential roles of the watershed cleanup project manager. The remainder of the document reviews each step in greater detail to show how to develop and implement an effective watershed cleanup program. Chapter 2 lists the programs and stakeholders likely to have lead roles in watershed cleanup and summarizes regulatory roles, authorities, and processes. Chapter 3 presents the resources available for watershed assessment and cleanup; it also includes an expanded list of agencies, programs, and other stakeholders that might be involved in a watershed cleanup. A summary of the resources and their applicability is provided in a table at the end of the chapter. Chapters 4 and 5 summarize the assessment and cleanup studies performed, processes used, and approaches applied by each of the major EPA and state programs and point out opportunities for integration. Two tools, the Comprehensive Preliminary Watershed Assessment and the Watershed Feasibility Assessment, are explained in Chapters 4 and 5, respectively, to help managers who might develop the watershed conceptual model and the watershed cleanup plan. Case studies are interspersed throughout the manual to highlight key concepts. For example, the Left Hand Watershed case study at the end of Chapter 2 demonstrates a multi-programmatic approach to watershed cleanup during the assessment, cleanup, and funding stages.

Federal Programs that Address Water Body Contamination

(See Chapters 2 and 3)

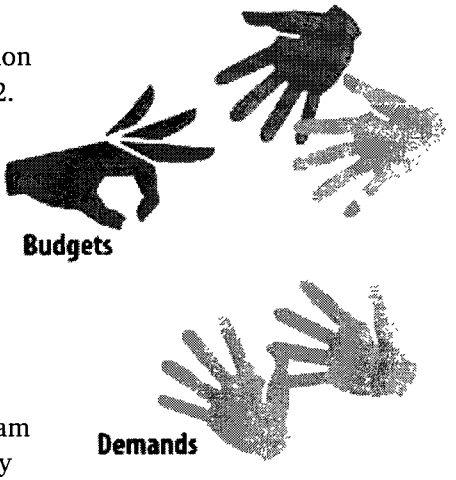
- Water Quality Monitoring and Assessment
- National Pollutant Discharge Elimination System (NPDES) Program
- TMDL Program
- CWA Section 404 Dredge and Fill
- Nonpoint Source Grants
- Source Water Protection
- Superfund
- Brownfields
- RCRA
- Abandoned Mine Lands
- Farm Bill
- Natural Resource Damage Assessment (NRDA)

Background

Over the past 30 years the country has made great strides toward reducing the amount of pollution in our waters through regulatory controls and improved wastewater treatment. Many of our waterways, however, are still contaminated as a result of ongoing industrial activities, polluted runoff, and the remains from historical disposal activities. In addition, the time frames associated with cleanup at some contaminated sites span decades, hampering the overall success of watershed restoration. Specific water and waste programs often become involved in a watershed on a sequential or location-specific basis rather than following a coordinated approach. This lack of integration can waste resources and lead to conflicting site-specific results in a watershed that are difficult to redress after a particular agency decision is reached, such as issuance of a CERCLA record of decision (ROD) or finalization of a TMDL. For example, conflict might occur if one regulatory program office uses water quality standards (WQS) to allocate loads in a TMDL within a watershed while another regulatory program office waives WQS when selecting a site remedy under CERCLA within the same watershed. Other potential conflicts may arise when trying to appropriately coordinate schedules for taking action to address releases from different sources within a watershed under different regulatory authorities.

Although there are numerous potential pitfalls in attempting to coordinate various programs in a watershed cleanup, agencies can complement and reinforce each other's activities, avoid duplication, and leverage resources to achieve greater results through integration.

Programs that Address Waterbody Contamination



Various federal and state programs address the assessment, cleanup, and restoration of contaminated waterbodies. These programs are discussed in detail in Chapter 2. Because Superfund and RCRA sites are often located in watersheds where TMDLs are being developed, the chapter summarizes three of the most prominent programs: the CERCLA program, the RCRA Corrective Action program, and the TMDL program.

The CERCLA program identifies sites from which hazardous substances, pollutants, or contaminants have been released or have the potential to be released, posing a threat to human health or the environment. If a site has been deemed sufficiently hazardous, it is placed on the National Priorities List (NPL) to receive funding and priority for cleanup. In general, EPA carries out the Superfund program at most Superfund sites, either directly or by supervising work being performed by potentially responsible parties (PRPs). States can have the lead role at sites within their jurisdiction after developing a Superfund Memorandum of Agreement (SMOA), State-Superfund Contract (SSC), and/or a Cooperative Agreement (CA) with EPA. Other federal agencies carry out CERCLA cleanups (using separately appropriated funds) at facilities under their respective jurisdiction, custody, or control.

Accidents or other activities at RCRA treatment, storage, and disposal facilities have sometimes released contamination into soil, ground water, surface water, and air. The RCRA Corrective Action Program allows these facilities to address the investigation and cleanup of such releases themselves, under governmental supervision. The RCRA Corrective Action Program differs from Superfund in that it deals with sites that have viable operators and ongoing operations.

Under the CWA's TMDL Program, states are required to identify waterbodies that do not meet WQS. Such "impaired waterbodies" are placed on the state's 303(d) list. For each waterbody on a state's 303(d) list, the state must calculate how much of a particular pollutant (contributing to the impairment) can enter the waterbody without exceeding the WQS. The calculation is called a TMDL.

If the watershed includes 303(d)-listed waters or has a TMDL, the waste and water programs should be encouraged to work together to ensure that assessment and cleanup activities are coordinated so that the requirements of all the programs are addressed.

Historically, the restoration of contaminated waterbodies has been approached from the perspective of individual federal and state programs. With shrinking budgets and increased demands on our time, we need to approach the cleanup of waterbodies in a holistic and integrated manner, using all the programmatic resources available. In many cases, the data collected to satisfy requirements under one program also can be used to meet requirements under other programs. For example, a tracer study performed to determine contaminant fate and transport for a Remedial Investigation (RI) at an NPL site could also be used to determine contaminant loading for a TMDL. Water quality and flow information used to develop or refine a state WQS could be used to help meet Superfund Site Inspection, RI, Risk Assessment, NRDA, and state water quality assessment requirements if sample collection and analysis procedures are agreed upon in advance. TMDL targets are often used as one of the remediation endpoints for RCRA sites that affect water quality.

Using a Watershed Approach

In the past 15 years, more and more organizations and agencies have moved away from individual efforts and more toward managing water resources using a watershed approach. A watershed approach is a flexible framework for managing water resource quality within specified drainage areas. This approach includes stakeholder involvement and activities supported by sound science

and appropriate technology. The watershed planning and cleanup process works within this framework by following a series of cooperative, iterative steps to assess existing conditions, identify and prioritize problems, develop goals and cleanup strategies, and monitor the effectiveness of cleanup efforts.

Developing a Watershed Management Plan

Use of a watershed approach may begin with the development of a watershed management plan by stakeholder groups receiving Nonpoint Source (CWA section 319) funds. A watershed plan is a strategy that provides assessment and management information for a geographically defined watershed, including the analyses, action, participants, and resources relating to developing and implementing the plan. The watershed activities described in this manual, although similar to watershed plans frequently developed with 319 funds, are focused on watersheds contaminated with hazardous or toxic materials. Efforts to address toxic substances in the watershed might be a subset of a larger watershed management plan and should complement that plan. The Pinellas County case study at the end of this chapter demonstrates multiple agencies cooperating to prepare a watershed management plan.

Elements of an Effective Watershed Cleanup Process

Several elements are essential for successful watershed cleanups. The steps presented in Figure 1-1 and described below apply to most projects. However, when the watershed approach is initiated the extent and importance of the elements are likely to vary depending on the scope, location, and complexity of the problem and the status of any existing program activities in the watershed. Community involvement is encouraged throughout the process and, indeed, is a required part of any CERCLA cleanup or TMDL development. Although, ideally, progress through these steps will be iterative, the key point is to ensure that they are accomplished, drawing on all possible resources available from all the stakeholders.

1. ***Identify driving forces and scale of watershed effort.*** The identification of an affected watershed often begins with a CWA 303(d) or NPL listing. These actions spur public interest and trigger funding support for public and agency involvement. The geographic scale of the project area will vary with the scope of the problem and the location of sources that contribute to the problem. If subwatersheds are designated, an additive approach can be taken to allow integration with downstream subwatersheds. The scale of the effort can also be defined by the impacts that will be addressed. The hydrologically defined geographic area should include all potential sources that may contribute to the impairment of the waterbody.

2. ***Form a Watershed Cleanup Team.*** A variety of stakeholders might play significant roles in the watershed cleanup, including local, state, and federal governments; private corporations; nonprofit organizations; and concerned citizens. Many impaired waterways already have one or more nongovernmental organizations working on restoration activities. A key component of an effective watershed approach is ensuring communication and cooperation among the various community, local, state, and federal stakeholders. The effort can be facilitated by a designated watershed project manager from a waste or water program. The project manager should identify regulatory programs that have potential involvement in assessment or cleanup efforts in the watershed and examine opportunities to coordinate resources in the watershed. Additional stakeholders might be identified later as additional land ownership or regulatory issues arise. The effort should promote a holistic approach in both a programmatic and geographic sense to ensure coordination in establishing and achieving cleanup goals.

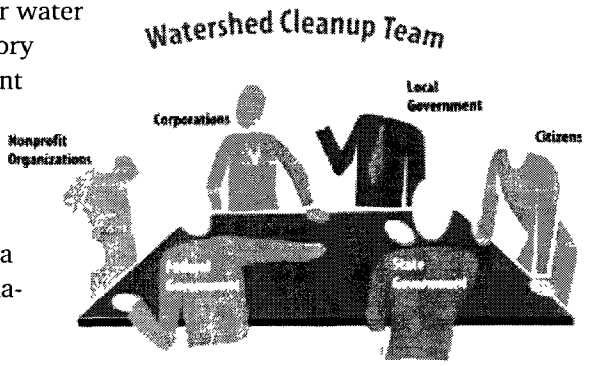
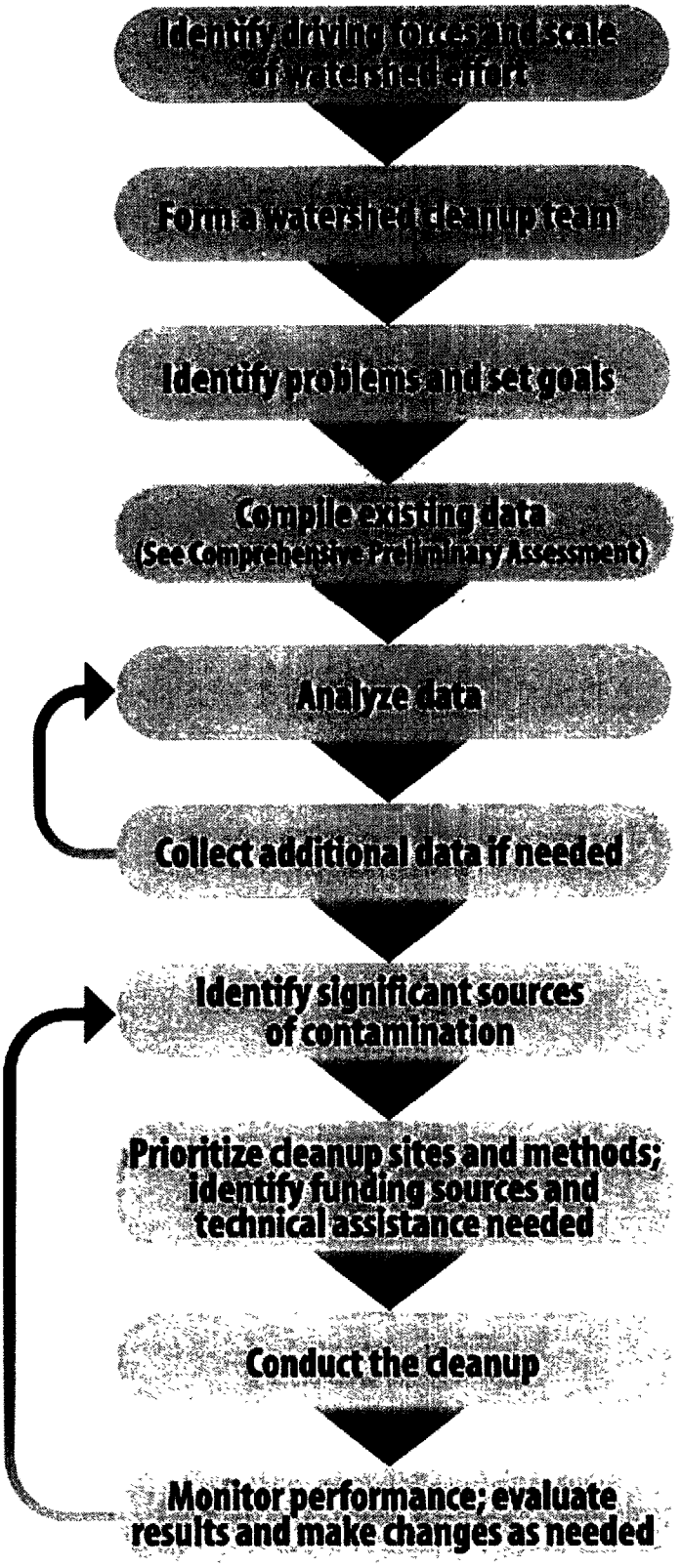


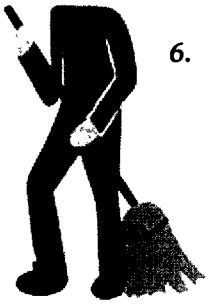
Figure 1-1. Watershed Cleanup Process



3. ***Identify problems and set goals.*** The Watershed Cleanup Team identifies the problems and expected results or outcomes of assessment and cleanup. Each program/stakeholder group will identify its priorities and goals, provide available data, and commit to a level of involvement in the process. Involvement can include in-kind services, contract support, funding, and data acquisition or management; the possibilities should not be limited. The Watershed Cleanup Team establishes common endpoints or, if necessary, agrees to do so on the basis of the findings of additional studies. Often one of the most difficult issues is prioritizing sites for cleanup—a determination that is the product of both regulatory and response program requirements, as well as stakeholder input. Also, a CERCLA removal, a CERCLA remedial action, and a natural resource restoration protection project each might result in a different degree of cleanup because of the respective programs' differing goals. Although some objectives will be unique to specific stakeholders, information gathered as part of work in the watershed should be shared with the stakeholder group and at least summarized for the public, ideally through a regularly updated Web site. (See the discussion of Community Outreach and Involvement below.) This might be a contentious process, but all stakeholder interests should be considered. Recognize that while regulatory agencies typically have responsibilities that must be carried out, any of the stakeholders might suggest ideas for carrying them out creatively.

4. ***Compile existing data.*** To conduct an initial assessment, the watershed cleanup team collects and evaluates all existing water chemistry and flow, sediment, geological, soils, biological, and source data. Special care should be taken to ensure that each stakeholder contributes existing data for use in a watershed-wide database. Often individual members of large organizations, including federal and state agencies as well as large, multi-location businesses, are unaware of all the information resources available to them. In addition to regulatory and water resource allocation agencies, colleges and universities are often an untapped source of information. Data should be compiled so that all participants can access and use it. Issues related to data integration are discussed in Chapter 4. Data should also be validated by field reconnaissance. A useful tool to accomplish preliminary data integration and field validation on a watershed-wide basis is the Comprehensive Preliminary Watershed Assessment, presented in Chapter 4. The assessment may be used to develop a site conceptual model, examples of which are also included in Chapter 4.

5. ***Analyze data.*** On the basis of existing data, the Comprehensive Preliminary Watershed Assessment, data analysis, and the site conceptual model, stakeholders will determine whether additional data are needed and, if so, how they will be collected. Data needs will depend on specific programmatic requirements. The studies conducted for the major assessment and cleanup programs are described in Chapter 4, along with potential opportunities for integration, but participants should also consider additional areas for integration that might apply to the contaminants, watershed, and participants in the specific watershed project. After carefully considering the types of additional data required for each agency or program and evaluating opportunities to consolidate data collection, managers can determine the methods and mechanisms for collecting the data. The data may be collected independently by stakeholders with available authorities and resources (as long as it is collected according to an agreed-upon quality assurance/quality control (QA/QC) plan, as described below), or a collaborative data collection effort may be launched.



6. ***Collect additional data, if needed.*** Identify potential sampling and analysis resources. Such resources can include EPA regional labs, access to existing CERCLA lab contracts, and grants to stakeholders or local universities. For collaborative sampling efforts, a joint SAP should be prepared and agency staff and stakeholders participating in fieldwork should be provided training to ensure that data collection is performed according to Agency protocol. Additional data collection will be determined as additional sources are identified and priorities are set. The process may be iterative. Any agencies collecting data independently of the collaborative efforts should agree to abide by the SAP, or the absence of adherence should be duly noted. In any event, inde-

pendently collected data should be characterized by consistent naming conventions and data format to allow all data to be compiled and shared through a single database.

7. ***Identify significant sources of contamination.*** Determine the significant sources of contamination and the associated contaminant loads on the basis of data from the Comprehensive Preliminary Watershed Assessment and additional data collected. This is part of the TMDL development, but it will also help other participants to prioritize sites. Identification and quantification of all significant sources provides the necessary data to assess the cumulative impacts from the watershed to the impaired waterbody. Identify seasonal variations in loads and loading contributions from the various sources. Identify resources for cleanup priorities and any additional assessments that will be necessary at significant source locations.

8. ***Prioritize cleanup sites and methods.*** The Watershed Cleanup Team identifies priority cleanup sites and potential cleanup alternatives. A tool it can use to evaluate cleanup options and their applicability to various situations is the WFA, described in Chapter 5. Many factors can affect the choice of priority cleanup locations, including contribution to contaminant loading, authority to require cleanup, willingness of property owners to participate, funding mechanisms, complexity of the site, and available technologies. Estimates of load reductions that would result from the cleanup of selected sites require supporting technical analysis demonstrating that the cleanup will attain and maintain the water quality defined by individual program standards.

9. ***Conduct the cleanup.*** Cleanup can be accomplished through CERCLA or RCRA actions, voluntary cleanups, Brownfields cleanups, implementation of NPDES permits or best management practices (BMPs), or any other available methods. Each of these cleanup methods typically requires the participation of the affected site owner and other potentially responsible parties (PRP), voluntarily or pursuant to an enforcement action. In addition, EPA might have resources to fund CERCLA cleanups, to facilitate brownfields cleanups, and to otherwise aid the effort. To avoid potential conflicts that may arise when trying to coordinate schedules and appropriate levels of cleanup for taking action to address releases from different sources within a watershed under different regulatory authorities, a document may be developed in which stakeholders delineate a clear process and line of authority for managing cleanup actions. The document need not itself be legally binding, but can reference regulations or other agreements.

10. ***Monitor performance.*** The watershed project manager develops a monitoring plan to determine the effectiveness of the implementation/cleanup actions and determine whether load reductions are being achieved and endpoints met. Effective long-term monitoring should include parameters of interest to all stakeholders and may include involvement of federal, state, tribal and local agencies; community groups; volunteer organizations; and educational institutions.

Community Outreach/Involvement

Although the stakeholders should represent a cross section of the community or communities affected by the watershed cleanup, the Watershed Cleanup Team will likely need to communicate directly with those affected by its work. CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require extensive outreach to affected communities, and cleanups proposed at NPL sites must be presented to the public for their review and comment. EPA has issued several useful guidance documents supporting such activities, including the Superfund Community Involvement Handbook, **www.epa.gov/publicinvolvement/involvework.htm**. EPA is developing an additional resource for creating and operating a Watershed Cleanup Team, *Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters,* EPA 841-B-05-005, October 2005. **http://www.epa.gov/owow/nps/watershed_handbook/**

Role of the Watershed Project Manager

The project manager is responsible for forming the Watershed Cleanup Team or interacting with the group in a manner that will allow programs, agencies, and communities to work together. The level of effort required and specific tasks will vary significantly depending on the size and complexity of the project and the number of participating agencies and stakeholders. Initial tasks the project manager may perform or arrange include the following:

- Identify stakeholders
- Initiate contact with all relevant stakeholders for the purpose of getting project buy-in
- Inform stakeholders of ten-step process
- Prepare an initial problem statement and maps summarizing existing data for use at the initial stakeholder meeting
- Identify potential funding for stakeholder groups and assist in funding acquisition, as necessary
- Continue communication with all participants throughout the process
- Organize and arrange meetings
- Prepare information sheets for use throughout the project, including a draft information sheet for use by participants in enlisting support for watershed cleanup efforts
- Prepare Preliminary Comprehensive Watershed Assessment
- Prepare statements of work for grants and contractors

If the Watershed Cleanup Team determines that a consolidated sampling effort will be conducted, the project manager might also perform or arrange for the following tasks:

- Perform initial site reconnaissance
- Prepare SAP
- Identify sampling locations
- Organize sampling responsibilities
- Arrange for training on sampling and sample-handling methods
- Develop maps showing sampling sites, potential sources, and waterbody names and points of access to sampling sites
- Use Global Positioning System (GPS) technology to identify sampling sites
- Facilitate agreement on sampling methods, analytes, timing, and priorities
- Enlist assistance with field support, funding support, and public participation support
- Enlist regional, state, or contract laboratory support
- Synchronize sampling events
- Arrange multi-program/multi-agency sampling teams
- Review and assess sampling results, and provide data summaries

Identifying Priority Watersheds

Cross-coordination between waste and water programs on individual waterbodies and in watersheds should be examined for all sites that have the potential to involve multiple programs. Often determinations are made in the EPA regions to focus significant resources on certain "priority watersheds." Numerous environmental and human health factors should be considered in the process of determining which watersheds will be designated as "priorities." Water quality is clearly an

important consideration, but so are soil contamination, pesticide runoff, endangered species, loss of wetlands, miles of impaired streams, air pollution deposition, wildlife impacts, natural vegetation impacts, human health concerns, and many other factors. The second case study in this chapter presents Oregon's prioritization of its 303(d) list of impaired waters for TMDL development, which takes into account the severity of the pollution and the uses to be made of such waters.

CASE STUDY

Developing a Watershed Management Plan

Cross Bayou Watershed, Pinellas County, Florida

Multiple stakeholders are preparing a watershed management plan for the Cross Bayou watershed in Pinellas County, the most densely populated county in Florida.

Background

The overall watershed management plan will address flooding, erosion, sedimentation, and stormwater pollution in the watershed through management strategies that identify and address sensitive and degraded uplands, wetland and open-water habitats, and sources of known or potential contamination. The plan will focus on the 10.5-mile-long Cross Bayou Canal, which has very poor water quality relative to other waterbodies in Pinellas County.

Hundreds of regulated sites within the pilot target area affect water quality in the Cross Bayou Canal and across the watershed. Pinellas County has created an inventory of sites of concern within the area. The County is establishing a brownfields program as the Cross Bayou watershed management plan is developed. The primary goal of the pilot is to integrate and implement Brownfields, One Cleanup, and Land Revitalization principles within the watershed area.

The watershed management plan's objectives and the wide diversity of the federal, state, and local partnership involved in the Watershed Management Taskforce provide an optimum framework for a successful One Cleanup/Land Revitalization pilot project.

Stakeholders

EPA programs involved in the area-wide pilot include the One Cleanup and Land Revitalization, Brownfields, Underground Storage Tank, RCRA, CERCLA, Federal Facilities, Pollution Prevention, Watershed Management, NPDES, Nonpoint Source, Smart Growth, and National Estuary programs. Other federal partners include the National Oceanic and Atmospheric Administration (NOAA), Department of Energy (DOE), Army Corps of Engineers (USACE), U.S. Geological Survey (USGS), Federal Aviation Administration, U.S. Coast Guard, and federal brownfields partners. Partners within the Florida Department of Environmental Protection include the Brownfields, Underground Storage Tank (UST), RCRA, CERCLA, Federal Facilities, Waste Cleanup, and Water Quality Programs. The Florida Fish and Wildlife Conservation Commission also is a partner. Regional partners include the Southwest Florida Water Management District and Tampa Bay National Estuary Program. Local government partners include Pinellas County at the head of the Watershed Management Taskforce and the cities of Pinellas Park, Largo and Seminole. Stakeholder involvement of local citizens and businesses will be covered by the Citizens Advisory Committee to the Watershed Management Taskforce.

(continued)

Cross Bayou Watershed, Pinellas County, Florida

Key Activities

The pilot project will coordinate water quality improvements with cleanup and redevelopment priorities.

- The watershed management plan will provide information online to the public about regulated sites in the watershed. Detailed information on sites that are remediated under the watershed management plan and pilot project will be provided through GIS and Web-based applications.
- The nexus of environmental cleanup and water quality assurance under the pilot project provides opportunities for federal and state regulators to integrate cross-program performance measures and results.
- Brownfields and other underutilized properties will be evaluated for productive reuse, including evaluation for inclusion in the implementation strategy for the Cross Bayou watershed management plan.

Criteria Used to Identify Priority Watersheds for Cleanup

State of Oregon

Background

Oregon developed a list of criteria to help prioritize its 303(d) list of impaired waters for TMDL development. The four levels of priority take into account the severity of the pollution and the anticipated uses for each waterbody.

Priority 1

- ***Endangered Fish Species:*** Spawning and rearing water bodies for federally listed threatened or endangered species or species addressed under the Oregon Plan.
  - ***Parameters of Concern:*** Biological criteria, dissolved oxygen, flow modification, habitat modification, pH, sedimentation, temperature, total dissolved gas, toxics, turbidity
- ***Health Advisories:*** Streams and lakes where the Oregon Health Division has issued a fish consumption advisory.
  - ***Parameters of Concern:*** Toxics (tissue)
- ***Drinking Water:*** Public and private domestic water supply where standard pretreatment technology (filtration and disinfection) is inadequate to meet drinking standards.
  - ***Parameters of Concern:*** Total dissolved solids, toxics (water column)

Priority 2

- ***Candidate Fish Species:*** Spawning and rearing waterbodies for fish species that are candidates or proposed for federal listing as threatened or endangered species or listed as critical on the Oregon sensitive species list.
  - ***Parameters of Concern:*** Biological criteria, dissolved oxygen, flow modification, habitat modification, pH, sedimentation, temperature, total dissolved gas, toxics, turbidity

State of Oregon

- ***Shellfish:*** Waterbodies that experience periodic closures for not meeting standards for shellfish growing waters.
  - ***Parameters of Concern:*** bacteria, toxics
- ***Water Contact Recreation:*** Waterbodies that experience chronic dry weather exceedances that correspond with higher recreational usage (generally June through September).
  - ***Parameters of Concern:*** Bacteria

Priority 3

- ***Salmonid habitat:*** Waterbodies designated for salmonid spawning and rearing that do not meet appropriate water quality standards.
  - ***Parameters of Concern:*** Biological criteria, dissolved oxygen, flow modification, habitat modification, pH, sedimentation, temperature, total dissolved gas, toxics, turbidity
- ***Water Contact Recreation:*** Waterbodies that experience chronic wet weather exceedances that correspond with lower recreational usage (generally October through May) or non-health-related (aesthetic) concerns.
  - ***Parameters of Concern:*** Bacteria, aquatic weeds or algae, chlorophyll *a*, nutrients, turbidity
- ***Wild and Scenic Rivers and State Scenic Waterways:*** Federally- or state-designated wild and scenic waters not meeting water quality standards that relate to aesthetics or other recreational water use.
  - ***Parameters of Concern:*** Aquatic weeds or algae, chlorophyll *a*, nutrients, turbidity
- ***Industrial Water Supply:*** Waters designated for industrial water supply where standard pretreatment technology is inadequate to meet standards.
  - ***Parameters of Concern:*** Total dissolved solids, turbidity

Priority 4

- ***Livestock Watering:*** Waters designated for livestock watering that do not meet appropriate water quality standards.
  - ***Parameters of Concern:*** Chlorophyll *a* or algae
- ***Other Resident Fish and Aquatic Life:*** Waterbodies not designated for salmonid spawning and rearing that do not meet appropriate water quality standards
  - ***Parameters of Concern:*** biological criteria, dissolved oxygen, flow modification, habitat modification, pH, sedimentation, temperature, total dissolved gas, toxics, turbidity
- ***Aesthetics:*** Other waters (not federally- or state-designated wild and scenic waters) not meeting water quality standards that relate to aesthetics or other recreational water use.
  - ***Parameters of Concern:*** Aquatic weeds or algae, chlorophyll *a*, nutrients, turbidity

Regulatory Authorities and Stakeholders

Federal, state and local environmental agencies often have an interest in site assessment and cleanup and may be able to contribute to the watershed remediation process. This chapter describes the potential roles, authorities, and interests of each of these agencies. The level of participation of a program will vary from project to project. The watershed project manager should ensure that respective parties' roles in a specific watershed project are discussed and identified at the initial meetings, while allowing for adjustment during subsequent meetings according to the projects. This chapter describes the agencies that operate under major environmental authorities, and then describes other stakeholders and the roles each may play in watershed investigation and cleanup. Additional entities that may provide resources for watershed cleanup are described in Chapter 3.

Watershed Cleanup Team

Coordination starts by identifying Watershed Cleanup Team participants that have a regulatory, financial, trustee/land manager, aesthetic, or other interest in watershed cleanup. Typical participants include:

- U.S. Department of Agriculture (USDA)
- U.S. Forest Service (USFS)
- U.S. Department of Interior (DOI)
  - Bureau of Land Management (BLM)
  - Bureau of Indian Affairs (BIA)
- USGS
- U.S. Fish and Wildlife Service (USFWS)
- National Park Service
- Office of Surface Mining (OSM)
- USACE
- State environment and health departments
- Community action groups
- Water allocation and other cross jurisdictional agencies (e.g., port authorities)
- County/local health/environmental departments
- Local and regional land use planning agencies
- Soil conservation districts
- Industry, landowners, and educational institutions

The potential roles of these agencies and stakeholders are described below. For the purposes of this manual, "communities" is used to refer to municipalities and related local agencies and established stakeholder groups. Additional information describing these groups can be found at the end of this chapter.

The authorities under which these participants may act include:

- EPA and state Superfund programs (Preliminary Assessment (PA)/Site Inspection (SI), Removal, and Remedial programs)
- EPA and state RCRA Programs
- EPA and state Clean Water Act Programs (NPDES, Nonpoint Source, TMDL)
- EPA and state Clean Air Programs
- EPA Toxic Substances Control Act (TSCA) program
- EPA Pesticide and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) programs
- EPA and state Safe Drinking Water Act (SDWA) programs
- EPA's Brownfields Program
- Natural Resource Trustees (Natural Resource Damage Assessment and Restoration)

Regulatory Authorities

Introduction

Depending on watershed location, contaminants, land use and ownership, and the type of resources impacted, a variety of regulatory and response authorities may be used to conduct studies, force cleanup actions, facilitate public participation, and otherwise contribute to cleanup of watersheds contaminated with hazardous substances and wastes. Sometimes, state and federal agencies are empowered to act within the same regulatory framework. This section describes regulatory and response authorities, and the agencies and programs tasked with those authorities. Table 2-1 summarizes the benefits and contributions of programs in cross-programmatic watershed cleanup. Figure 2-1 provides a visual presentation of how the primary watershed cleanup programs fit together. For brevity, these descriptions use the term "states" for roles that may also be filled by tribes and territories, as applicable.

When considering the various regulatory and response programs, several of their common, as well as distinguishing, characteristics should be kept in mind by the watershed team as it looks for the best cleanup strategy. For example, some programs such as the CWA and RCRA are primarily (but not exclusively) regulatory programs. They apply most easily to facilities (and categories of industry) with ongoing business operations, and impose a detailed set of regulations that are carried out in part in a required operating permit. Other programs, such as CERCLA, authorize actions that respond to discrete environmental contamination wherever it is located and regardless of whether it comes from one or many different sources. While the CERCLA program looks first to enforcement mechanisms in carrying out its mission, it does include resources that can fund cleanups where liable parties are (at least initially) unwilling to participate or cannot be found. Under some CWA and RCRA programs (as well as the

gure 2-1. Program Flow Chart

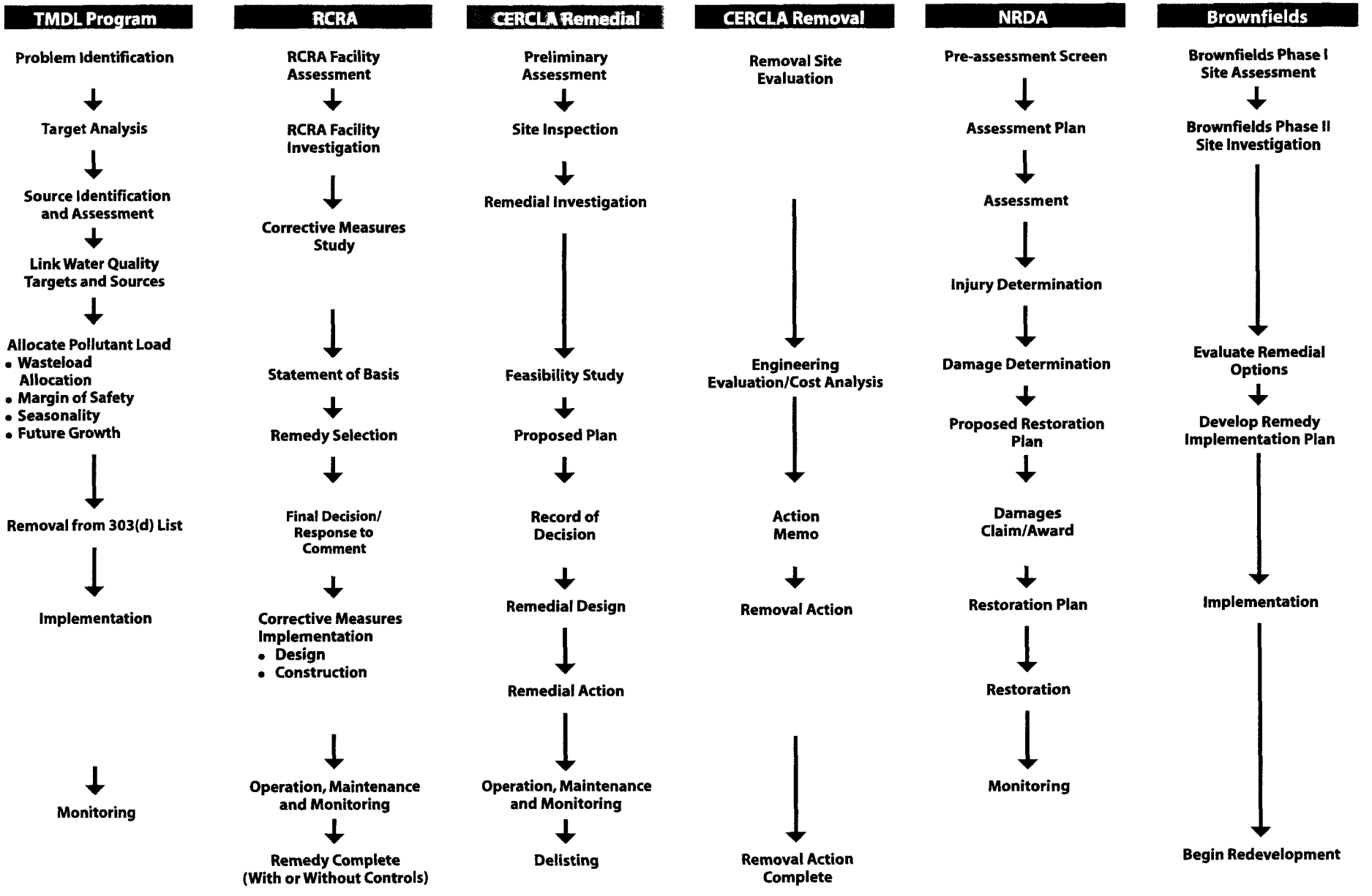


Table 2-1. EPA Programs Using a Watershed Approach

Program Contributions	Program Benefits
WATER PROGRAMS	
Water Quality Standards Program	
Provides water quality goals for specific water bodies in the watershed Provides designated water uses and water quality criteria to protect the uses, for each waterbody Provides state/tribal antidegradation policy	Standards provide specific goals for watershed planning Standards can be adapted to reflect holistic, watershed approach States/tribes must consider input from the public regarding appropriate water quality standards revisions EPA approval ensures conformance with Clean Water Act
Monitoring and Assessment Program	
Provides water quality data Identification of impacted waters Ongoing water quality monitoring	Assistance with ongoing water quality monitoring Water quality data Access to EPA regional laboratories
NPDES Program	
Water quality data from dischargers Identification of point sources Implementation of TMDL source allocations by permit restrictions Report ongoing monitoring results	Watershed approach will assist the NPDES program in setting appropriate discharge limitations Coordinated ongoing monitoring Water quality data
TMDL Program	
Funding for public participation Funding for water quality studies Project Coordinator Plan and participate in data collection Watershed based SAP	Identification of sources in watershed Quantification of significant source loads Streamlined public participation Coordinated data collection Coordinated long-term monitoring
319 Nonpoint Source Program	
Funding for cleanup Funding for assessment Funding for public participation Funding for developing and implementing watershed plans Local contacts	Coordinated relationships with agencies and community in assessment and implementation Assistance in prioritizing NPS cleanup Coordination on federal lands Coordinated long-term monitoring
Drinking Water Standards Program	
Interact with drinking water supply personnel	Data from the specific watershed
Source Water Protection	
Identify waters to be protected Interact with drinking water facilities	Coordinated efforts and funding to achieve clean source water
RCRA PROGRAMS	
Identification of contaminant sources Authority for assessment and cleanup Data Long-term monitoring and management	Problem site identification and prioritization Streamlined community involvement Collaborative monitoring

Table 2-1. EPA Programs Using a Watershed Approach (continued)

Program Contributions	Program Benefits
CERCLA PROGRAMS	
Contract support for watershed assessment activities	Ongoing monitoring (State or PRP funded)
Funding for Community Involvement	Risk assessment studies
Sample collection	Watershed program manager
Laboratory analysis	Contributions to watershed database
Immediate action at priority sites causing unacceptable threat to human health or the environment	Streamlined community involvement
Data from Site Assessment, Removal Assessment, Remedial Investigation	Assistance with ongoing monitoring
Authority to conduct cleanup at priority sites	Coordinated interagency efforts
Contract support for database development	Additional information for five-year reviews
Training	Site identification
	Site prioritization
BROWNFIELDS PROGRAMS	
Funding for community involvement and assessment support	Site Identification
Authority and funding for cleanup actions	Streamlined community involvement
	Site prioritization

Clean Air Act) states may be "authorized" to administer the federal programs under state law upon approval by EPA, sometimes imposing stricter standards than are required in the "base" federal program. CERCLA, on the other hand, is not a delegated program (although EPA funds states to carry out certain CERCLA activities for the Agency). However, a number of states have "mini" Superfunds that are similar to CERCLA; many states also have brownfields cleanup programs that have set state cleanup standards, to which EPA's CERCLA program may give some deference under memoranda of agreement.

Another way in which the various regulatory and response programs vary is through their use of terminology that may be sometimes confusing. Typically, the principal federal and state environmental laws applicable to watershed cleanup can be triggered by a broad range of substances, a subset of which have been deemed especially "hazardous" or "toxic" and are made subject to stricter controls and authorities. Understanding which kind of substances are impacting a watershed, and how they fit into federal and state regulatory programs, will make it easier for the watershed project manager to develop the most efficient response strategy. This issue is complicated by the fact that key terms often sound similar from one program to another, and yet can have different meanings and indeed may not be consistent. "Solid waste," "hazardous waste," "hazardous substance," "pollutant," and "toxic pollutant" are each used in various federal environmental programs, sometimes referring to the same, and sometimes different, substances.

Finally, the watershed cleanup team should be aware that different regulatory and response programs may result in different degrees of pollution control or cleanup. Indeed, this can be the case in a single program. For example, as explained in more detail below, a CERCLA "removal" action is designed to abate an immediate threat to human health and the environment. While many CERLCA "removal" actions will comprise the final remedy at the site, some may leave behind contaminants at a level that will require further measures to complete a CERCLA "remedial" action. Note also that still further cleanup might be necessary to achieve restoration of natural resources under CERCLA. Different regulatory and response programs may also result in different cleanup standards in different media. For example, copper standards are typically much lower in surface water than in ground water while the reverse is true for most volatile organic compounds (VOCs).

Clean Water Act

Perhaps the most important programs for consideration by the watershed cleanup team are found in the CWA, which establishes several means to restore and maintain the chemical, physical, and biological integrity of the nation's waters.[1] The 1972 Act set forth a goal of achieving zero discharge of pollutants by 1985 and, as an interim goal and where possible, ensuring water quality that is both "fishable" and "swimmable" by mid-1983. While those dates have passed, the goals remain. Under the CWA, a pollutant is broadly defined to include industrial, municipal, or agricultural waste discharged into water, subject to certain exceptions. The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. (Note that, as discussed below, certain categories of activities involving "pollutants" may nevertheless be exempt from regulation under the CWA.)

The Water Quality Criteria and Standards, and Water Quality Assessment programs provide the foundations for the CWA water quality programs. Once water quality conditions and goals have been established, the CWA includes various programs, including TMDL, Nonpoint Source (NPS), NPDES, and Wetlands for achieving those water quality conditions and goals. EPA and state environment departments administer all CWA programs except for the CWA Section 404 Dredge and Fill program (see Chapter 5 of this manual), which the USACE jointly administers with EPA and authorized states.

In the early years of the program, EPA and states focused more on technology-based source controls (including principally the NPDES program) than on water quality-based programs such as water quality standards. The recent emphasis on TMDLs, and on resolving complex NPDES permit issues, has heightened the immediate need to strengthen the standards program in many areas, and can make watershed cleanup more challenging. With EPA's assistance, states and authorized tribes have reviewed and updated these standards on an ongoing basis; however, evolving science, increasing implementation demands, and other circumstances have often significantly outpaced these efforts. Examples of evolving science include the need to update criteria based on new information, the need to reflect newly-understood local variations in pollutant chemistry and biology, the need for clarity in the implementation of new and existing criteria, and the desirability of having more direct measures of designated use protection through biological criteria.
www.epa.gov/waterscience/standards/strategy/final.pdf

Water Quality Criteria and Standards

CWA Section 303(c) establishes the basis for a WQS program. WQS are based on three elements:

- Designated (beneficial) uses
- Numeric and/or narrative criteria
- Antidegradation policies and procedures

States are required to specify appropriate water uses to be achieved and protected, taking into consideration the use and value of water for public water supplies; protection and propagation of fish, shellfish, and wildlife; recreation in and on the water; and agricultural, industrial, and other purposes including navigation. Typical designated water uses include recreational (primary—with human contact, and secondary—incidental human contact), agriculture (crop irrigation and livestock drinking), aquatic life (cold water aquatic life, warm water aquatic life), domestic water supply, and wetlands. Section 101(a)(2) of the CWA established as a national goal "water quality that

[1] Similar to RCRA and the CAA, the 1977 Clean Water Act actually comprised amendments to existing federal water pollution control legislation, the most important of which was the Federal Water Pollution Control Act Amendments of 1972, (Pub. L. 92500) (FWPCA), which established the NPDES permit system.

provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water wherever attainable." WQSs are developed by states, but must be approved by EPA.

EPA develops National Recommended Water Quality Criteria which are expressed as levels of individual pollutants, water quality characteristics, or descriptions of conditions of the water body that, if met, will generally protect the designated use of the water. Criteria are expressed in either narrative or numeric formats and may be developed to apply generally or to site-specific situations. EPA's compilation of National Recommended Water Quality Criteria contains recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These criteria are published pursuant to Section 304(a) of the CWA and provide guidance for states and tribes to use in adopting WQS. EPA's National Recommended Water Quality Criteria are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. In adopting criteria, states and tribes may:

- adopt the criteria that EPA publishes under section 304(a) of the CWA
- modify the section 304(a) criteria to reflect site-specific conditions
- adopt criteria on the basis of other scientifically defensible methods

www.epa.gov/waterscience/criteria/wqcriteria.html

Antidegradation policies are established to protect existing uses and high quality waters. States are required to adopt an antidegradation policy consistent with the water quality standards regulation (40 CFR Part 131).

WQSs provide the regulatory basis for effluent limits beyond technology-based levels of treatment for NPDES permits. WQS also provide the basis for allocations in TMDLs. State water quality standards for waterbodies may be obtained from individual states online or on EPA's WATERS database. **www.epa.gov/wqsdatabase, www.epa.gov/waters**

Water Monitoring and Assessment

Monitoring and assessment of water quality may be undertaken by many different agencies. States are responsible for setting the water quality standards for waters under their jurisdiction, and for assessing their water quality. States have to report to EPA every two years on the condition of their waters under 305b. States and tribes receive pollution control and environmental management grants from the EPA that help them establish and maintain monitoring programs.

Elements of a State Monitoring Program (EPA 2003: EPA 841-B-03-003) (see the boxes on pages 20 and 21) describes the recommended core components of a state monitoring program. State monitoring programs should be designed to meet multiple monitoring objectives, and sampling may be conducted using a set of core and supplemental indicators. State monitoring program objectives should include:

- establishing, reviewing, and revising water quality standards (Section 303(c))
- determining water quality standards attainment (Section 305(b))
- identifying impaired waters (Section 303(d))
- identifying causes and sources of water quality impairments (Sections 303(d), 305(b))
- supporting the evaluation of program effectiveness.

EPA's surface water assessment guidance, *Consolidated Assessment and Listing Methodology* (EPA, July 2002), provides a recommended framework for states and other jurisdictions to document how they collect and use water quality data and information for environmental decision-making. The primary purposes of these data analyses are to determine the extent to which waters are

attaining water quality standards, to identify waters that are impaired and need to be added to the 303(d) list and to identify waters that can be removed from the 303(d) list because they are attaining standards.

States are to submit Integrated Reports (the 305(b) report and 303(d) list of impaired waters) to EPA biennially with information on the status of each water body, including information on water quality, designated uses, and causes of nonattainment. These assessments are based on individual state's Assessment Methodology, which may describe the state's methodology for determining impairment; describe the minimum number of samples required to make an impairment determination; and define the age of data allowed, the type of sampling protocols accepted by the state, and other relevant criteria. The water body assessments are to be based on existing and readily available data, including evidence of exceedances of water quality standards, direct evidence of impairment of beneficial uses, evidence that narrative standards are not being met, and computer modeling. Waters that are threatened or impaired by pollutants are listed and prioritized on the 303(d) list, also are to be submitted to EPA biennially.

While state agencies have the lead in implementing monitoring programs and assessing the condition of those waters as required by the CWA, other federal agencies are also involved in water quality monitoring to meet their own agency and program objectives. Data from these sources should be considered (on the basis of data quality, accessibility, and applicability) by the state when making an impairment decision for an individual waterbody (i.e., healthy or impaired). For example, the USGS conducts extensive chemical monitoring through its National Stream Quality Accounting Network (NASQAN) at fixed locations on large rivers around the country. Its National Water Quality Assessment program (NAWQA) uses a regional focus to study status and trends in water, sediment, and biota. The USFWS, NOAA, and the USACE are other examples of federal agencies that conduct water quality monitoring to support their programs and activities.

State agencies, such as game and fish agencies, and private entities such as universities, watershed associations, environmental groups, and industries also perform water quality monitoring. They may collect water quality data for their own purposes, as well as to share with government decision makers. Volunteer monitors—private citizens who volunteer to regularly collect and analyze water samples, conduct visual assessments of physical conditions, and measure the biological health of waters—may be of great assistance in collecting data and assessing the biological condition (health) of that waterbody. Prior to implementing any locally based monitoring effort, the watershed cleanup team should review the state's monitoring strategy, list of core indicators, and assessment methodology. Prior to conducting any monitoring in a cleanup area, the monitoring objectives should be established and indicators selected that ensure the predetermined objectives will be achieved.

Elements of a State Water Monitoring and Assessment Program

www.epa.gov/owow/monitoring/elements/elements.html

The recommended ten elements of a state water monitoring and assessment program are:

1. ***Monitoring Program Strategy***
   The state has a comprehensive monitoring program strategy that serves its water quality management needs and addresses all state waters, including streams, rivers, lakes, the Great Lakes, reservoirs, estuaries, coastal areas, wetlands, and ground water. The strategy should contain or reference a description of how the state plans to address each of the remaining nine elements. The monitoring program strategy is a long-term implementation plan and should include a timeline, not to exceed ten years for completing implementation of the strategy. EPA believes that state monitoring programs can be upgraded to include all of the elements described below within the next ten years. It is important that the strategy be comprehensive in scope and identify the technical issues and resource needs that are currently impediments to an adequate monitoring program.

2. ***Monitoring Objectives***
   The state has identified monitoring objectives critical to the design of a monitoring program that is efficient and effective in generating data that serve management decision needs. EPA expects the state to develop a strategy and implement a monitoring program that reflects a full range of state water quality management objectives including, but not limited to, CWA goals. For example, monitoring objectives could include helping establish water quality standards, determining water quality status and trends, identifying impaired waters, identifying causes and sources of water quality problems, implementing water quality management programs, and evaluating program effectiveness. Consistent with the CWA, monitoring objectives should reflect the decision needs relevant to all types of state waters.

3. ***Monitoring Design***
   The state has an approach and rationale for selecting monitoring designs and sample sites that best serve its monitoring objectives. The state monitoring program will likely integrate several monitoring designs (e.g., fixed station, intensive and screening-level monitoring, rotating basin, judgmental and probability design) to meet the full range of decision needs. The state monitoring design should include a probability-based network for making statistically valid inferences about the condition of all state water types, over time. EPA expects the state to use the most efficient combination of monitoring designs to meet its objectives.

4. ***Core and Supplemental Water Quality Indicators***
   The state uses a tiered approach to monitoring that includes core indicators selected to represent each applicable designated use, plus supplemental indicators selected according to site-specific or project-specific decision criteria. Core indicators for each water resource type include physical/habitat, chemical/toxicological, and biological/ecological endpoints as appropriate, and can be used routinely to assess attainment with applicable water quality standards throughout the state. Supplemental indicators are used when there is a reasonable expectation that a specific pollutant may be present in a watershed, when core indicators indicate impairment, or to support a special study such as screening for potential pollutants of concern.

(continued)

National Pollutant Discharge Elimination System

The CWA generally prohibits point source discharges of pollutants into waters of the United States without an NPDES permit. A point source is any discernible, confined and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, discrete fissure, or container. It also includes vessels or other floating craft from which pollutants are or may be discharged. By law, the term "point source" also includes concentrated animal feeding operations, which are places where animals are confined and fed. Significantly, Congress exempted agricultural stormwater discharges and return flows from irrigated agriculture from the definition of point sources, even when such is collected and discharged from a pipe, ditch, or other discrete conveyance. Discharge of storm water from municipal storm sewer systems require a NPDES permit.

(continued)

5. ***Quality Assurance***
   Quality management plans and quality assurance program/project plans are established, maintained, and peer reviewed according to EPA policy to ensure the scientific validity of monitoring and laboratory activities, and to ensure that state reporting requirements are met.

6. ***Data Management***
   The state uses an accessible electronic data system for water quality, fish tissue, toxicity, sediment chemistry, habitat, biological data, with timely data entry (following appropriate metadata and state/federal geo-locational standards) and public access. In the future, EPA will require all states to directly or indirectly make their monitoring data available through the new Storage and Retrieval (STORET) system. For states that do not currently operate STORET, their monitoring strategies should provide for use of STORET as soon as is practicable. For the 2006 305(b) reports and 303(d) lists, EPA strongly recommends that all states store assessment information using the EPA Assessment Database or an equivalent relational database and define the geographic location of assessment units using the National Hydrography Dataset (NHD).

7. ***Data Analysis/Assessment***
   The state has a methodology for assessing attainment of water quality standards based on analysis of various types of data (chemical, physical, biological, land use) from various sources, for all waterbody types and all state waters. The methodology includes criteria for compiling, analyzing, and integrating all readily available and existing information (e.g., volunteer monitoring data, discharge monitoring reports).

8. ***Reporting***
   The state produces timely and complete water quality reports and lists called for under Sections 305(b), 303(d), 314, and 319 of the CWA and Section 406 of the Beaches Act. EPA issued 2002 Integrated Water Quality Monitoring and Assessment Report Guidance on November 19, 2001, to encourage integration and consistency in the development and submission of Section 305(b) water quality reports and Section 303(d) impaired waters lists. EPA will continue to support the use of this integrated reporting framework for future reporting cycles. Under current regulations, Section 303(d) lists and Section 305(b) reports are due no later than April 1 of even-numbered years. To remain eligible for Section 106 grants, the state also must submit annual updates of water quality information. This requirement may be satisfied by annually updating 305(b) assessment information or by annually uploading monitoring data to the national STORET warehouse.

9. ***Programmatic Evaluation***
   The state, in consultation with its EPA Region, conducts periodic reviews of each aspect of its monitoring program to determine how well the program serves its water quality decision needs for all state waters, including all waterbody types. This should involve evaluating the monitoring program to determine how well each of the elements is addressed and determining how needed changes and additions are incorporated into future monitoring cycles.

10. ***General Support and Infrastructure Planning***
    The state identifies current and future resource needs it requires to fully implement its monitoring program strategy. This needs assessment should describe funding, staff, training, laboratory resources, and upcoming improvements.

The CWA's NPDES program recognizes three categories of pollutants:

- "Conventional pollutants" include biological oxygen demand (BOD), total suspended solids (TSS), coliform, pH, and oil and grease.
- "Toxic pollutants" are designated by EPA as those pollutants or combination of pollutants, including disease-causing agents, "which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains" will "cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring." Thus far, EPA has designated 65 categories of toxic pollutants under the CWA.
- Nontoxic "nonconventional" include any pollutants not included in the first two categories but that still may pose a threat (e.g., ammonia and heat).

NPDES permits include discharge limits and monitoring requirements. Discharge limits are based on technology and on water quality standards, and may be based on the mass of pollutant allowed to be discharged, the concentration of the pollutants in the effluent, indicator concentrations, effluent toxicity, effluent flow rate, or visual observations (i.e., sheen, foam, or floating solids). To find out if a discharge is covered by an NPDES permit, call the EPA regional office or the state office responsible for issuing NPDES permits.

Stormwater management is also included in the NPDES Program. The NPDES stormwater program addresses nonagricultural sources of stormwater discharges that adversely affect the quality of the nation's waters. The program uses the NPDES permitting mechanism to require the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local waterbodies. The NPDES stormwater permit regulations promulgated by EPA cover the following classes of stormwater discharges:

- Operators of Municipal Separate Storm Sewer System (MS4s) in "urbanized areas" as delineated by the Bureau of the Census.
- Industrial facilities in any of the 11 categories that discharge to an MS4 or to waters of the United States; all categories of industrial activity (except construction) may certify to a condition of "no exposure" if their industrial materials and operations are not exposed to stormwater, thus eliminating the need to obtain stormwater permit coverage.
- Operators of construction activity that disturbs one or more acres of land; construction sites less than one acre are covered if part of a larger plan of development.

The regulated entities must obtain an NPDES stormwater permit and implement stormwater pollution prevention plans (SWPPPs) or stormwater management programs (both using BMPs) that effectively reduce or prevent the discharge of pollutants into receiving waters.

Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Implementation Guidance (EPA 833-B-03-004, December 2003) provides EPA's recommended steps and ideas for watershed-based permitting implementation. This approach, aimed at achieving new efficiencies and environmental results, provides a process for considering all stressors within a hydrologically defined drainage basin or other geographic area, rather than addressing individual pollutant sources on a discharge-by-discharge basis. **www.nacwa.org/advocacy/tmdlhb/us/2003-12-17.pdf**

A state must calculate a water quality-based limitation for a NPDES discharger where there is a reasonable potential that a discharger will cause or contribute to an exceedance of water quality standards. The determination of reasonable potential must account for existing controls, variability of the pollutant in the effluent, and, if appropriate, dilution of the effluent in the receiving water. Water quality-based effluent limits are often based on a TMDL with the wasteload allocation component of the TMDL applicable to point source discharges. The calculation of water quality-based limits includes a loading analysis to determine the level of control needed to achieve water quality standards at the point of compliance in the waterbody. In the watershed approach, the permit writer should consider the cumulative effects from multiple discharges in a basin. Section 301(b)(1)(C) requires limits be included in NPDES permits that are as stringent as necessary to meet water quality standards.

Information about NPDES permits for major sources that discharge greater than one million gallons of water per day is available on EPA's Permit Compliance System (PCS) database available from EPA's Watershed Assessment, Tracking, and Environmental Results (WATERS) database (**www.epa.gov/waters**). Data about smaller NPDES permitted dischargers may be listed in PCS but are also available from state discharge permitting agencies and EPA regions.

Total Maximum Daily Load (TMDL)

When pollutants adversely affect the use of a waterbody even after implementation of effluent limits for point source dischargers under the NPDES program, the CWA requires a study to be conducted and a plan developed whereby the impaired segment of that waterbody will be restored. Both this study and the actual numeric load that the stream can bear and still meet water quality standards are commonly called the TMDL. The TMDL establishes the amount of a pollutant allowed in the relevant waterbody. Section 303(d) requires that States develop a list of waterbodies that need additional work beyond existing controls to achieve or maintain water quality standards. The additional work necessary includes the establishment of TMDLs to determine the necessary reductions in load needed to meet water quality standards. The TMDL should:

Load is the total mass of pollutant that flows through the water body over a given period of time.

Load = Concentration x Flow

- Identify the sources and causes of the pollutant responsible for impairment.
- Identify the water quality goal. How much does the pollutant need to be reduced to meet water quality objectives?
- Quantify the total amount of pollutant that can be allowed into the water and what reductions are needed to achieve that amount. Surrogate endpoints may be established that are directly linked to the impairment to ensure the achievement of the water quality goals.

The following two elements are not required but may be included with a TMDL submission.

- Identify and implement the practices needed to reduce excess pollutants.
- Monitor the waterbodies to ensure the goals are being met, and modify the plan if needed.

TMDL documents are measured against the following review criteria:

1. **Water Quality Impairment Status**
   TMDL documents should include a description of the listed water quality impairments (pollutants). While the 303(d) list identifies probable causes and sources of water quality impairments, the information contained in the 303(d) list is generally not sufficiently detailed to provide an adequate understanding of the impairments. TMDL documents should include a thorough description/summary of all available water quality data such that the water quality impairments are clearly defined and linked to the impaired beneficial uses (e.g., aquatic life, drinking water, etc.) and/or appropriate WQS.

2. **Water Quality Standards**
   The TMDL document should include a description of all applicable WQS for all affected jurisdictions. TMDLs should result in attaining and maintaining WQS. WQS are the basis from which TMDLs are established and the TMDL targets are derived, including the numeric, narrative, use classification, and antidegradation components of the standards.

3. **Water Quality Targets**
   Quantified targets or endpoints (e.g., numeric standards, macroinvertebrate diversity, etc.) should be provided to address each listed pollutant/waterbody combination. Target values should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the TMDL target. For pollutants with narrative standards, the narrative standard is translated into a measurable value. At a minimum, one target is identified for each pollutant/waterbody combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial

uses (e.g., for a sediment impairment issue, it may be appropriate to include targets representing water column sediment such as TSS, embeddeness, stream morphology, up-slope conditions, and a measure of biota).

4. **Significant Sources**
   TMDLs should consider all significant sources of the stressor of concern. All sources or causes of the stressor should be identified or accounted for in some manner. The detail provided in the source assessment step drives the rigor of the allocation step. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each significant source when the relative load contribution from each source has been estimated. Ideally, therefore, the pollutant load from each significant source should be quantified. This can be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques.

5. **Total Maximum Daily Load**
   TMDLs include a quantified pollutant reduction target. According to EPA regulation (40 CFR 130.2(i)) TMDLs can be expressed as mass per unit of time, toxicity, percent load reduction, or other measure. TMDLs should address, either singly or in combination, each listed pollutant/waterbody combination.

6. **Allocation**
   TMDLs apportion responsibility for taking actions or allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or dividing of responsibility. A performance-based allocation approach, where a detailed strategy is articulated for the application of BMPs, may also be appropriate for nonpoint sources.

7. **Margin of Safety/Seasonality**
   A margin of safety (MOS) is a component of the TMDL that accounts for the uncertainty about the relationship between the pollutant loads and the quality of the receiving waterbody (303(d)(1)(c)). The MOS can be implicitly expressed by incorporating a MOS into conservative assumptions used to develop the TMDL. In other cases, the MOS can be built in as a separate component of the TMDL (in this case, quantitatively, a TMDL = Wasteload Allocation + Load Allocation + Margin of Safety).

   Seasonal considerations, such as critical flow periods (high flow, low flow), should also be be considered when establishing TMDLs, targets, and allocations.

8. **Monitoring Strategy**
   Many TMDLs are likely to have significant uncertainty associated with selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL documents to articulate the means by which the TMDL will be evaluated in the field, and to provide supplemental data in the future to address any uncertainties that may exist when the document is prepared. At a minimum, the monitoring strategy should:

   - Articulate the monitoring hypothesis and explain how the monitoring plan will test it.
   - Address the relationships between the monitoring plan and the various components of the TMDL (targets, sources, allocations, etc.).
   - Explain any assumptions used.
   - Describe monitoring methods.

- Define monitoring locations and frequencies, and list the responsible parties.

9. **Public Participation**
   The fundamental requirement for public participation is that all stakeholders have an opportunity to be part of the process, and EPA will take into account comments and information submitted by interested parties at the time of making TMDL decisions. Public participation should fit the needs of the particular TMDL.

10. **Restoration Strategy**
    At a minimum, sufficient information should be provided in the TMDL document to demonstrate that if the TMDL were implemented, water quality standards would be attained or maintained. Adding detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement but is considered a value added component of a TMDL document.

11. **Technical Analysis**
    TMDLs should be supported by an appropriate level of technical analysis. It applies to all of the components of a TMDL document. It is vitally important that the technical basis for all conclusions be articulated in a manner that is easily understandable and readily apparent to the reader. Of special importance, the cause and effect relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and allocations must be supported by an appropriate level of technical analysis.

The state develops the TMDL in cooperation with interested parties prior to formal submission for public comment. After incorporating comments, the state submits the TMDL to EPA for approval. EPA either approves or disapproves the TMDL.
www.epa.gov/owow/tmdl

The TMDL is implemented using a variety of authorities and strategies. CWA programs that may be used to accomplish solutions to watershed pollution include the NPDES Program, 319 NPS Program, CWA 401 authority, CWA 404 Program, and the Clean Water State Revolving Fund. Using the watershed approach, CERCLA, RCRA, Brownfields, Farm Act, and other authorities and funding mechanisms may be used to effect cleanup and achieve water quality standards.

Nonpoint Sources

Congress enacted Section 319 of the CWA in 1987, establishing a national program to reduce nonpoint source water pollution. Nonpoint source pollution is caused by rainfall or snowmelt moving over and through the ground and carrying natural and anthropogenic pollutants into lakes, rivers, streams, wetlands, estuaries, other coastal waters, and ground water. Atmospheric deposition and hydrologic modification are also nonpoint sources of pollution.

Section 319 of the CWA authorizes EPA to award grants to states and territories (hereinafter referred to as "states") for the purpose of assisting them in implementing approved NPS management programs developed pursuant to section 319(b). The primary goal of the NPS program is to control NPS pollution through implementation of management measures and practices to reduce pollutant loadings resulting from each category or subcategory of NPSs identified in the state's NPS assessment report developed pursuant to section 319(a). Section 319 grants are also awarded to eligible Indian Tribes that have approved NPS assessments, approved NPS management programs, and also have "treatment-as-a-State" status.

Section 319 grants are awarded to state NPS agencies in two categories: base funds and incremental funds. States may use the "base funds" for the full range of activities addressed in their approved NPS management programs. For example, the funds may be used for protection of unimpaired waters, restoration of impaired waters, education and training, and staffing or support to

manage and implement their NPS management programs. In general, States have great flexibility as to how to use these base funds. States must use $100 million of Section 319 funds, referred to as "incremental funds," to develop and implement watershed-based plans that address NPS impairments in watersheds that contain Section 303(d)-listed waters. Up to 20 percent of the base and incremental funds may be used to develop NPS TMDLs and watershed-based plans to implement NPS TMDLs.

EPA emphasizes watershed-based planning as a means for resolving and preventing NPS pollution problems and threats. Watershed-based plans provide a coordinating framework for solving water quality problems by providing a specific geographic focus, integrating strong partnerships, integrating strong science and data, and coordinating priority setting and integrated solutions. The following information must be included in watershed-based plans to restore waters impaired by NPS pollution using incremental Section 319 funds:

- An identification of the causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve load reductions and any other goals identified in the watershed-based plan
- An estimate of the load reductions expected from the implementation of management measures
- A description of the NPS management measures needed to achieve load reduction and identification of the critical areas in which the measures will be needed to implement the plan
- An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the plan
- An information and education component that the state will use to enhance public understanding of the project and encourage public involvement in selecting, designing, and implementing the NPS management measures
- A schedule for implementing the NPS management measures identified in the plan that is reasonably expeditious
- A description of interim, measurable milestones that can be used to determine whether NPS management measures or other control actions are being implemented
- A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward the water quality standards and for determining whether the plan needs to be revised or, if an NPS TMDL has been established, whether the NPS TMDL needs to be revised
- A monitoring component to evaluate how effective the implementation efforts are as measured against the set of criteria developed as described previously
- EPA has published a *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* intended to help communities, watershed organizations, and state, local, tribal and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. The Handbook is available online at: **http://www.epa.gov/owow/nps/watershed_handbook/**.

Wetlands

Wetlands are protected under CWA Sections 401 and 402 as waters of the United States as well as under CWA Section 404. CWA Section 404 states that dredged or fill material cannot be deposited into waters of the United States if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. A permit is required for all construction within the nation's wetlands. EPA sets environmental criteria that must be satisfied to obtain a permit and retains other Section 404 authority; the USACE reviews applications and issues permits. To apply for a permit, one must show that he or she has: taken steps to

avoid wetland impacts where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or create wetlands. Projects with potentially significant impacts typically require an individual permit; however, USACE is authorized to issue categorical "general permits" permitting certain types of activities for which it determines that the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effects on the environment. General permits may be issued on a nationwide, regional, or state basis for categories of activities (for example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process. During the permitting process, the USACE considers the views of other federal, state, and local agencies; interest groups; and the general public. Any adverse impacts to the aquatic environment from a permitted activity must be offset by mitigation requirements, which may include restoring, enhancing, creating, and preserving aquatic functions and values. **www.epa.gov/owow/wetlands/regs/sec404.html**

Oil and Hazardous Substances

Section 311 of the 1972 Federal Water Pollution Control Act (FWPCA), titled "Oil and Hazardous Substance Liability," provides federal authority to respond to spills of oil or hazardous substances "into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone..." Oil is defined broadly under this section and includes "oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil." Section 311(b) of the FWPCA further charged EPA with the task of developing regulations designating hazardous substances other than oil that in any quantity could result in imminent and substantial danger to the public health or welfare if discharged and to develop methods for addressing such discharges.

The Oil Pollution Act of 1990 (OPA) established new requirements and extensively amended section 311 to provide, in part, enhanced capabilities for oil spill response (including a national Oil Spill Liability Trust Fund) and natural resource damage assessment by a federal trustee. **www.epa.gov/oilspill/opaover.html**

An owner or operator may be held liable for all actual costs of response incurred under 33 USC §1321(c), subject to certain limitations. Costs of removal may include any expenses incurred by the federal or state government in the restoration or replacement of natural resources damaged by an oil spill discharge. The 311 program is a response program that operates similar to CERCLA; indeed, the CERCLA NCP was first created under section 311.

Responsibilities under Section 311 are shared primarily by EPA and the United States Coast Guard (USCG). Generally EPA is the lead federal response agency for oil spills occurring in inland waters, and the USCG is the lead response agency for spills in coastal waters and deepwater ports.

Clean Water Act Enforcement

EPA or the state may issue an order to any person or company who violates the CWA. The order may impose a civil penalty plus recovery of any economic benefit of noncompliance and may require correction of the violation. Any person discharging a pollutant into the waters of the U.S. is subject to the enforcement provisions of the CWA. A person is defined as an individual, corporation, partnership, association, state, municipality, commission, or political subdivision of a state, or any interstate body. Under Section 309 of the CWA, penalties for discharging a pollutant without having a permit into the waters of the United States may be up to $27,500 per violation per day. Under Section 311, a Class 1 penalty may be assessed in an amount of up to $10,000 per violation, not to exceed $25,000; a Class II penalty may be assessed in an amount of up to $10,000 per day per violation, but not to exceed $125,000.

Safe Drinking Water Act

The SDWA protects public health by regulating the nation's public drinking water supply. SDWA authorizes EPA to set national health-based standards for drinking water supplied to the public to protect against naturally occurring and anthropogenic contaminants that may be found in drinking water. SDWA focuses on treatment of drinking water, on operator training to support that treatment, source water assessment and protection, funding for water system improvements and public information to provide safe drinking water at the tap. SDWA programs are administered by EPA and states. **www.epa.gov/safewater/sdwa/index.html**

Drinking Water Standards

Drinking water standards are set by EPA to control the level of contaminants in the nation's publicly supplied drinking water. The SDWA requires EPA to set these standards, which public water systems are required to meet. EPA has set standards for 90 chemical, microbiological, radiological, and physical contaminants in drinking water. EPA also conducts research and collects information to determine when currently unregulated contaminants may pose a significant widespread public health risk and should therefore be regulated in the future.

Under the SDWA the Maximum Contaminant Level Goal (MCLG) is the level of a contaminant in drinking water below which there is no known or expected health risk, allowing for a margin of safety. These goals are set without consideration for whether the technology is available to meet them, and, therefore, are sometimes set at levels lower than public water systems can meet. MCLGs are not enforceable.

The Maximum Contaminant Level (MCL) is the maximum amount of a contaminant allowed in water delivered to a user of any public water system or a treatment technique set at levels as close to MCLGs as feasible, considering available technology and cost. MCLs are enforceable standards. While under the SDWA, compliance with drinking water standards is usually at the entrance to the distribution system, with compliance for some rules requiring monitoring in the distribution system or at the tap. CERCLA requires that ground water cleanups achieve MCLs and non-zero MCLGs. (See discussion of CERCLA below.)

EPA also sets Secondary Drinking Water Regulations, which are nonenforceable guidelines for contaminants that may cause cosmetic effects (such as skin and tooth discoloration) or aesthetic effects (such as taste or odor). Water systems are not required by EPA to adopt these secondary standards, but states may choose to adopt and enforce them.

Source Water Protection

The Source Water Protection program focuses on preventing contamination of both ground water and surface water sources of public drinking water. The Source Water Protection program has two primary parts: Source Water Assessment and local Source Water Protection planning and implementation. A Source Water Assessment is conducted by the state and identifies the area of the watershed or aquifer serving one or more public water systems, and assesses potential point and nonpoint sources of contamination to determine the relative risk or level of concern they may pose to the public water system's sources of drinking water to provide a platform for local protection planning. Each assessment must include four major elements:

1. delineating (or mapping) the source water assessment area
2. providing an inventory of potential sources of contamination in the delineated area
3. determining the susceptibility of the water supply to those contamination sources
4. releasing of the results of the determinations to the public.

Planning includes designing contaminant source management plans and contingency/emergency plans. Source Water Protection is voluntary and uses the results of the Source Water Assessment with additional, local information as needed, to prevent and remediate contamination of the public water system's source waters. Wellhead Protection programs protect underground-based sources of drinking water by protecting the area surrounding drinking water wells—the wellhead protection area. Source Water and Wellhead Protection programs are statutory programs and have no associated regulations. The Sole Source Aquifer program may also be used to help protect an aquifer serving as a drinking water source.

Underground Injection Control (UIC) Program

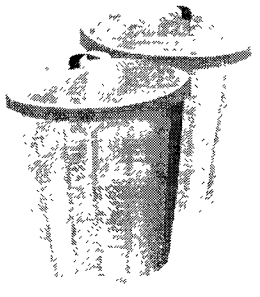
Injection wells have the potential to cause contamination of underground drinking water sources. The UIC program seeks to prevent such contamination by setting minimum requirements for state programs regulating underground injection. The goals of the EPA's UIC Program are to prevent contamination by keeping injected fluids within the well and the intended injection zone, or, when injecting fluids directly or indirectly into or above underground sources of drinking water, to require that injected fluids not endanger underground sources of drinking water. These minimum requirements affect the siting of an injection well, and the construction, operation, maintenance, monitoring, testing, and, finally, the closure of the well. All injection wells require authorization under general rules or specific permits.

Resource Conservation and Recovery Act (RCRA)

RCRA governs the management of solid waste and its subset, hazardous waste, as well as underground storage tanks.[2] To achieve these goals, RCRA established three distinct yet interrelated programs[3] whose different characteristics the watershed cleanup team must consider when looking at both sources of contamination and resources for cleanup. RCRA Subtitle D, the solid waste program, encourages states to develop comprehensive plans to manage nonhazardous industrial solid waste and municipal solid waste, sets criteria for municipal solid waste landfills (MSWLFs) and other solid waste disposal facilities, and prohibits the open dumping of solid waste. RCRA Subtitle C, the hazardous waste program, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal—in effect, from cradle to grave. RCRA Subtitle I, the UST program, regulates USTs storing hazardous substances and petroleum products. RCRA also encourages resource recovery and waste minimization. RCRA is administered by EPA and state environmental agencies. Funding for assessment, cleanup, and monitoring activities is the responsibility of the facility owner.

Following is a brief summary of those provisions of RCRA likely to be most relevant to a watershed cleanup; more detailed information is available in the *RCRA Orientation Manual*, EPA530-R-02-016 (January, 2003). **www.epa.gov/epaoswer/general/orientat/romtoc.pdf**

RCRA Solid Waste program (Subtitle D)



Under EPA's RCRA, a "solid waste" is defined as any solid, semi-solid, liquid, or contained gaseous material discarded from industrial, commercial, mining, or agricultural operations, and from community activities. Solid waste can include garbage, construction debris, commercial refuse, sludge from water supply or waste treatment plants, or air pollution control facilities, and "other discarded materials." EPA's regulatory definition of solid waste, found in 40 CFR section 261.2, is narrower than the statutory definition, and defines "discarded"

[2] Typically, the term "RCRA" is used to refer to both the statute itself (including amendments) and the regulations implementing it.

[3] For example, EPA has long struggled with defining which types of recycled materials should not be deemed "discarded" and thus excluded from the definition of solid wastes. However, this issue typically comes up only in the context of solid wastes that are also hazardous waste.

material as (1) materials that are abandoned, (2) materials that are "recycled," (3) materials that are "inherently wastelike," and (4) waste military munitions. Each of these terms is further defined in RCRA's regulations. Exclusions from the definition of solid waste are listed in 40 CFR section 261.4(a). Key exclusions include solid or dissolved materials in irrigation return flows; industrial discharges which are point sources subject to a NPDES permit under the CWA; and source, special nuclear, or byproduct material as defined by the Atomic Energy Act (AEA).

Unlike the extensive regulatory system that governs hazardous waste management (discussed below), solid waste is primarily regulated by states and municipalities and managed on the local level. EPA's role in implementing solid waste management programs does include setting national goals, providing technical assistance, and developing educational materials.[4] (One of RCRA's enforcement tools—7003 orders—does apply to solid, not only hazardous, wastes, and is discussed below as part of the discussion of RCRA enforcement authorities.)

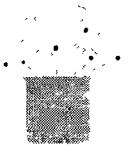
RCRA Hazardous Waste program (Subtitle C)

A RCRA hazardous waste is a RCRA "solid waste" that EPA determines poses substantial or potential threats to public health or the environment. For a hazardous waste to be regulated as a hazardous waste it must first fall under the regulatory definition of solid waste, and then within the definition of hazardous waste, both of which are described in 40 CFR section 261 Identification and Listing of Hazardous Waste. There are two types of RCRA hazardous wastes: those that have been specifically listed as a hazardous waste by EPA (e.g., F001 wastes, comprised of certain halogenated solvents that have been used in degreasing activities) and those that exhibit one or more of the following characteristics of hazardous wastes (corrosiveness, ignitability, reactivity, or toxicity).

- ***Corrosive Waste.*** A corrosive material can wear away (corrode) or destroy a substance. For example, most acids are corrosives that can eat through metal, burn skin on contact, and give off vapors that burn the eyes.

- ***Ignitable Waste.*** An ignitable material can burst into flames easily. It poses a fire hazard; can irritate the skin, eyes, and lungs; and may give off harmful vapors. Gasoline, paint, and furniture polish are ignitable.

- ***Reactive Waste.*** A reactive material can explode or create poisonous gas when combined with other chemicals. For example, chlorine bleach and ammonia are reactive and create a poisonous gas when they come into contact with each other.



- ***Toxic Waste.*** Toxic materials or substances can poison people and other life. Toxic substances can cause illness and even death if swallowed or absorbed through the skin. Pesticides, weed killers, and many household cleaners are toxic.

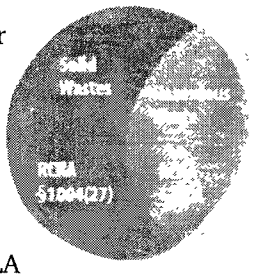
Additionally, RCRA hazardous wastes generally include materials generated by the treatment of hazardous waste (the "derived from" rule), or that are contained in a hazardous waste (the "mixture rule").

RCRA Subtitle C establishes an extensive management system that regulates hazardous waste from the moment it is generated until its ultimate disposal, in effect from "cradle to grave." EPA's Subtitle C Program establishes various administrative requirements applicable to the three catego-

[4] Two important exceptions are the 40 CFR Part 257 federal solid waste disposal facility criteria for nonhazardous, nonmunicipal landfills, and the Part 258 municipal solid waste disposal facility criteria. However, the states generally carry out enforcement of these programs

ries of hazardous waste handlers: generators; transporters; and owners or operators of treatment, storage, and disposal facilities (TSDFs). The regulations applicable to RCRA TSDFs are the most extensive; therefore, facilities that generate only hazardous wastes typically take steps to ship such wastes to TSDFs before they trigger the TSDF regulations. Additional information regarding the Subtitle C program may be found at **www.epa.gov/epaoswer/general/orientat/rom3.pdf**.

Of special interest to the watershed cleanup team, TSDFs are required to assess all their solid waste management units, regardless of when the wastes were disposed of, and to perform corrective action for all releases of hazardous waste and hazardous constituents. Facilities must implement corrective action when necessary to protect human health and the environment, plus perform off-site corrective action when necessary. EPA estimates that at least 3,700 facilities are undergoing corrective action.



Relationship between CERCLA hazardous substances and RCRA hazardous wastes.

RCRA corrective action follows several steps, which are largely analogous to the CERCLA cleanup process.

1. ***RCRA Facility Assessment (RFA).*** Performed to determine evidence of a release. Includes desktop review of available information, visual inspection, and, occasionally, confirmatory sampling. After the RFA is completed, a schedule of compliance is developed for additional steps, if necessary.
2. ***RCRA Facility Investigation (RFI).*** Detailed characterization of the nature, extent, direction, rate, movement, and concentration of released contaminants. This may be performed in stages to minimize analytical costs. A corrective measures study is required if the RFI shows that action levels, determined on a site-specific basis, are exceeded. Action levels may be derived from state water quality standards, SDWA MCLs, or other appropriate standards.
3. ***Corrective Measures Study (CMS).*** Study to determine the appropriate corrective measure. EPA selects the remedy, and the facility owner/operator implements the remedy with EPA and/or State oversight. EPA or the State may administer the remedy under various administrative mechanisms, including permits, enforcement orders, or other agreements.
4. ***Corrective Measures Implementation (CMI).*** The remedy is designed, constructed, and operated and maintained.

Interim measures are short-term measures that can be required at any time to respond to immediate threats. Similar to the EPA CERCLA Removal Program, interim measures do not require an RFI or CMS.

Additional information regarding the corrective action program may be found at **www.epa.gov/epaoswer/general/orientat/rom39.pdf**

RCRA Underground Storage Tank Program (Subtitle I)

The **underground storage tank (UST) Program** regulates USTs containing CERCLA hazardous substances and petroleum products. The RCRA UST program does not cover certain categories of tanks.

RCRA's UST program includes technical performance standards for all USTs and regulations to require petroleum UST owners and operators to have the financial means to pay for cleanups and to compensate third parties. The program also includes a detailed corrective action procedure.

EPA is authorized to undertake corrective action in response to a petroleum release from a UST only if such action is necessary to protect human health and the environment, and one or more of the following situations exist:

1. No owner or operator can be found within 90 days to carry out the corrective action.

2. A situation exists which requires prompt action.
3. Corrective action costs at a facility exceed the requisite financial responsibility amounts.
4. The owner or operator had failed or refused to comply with a corrective action order.

When an underground storage tank owner/operator fails to start or complete an appropriate cleanup following an underground storage tank release, a corrective action order may be issued. RCRA Section 9003(h) authorizes EPA to issue administrative orders to compel owner/operators of leaking underground storage tanks to take specific corrective actions to:

- Carry out investigative studies
- Take action to fix the tank and cleanup what was leaked
- Close the underground storage tank

Additional information on RCRA's underground storage tank program can be found at **www.epa.gov/epaoswer/general/orientat/rom4.pdf**

RCRA Enforcement Authorities

RCRA has several cleanup enforcement authorities available to compel cleanup, both at RCRA-regulated treatment, storage, and disposal facilities as well as any place where RCRA solid waste has been handled that has created an imminent and substantial endangerment. Cleanup enforcement under RCRA generally means that EPA, or the authorized state, closely monitors the hazardous waste handler (e.g., generator, transporter, and TSDF) activities, provides compliance incentives and assistance, and takes legal action when a facility does not comply with the regulation. Facility inspections by federal and state officials are the primary tool for monitoring compliance.

The federal RCRA cleanup enforcement authorities listed below can be valuable tools for accomplishing cleanup of a contaminated watershed:

- ***RCRA Section 3013.*** EPA has the authority to issue an order requiring the owner or operator of a RCRA hazardous waste TSDF to conduct monitoring, testing, analysis, and reporting to ascertain the nature and extent of a hazard.
- ***RCRA Section 3007.*** Allows EPA to request information regarding hazardous waste practices and events at a facility and to gain access to a facility to collect waste samples.
- ***RCRA Section 3008(a).*** EPA uses its general RCRA enforcement authority to compel compliance with any violation of Subtitle C, as well as to assess penalties.
- ***RCRA Section 3008(h).*** Allows EPA to issue an order requiring corrective action at an interim status facility when there is evidence of a release of a hazardous waste or a hazardous constituent into the environment.
- ***RCRA Section 7003.*** EPA uses this authority to address situations that may present an imminent and substantial endangerment. It is important to note that Section 7003 applies to the management of any solid waste that may present an imminent and substantial endangerment, not merely RCRA hazardous wastes.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA, frequently referred to as Superfund, provides federal authority to respond to releases or threatened releases in the environment of "hazardous substances" or "pollutants or contaminants" that may present an "imminent and substantial threat" to human health and the environment. While both CERCLA and RCRA address land contamination and have overlapping provisions, their underlying focus is different. CERCLA is a response program designed to remedy poorly made past waste management decisions wherever contamination has come to be located, whereas the RCRA waste management standards comprise a largely regulatory, prescriptive set of rules that are gen-

erally applicable to operating facilities and are designed to prevent such mistakes in the present and future.

The NCP provides the framework for response to releases and threatened releases of hazardous substances, pollutants, and contaminants under CERCLA as well as oil and hazardous substances under the CWA, 40 CFR Part 300.

Several important terms are common to all aspects of CERCLA.

> ***Hazardous substances:*** A "hazardous substance" under CERCLA is any substance that has been designated under specific sections of several other federal environmental statutes, including the Clean Air Act (CAA) (Section 112 toxics), the CWA (Section 1317(a) toxic pollutants), the Toxic Substances Control Act (TSCA) (Section 2606 imminently hazardous chemical), and any RCRA hazardous waste. In addition, EPA may designate additional substances as hazardous substances under CERCLA. Hazardous substances under CERCLA do not include "petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance." EPA maintains a list of hazardous substances at 40 C.F.R. Part 302.
>
> ***Pollutant or contaminant:*** The phrase "pollutant or contaminant" is broadly defined under CERCLA to include essentially any substance that may cause "death, disease, behavioral abnormalities, cancer," or other physical injuries. Petroleum products are also excluded from the definition of "pollutants or contaminants." Although broader than "hazardous substances," "pollutants or contaminants" are generally not subject to EPA's enforcement authorities under Sections 106 and 107.
>
> ***Release:*** The term "release" is also defined broadly under CERCLA to include "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment."
>
> ***Facility:*** The term "facility" under CERCLA essentially means any place where a hazardous substance, pollutant or contaminant has come to be located.
>
> ***Environment:*** The term "environment" under CERCLA includes surface water, ground water, land surface or subsurface strata, or ambient air, as well as the navigable waters and ocean waters within the United States or under jurisdiction of the United States.

The release or threatened release of hazardous substances, pollutants, or contaminants can be determined in several ways: notification of EPA by a state or local government, or a private party, as well EPA's own efforts. The five basic steps in the CERCLA response process include: discovery or notification, assessment, response alternative consideration, cleanup decision, cleanup, and closeout.

CERCLA cleanups may be performed by EPA, other federal agencies, states, innocent parties, or parties responsible for the contamination. However, only EPA is authorized to spend CERCLA funds. Additionally, CERCLA bars the expenditure of CERCLA remedial action funds on federal facilities. EPA first tries to get responsible parties to undertake response work themselves, either through consensual agreements or by taking other enforcement actions. If necessary, EPA will perform response actions and seek cost recovery from those responsible for the release.

EPA's CERCLA activities includes the ***removal program***, which generally responds to immediate, short-term threats; the ***site assessment program***, which considers whether a particular site should be placed on the NPL comprising the nation's most serious sites; and the ***remedial program***, which addresses NPL sites and governs the necessary assessment, planning, and response actions. The following discussion also addresses CERCLA enforcement issues, federal facilities and EPA's involvement with natural resources damage assessments and restoration.

CERCLA Removal Program

The Removal program responds to situations where a release or threatened release of a hazardous substance poses an immediate, unacceptable threat to the public health or environment. Removal actions are often short-term federal responses to prevent, minimize, or mitigate the effects of hazardous substances, pollutants, or contaminants that have been released into the environment, or where there is a substantial threat of a release. Removal actions may be conducted at non-NPL sites or in conjunction with the remedial program at an NPL site. Removal actions may include, for example, stabilization of an impoundment, removal of sediment hotspots, installation of a security fence, or removal of drums and transportation to a RCRA TSDF.

A CERCLA removal may be conducted during any step of the response process at an NPL site, as well as at non-NPL sites. In most cases, an on-scene coordinator (OSC) designated by the lead agency (generally EPA at privately-owned sites; the relevant federal agency at federally-owned facilities) directs a removal action, and the work is done by emergency response contractors. When a removal takes place at an NPL site, it may be directed by a remedial project manager and performed by remedial contractors.

EPA differentiates among three types of removal actions depending on the urgency of the situation. The type of removal action at issue can also affect who conducts or otherwise supervises the response. All removal actions require preparation of an "action memorandum," which documents the basis for taking the action.

- A *classic emergency* requires actions within minutes or hours of discovery. Actions are taken under the authority of the NCP and with the guidance of Regional and Area Contingency Plans to take the necessary actions to ensure an efficient, coordinated, and effective response to discharges of hazardous substances. The Superfund Emergency Response program maintains a response system ready for virtually any emergency wherever it occurs. EPA may undertake (or supervise) emergency removal actions at privately owned sites, and on lands owned by federal land managers (FLM) [FLMs such as DOI or USDA]. The Department of Defense (DoD) and DOE undertake emergency removal actions on their lands.
- A *time-critical removal action* (TCRA) may be done if less than six months are available before site activities must be initiated to protect human health. A removal assessment is performed and alternatives to correct the problem are considered. EPA may undertake (or supervise) TCRAs at privately owned sites. The FLMs, DoD, and DOE undertake emergency removal actions on their lands.
- A *non-time-critical removal action* (NTCRA) is generally called for if greater than six months are available before site activities must be initiated. A removal assessment is performed to determine the extent and nature of contamination, and an EE/CA is prepared to document site characteristics, identify removal action objectives, identify applicable or relevant and appropriate requirements (ARARs), identify and analyze potential removal action alternatives, and provide a recommended removal action alternative. After public comment, the removal action is selected and performed. EPA undertakes (or supervises) NTCRAs at privately owned sites. The FLMs, DoD, and DOE undertake NTCRAs on their lands.

CERCLA Site Assessment Program

The CERCLA Site Assessment program conducts screening investigations to evaluate potential threats to human health and the environment associated with a specific site. The program helps identify and prioritize sites that should be on the NPL. The following site assessment steps are taken prior to NPL listing:

1. ***Site Identification or Discovery.*** Sites may be discovered by anyone, but are frequently identified by concerned citizens who call the local or state health department or EPA to report a release (or the threat of a release) of a hazardous substance to the environment. Once identi-

fied, EPA enters the site into the CERCLA Information System (CERCLIS) database that tracks all sites investigated using funds from CERCLA.

2. ***Preliminary Assessment (PA).*** The PA is a limited-scope investigation in which available information about a site and its surrounding area is compiled. The PA is designed to distinguish between sites that pose little or no threat to human health and the environment and sites that may require further investigation. If the PA results in a recommendation for further investigation, an SI is performed.

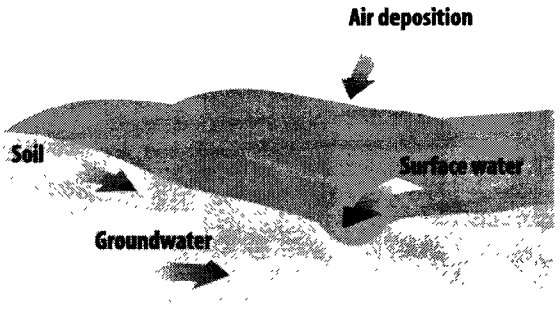
3. ***Site Inspection (SI).*** The SI involves collecting on-site characterization samples and off-site ground water, surface water/sediments, soil, air, or fish tissue samples to determine if substances at the site are being released to the environment, and to assess if they pose a threat to nearby targets (such as water intakes). The SI can be conducted in one stage or two. The first stage, or focused SI, tests hypotheses developed during the PA and can yield information sufficient to prepare an Hazardous Ranking System (HRS) scoring package. If further information is necessary to document an HRS score, an expanded SI is conducted. To save time and money, the PA and SI phases may be completed at once. Often states are funded by EPA to undertake PAs and SIs.

There are three mechanisms for placing sites on the NPL:

1. EPA's HRS.
2. Each State or Territory may designate one top priority site regardless of score.
3. The third mechanism allows listing a site if it meets all three of these requirements:
   - The Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Public Health Service has issued a health advisory that recommends removing people from the site.
   - EPA determines the site poses a significant threat to public health.
   - EPA anticipates it will be more cost effective to use its remedial authority (available only at NPL sites) than to use its emergency removal authority to respond to the site.

4. ***Hazard Ranking System Scoring.*** The HRS is a numerical screening system used to prioritize sites for listing on the basis of data from the PA and SI and that is used to decide which sites should be proposed for inclusion on the NPL. Scoring is done using three factors related to risk and four pathways of exposure. The three risk factors are likelihood of release, characteristics of the waste, and the people or sensitive environments affected by the release. To determine an HRS score for a site, EPA looks at migration pathways—how contamination moves in the environment. EPA examines four migration pathways:

   - **Ground water** that may be used for drinking water
   - **Surface water** (like rivers and lakes) used for drinking water and for plant and animal habitats
   - **Soil** that people may come in contact with or that can be absorbed lower in the food chain
   - **Air** that carries contaminants



A site can score high on the HRS even if only one pathway score is high. Sites with a preliminary HRS score of 28.50 or greater are eligible for listing on the NPL. Sites ranking high enough on the HRS may then be proposed by EPA for listing on the NPL. Each state may also nominate a site for the NPL. Contaminated sites placed on the NPL may require long-term response under the CERCLA Remedial program. Note that not all sites with a preliminary HRS score of 28.50 or above will be placed on the NPL.

HRS scores do not determine the priority for funding of remedial investigations, because the information collected to develop HRS scores is not sufficient to determine either the extent of contamination or the appropriate response (if any) for a site. Moreover, the sites with the highest scores do

not necessarily come to the EPA's attention first. EPA relies on more detailed studies in the RI/feasibility study (FS) which typically follows listing.

NPL sites may be as small as a few thousand square feet or thousands of acres. Some are complex and highly contaminated, requiring many years to fully study the problem, to develop a remedy, and to complete the cleanup.

CERCLA Remedial Program

Once a site is listed on the NPL, the EPA remedial program (or the responsible party with oversight by EPA), conducts a RI/FS to define the extent of contamination, estimate the risk to human health and the environment, and evaluate effective remedial alternatives to address the problem. Federal agencies conduct their own RI/FSs at facilities under their jurisdiction, custody, or control. A ROD is prepared describing the selected action to clean up the site and documenting the remedy selection decision. The remedial action is undertaken, according to the remedial design. Long-term operations and maintenance (O&M) are conducted as necessary. After cleanup is complete, at all sites at which hazardous substances remain at levels that do not allow for unrestricted use and unlimited exposure, EPA is required to review the remedy every five years to ensure the remedy remains protective.

The CERCLA Process

1. ***Remedial Investigation/Feasibility Study.*** The RI is conducted to determine the risk to human health and the environment posed by the site and to gain information required to evaluate the feasibility of remedial alternatives. The RI/FS generally includes baseline risk assessments (human health and ecological), hydrologic studies, ground water studies, treatability studies, and any other studies required to determine site conditions, threats to human health and the environment, and determine appropriate and cost effective actions to clean up the site. The short- and long-term aspects of three criteria (i.e., effectiveness, implementability, cost), will guide the development and screening of alternatives as appropriate. Alternatives that remain after the initial screening must undergo a detailed analysis that consists of an assessment of individual alternatives against each of nine evaluation criteria. The RI/FS considers all ARARs.
2. ***Proposed Plan (PP).*** The lead federal agency under CERCLA (EPA at privately owned sites or the FLM, DoD, or DOE at sites under their jurisdiction, custody, or control) issues a PP, summarizing the RI and FS and presenting a recommended alternative. The public (including potentially responsible parties— PRPs) is given 30 days to comment on PPs, which is extended upon request or an additional 30 days.
3. ***Record of Decision.*** On the basis of the findings of the RI/FS, a decision is made concerning actions that will be taken to protect human health and the environment. The ROD explains the selection of the final remedy by documenting all relevant facts, analyses, and policy considerations.
4. ***Remedial Design/Remedial Action.*** The selected remedy is designed, normally by the potentially responsible party, and then submitted to EPA for approval. The remedy is implemented/constructed according to the selected remedial design. The remedial design and remedial action may be financed and performed by the PRP and/or EPA.
5. ***Maintenance/Monitoring.*** The remedy is maintained for as long as is deemed necessary for protection of human health and the environment. Routine monitoring is conducted to ensure the remedy is operating according to plan and that risks are being reduced.
6. ***Five-Year Reviews.*** Where hazardous substances are left at a site at levels that do not allow unrestricted use of the property, CERCLA requires that the remedy be evaluated no less often than every 5 years to determine its effectiveness and to determine if it continues to be protective of human health and the environment. The community is encouraged to provide input, and the results are presented to the public.

CERCLA Enforcement Authorities

A key element of CERCLA is its emphasis on enforcement. CERCLA provides EPA with enforcement authorities to get PRPs to implement removal or remedial actions at sites, either through consensual settlements or unilateral enforcement orders. CERCLA also provides EPA (as well as state and local governments and even private parties) the authority to seek reimbursement of its costs from PRPs. EPA's guiding philosophy in implementing the Superfund program is to pursue "enforcement first" throughout the process. In this way, EPA seeks to compel those who are responsible for hazardous waste sites to undertake the cleanup and to conserve the resources of the trust fund for those sites where no PRPs can be found.

Under CERCLA, a person (which can include a corporation, a governmental entity, and a variety of other organizations, as well as individuals) can be liable for response costs where:

- There is a release or a threatened release of a hazardous substance from a facility into the environment that causes incurrence of response costs, and
- The person is included in at least one class of PRPs

Section 107(a) of CERCLA identified four categories of PRPs:

- ***Current owners or operators of a site.*** As passed in 1980, CERCLA imposed potential liability on virtually any current owner of contaminated property. In 2002, Congress passed amendments to CERCLA that, among other provisions, allowed those who acquired property after January 11, 2002, and who met and maintained certain conditions (exercised due diligence before acquiring the property, and cooperated with government cleanup agencies after acquisition, etc.) to avoid liability. Such parties are termed "bona fide prospective purchasers" (BFPPs).
- ***Former owners or operators of a site at the time of disposal.*** Courts have differed as to whether passive migration during one's ownership of a site constitutes "disposal."
- ***Those who arranged for disposal.*** "Generators" are by far the largest category of PRPs, and can include virtually anyone who participated in the chain of disposal of hazardous substances, from the business that generated the wastes, the hauler who removed them, and the site owner or operator that moved them around at the site.
- ***Transporters that selected disposal sites.*** Includes transporters who also substantially participated in the selection of a disposal site.

CERCLA provides EPA with multiple authorities to achieve cleanup and payment for cleanup. Table 2-2 lists those most commonly used.

Table 2-2. Most Commonly used CERCLA Enforcement Authorities

CERCLA	Enforcement Authority
Section 104	While much of Section 104 addresses the President's authority to take removal and remedial actions, Section 104(e) authorizes EPA to gather information and get access to a site from others and assess penalties for noncompliance.
Section 106	EPA can order, or ask a court to order, PRPs to clean up a site or take other necessary response action when an imminent or substantial endangerment may exist at a site. This section also authorizes penalties for failure to comply with such orders and sets forth procedures whereby a PRP that complies with such an order, yet believes it is not exclusively responsible for the contamination, can seek reimbursement from the CERCLA Trust fund.
Section 107	Commonly referred to as EPA's cost recovery authority, this section describes the four categories of PRPs from whom EPA (and other parties) can recover cleanup costs. This section (in conjunction with other provisions of CERCLA) also describes certain defenses and exemptions to liability, including the BFPP provisions.
Section 120	Provides that federal facilities must achieve the same degree of cleanup as private facilities, and sets forth the requirements and procedures under which EPA and/or the states supervise such cleanups.
Section 122	Sets forth procedures whereby EPA can negotiate cleanup agreements with PRPs.

Federal Facility Issues

Watersheds typically contain land owned by a variety of private and public owners. EPA's role under CERCLA varies depending on who owns the land. On privately-owned lands, EPA undertakes or supervises all response actions. EPA shares CERCLA response authority with the FLMs on land owned by FLMs. Specifically, EPA has CERCLA emergency removal authority on such lands, while the FLMs have nonemergency removal and remedial CERCLA authority. (Note that on federal lands not on the NPL, the state, not EPA, is typically the lead regulator.) The DoD and the DOE have all removal and remedial response authority under CERCLA, and EPA's involvement typically is limited to oversight of cleanups of such that are on the NPL. (Note that EPA can use authorities other than CERCLA, such as RCRA and the SDWA, to compel DoD and DOE to undertake cleanups on their lands.)

Federal facilities, particularly those belonging to DoD and DOE, often pose challenging cleanup issues because of their broad range of contaminants, facility size, and reuse requirements. CERCLA generally bars the spending of Superfund money on the cleanup of federal lands, so funding must come from DoD, DOE, and FLM appropriations. Increasingly, FLMs are taking enforcement actions themselves under CERCLA. CERCLA Section 120(a) does provide that federal facilities are subject to, and must comply with, CERCLA in the same manner and to the same extent, both procedurally and substantively, as any nongovernmental entity. Mixed ownership sites (part federal land, part private ownership), often found in watersheds, provide opportunities for EPA and the FLMs to develop creative working relationships. A memorandum of understanding (MOU) may be used, but is not required, to define specific roles and responsibilities. Because many federal facilities are also subject to RCRA regulations, a Federal RCRA/CERCLA Coordination Policy was developed to eliminate duplicative efforts to meet regulatory requirements.

Further information about the cleanup of federal facilities can be found at EPA's Federal Facilities Restoration and Reuse office, **www.epa.gov/swerffrr**, and **www.fedcenter.gov**. *The Yellow Book: Guide to Environmental Enforcement and Compliance at Federal Facilities*, EPA 315-B-98-011 (Feb. 1999), offers a comprehensive summary of the principal federal environmental statutes, and how they apply at federal facilities. (Available at **www.epa.gov/swerffrr/pdf/yellowbk.pdf**.)

Natural Resource Issues

By Executive Order 12580 and the NCP, the President has designated the Secretaries of Defense, Interior, Commerce, Agriculture, and Energy as Natural Resource Trustees (Trustees) for various federal natural resources. Trust resources that are assigned to each Trustee are identified in Table 2-3. State Trustees are assigned by the state governor for state resources and are typically the directors of state departments having related responsibilities (i.e., health, environmental protection, natural resources, parks and recreation). States commonly have more than one Trustee. Trustees for tribal lands are the tribal chair or his/her designee.

Under CERCLA, if Natural Resources Trustees determine that remedial or removal actions are insufficient to restore the natural resources injured by releases from a Superfund site or if use of the resource is lost or curtailed, the Trustees may seek to collect damages from CERCLA responsible parties. Damages may be assessed against a responsible party, but Superfund money may not be used for restoration. Executive Order 13112, February 3, 1999, does support alternative, beneficial approaches using native species for required revegetation as part of the overall remediation at some sites. NRDA is the responsibility of Natural Resource Trustees, not EPA; however, CERCLA and the NCP require that EPA notify and coordinate with Trustees throughout the Superfund process. Because it relates to both CERCLA and the CWA, the NRDA process is described in more detail below.

Additional support for CERCLA assessment and cleanup is available from a variety of agencies, including: USACE, U.S. Coast Guard Strike Force, USFS, DOI (USFWS, U. S. Bureau of Reclamation [BOR], BLM), Department of Labor, and Natural Resource Trustees.

Natural Resource Damage Assessment

Watersheds often include lands held in trust for use by the public. CERCLA and OPA (passed as amendments to the CWA) allow Natural Resource Trustees to assess injuries to such public natural resources, determine damages, and require responsible parties (CERCLA PRPs) to provide for restoration of resources injured due to the release of oil and hazardous substances. Natural resources are broadly defined to include "land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources." The statutes recognize that when oil or hazardous substances (the term does not include pollutants or other contaminants) enter the environment, they may harm natural resources, reduce the public's use or enjoyment of them, or degrade an ecological function that they provide. When the changes to the resource are adverse and measurable, the affected resource is said to be injured. Injury to natural resources serves as the basis for a damage claim under CERCLA and OPA.

NRDA may be performed by Trustees concurrently with other CERCLA actions, including emergency response, removal, PA/SI, and remedial actions, though this is not always the case in practice. Although EPA guidance encourages NRDA activities to occur concurrently with CERCLA or OPA response actions, NRDA can begin after remedial action is underway, or even complete. Additionally, Trustees may pursue compensation for injuries to natural resources even if they are not going to be addressed by CERCLA or OPA response actions. For sites located where cross-programmatic watershed cleanup may be implemented, NRDA may be coordinated with other aspects of watershed assessment and cleanup.

Table 2-3. Federal Natural Resource Trustees

Trustee	Resources
Department of Interior (DOI) Fish & Wildlife Service (USFWS) Bureau of Land Management (BLM) Bureau of Reclamation (BOR) Bureau of Indian Affairs (BIA) Bureau of Mines (BOM) Minerals Management Service National Park Service (NPS) U.S. Geological Survey (USGS)	• Certain anadromous fish (fish that spend a portion of their lifetime in both fresh and salt water, e.g., salmon). • Certain endangered species • Certain marine mammals • Federally owned minerals • Migratory birds • National Wildlife Refuges and Fish Hatcheries • National Parks and Monuments • Tribal resources, in cases where the United States acts on behalf of the Indian Tribe
Department of Agriculture (USDA) Forest Service (USFS)	• Federal rangeland • Federally managed fisheries • Federally owned or managed farmland • Land enrolled in the Wetlands Reserve Program • National forest land
Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA)	• Coastal environments, including salt marshes, tidal flats, estuaries, or other tidal wetlands • Designated Estuarine Research Reserves or Marine Sanctuaries • Endangered marine species • Marine mammals • Rivers or tributaries to rivers which historically support or presently support anadromous fish (For cases involving resources in coastal waters and anadromous fish streams, DOC acts as a co-Trustee with the Department of the Interior.)
Department of Defense (DoD)	• Lands owned by DoD or the Army, Navy, Air Force, and Defense Logistics Agency. These lands include military bases, training facilities, research and development facilities, and munitions plants. May share responsibility with other federal trustees.
Department of Energy (DOE)	• DOE's land-holdings include national research and development laboratories, facilities, and offices. May share responsibility with other federal trustees.

NRDA is described at 43 CFR 11, and additional information is available at **www.epa.gov/superfund/programs/nrd**. The elements of a NRDA include the following:

1. ***Preassessment Screen.*** Readily available data is reviewed to determine whether a release justifies a NRDA. Five questions must be answered affirmatively to proceed with an NRDA:
   - Has a discharge of oil or a release of a hazardous substance occurred?
   - Have natural resources for which the federal or state agency or tribe may assert trusteeship under CERCLA been, or are they likely to be, adversely affected by the discharge or release?
   - Is the quantity and concentration of the discharged oil or released hazardous substance sufficient to potentially cause injury to those natural resources?
   - Is data sufficient to pursue an assessment readily available or likely to be obtained at reasonable cost?
   - Will response actions, if any, not sufficiently remedy the injury to natural resources without further action?
2. ***Assessment Plan.*** Planning, coordination, and involvement of the public, PRPs, and Trustees are used to identify and document the methodologies that will be used in the assessment. A preliminary estimate of damages and a Restoration and Compensation Determination Plan are developed to ensure that assessment costs are reasonable compared to the estimated damage.
3. ***Assessment.*** Actual damage assessment is performed in three steps: Injury Determination, Quantification of Service Effects, and Damage Determination. The Injury Determination establishes that the resource has been injured as the result of a hazardous substance release. The Quantification of Service Effects quantifies the reduction in natural resource services resulting from the injuries attributed to the hazardous substance release. The Damage Determination values the natural resource damages as the sum of restoration costs, diminution in value of natural resource services between the release and restoration, and damage assessment costs.
4. ***Post-Assessment.*** An assessment report is prepared, the claim for damages is presented to responsible parties, and a restoration account is set up with the damage payment. A restoration plan is prepared documenting actions that will be taken to restore, rehabilitate, replace, or acquire equivalent resources and how the loss of services will be addressed consistent with the damage award.

Similar regulations (15 CFR 990) have been prepared by NOAA for NRDAs related to coastal releases of oil and hazardous materials under the CWA, OPA, CERCLA, and the National Marine Sanctuaries Act. The NOAA NRDA is performed in three steps:

1. ***Preliminary Assessment.*** The Trustees determine whether injury to public trust resources has occurred. Their work includes collecting time-sensitive data and reviewing scientific literature about the released substance and its impact on trust resources to determine the extent and severity of injury. If resources are injured, Trustees proceed to the next step.
2. ***Injury Assessment/Restoration Planning.*** Trustees quantify injuries and identify possible restoration projects. Economic and scientific studies assess the injuries to natural resources and the loss of services. These studies are also used to develop a restoration plan that outlines alternative approaches to speed the recovery of injured resources and compensate for their loss or impairment from the time of injury to recover.
3. ***Restoration Implementation.*** The final step is to implement restoration and monitor its effectiveness. Trustees work with the public to select and implement restoration projects. Examples of restoration include replanting wetlands, improving fishing access sites, and restoring salmon streams. The responsible party pays the costs of assessment and restoration and is often a key participant in implementing the restoration.

Brownfields

EPA's Brownfields Program is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields. The program began as an administrative effort within the CERCLA program and was then formalized under the Small Business Liability Relief and Brownfields Revitalization Act, (Public Law 107-118), enacted as amendments to CERCLA in 2002. EPA's Brownfields Program provides financial and technical assistance for brownfields activities through an approach based on four main goals: protecting the environment, promoting partnerships, strengthening the marketplace, and sustaining reuse.

The law defines a Brownfields site as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." The term includes abandoned, idled, or underused industrial or commercial facilities, agricultural and residential land, among other types of uses, but does not apply to federal lands, NPL sites, or land subject to enforcement actions or certain response actions under CERCLA or under certain provisions of other federal environmental laws.

The Brownfields process is tailored to the specific end use of the property. Cleanup standards generally are determined according to the expected property use. Property owners may be able to obtain funding from public programs and private banks and institutions. Sampling plans are flexible and dynamic and allow for adjustments in the field. Generally EPA funded Brownfields cleanups go through state cleanup programs. While the Brownfields process is flexible, it includes the following general steps:

1. ***Phase I Site Assessment and Due Diligence.*** Obtain background information to determine the extent of contamination and legal and financial risks.
2. ***Phase II Site Investigation.*** Sample the site to identify the type, quantity, and extent of contamination.
3. ***Evaluate Remedial Options.*** Compile and assess possible remedial alternatives.
4. ***Develop Remedy Implementation Plan.*** Coordinate with stakeholders to design a remedy implementation plan.
5. ***Remedy Implementation.*** Perform necessary actions to reduce health or environmental risk.
6. ***Begin Redevelopment.***

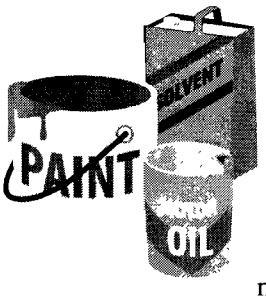
While EPA provides funding opportunities, brownfields investigations and cleanups are typically undertaken by state or local redevelopment agencies or private parties. EPA Brownfields grants are available to eligible entities[5] to perform site assessments, community involvement, cleanup, job training, and workforce development; for capitalization of revolving loan funds; and as state/tribal grants to help in developing Brownfields response programs.

Another program with criteria similar to the Brownfields program is EPA's Superfund Redevelopment Initiative (SRI). As part of the Superfund Redevelopment Program, EPA has developed a pilot program to help local governments participate in the cleanup and reuse of Superfund sites. Reuse of sites is integrated into the Superfund risk assessment and cleanup. Under the pilot program, EPA provides, or seeks to have PRPs provide, up to $100,000 in financial assistance or services to local governments for specified activities to help determine the future use of their sites. This program also encourages partnerships with states, local government agencies, citizen groups, and other federal agencies to restore previously contaminated properties to beneficial use.

[5] e.g., state and local governments

Similarly, RCRA Brownfields Prevention Initiative focuses on RCRA facilities not in full use where there is redevelopment potential but reuse or redevelopment is slowed due to real or perceived concerns about contamination, liability, or RCRA requirements. The initiative has funded projects that illustrate how innovations and reforms under RCRA can reduce barriers to reuse and redevelopment of RCRA Brownfields sites. The RCRA Brownfields Prevention Targeted Site Efforts Initiative provides support to sites where cleanup has been delayed to prevent them from becoming Brownfields sites. Funding is applicable to sites with significant redevelopment potential and limited EPA support to complete the project.

EPA's UST Fields Initiative was created to encourage the cleanup and reuse of abandoned properties contaminated with petroleum from USTs. "UST fields" are abandoned or underused industrial and commercial properties where revitalization is complicated by real or perceived environmental contamination from USTs.



Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) (15 USC 2601 et seq.) was enacted in 1976 to give EPA the authority to track chemicals produced in or imported into the United States. EPA tracks the thousands of new chemicals developed each year and repeatedly screens all chemicals. EPA can require reporting or testing of chemicals that may pose environmental risks or human health hazards and ban the manufacture or importation of any chemicals that may pose unreasonable risks. TSCA supplements the Clean Air Act and Toxics Release Inventory (TRI) under Emergency Planning Community Right-to-Know Act (EPCRA). In addition, TSCA regulations in the United States (40 CFR Part 761) dictate restrictions on the manufacture, sale, use, disposal, import and export of polychlorinated biphenyls (PCBs). TSCA also includes provisions for allowable uses of PCBs.

TSCA regulations establish a concentration-based hierarchy that governs all aspects of PCB use and disposal and dictates specific behaviors that are necessary for compliance. Regulations and policy specify:

- How PCBs may be used, processed, distributed, manufactured, exported, and/or imported
- Acceptable storage and disposal conditions
- Spill cleanup requirements
- Recordkeeping and reporting requirements

EPA is developing policy to clarify the implementation of TSCA's PCB Disposal Regulations at Superfund sediment sites.

Stakeholders

The following stakeholders may be part of the Watershed Cleanup Team.

Federal Government Stakeholders

- EPA
  - Water Programs
  - RCRA
  - Superfund
  - Brownfields
- Natural Resource Trustees (See Table 2-3)
- Land/Resource Management Agencies
  - Department of Interior (BLM, BIA, BOR)

- Department of Agriculture (USFS, Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA))
- Department of Commerce (DOC)

- USACE
- Other federal facilities, including DoD and DOE
- Federally established interstate or international coalitions

Federal agencies may provide regulatory authority and responsibility, financial resources, contracting resources, and scientific resources. Additional federal agencies that provide invaluable resources for watershed assessment and cleanup are presented in Section 3.

State and Tribal Government Stakeholders

State agencies may provide regulatory authority, resources, and technical assistance for watershed planning, assessment, and cleanup.

- Environment Departments (Water, RCRA, State "Mini Superfunds," and other programs)
- Watershed Management Groups
- Water Engineer/Water Authority
- Health Department
- Fish and Wildlife Agency
- Natural Resource Agencies (as designated by state governor/tribal leader)

Local Government Stakeholders

The roles of local government stakeholders will vary depending on the watershed issues and local interest. Roles may include implementation of zoning and land use restrictions, accessing funding, encouraging participation and funding from federal and state agencies, lobbying for action, and establishing special districts for watershed protection or redevelopment.

- Water and Wastewater Districts
- City and County Health/Environment Departments
- City and County Planning Departments
- Soil and Water Conservation Districts
- City and County Officials
- Special Districts (e.g., water allocation agencies)

Nongovernment Stakeholders

A variety of nonregulatory stakeholders may have an interest in and contribute to the watershed cleanup process. Individuals may also be interested in participating in the watershed cleanup process, so citizens should be notified of the watershed effort at key points in the process. The participation of local and nongovernment stakeholders may positively influence funding decisions of state and federal agencies and may attract funding from a wide range of sources.

Community Action Groups

Community action groups have a vital interest in and intimate knowledge of the area. They represent the people who have to live with the problems and solutions and are most concerned about watershed contamination and the issues associated with watershed cleanup. They offer knowledge of local information, community issues, and acceptable and unacceptable alternatives. The most effective community action groups will be balanced and represent a wide range of interests in the community. Organizations with a limited focus or perspective should be represented in the primary watershed group but should not dominate the group. Community action groups may pre-exist the watershed effort or may be formed to directly address the watershed issues.

Industry

Industry associations and individual industries may help develop solutions to common problems. The TMDL program addresses both point and nonpoint sources of pollution, however, the regulatory requirements for implementation falls only on point source dischargers (NPDES permits are required to be consistent with wasteload allocations). These regulated point sources are frequently interested in the development and implementation of TMDLs and can provide significant resources. Revitalized land may also interest various industry groups.

Educational Institutions

Universities can provide assistance for communities in assessment and cleanup of watershed and often have previously undertaken relevant research. Cooperative efforts benefit both the university and the community. Universities can provide a high level of expertise at low cost. University studies are often seen in the community as unbiased. The university benefits from community outreach and opportunities for student education. The university also develops relationships with agencies and is seen as a positive influence on the community. Studies and pilot projects can be performed by students under the guidance of experienced faculty and financed by grants from federal environmental programs, the National Science Foundation, and other sources. Universities can provide expertise in a wide range of areas including but not limited to: study design, sampling, assessment, monitoring, modeling, physical and biological waterbody assessments, volunteer training, mapping, and group facilitation.

Environmental Action Groups

Numerous environmental action groups, such as Trout Unlimited and The Nature Conservancy may have an interest in watershed issues such as habitat and resource management. The groups can be a powerful advocate in lobbying for grants and funding. The listed groups are for illustration only. Many of the groups have local chapters that could partner in the actual watershed effort.

American Rivers is a national conservation organization dedicated to protecting and restoring America's river systems and to fostering a river stewardship ethic. Along with conservation efforts, American Rivers promotes public awareness about the importance of healthy rivers and the threats that face them. American Rivers, Inc. is a nonprofit organization recognized under Internal Revenue Service Tax Code 501(c)(3). Provided by American Rivers. **www.amrivers.org**

The Renewable Natural Resources Foundation (RNRF) is a nonprofit, public, tax-exempt, operating foundation established to advance sciences and public education in renewable natural resources; promote the application of sound, scientific practices in managing and conserving renewable natural resources; foster coordination and cooperation among professional, scientific, and educational organizations having leadership responsibilities for renewable natural resources; and develop a Renewable Natural Resources Center. **www.rnrf.org**

Restore America's Estuaries is a national nonprofit organization established to preserve the nation's network of estuaries by protecting and restoring the lands and waters essential to the richness and diversity of coastal life. Work includes on-the-ground restoration projects and production of collaborative tools and resources to guide the restoration process, including *A National Strategy to Restore Coastal and Estuarine Habitat*, *Funding for Habitat Restoration Projects: A Citizen's Guide*, and *Principles of Estuarine Habitat Restoration*. **www.estuaries.org**

Trout Unlimited is a grassroots network formed to conserve, protect, and restore North America's trout and salmon fisheries and their watersheds. Trout Unlimited promotes coldwater conservation and protects rivers and fisheries. Trout Unlimited accomplishes this mission on local, state, and national levels with an extensive and dedicated volunteer network. The organization employs professionals who testify before Congress, publish a quarterly magazine, intervene in federal legal proceedings, and work with the organization's volunteers to keep them active and involved in conservation issues. **www.tu.org**

The Nature Conservancy focuses on preserving plants, animals, and natural communities by protecting the lands and waters they need to survive. The approach is to identify the highest priority places and protect and manage them to ensure their survival. The Nature Conservancy has five priority conservation initiatives to address the principal threats to conservation at the sites where it works, focusing on fire, climate change, freshwater, marine, and invasive species. The organization promotes conservation and the participation of communities, businesses, governments, partner organizations, indigenous people and communities, and individuals to preserve the world's lands and waters. **http://nature.org**

Other partners may include Ducks Unlimited, the National Association of Service and Conservation Corps, the National Wildlife Federation, the National Audubon Society, and the Wildlife Habitat Council.

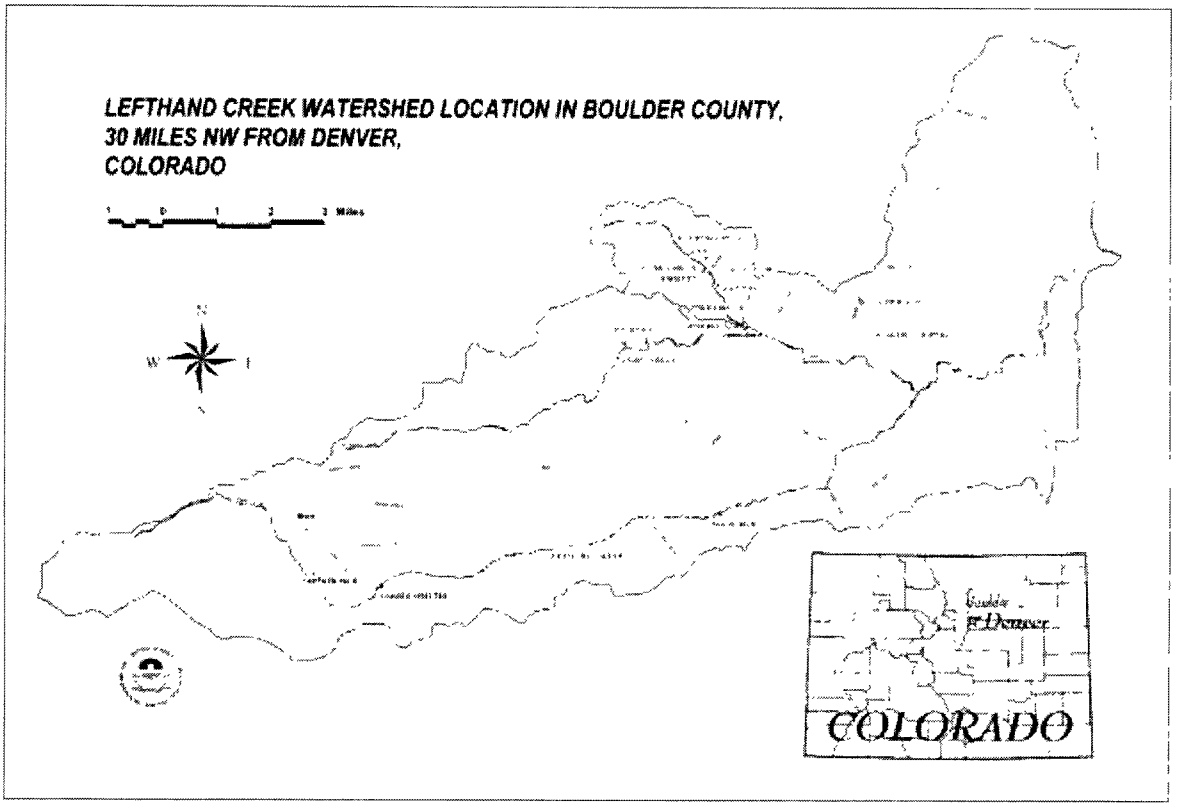
Volunteer Water Monitoring Programs

Data gathered by River Watch volunteers has been used by state water quality agencies, regional planning commissions, local planning commissions, departments of public works, conservation districts, USFS, EPA, and nonprofit conservation agencies. **www.riverwatch.org**

Landowners/Citizens

Landowners have a vested interest in cleanup of their watersheds and can be the best source of information regarding the problems that need to be addressed and solutions that will be effective and acceptable to the community.

Left Hand Watershed, Colorado



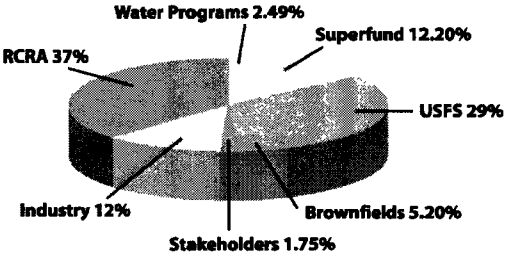
Left Hand Watershed—Problem Identification and First Steps

The Left Hand Watershed encompasses approximately 85 square miles in northcentral Colorado on the east slope of the Front Range of the Rocky Mountains northwest of the city of Boulder. The Left Hand Watershed is listed on the State of Colorado's 1998 303(d) list as impaired for not supporting the aquatic life use classification due to metal contamination from historical mining wastes. In May 2002, the Boulder County Board of Health sent a letter to the Colorado Governor's office requesting support for the NPL designation for the Captain Jack Mill site. The site was listed on the NPL in September 2003.

When approached by the EPA about the possibility of NPL designation for the Golden Age Mining District and the Slide Mine site to fund cleanup activities within the Left Hand watershed outside of the Captain Jack Mill NPL site, the community showed little public support. In response, EPA provided funding to the State of Colorado, which issued a Superfund Block Cooperative Agreement for prelisting activities to the Boulder County Health Department (BCHD) to provide community involvement support and for subcontract work from the Western Center for Environmental Decision-Making, a nonprofit organization. This allowed BCHD to create a community-based task force to explore alternatives to the NPL designation and inform the impacted communities about Superfund and other cleanup options. In 2001, the BCHD facilitated the formation of the Left Hand Watershed Task Force to assess existing environmental and health data related to the watershed, determine if a cleanup action was necessary, and, if necessary, evaluate cleanup options and recommend

the preferred options. EPA's Technical Outreach Services to Communities (TOSC) provided an independent study summary to identify the size and levels of impacts and possible pros and cons of cleanup under Superfund. The 2002 Left Hand Watershed Task Force Report indicated that despite numerous individual studies of the watershed, no comprehensive, systematic study of the entire watershed could conclusively establish the exact extent of potential risks to aquatic life and human health, the potential effects to water quality from a catastrophic storm or similar event, the source(s) of contaminants, or the appropriate remediation strategies to remove contaminants. As a result of the study, the Left Hand Watershed Oversight Group (LWOG) was formed to direct future efforts at cleaning up mine wastes.

Lefthand Watershed Project Funding



Program Integration

The Left Hand Watershed was selected as a pilot project of EPA's One Cleanup program in 2003 on the basis of the potential for cross-programmatic watershed assessment and cleanup. The Left Hand Watershed pilot is a cross-programmatic, multi-agency approach to addressing pollution problems found in a watershed impacted by abandoned mines. The goal of the watershed-based approach was to provide a transparent and efficient cleanup in partnership with the community and local, state, and federal agencies. A TMDL Specialist within EPA's Water Program was assigned as the Program Manager for the cross-programmatic effort. Key contacts were identified, preliminary data was consolidated and mapped, a fact sheet was prepared, and a meeting was held for participants to discuss their interests in the watershed and the resources available to conduct work. Early in the process commitments were obtained to design and coordinate a novel environmental assessment and cleanup program for this watershed, adhering to a specific plan of action that capitalized on the multiple funding mechanisms and program priorities of all participants. The Left Hand Watershed cross-programmatic effort showed an innovative cooperation strategy among EPA program personnel from the CERCLA Remedial, Removal, and Assessment Programs; CWA NPS, and TMDL Programs; SDWA Programs; Brownfields Program; RCRA Program; and the Federal Facilities Program. The initiative also brought together notable non-EPA stakeholder groups including BCHD, University of Colorado (CU), the James Creek Watershed Initiative, Colorado River Watch, Trout Unlimited, USFS Abandoned Mines and Watershed Programs, and USFWS. The coordinated efforts eliminated duplication by combining resources to conduct collaborative watershed-wide characterization activities and feasibility assessment. The results were used to prioritize sources of contaminant loading to the watershed and designate responsibility for implementation of cleanup activities at those sites. The resources identified and used for assessment, cleanup, and community involvement in Left Hand Watershed activities as of May 2005 are shown on the table at the end of this Case Study. Contribution of financial resources is shown in the pie chart above.

Collaborative Assessment and Feasibility Analysis

A collaborative watershed assessment program was implemented to allow multiple agencies and programs to gather data to meet the needs of all stakeholders. The EPA Left Hand Watershed Program Manager worked with state and federal participants to prepare an SAP that incorporated

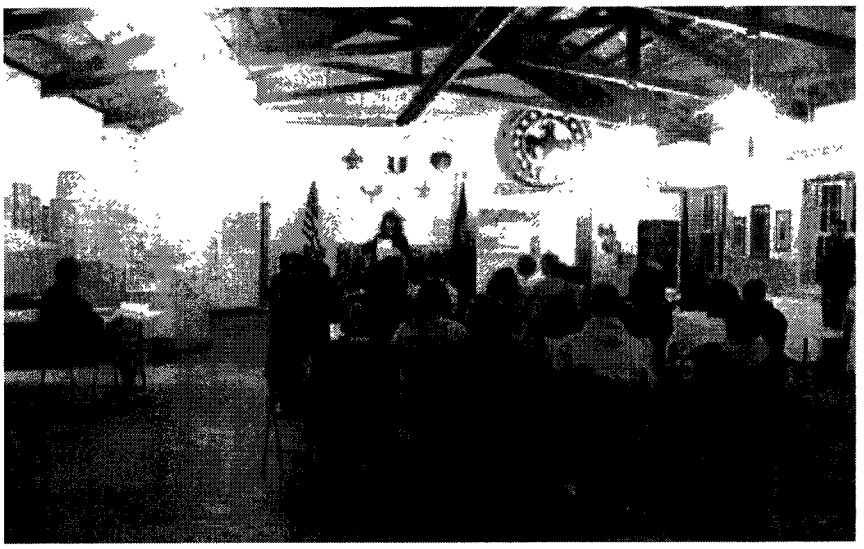
the data quality objectives of all participants and clearly stated the project goals and methods to accomplish those goals. Sampling, equipment, training, and technical resources were identified and participating programs and agencies were assigned specific tasks. Key state and federal program participants worked side by side to perform field sampling, with training and oversight provided by the EPA Region 8 laboratory. The sampling campaign was executed by field teams consisting of 15 people per day for an entire week each season. Analysis for metals was provided by the Superfund Contract Laboratory Program (CLP) contract. The EPA Region 8 lab conducted the analysis for sediment, nutrients, and macroinvertebrates and measured particle size distributions. The Region 8 NPDES program provided a water quality grant to the LWOG and CU for salt-injection studies and macroinvertebrate tissue analysis. The combined stream flow and metals concentration data provided the information needed to calculate metal loads and apportion source contributions for the TMDL. A database with a spatial interface was developed for the project by the Superfund Technical Assessment and Response Team (START) contractor using EPA Site Assessment funding and provided a tool to display data to allow collaborative decision making among the cleanup team. Evaluation of alternatives for cleanup were streamlined by conducting a site-wide feasibility assessment that included surveying and cost estimation of cleanup alternatives for all significant loading sources in the Little James Creek subbasin. The feasibility assessment was funded by the EPA TMDL contract. The results of these efforts were used to prepare program-specific assessments of cleanup alternatives throughout the basin by the Water, CERCLA, and Brownfields Programs.

Leveraged Resources for Remediation, Restoration, and Reuse

Cross program collaboration has expedited and expanded cleanup, restoration, and revitalization within the watershed. This has been most evident in the areas of public participation, assessment, and revitalization. Examples of program coordination in revitalization include the State Voluntary Cleanup Program (VCP) coordination with the TMDL program to design the Burlington Mine remediation using the estimated load reductions required to meet water quality standards. The Brownfields program expanded its Targeted Brownfields Assessment (TBA) support from the initial scope of a single site at the Argo Mine on property purchased by Boulder County for Open Space to include a ground water impact assessment for the entire upper Little James Creek subbasin. The 319 NPS Program provided the community with grants for the development of a watershed management plan and for implementation of NPS controls in the watershed and may be a source of cleanup/implementation funding. A TMDL is being developed for the entire Left Hand Watershed that will identify all significant loading sources in the watershed and quantify load reductions necessary to meet WQS. The combined efforts of EPA and USFS expedited assessment and cleanup planning for the Streamside Tailings and Bueno Mine (mixed private/federal ownership) sites. An MOU between EPA Region 8 and USFS Region 2 was developed for the Left Hand Watershed project to describe the roles each program will play in assessment and cleanup of mixed ownership sites. The MOU will apply to other mixed ownership sites within the regions. One lead agency will be designated for each site, but work will be cooperative unless the agencies prepare an Interagency Agreement to transfer funding for a single agency to perform the cleanup.

Enhanced Community Participation

The BCHD, LWOG, Colorado Department of Health and the Environment (CDPHE), USFS, and EPA's Region 8 have effectively engaged citizens in the affected communities. CERCLA provided support through the TOSC Program and a Technical Assistance Grant (TAG). When the Left Hand Watershed Task Force (LWTF) Report recommendations from the LWTF called for further assessment and remediation under the auspices of the Superfund Captain Jack Mill NPL site, and further assessment using alternatives to Superfund throughout the remainder of the Left Hand Watershed, the agencies worked with the community to determine a plan of action. As part of the additional assessment work, Boulder County Open Space requested a TBA from Colorado's Brownfields program and EPA Region 8 Brownfields program leveraged the State's effort to complete and expand the assessment when resources limited its completion. Colorado River Watch Network contributed



to the effort with ten years of monitoring data, using support from the state's water quality program and Colorado Division of Wildlife. River Watch volunteers perform monthly surface water sampling at 13 sampling locations and annual macroinvertebrate and habitat analysis, allowing a continual picture of watershed health. Public interest spurred the USFS to prioritize funding for this project. The USFS Service proposed the Left Hand Watershed as its priority watershed for the USGS Central Colorado Assessment Project (biological and water chemistry assessment) of the Roosevelt National Forest due, in part, to high community interest in the watershed.

The agencies and programs worked together in public education and participation efforts. For example, program coordinators designed a fact sheet tailored for the Left Hand communities describing the watershed process. The fact sheet was unique in that it did not simply describe the site activity but provided brief descriptions of the various programs, existing and upcoming activities, potential funding opportunities, and key contact information. The fact sheet provided stakeholders with a reference document to simplify the myriad of agencies and programs involved in the watershed.

Well-attended community meetings solicited input regarding sampling design and remediation alternatives from across the various programs. Field training was provided for the multiple sampling events. Community members and water district personnel assisted in all sampling. A critical component of community outreach was education on the various programs involved in the cleanup. This included meetings to explain the ramifications and opportunities related to such programs as Superfund, Brownfields, and TMDL. In addition, a workshop was provided to describe the funding restrictions and opportunities. The LWOG provided suggestions and comments on the sampling plan and site selection and the LWOG coordinator was a participant in all of the planning meetings and has been a great liaison with the community.

Success of Cross-Programmatic Watershed Cleanup

The synchronization of multiple agencies and programs has streamlined complicated interagency boundaries, provided for timely assessments and interpretation of results, investigation of a range of potential remedies, and focus of resources on collaborative cleanup. All the involved programs expanded beyond their typical site/program boundaries to contribute resources to this comprehensive watershed approach. By working together, assessment information will be used across programs rather than being program-specific, which is the more traditional way of doing work at EPA and the state.

Left Hand Watershed Funding

Partner	Assessment/Cleanup Activity	Funds/ Assistance
Water Program Resources		
Regional Geographic Initiative Funds	To University of Colorado for salt-injection study, and macroinvertebrate analysis for high and low flow loading analysis.	$20K
TMDL Contract EPA R8	Little James Creek TMDL (complete). Left Hand Watershed TMDL (in progress). Little James Creek subbasin Feasibility Analysis.	$100K
319 NPS Grant EPA R8	From CDPHE to James Creek Watershed Initiative for CU off-road vehicle recreation study. Phase 1 2001.	$18K
319 NPS Funds CDPHE	James Creek Restoration Project, Phase II. Reclamation of James Creek's riparian corridor.	$66K
319 NPS Base Funds	From CDPHE to Left Hand Watershed Oversight Group for Watershed Management Plan Development	$25K
Water Quality Cooperative Agreement	Water quality monitoring (synoptic sampling) to characterize all source areas and load contributors within watershed.	$20K
Source Water Assessment	CDPHE source water assessment of raw water sources for each public water system.	$10K
CERCLA Resources		
Superfund Block Community Agreement	Grant from CERCLA to CDPHE Hazardous Materials and Waste Management Division to Boulder County for task force to review existing data and make recommendation on NPL listing and alternatives analysis.	$25K
EPA One Cleanup Program	Preparation of a multi-agency, multi-program watershed clean-up manual.	$38K
EPA One Cleanup Program	Watershed wide feasibility analysis offering cleanup options to multiple agencies and programs. (Coordinated with TMDL.)	$38K
CERCLA USFS/EPA	Golden Age, Bueno Mine, and Streamside Tailings Cleanup. Little James Creek Assessment and Feasibility Analysis.	$500K
EPA Region 8 Laboratory	Laboratory analysis. Personnel for water quality, fish tissue, and macroinvertebrate sampling support.	–
CERCLA Remedial	Captain Jack RI/FS. Prior to NPL designation, two SIs were performed.	$780K
CERCLA Remedial EPA R8	CLP sample analysis of surface water, sediment, and fish tissue samples during collaborative sampling events.	$75K
CERCLA Site Assessment	EPA R8 START Contractor for site-wide database with spatial component. Map development.	$35K
CERCLA Site Assessment	To EPA R8 START Contractor for HRS package development for Slide Mine.	$10K
Brownfields Resources		
Targeted Brownfields Assessment	From EPA and CDPHE for surface water and ground water assessment at Argo, Orphan Johnny, and Evening Starr mines (owned by Boulder County Open Space) within the Little James Subbasin.	$30K EPA $10K CDPHE
Brownfields Cleanup Grants and Loans	Boulder County Open Space has applied for a Brownfields Cleanup Grant to perform cleanup on three Open Space properties within the Little James Subbasin.	Application is for $200K per site.

Left Hand Watershed Funding

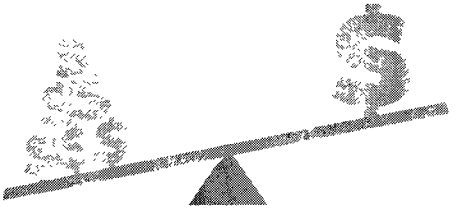
Partner	Assessment/Cleanup Activity	Funds/ Assistance
RCRA Program		
Raytheon	RCRA RFIs, Interim Remedial Measures, ground water sampling, ground water pumping, vapor extraction, and water treatment.	$4.5 Million
DOI Resources		
USFWS, USGS, USFS	Personnel for watershed high and low flow sampling and macroinvertebrate collection and assessment. Loading assessment.	Field support
USFS—Watersheds Program and Volunteer groups	Revegetate off-road vehicle area impacting James Creek east of Castle Gulch. Equipment and supplies were funded by a grant from the Colorado State Parks Off-Highway Vehicle program. Volunteers from four wheel drive groups.	–
USFS—Abandoned Mines Program	EE/CA for Golden Age was completed this year through AML funds. $600K has been designated for cleanup within the Left Hand watershed. Proposed $2.6M. $600K approved as of 5/05.	$600K
USFS—Abandoned Mines	PA/SI and Engineering Evaluation and Cost Analysis (EE/CA) for Fairday Mine. Planned Removal Action Implementation.	$405K
Local/Industry Resources		
Honeywell—Voluntary Cleanup	Voluntary cleanup to prevent water from contacting waste rock at Burlington Mine, Jamestown.	$1.5 million
Left Hand Water District	Mitigate impacts of sediment in James Creek. Support for Watershed Coordinator.	$103.5 K
Stakeholder Matching Funds	From CU Outreach Committee, REU, Honeywell, and in-kind technical advising for water quality assessments.	$53K
Stakeholder Matching Funds	Watershed Management Plan Development ($20K from CDMG, BCHD, LHWD, landowners), Seacrest toxicity study ($30K).	$50K
Stakeholder CU	Study the effect of off-road vehicle recreation. Undergraduate Research Opportunity Grant, NSF Grant. Plus 50 volunteers.	$7K
Colorado River Watch	Monthly volunteer surface water sampling at 13 locations. Annual macroinvertebrate and micro/macro habitat analysis.	–
Colorado Division of Wildlife/ Colorado River Watch	Analysis of monthly surface water samples collected by James Creek Watershed Initiative Stakeholders. Monthly Laboratory metals and TDS analysis of 13 samples. High and low flow nutrient analysis.	–

Resources

Watershed-based cleanups may be accomplished through various funding and other resources available for investigation, cleanup, monitoring, and community involvement. This section presents government funding opportunities available to various stakeholders, applicability of funds, accessing the funds, and project requirements in use of the funds. Additional sources of funding may be available through state programs and government appropriations. A thorough review of grants and other funding available for specific projects should be conducted to determine potential assistance. A summary of assessment and cleanup finanical resources is provided in Table 3-1 at the end of this chapter. One Web site that can assist in finding federal grants for a variety of tasks and grantees is **www.grants.gov**.

This section also presents nonfinancial resources available through government and nongovernmental agencies, such as scientific resources, contracting resources, facility and manpower resources, and analytical resources.

Leveraging Funding



Environmental partnerships enable agencies working together and with communities to face complex environmental challenges on a scale that cannot easily be secured when an environmental program acts alone. Targeting problems at a watershed scale which include reducing the effects of toxic substances on human health and ecosystems often require leveraging resources across programs, agencies, and community-based organization. Most grant programs encourage collaboration and partnerships. Combining multiple external sources for project support can be a very successful strategy. This can result in a "multiplier" effect, as the different funding sources can provide the match for each other. Multiple objective projects are particularly suited to this practice. Reviewers for grant awards often view this strategy favorably, as it also enhances their "leveraging" (getting more for their money). Different funding sources can be used at variety of sites; activities supported by different federal programs at otherwise independent sites within a watershed can be coordinated for the benefit of the entire watershed. Funds should be selected on the basis of project objectives (e.g., wetland creation, education, recreation, stream restoration) with multiple compatible objectives increasing the number of potential sources, and thus potential available funds. Federal sources typically do not allow other federal sources to be used as match. A unique exception are the Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF). The SRFs are made up of federal capitalization grants, state match, loan repayments, interest earnings and leverage bond proceeds. The SRFs allow loans made from funds other than the federal capitalization grants and associated state match to match other federal programs, if allowed by the other federal programs. The following scenario is an illustration of how leveraged funding can work.

Demonstration Scenario: Project for stream restoration with erosion control and wetlands creation and restoration.

Funding opportunities:

1. $3M state revolving fund loan at 4 percent requires $221,000 payment per year for 20 years with no down payment.

2. The $3M is split into three increments:

   - $1M to support a $2M USACE project = $3M
   - $1M to support a $2M Urban Drainage project = $3M
   - $1M to support a $2M state Wetlands Program grant = $3M

This scenario is simplified and hypothetical, but it illustrates how a $3M loan can be leveraged into $9M for a project (or projects). Integration of other objectives or funding sources into this scenario could increase leveraging further. Match requirements can also be fulfilled through in-kind support, which is frequently utilized in 319 Nonpoint Source grants and CERCLA community support funds.

Paying attention to the applicability of funds can also maximize available funding resources. Superfund can only be used to fund cleanups necessary to eliminate unacceptable risks to human health and the environment; they cannot otherwise address ecological restoration activities, such as natural damage claims and riparian corridor restoration. However NPS 319 water program and Natural Resource Damage Assessment (NRDA) funding may support restoration activities that the Superfund program cannot. Put another way, if restoration is an objective of the Watershed Cleanup Team, Superfund dollars could be used for contaminant assessment and remediation, and CWA 319 NPS funding and NRDA funding, if available, could be used to complete restoration. Attempts should be made to coordinate the remediation activities with the restoration goals.

Water Program Funding Resources

Funding is available from EPA and states through EPA's water programs. Loans with advantageous terms can be issued through the Clean Water State Revolving Funds (CWSRFs) or the Drinking Water State Revolving Fund (DWSRF), subject to state priorities and eligibility under the Act. Grants and cooperative agreements are also available. The SRF is a permanent revolving fund to provide loans and other assistance (40 CFR section 35.3115). Because communities must repay SRF loans, the SRF program alone will not generally be useful in funding watershed assessment and cleanup projects. However, communities may use the money borrowed from the SRF as matching funds to meet grant requirements, thus multiplying the value of the funds borrowed. CFDA 66.458. **www.epa.gov/water/funding.html**

Water Program Loans

The Clean Water State Revolving Fund (CWSRF) program is managed largely by the states, and makes loans to communities, municipalities, individuals, citizens groups, and non-profit organizations for high priority water quality activities. Funds are then repaid to CWSRF's over terms as long as twenty years. Funds are typically used to finance large municipal wastewater treatment facilities, but may also be used to help manage NPS pollution, runoff control, wet weather flow control, alternative treatment technologies, and water reuse and conservation projects. Funds may also be used to fund wetlands, estuaries, Brownfields remediation, and Polluted Runoff Abatement projects or implement Comprehensive Coastal Management Plans developed through EPA's National Estuary Program. Brownfield sites that suffer from water quality impairment can use the CWSRF as a powerful financial instrument for planned corrective action.

The list of brownfield projects that may be eligible for CWSRF funding includes, but is not limited to:

- excavation and disposal of underground storage tanks
- constructed wetlands (filtering mechanism)
- capping of wells
- excavation, removal, and disposal of contaminated soil or sediments
- tunnel demolition
- well abandonment
- Phase I, Phase II, and Phase III assessments

Some potential repayment sources include:

- fees paid by developers on other lands
- recreational fees (fishing licenses, entrance fees)
- dedicated portions of local, county, or state taxes or fees
- property owner ability to pay (determined during loan application)
- donations or dues made to nonprofit groups
- stormwater management fees
- wastewater user charges

Loan eligibility and funding priorities vary from state to state. Typical applicants for wastewater and stormwater projects are municipalities and other public organizations, but nonprofit organizations or private entities may also apply for nonpoint source and estuary protection projects. The loans offer advantageous interest rates and repayment periods. States set funding priorities.

The Drinking Water SRF is used to issue loans to communities for drinking water systems improvements. States can customize loan terms to meet the needs of small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water. Loans are available to both publicly and privately owned community water systems, and nonprofit non-community water systems are also eligible for funding. However, some states only allow public facilities in their state to receive funds. Loans made under the program can have interest rates between 0 and market rate and repayment terms of up to 20 years. For communities that qualify for disadvantaged assistance, loans can include principal forgiveness and terms up to 30 years.

Water Program Grants

Research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution are eligible for water program grants. Activities that are not eligible for water program grants are: routine program implementation, implementation of routine water quality protection or restoration measures, regulatory compliance or mitigation, land acquisition, recreational features such as hiking trails, purchase of vehicles, or completion of work which was to have been completed under a prior grant. Region 8 criteria for their Consolidated Funding Process are summarized at the end of this section. Projects are funded from $10,000 to $200,000 with an average of $45,000.

EPA National or Regional priorities, funding levels, current specifications, and review criteria for proposals will be identified in the competitive funding announcements. Applicants should go to www.grants.gov to identify potential competitive funding opportunities for water program fund-

ing. The competitive announcements will identify proposal/application specifications and evaluation criteria.

See the Left Hand Watershed Case Study in Chapter 2 to see examples of grants that have been awarded and the types of work they are funding.

The Water program funding sources listed below are managed differently in the various EPA regions. Because of the regional differences in the management of these funds, a review of regional procedures and priorities should be performed to determine what resources are most useful for a watershed.

Assessment and Watershed Protection Program Grants and Cooperative Agreements (SWA Section 104 (b) (3), CFDA 66.480). The AWPPGs provide eligible applicants an opportunity to carry out projects to develop effective, comprehensive programs for watershed protection, restoration, and management. The projects that eligible applicants can undertake are diverse. Projects should be innovative or demonstrative in design and contribute to overall development and improvement of watershed programs. In the past, award recipients have pursued a wide range of activities, such as developing management tools, advancing scientific and technical tools for protecting watershed health, improving availability of data and information about watersheds, and training watershed managers and the public about watershed management. No cost share or match is required; however, projects with matching funding, in-kind services, or other support are favored.

These grants may not be used solely for the operational support of specific watershed projects, for example, support for the implementation of individual watershed projects or the development of Total Maximum Daily Loads (TMDLs) for specific water bodies (normally funded under Section 106/319 grants) or for in-depth monitoring (beyond traditional volunteer monitoring programs) for individual water bodies. All projects funded through this program must contribute to the overall development and improvement of watershed programs. Project funding ranges from $5,000 to $80,000.

Water Quality Pollution Control Grants. (CWA Section 106) States and interstate agencies are eligible for grants to establish and implement ongoing water pollution control programs. This program takes a watershed protection approach at the state level by looking at water quality problems holistically and targeting the use of limited finances available for effective program management.

Total Maximum Daily Load Program Funds. (CWA Section 104(b)(3), CFDA 66.436) Surveys, Studies, Investigations Grants and Cooperative Agreements for Water Quality Projects) EPA funds are available for projects that lead to the completion of a Total Maximum Daily Load or contribute toward the development of a TMDL or multiple TMDLs. These funds are referred to as "extramural funds" and can be used for contract support, grants to states or tribes, or interagency agreements (IAGs) with other federal agencies (i.e., Forest Service, USGS, USFWS, etc.). State, Tribal, and interstate agencies interested in using these funds may not receive grants for routine TMDL development purposes normally funded with Section 106 or 319 funds. In these cases, projects must be innovative or demonstrative in nature consistent with Section 104(b)(3) of the Clean Water Act. Reuse of contract funds by State, Tribal, or interstate agencies may also be restricted in some cases.

Wetland Program Development Cooperative Agreements and Grants. (Clean Water Act, Section 104(b)(3), as amended; Public Law 92-500; 33 U.S.C. 1254(b)(3), CFDA 66.461) States, tribes, and local governments are eligible for wetlands program grants to aid in developing wetland protection programs. Projects must contribute to the direct protection of wetlands, must result in product/deliverables, should address national and regional priorities, should be consistent with state/tribal/local government wetlands conservation priorities or strategies, and must demonstrate a 25 percent nonfederal match. While grants can be used to build and refine any element of a comprehensive wetland program, priority is currently given to projects that address the four prior-

ity areas identified by EPA: strengthening state/tribal comprehensive wetland programs, developing a comprehensive monitoring and assessment program, improving the effectiveness of compensatory mitigation, and refining the protection of vulnerable wetlands and aquatic resources.

Regional Geographic Initiative. (RGI) (CFDA 66.034, 66.424, 66.436, and 66.716) Most RGI grants are awarded under the authorities under Section 103 (b)(3) of the Clean Air Act or Section 104 (b)(3) of the Clean Water Act and therefore must qualify as a "survey, study, research, investigation, experiment, training, or demonstration." RGI is not a grant program but a pot of funds that the regions receive annually to address high priorities identified each year. The money can be used to fund grants but there are other funding vehicles used for this money (includes funding contracts, etc.). Each region has full authority to determine their own priorities for using this money, there are no set dollar amounts identified for water, watershed, or waste projects. Grants, cooperative agreements, and inter-agency agreements can be made available to state water pollution control agencies, interstate agencies, and other public or nonprofit agencies, institutions, organizations and individuals to fund unique, geographically based projects that fill critical gaps in EPA's ability to protect human health and the environment. RGI projects:

- address places, sectors, or innovative projects
- are based on a regional, state, tribal, or other strategic plan
- address problems that are multimedia in nature or fill a critical gap in the protection of human health and the environment
- demonstrate state, local, or other stakeholder participation
- identify opportunities for leveraging other sources of funding

Projects may receive funding for one or more years, but generally will not receive RGI funds for more than four years. Each EPA Regional Office is responsible for the execution of the RGI program within its states. To obtain information about the availability of funds for a project, contact the appropriate Regional RGI Coordinator.

Source Water Grants. (Safe Drinking Water Act, Section 1442, as amended; Public Law 104-182, CFDA 66.424) may be available on an irregular basis to assist communities in protecting their water sources. Tribes or federal agencies and nonprofit organizations working with tribes are eligible. Source water projects use the results of source water assessment to implement a water protection policy. Funding priorities under 66.424 include but are not limited to: research on the occurrence of contaminants in drinking water, source water protection and treatment methods, measures to protect water quality in the distribution system and at the tap, tribal source water protection program support, tribal operator certification program support, tribal capacity development program support, and assistance to tribes in administration of the Drinking Water Infrastructure Grants health effects associated with drinking water contaminants. There is funding for Tribal Source Water Protection managed by the regions. Tribes should contact their region for more information.

Nonpoint Source Funds. (CWA 319(h)) Section 319 grants are awarded to states and territories (hereinafter referred to as "states") for the purpose of assisting them in implementing NPS management programs. Section 319 grants are awarded to state NPS agencies in two categories: base funds and incremental funds. States may use the "base funds" for the full range of activities addressed in their approved NPS management programs. For example, the funds may be used for protection of unimpaired waters, restoration of impaired waters, education and training, and staffing or support to manage and implement their NPS management programs. In general, States have great flexibility as to how to use these base funds. States must use $100 million of Section 319 funds, referred to as "incremental funds," to develop and implement watershed-based plans that address NPS impairments in watersheds that contain Section 303(d)-listed waters. The watershed-based plan must be designed to achieve the load reductions called for in the NPS TMDL. If a TMDL has not yet been developed, the plan must be designed to reduce NPS pollutant loadings that are

contributing to water quality threats and impairments. Up to 20 percent of the base and incremental funds may be used to develop NPS TMDLs and watershed-based plans to implement NPS TMDLs.

The NPS grant to the state requires a nonfederal match of 40 percent. The federal share of the cost of each management program implemented with federal assistance shall not exceed 60 percent of the cost incurred by the State in implementing such management program and shall be made on the condition that the nonfederal share is provided from nonfederal sources. The nonfederal match can be provided by individuals, organizations, local governments, or state agencies. In-kind donations can also be used for the match—this might involve the use of equipment or space, a donation of time, or volunteer services.

Approved state NPS management programs provide the framework for determining what activities are eligible for funding under Section 319(h). Examples of previously funded projects include: the installation of best management practices (BMPs) to control animal waste from animal feeding operations (not subject to NPDES permit requirements), streambank stabilization and shoreline restoration projects, forest road decommissioning to reduce erosion and sedimentation, basinwide landowner education programs, and wetlands restoration projects. Section 319 funds may also be used to fund abandoned mine land reclamations projects and urban storm water activities that are not specifically required by a draft or final NPDES permit. Additional details regarding these types of projects is given below:

- Updating and refocusing the state NPS Management program and NPS Assessments to improve program effectiveness. States may use up to 20 percent of their base section 319 allocation for this purpose. States should refine their programs to reflect their most pressing needs and highest-priority water quality problems. Activities and analyses that may be funded include establishing indicators and milestones, developing TMDLs and watershed plans, and improving assessment efforts.
- Implementing ground water protection activities. Ground water activities are eligible for section 319 grants if they are identified in the state's NPS Management program, Ground water Protection Strategy, or Comprehensive State Ground water Protection program.
- Funding urban storm water runoff activities if those activities meet the following conditions: (1) the activities are not specifically required by a draft or final NPDES permit, and (2) the activities do not directly implement a draft or final NPDES permit. Activities that might meet the above requirements include technical assistance; monitoring to address implementation strategies; BMPs; information and education programs; technology transfer and training; and development and implementation of regulations, policies, and local ordinances to address storm water runoff.
- Funding abandoned mine land (AML) reclamation projects designed to protect water quality if those activities meet both of the following conditions: (1) the activities are not specifically required by a draft or final NPDES permit, and (2) the activities do not directly implement a draft or final NPDES permit. Activities that might meet the above requirements include remediation of water pollution from abandoned mines or portions of abandoned mines, mapping and planning of remediation, monitoring, technical assistance, information and education programs, technology transfer and training, and development and implementation of policies addressing AMLs.
- Implementing lake protection and restoration activities except for in-lake work such as aquatic macrophyte harvesting or dredging unless the sources of pollution have been addressed sufficiently to ensure that the pollution being remediated will not recur. States are encouraged to use section 319 funding for eligible activities that might have been funded in previous years under CWA section 314 (Clean Lakes Program).

Additional Water Program Support

The Watershed and Water Quality Modeling Technical Support Center provides assistance to EPA regions, state and local governments, and their contractors in the implementation of the CWA. The Center, which is part of EPA's Office of Research and Development (ORD), is committed to providing access to technically defensible tools and approaches that can be used in the development of TMDL, waste load allocations, and watershed protection plans. The Center reaches out to experts throughout EPA and states to bring technical expertise together. **www.epa.gov/athenswwqtsc/index.html**

EPA Central Geographic Information System (GIS) support programs are available in every region and are usually found in EPA regional Information Technology support program. They can provide an array of mapping and GIS support, including aerial photography and satellite images access via TerraServer and GlobeXplorer web services tools within their ArcGIS systems. TerraServer image services includge panchromatic Digital Orthophoto Quads down to one-meter resolution. GlobeXplorer image services include both panchromatic and color images, satellite and aerial photos, down to sub-meter resolution. Both image Web services are currently available to all EPA employees running the ArcGIS software.

The Volunteer Monitoring Program helps volunteer water monitors build awareness of pollution problems, become trained in pollution prevention, help clean up problem sites, provide data for waters that may otherwise be unassessed, and increase the amount of water quality information available to decision makers at all levels of government. Volunteer data provide delineation and characterization of watersheds, screening level assessments for water quality problems, and measure baseline conditions and trends. EPA sponsors national conferences that bring together volunteer organizers and agency representatives, manages a listserve for volunteer monitoring program coordinators, supports a national newsletter for volunteer monitors, maintains a directory of volunteer monitoring programs, and publishes manuals on volunteer monitoring methods and on planning and implementing volunteer programs. Information is available at **http://yosemite.epa.gov/water/volmon.nsf**. Regional EPA offices provide technical assistance related to data quality control, serve as contacts for volunteer programs, manage grants to state agencies that include provision for volunteer water monitoring and public participation, and provide information exchange services for volunteers.

Region 8 2005 Criteria to Assist in Selecting Potential Funding Opportunities for Watershed Projects

Region 8 combines the water program grants under one RFP, called the Consolidated Funding Process (CFP). The description of the funding programs and the review criteria for the 2005 RFP are summarized below. The Region 8 criteria are based on EPA program specific guidelines. The priorities and criteria can vary in each region. Because EPA National and Regional priorities and funding levels may change over time, the current RFP specifications and criteria should be reviewed prior to submission of any proposal.

General requirements for outcomes and outputs are outlined in all RFPs. The 2005 guidelines include the following:

In compliance with EPA Order 5700.7 on environmental results, applicants are required to address outcome and output environmental measurements in their proposals. The term "outcome" means the result, effect or consequence that will occur from carrying out an environmental program or activity. Outcomes may be environmental, behavioral, health-related, or programmatic in nature but must be quantitative. There are two major types of outcomes—end outcomes and intermediate outcomes. End outcomes are the desired end or ultimate results of a project or program. They represent results that lead to environmental or public health improvement. A change in water quality and resultant change in human health or environmental impacts are examples of end outcomes. Intermediate outcomes are outcomes that are expected to lead to end outcomes but are not themselves "ends." For example, for an air pollution project, reductions in emissions may be viewed as an intermediate outcome to measure progress toward meeting or contributing to end outcomes of improved ambient air quality and reduced illness from air pollution.

The term "output" refers to an environmental activity or effort and associated work product that will be produced or provided over a period of time or by a specified date. Outputs may be quantitative or qualitative but must be measurable during the funding period. Examples of outputs include, but are not limited to, the number of stakeholder groups involved in the process, the number of facilities participating in a demonstration, the development of a report or training manual, increased monitoring, the number of workshops or training courses conducted, and the number of people trained.

Description of Funding Programs

There are seven funding programs for which awards are expected to be made under the Region 8 2005 RFP. Each of these programs and their expectations for outcomes and outputs is described below.

- Tribal Source Water Protection: The Source Water Protection program is looking for proposals to complete source water assessments in accordance with EPA guidelines and implement Source Water Protection for public water systems in Indian Country within Region 8. Protection may include addressing sources of existing contamination and/or activities or facilities that pose a threat but do not currently contribute contaminants to either surface or ground water used for public water supply. Note that a complete source water assessment per EPA guidelines includes the following steps: 1) delineation of Source Water Protection Area(s), 2) completion of inventory of potential contaminant sources, 3) susceptibility analysis to determine relative risk to water source posed by inventoried potential contaminant source, and 4) provide a report to the public. Construction activities are not eligible for funding under this program. Match is optional.

- Projects funded under this program support progress towards EPA Strategic Plan Goal 2, Sub-objective 2.1.1 (Water Safe to Drink) and Goal 4, Sub-objective 4.2.1 (Sustain Community Health).

Anticipated outcomes for Tribal Source Water Protection projects include but are not limited to:

- Identification of relative risks to sources of drinking water from potential contaminants
- Heightened awareness to the public, governmental agencies, and private sector regarding the importance of protecting sources of water used for drinking water
- Enhanced coordination, cooperation, and/or development of partnerships, among individuals, governmental agencies, and private sector for protecting sources of public drinking water from identified sources of existing or potential contamination
- Implementation of management measures to prevent, reduce, or eliminate risks from contaminants to drinking water
- Development of contingency planning strategies to deal with water supply contamination or service interruption emergencies

Anticipated outputs for Tribal Source Water Protection projects include but are not limited to:

- Completion of source water assessments that identify relative risks to water sources
- Studies or investigations to further define risks to water sources
- Development of source water protection plans for addressing medium to high risks
- Specialized studies or investigations to further define protection measures
- Development of best management practices to reduce or mitigate risks
- Undertaking non-construction protection measures, including land use practices or controls

Applicants seeking funds for Tribal Source Water Protection must address the general and program-specific criteria in Section V of this solicitation.

- Regional Geographic Initiative (RGI) and Environmental Priorities Program (EPP): RGI and EPP funds support projects that have been identified as a high priority by the Region, States, Tribes, localities, or citizen groups due to high or potentially high human health or ecosystem risk, or due to significant potential for risk reduction or avoidance. Three types of projects will be considered for RGI and EPP funding:

1) Projects that protect and restore water quality on a watershed basis: Projects must contribute directly to the achievement of the watershed and water body restoration measures under this strategic goal (for more information on the strategic goal, refer to EPA's website at http://www.epa.gov/water/waterplan/documents/FY06NPGNarrative.pdf). Projects may contribute to meeting the measures by conducting restoration of impacted waters to achieve measurable improvement, or by improving the States' and/or Tribes' capacity to target, achieve, measure, and report water quality improvement on a watershed basis. Note that RGI and EPP funds cannot be used by States or Tribes to carry out activities that would normally be funded under water quality (Section 106) or non-point source (Section 319) State and Tribal Assistance Grants. Projects funded under this program support progress toward EPA Strategic Plan Goal 4, Sub-objective 4.2.1 (Healthy Communities).

Examples of outcomes for RGI or EPP watershed projects include but are not limited to:

- Implemented Best Management Practices (BMPs) and restoration projects that improve riparian and in-stream physical, chemical, or biological health. Some examples include miles of stream channel restored, miles of riparian vegetative buffer installed, and pounds of pollutant loading reduced or eliminated as a result of improved practices or restoration activities.
- Improved water quality as measured by pre- and post-project monitoring of water chemistry, physical habitat, or biological indicators. EPA recognizes that for most water quality restoration activities, measurable responses in water quality are likely to take longer than the project period.
- Improved capability by a state or tribe to conduct assessment activities that measure effectiveness and environmental results of actions conducted as part of the nonpoint source or other restoration programs, or assistance provided by the state to local partners in measuring environmental results.

Examples of outputs for RGI or EPP watershed projects include but are not limited to:

- A comprehensive characterization of all sources and causes of water quality impairment within a watershed that will allow recipients to develop a restoration plan
- Development of a comprehensive watershed management plan that establishes priority restoration actions needed to address water quality impairments watershed-wide
- A final project report that documents and quantifies BMPs and restoration activities implemented
- Enhanced multi-sector partnerships that are capable of leveraging resources from multiple sources to implement planned restoration actions

Applicants seeking funds from the RGI or EPP programs to protect and restore water quality on a watershed basis must address the general and program specific criteria in Section V of this solicitation.

2) Projects that address community-based air toxics: For air toxics projects, proposals must support and promote the coordination and acceleration of research, investigations, experiments, demonstrations, surveys, and studies relating to local air toxics assessment, reduction, and/or elimination projects; however, priority will be given to proposals where the majority of federal dollars go to education and outreach activities related to air toxics and/or demonstration projects which implement mitigation activities as stated in criteria number 3 on page 20. For more information on EPA's community air toxics program go to the web site www.epa.gov/air/toxicair/community.html. Projects funded under this program support progress toward EPA Strategic Plan Goal 1, Objective 1.1 (Healthier Outdoor Air).

Anticipated outcomes for air toxics projects include but are not limited to:

- Reducing risks from exposure to air pollutants through collaborative action at the local level
- Developing a comprehensive understanding of sources of risk from air toxics and setting priorities for effective action
- Creating multi-faceted partnerships at the local level to improve local air toxics conditions

Anticipated outputs for air toxics projects include but are not limited to:

- Creation of multi-stakeholder partnerships
- Promotion and establishment of multi-stakeholder partnerships/collaborations
- Knowledge of refined risk information on the local level (improved inventories, modeling)

- Understanding of local areas of highest risk
- Localized risk information to supplement the National Air Toxics Assessment
- Integrating efforts to understand mobile, indoor, and stationary sources
- Integrating relevant health information
- Development of federal/state/local capacities in air toxics assessment
- Implementation of air toxics reduction activities
- Development of means to measure results
- Development of outreach and education materials addressing air toxics
- Development and conduct of training courses addressing air toxics

Applicants seeking funds from the RGI or EPP programs to address community-based air toxics must address the general and program specific criteria in Section V of this solicitation.

3) Projects that address non-tribal Source Water Assessment and Protection: The Source Water Protection program is looking for proposals to implement Source Water Protection measures at public water systems in Region 8. Protection may include addressing sources of existing contamination, and/or activities or facilities that pose a threat but do not currently contribute contaminants to either surface or ground water used for public water supply. Construction activities are not eligible for funding under this program. Match is optional. Projects funded under this program support progress toward EPA Strategic Plan Goal 2, Sub-objective 2.1.1 (Water Safe to Drink) and Goal 4, Sub-objective 4.2.1 (Sustain Community Health).

Anticipated outcomes for non-tribal Source Water Protection projects include but are not limited to:

- Heightened awareness of public agencies, governmental agencies, and the private sector of the importance for protecting sources of water used for drinking water
- Enhanced coordination, cooperation, and/or development of partnerships among individuals, governmental agencies, and the private sector for protecting sources of public drinking water from identified sources of existing or potential contamination
- Implementation of management measures to prevent, reduce, or eliminate risks to drinking water
- Development of contingency planning strategies to deal with water supply contamination or service interruption emergencies

Anticipated outputs for non-tribal Source Water Protection projects include but are not limited to:

- Studies or investigations to further define risks to water sources
- Development of source water protection plans for addressing medium to high risks
- Specialized studies or investigations to further define protection measures
- Development of best management practices to reduce or mitigate risks
- Undertaking non-construction protection measures, including land use practices or controls

Applicants seeking funds from the RGI or EPP programs to address non-tribal source water assessment and protection must address the general and program specific criteria in Section V of this solicitation.

- Total Maximum Daily Load (TMDL) Program: This program will evaluate projects for TMDL development for water bodies that have been identified on an EPA-approved Clean Water Act Sec-

tion 303(d) list. States and Tribes that receive Section 106 grant funding are not eligible to receive TMDL grant funding. Projects funded under this program support progress toward EPA Strategic Plan Goal 2 (Clean and Safe Water), Objective 2 (Conserve and Enhance Nation's Waters), Sub-Objective 1 (Restore and Protect Watersheds).

Anticipated outcomes for TMDL projects include but are not limited to:

- Restore and maintain watersheds and their aquatic ecosystems to protect human health and support recreational activities and provide healthy habitat for fish and wildlife
- Improve the quality of water and sediments to allow the safe consumption of fish
- Restore water quality to allow swimming safe from waterborne diseases
- Attain water quality standards in waters previously identified as not attaining standards
- Improve water quality in Indian country
- Reduce levels of phosphorous contamination in rivers, streams, and lakes

Anticipated outputs for TMDL projects include but are not limited to:

- Development of TMDLs necessary to protect and improve water quality on a watershed basis
- Completion of assessments that characterize water quality and pollutant loading in order to identify waters that need TMDLs, or to develop TMDLs for waters already listed on a state Section 303(d) list

Applicants seeking funds from the TMDL program must address the general and program-specific criteria in Section V of this solicitation.

- Wetlands Program Development Grants (WDPG): The Wetlands Program Development Grant program places emphasis on projects that will demonstrate how the use of management, technical, and information tools lead to positive environmental outcomes. The outcomes should be expressed in terms of a goal to document improvement in wetland quantity and quality in specific geographical areas, and across an entire State or Tribal nation. States and Tribes are encouraged to integrate wetland monitoring goals with their existing State and Tribal wetland strategies. Projects that collect environmental data must have an approved Quality Assurance plan and the data must be made available as a part of the existing public databases or lead to the creation of that type of database. Projects from non-governmental entities can be funded, but only as a pass-through grant to the lead wetland coordination agency and must be closely coordinated with them. Therefore, it is strongly recommended that project proposals be routed through the appropriate point of contact prior to being submitted to EPA. See Attachment B for a list of State contacts. EPA will support the local government initiative and Tribal efforts by targeting at least 15% of their Regional allocation to local government and Tribal applications. Tribes are encouraged to submit proposals which involve watershed-based wetlands and stream corridor projects. See Attachment C for a list of Tribal contacts. This supports the EPA's Program Activity Measure (IV-WD-3) as specified in the Fiscal Year 2005 National Water Program Guidance. Projects funded under this program support progress toward EPA Strategic Plan Goal 2, Objective 2.2 (Protect Water Quality).

Anticipated outcomes for WPDG projects include but are not limited to:

- Building capacity at all levels of government to develop and implement effective, comprehensive programs for wetland protection and management
- Developing a comprehensive monitoring and assessment program
- Improving the effectiveness of compensatory mitigation
- Refining the protection of vulnerable wetlands and aquatic resources

(continued)

The anticipated output for WPDG projects includes but is not limited to:

- A final report that includes a summary of the project and a description of progress made toward the outcomes

While WPDGs should be used by recipients to build and refine any element of a regulatory or non-regulatory wetland program, emphasis will be given to funding projects that best meet the general and program-specific criteria in Section V of this solicitation.

- Source Reduction Assistance (Pollution Prevention) Program: The Pollution Prevention Act of 1990 defines "source reduction" to mean any practice that reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal, and reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. Source reduction practices may include equipment or technology modifications, process procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

The term "pollution prevention" means source reduction, as defined under the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water, or other resources or protection of natural resources through conservation.

The applicant will have the flexibility of scaling up prior source reduction or pollution prevention projects to generate greater environmental impact. Projects that have the potential to be scaled up must include activities that align with one of the regional priorities.

Projects relating to ENERGY STAR® and renewable energy, and projects that support the Resource Conservation Challenge would be considered under this funding source. Information about the ENERGY STAR® program can be found at www.energystar.gov and information about the Resource Conservation Challenge can be found at www.epa.gov/rcc.

Projects funded under this program support progress toward the following goals in EPA's Strategic Plan:

- Goal 1, Objective 1.5 (Reduce Greenhouse Gas Intensity)
- Goal 3, Sub-Objective 3.1.1 (Reduce Waste Generation and Increase Recycling)
- Goal 5, Objective 5.2 (Improve Environmental Performance through Pollution Prevention and Innovation)

Examples of outcome-based metrics for pollution prevention include but are not limited to:

- Pounds of pollution reduced
- BTUs of energy conserved
- Carbon reductions
- Pounds of waste reduced, recycled, or put to beneficial use
- Gallons of water saved
- Dollars saved through pollution prevention efforts

Examples of outputs for pollution prevention include but are not limited to:

- Number of stakeholder groups involved in a process
- Number of workshops, training, and courses conducted

Applicants seeking funds from the Source Reduction Assistance program must address the general and program specific criteria in Section V of this solicitation.

- Strategic Agriculture Initiative: The purpose of the Food Quality Protection Act (FQPA) Strategic Agricultural Initiative (SAI) Grant Program is to help implement FQPA and support "transition" efforts by growers to more environmentally-sound pest management practices. The program supports grants for education, extension, demonstration, and implementation projects for FQPA transition and reduced-risk practices for pest management in agriculture. Priority is placed on project proposals that include a "whole systems" approach by integrating pest, soil, and crop management practices; address an array of commodities; focus on sustainable agriculture; incorporate conservation planning; and are submitted by applicants that have a proven track record of grower participation and adoption of sustainable pest management practices. Successful applicants will also have an outreach and extension component to their program. "Sustainable" agriculture refers to farming practices that are environmentally sound, economically viable, and socially responsible. FQPA/SAI funds are not intended to support basic research; however, proposals may include a component for applied on-farm research, as long as they also have demonstration, education, and/or outreach activities. Proposals that maximize the use of resources for "on-the-ground" activities will be viewed more favorably than those proposals with high administrative costs. Measures of success should be linked to reduction of pesticide use/risks, implementation of alternative agricultural practices, and/or similar impacts. For assistance with measuring results of projects, see the SAI Toolbox http://www.aftresearch.org/sai (SAI Grant Applicants, Performance Measures). Projects funded under the Strategic Agriculture Initiative will support progress toward EPA Strategic Plan Goal 4 - Healthy Communities and Ecosystems; Objective 4.1 - Chemical, Organism, and Pesticide Risk; Program/Project 92 - Field Programs.

Anticipated outcomes for Strategic Agriculture projects include but are not limited to:

- Increased number of growers using reduced-risk/IPM tools and techniques
- Quantitative and qualitative benefits to human health, the environment, and communities
- Partnerships between crop producers, EPA, other federal/state/local agencies, and other interested stakeholders to implement reduced-risk/IPM programs and to leverage funds from other sources to increase the scope of the FQPA/SAI program

Anticipated outputs for Strategic Agriculture projects include but are not limited to:

- Educational and outreach materials for growers
- Conservation plans for growers that include reduced-risk pest management
- Conferences, seminars, and on-site field training
- Partnerships established between federal and non-federal programs to provide reduced-risk/IPM programs for crop producers

Applicants seeking funds from the Strategic Agriculture Initiative must address the general and program specific criteria in Section V of this solicitation.

Types of Award Agreements

Awards will be in the form of grants, cooperative agreements, or inter-agency agreements, depending on the source of funds. Inter-agency agreements are made between two federal agencies for projects that meet the needs and interests of both agencies. Grants have minimal EPA oversight. Cooperative agreements permit substantial involvement between the EPA Project Officer and the selected applicants in the performance of the work supported. EPA sees its role as providing training, tools, technical assistance, and other support. Although EPA will negotiate precise terms

and conditions relating to substantial involvement as part of the award process, the anticipated substantial Federal involvement for projects selected may include:

- close monitoring of the recipient's performance;
- collaboration during the performance of the scope of work;
- in accordance with 40 CFR 31.36(g), review of proposed procurements;
- approving qualifications of key personnel (EPA does not have authority to select employees or contractors employed by the recipient);
- review and comment on content of publications (printed or electronic) prepared under the cooperative agreement (the final decision on the content of reports rests with the recipient).

Dollar Range of Awards

The estimated dollar range of awards will be between approximately $10,000 and $200,000 depending on the project type, but we anticipate that most projects awarded will be in the $25,000–$75,000 range.

Eligibility Information

A. Eligible Applicants: The types of entities eligible to receive EPA funding vary according to the requirements of each grant program and CFDA number. Table 1 on page 16 specifies eligible applicants for each of the funding programs and CFDAs included in this solicitation. Note that for most funding programs, private individuals and for-profit organizations are not eligible to apply directly to EPA for funding; however, they may be able to participate in a project voluntarily or through a contract mechanism as described below. The only exception is that individual farmers can apply directly for funding under the Strategic Agriculture Initiative.

B. Eligible Uses of Funds: Regional Geographic Initiative (RGI), Environmental Priorities Program (EPP), and TMDL Program funds may not be used for any activities that the Congress funds from the State and Tribal Assistance Grant (STAG) account. This includes all categorical grant programs, with two exceptions for RGI and EPP and only the second exception for TMDL: 1) These funds may be used for Section 103 Clean Air Act grants, IF the purpose of the project is to conduct investigations, experiments, demonstrations, surveys, studies, and training to support program implementation AND the recipient is either an air pollution control agency or a non-profit organization; 2) These funds may be used for certain activities under Section 104(b)(3) of the Clean Water Act. (Any submissions that fall in this category will be reviewed on a case-by-case basis.)

In general, EPA funds may be used to pay for personnel, fringe benefits, travel expenses, outreach materials, supplies, and equipment (though there are typically limitations on equipment). Awardees cannot use federal funds to purchase land, vehicles, or other capital equipment and cannot use federal funds to lobby or to complete work which was to have been done under a prior grant. Funding may be used to contract for services, provided the recipient follows procurement and sub-award or sub-grant procedures contained in 40 CFR Parts 30 or 31, as applicable. Successful applicants must complete contracts for services and products and conduct cost and price analyses to the extent required by these regulations. The regulations also contain limitations on consultant compensation. Applicants are not required to identify contractors or consultants in their proposal. Moreover, the fact that a successful applicant has named a specific contractor or consultant in the proposal EPA approves does not relieve it of its obligations to comply with competitive procurement requirements. Contracts must follow procurement guidelines.

C. Match Requirements: The Wetlands Program Development Grant (WPDG) program requires a match of 25%. To calculate the appropriate dollar match for WPDG, divide the amount of funds being requested by 3. For example, if you are requesting $100,000 from EPA, divide that by 3 and

(continued)

the match requirement is $33,333. The final match requirement may be reduced for successful Tribal applicants if, upon selection, the proposal is placed in a performance partnership grant (see regulations at 40 CFR 536(c)).

The Source Reduction Assistance program requires a match of 5%. To calculate the appropriate dollar match, divide the amount of EPA funds being requested by .95 for the total, then subtract the requested amount to get the match. For example, $25,000 of EPA funds divided by .95 equals $26,316. Subtract $25,000 from $26,316 and the match required will be $1,316.

For the other five programs listed in this solicitation, match is optional but leveraging funds from other sources will be considered in the evaluation of proposals. See Table 1 for more information on match requirements.

TABLE 1 Description of Funding Programs and Eligibility

Funding Program	[illegible]	[illegible]	Funds Type of Award	Mechanism Eligible Applicants
Tribal Source Water	66.424	Optional	Grant, Cooperative Agreement, or Inter-Agency Agreement	Tribes, institutions of higher ed, community-based environmental and non-profit organizations, federal agencies.[2]
Regional Geographic Initiative (RGI) and Environmental Priorities Program (EPP)	66.436 or 66.034	Optional	Grant, Cooperative Agreement, or Inter-Agency Agreement	States, tribes, local gov., federal agencies, institutions of higher ed, community-based environmental and non-profit organizations.
Total Maximum Daily Load (TMDL)	66.436	Optional	Grant, Cooperative Agreement, Inter-Agency Agreement, or contract support	States, tribes, local gov., non-profits, federal agencies
Wetlands Program Development Grant	66.461	25%	Cooperative Agreement	States, tribes, local gov.
Source Reduction Assistance (Pollution Prevention)	66.717	5%	Grant or Cooperative Agreement	States, tribes, local gov., school dist and higher ed, non-profits, community-based grassroots orgs.
Strategic Agriculture Initiative	66.716	Optional	Grants	States, tribes, local gov., institutions of higher ed, non-profits including commodity groups/associations, farmers groups and individual farmers.

1 The Catalog of Federal Domestic Assistance (CFDA) can be viewed on the Web site http://www.cfda.gov.

2 EPA's 2003-2008 Strategic Plan goals, objectives, and sub-objectives can be viewed on the Web site http://www.epa.gov/ocfo/plan/plan.htm

RCRA Funding Resources

Resources for conducting RCRA assessment and cleanup activities come from business/property owners. RCRA-related Brownfields projects may be funded as described below.

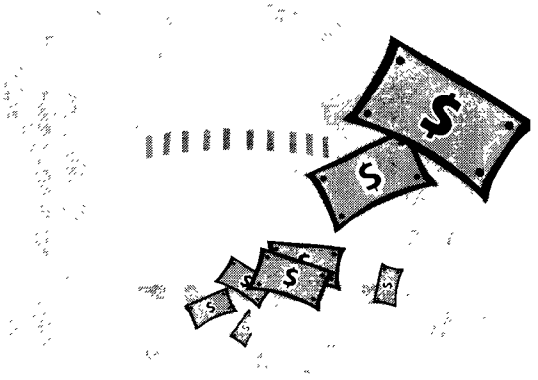
UST/LUST Funds

The 1986 amendment created the Leaking Underground Storage Tank (LUST) Trust Fund to provide federal funds for corrective actions and pay for cleanup at UST sites where the owner or operator is unknown, unwilling, or unable to respond, or that require emergency action. Revenues for the trust fund are derived from a gasoline tax.

The 2002 Brownfields law authorized EPA to grant funds to states and communities so they can inventory, assess, and clean up low-risk, petroleum-contaminated brownfields. In 2003, EPA provided almost $23 million to state and local governments to assist them in assessing, cleaning up, and reusing petroleum brownfields. This program complements the USTfields initiative of 2000 and 2001 for the reuse of abandoned gas stations. A total of 50 USTfields Pilots were awarded up to $100,000 each from the LUST Trust Fund to assess, clean up, and ready for reuse high-priority, petroleum-impacted sites.

CERCLA Funding Resources

Funds for assessment and cleanup of CERCLA sites may be provided by EPA CERCLA allocations from Congress or PRPs. (The special taxes that Congress enacted to fund the dedicated Hazardous Substance Superfund expired on December 31, 1995, and have not been renewed.) EPA's CERCLA Site Assessment program funds work (its own, and states' under cooperative agreements) to assess possible releases at sites. Once EPA has determined that there is a need for CERCLA response action(s), it first considers its enforcement options. Ideally, one or more PRPs agree to perform the work under EPA supervision. (As noted above, federal facilities generally undertake cleanup work under CERCLA at their own facilities, using separately authorized funds.) Where PRPs only contribute money, and EPA performs the work, funds from the PRPs are generally placed in a special account that is used only for work at that site. The NRDA aspect of CERCLA is funded by the Trustees and PRPs.



EPA, states, and FLM agencies each manage certain CERCLA activities, but only EPA is empowered to disburse CERCLA funds. CERCLA grants to fund site-specific activities are not available to other agencies to conduct activities except for funding available for communities to meet the Community Involvement requirements of CERCLA. (Grants under the Small Business Liability Relief and Brownfields Revitalization Act are discussed separately.) This section describes assessment and cleanup resources available through CERCLA.

Pre-Remedial Program

Pre-remedial program funds are used to perform tasks required for site assessment and listing on the NPL. Funding for a specific project is on the basis of annual allocations and priorities of EPA regions. Projects with high interest from the community or state or federal agencies are often given priority for resources. The amount of funding allocated for a PA or SI at a site is based on the complexity of the site, nature of contaminants, regional priorities, and regional funding available, but is limited by the nature of the studies.

Remedial Program

Remedial activities are funded through the Superfund as supplemented by congressional appropriations, as well as by PRPs. For remedial actions funded by Superfund and congressional appropriations, EPA regions prioritize their sites and then negotiate with EPA Headquarters and other regions to determine what projects will be funded. For remedial actions funded by potentially responsible parties, EPA encourages site cleanup teams to establish "special accounts" at each site, allowing payments by potentially responsible parties to be used at the site. Additionally, the remedial program may draw on the many CERCLA resources described below, including EPA Regional Laboratories, the CLP, the Environmental Services Assistance Team (ESAT), and the Response Action Contracts (RACs).

Removal/Emergency Response Program

There are three tiers to Removal/Emergency Response funding according to the urgency of the problem.

- ***Emergency Response:*** On-scene coordinators (OSCs) have a $200,000 warrant to respond to situations that pose an immediate risk to public health. An action memo must be prepared after the action to document decisions. For expenditures beyond $200,000 in an emergency situation or after the site moves from an emergency to time-critical removal status, the OSC documents the continued threat in an Action Memo (including revised upward budget) and obtains emergency response management and Assistant Regional Administrator approval and enforcement concurrence.
- ***Time-Critical Removal:*** Time critical actions may be taken to protect public health. Generally as much as $2 million may be spent after consultation with EPA's Enforcement program. Additional approval is required for spending above $2 million, or if the removal action will exceed 12 months, and EPA Headquarters must approve of expenditures over $6 million. An action memo must be prepared prior to project implementation.
- ***Non-Time Critical Removal:*** Applicable to sites that pose a health or environmental threat for which more than six months are available for planning. An EE/CA must be performed to compare removal options. Funding is limited by regional allocations for the Removal/Emergency Response program.

Natural Resource Damage Assessment

Under CERCLA and OPA, Trustees assess injuries to public natural resources, determine damages, and require PRPs to provide for restoration of resources injured due to the release of oil and hazardous substances. Natural Resource Damages are recovered from PRPs and may be used for assessment and restoration activities.

Funds deposited into the DOI's NRDA and Restoration Fund may be used as nonfederal matching funds for federal grants if the money is deposited pursuant to a joint and indivisible recovery by the DOI and a nonfederal Trustee and the money is transferred to the nonfederal Trustee. The money may not be used for nonfederal matching funds if it is transferred to the federal Trustee agency, then distributed to a nonfederal agency.

Superfund Community Involvement Resources

TAGs are awarded by EPA to community groups to contract with independent technical advisors to interpret and help the community understand technical information about the NPL site or proposed site in their community. Groups eligible to receive grants under the TAG program are those whose members may be affected by a release or threatened release of toxic wastes at any facility listed or proposed for listing on the NPL, and where preliminary site work has begun. In general, eligible groups are those groups of individuals who live near the site and whose health, economic

well-being, or enjoyment of the environment are directly threatened. A group applying for a TAG must be incorporated as a nonprofit (or working toward incorporation). PRPs, academic institutions, local governments, or groups established or supported by the government are not eligible for TAG awards. If more than one group applies for a TAG, they are encouraged to form a coalition to apply for the grant (because only one TAG may be awarded). Up to $50,000 is available for the community to participate in decision making at their site. A 20 percent match, which may include donated or in-kind services, must be contributed by the community group. **www.epa.gov/superfund/tools/tag/index.htm**

The TOSC program provides free, independent, nonadvocate technical assistance about contaminated sites. Services and products may include: explanation and review of technical documents, help to understand health risks and environmental issues, learning experiences to explain basic science and environmental policy, information about existing technical assistance materials, training for community leaders in facilitation and conflict resolution, and assistance to help communities participate in the cleanup decision-making process. **www.toscprogram.org**

EPA Internal CERCLA Resources

The ***Environmental Response Team (ERT)*** is a group of EPA technical professionals who provide EPA regional and headquarters offices; USCG district offices; federal, state, local agencies; and foreign governments experienced technical and logistical assistance in responding to environmental emergencies such as oil or hazardous materials spills. The staff serve as inhouse consultants on innovative and emerging technologies and are recognized experts in several fields of science. In addition to its emergency response tasks, the ERT provides remedy recommendations/implementation, technology efficacy/cost effectiveness, and emerging technology evaluation through bench, pilot, and full-scale studies promoting the One Cleanup Program. Members are involved in land revitalization efforts and ecological risk assessment as well as revegetation of sites fostering implementation, resulting in a more robust solution. The ERT is also active in policy development, evaluation, and implementation in areas such as soil and ground water indoor air vapor intrusion, ecological risk assessment, contaminated sediment remediation, and counterterrorism and homeland security.

The ERT can provide a limited amount of technical assistance, but requires site funding for large efforts. The ERT operates through EPA's Office of Superfund Remediation and Technology Innovation (OSRTI), but is available for assistance on Brownfields, RCRA, water, or other EPA projects.

EPA's Office of Research and Development supports ***Technical Support Centers (TSCs)*** funded by the OSRTI and the Technical Support Project. Site-specific assistance and technical support is available to EPA regions and to EPA program offices. **www.epa.gov/tio/tsp/tscs.htm**

Technical Support Centers are operated through ***National Risk Management Research Laboratory*** offices in Ada, Oklahoma, and Cincinnati, Ohio. The *Ground Water and Ecosystems Restoration Division* in Ada conducts research and technical assistance to provide the scientific basis to support the development of strategies and technologies to protect and restore ground water, surface water, and ecosystems impacted by man-made and natural processes. The *Land Remediation and Pollution Control Division* in Cincinnati, Ohio, conducts research, development, and demonstration projects on management of hazardous wastes and contaminated media. **www.epa.gov/ORD/NRMRL**

Technical Support Centers are also provided through ***National Exposure Research Laboratory*** offices in Cincinnati, Ohio, and Las Vegas, Nevada. The *Microbial and Chemical Exposure Assessment Research Division* in Cincinnati performs research to measure, characterize, and predict the exposure of humans to chemical and microbial hazards. The Environmental Sciences Division in Las Vegas operates the TSC for Monitoring and Site Characterization and provides technical support and assistance to regional staff including: analytical chemistry; statistical analysis/consultation; ground water/soils modeling, monitoring, and fingerprinting; air modeling and monitoring; and review of

documents. This group works with the Remedial Project Managers (RPMs) and OSCs throughout a site characterization event, i.e., from planning and design to analysis and data interpretation. When on-site work is required, the Las Vegas TSC mobilizes specialized teams of field scientists equipped with portable or deployable instruments to aid the regions with screening level assessments and site characterization. **www.epa.gov/nerl**

The ***National Air & Radiation Environmental Lab*** performs analyses on samples for a number of radionuclides and hazardous materials. Typical samples include air, water, soil, vegetation, human tissue, and food. The laboratory routinely provides analytical and technical support for the characterization and cleanup of Superfund and Federal Facility sites. It also operates the Environmental Radiation Ambient Monitoring System (ERAMS). The system consists of sampling stations in each state that regularly collect air particulate, surface water, drinking water, precipitation, and milk samples for radioactivity analyses. The system can also track airborne radioactivity from any accidental release. If necessary, the ERAMS sampling frequency can be increased to meet the needs of any radiological emergency response. **www.epa.gov/narel**

The ***Radiation and Indoor Environment National Lab*** specializes in developing, demonstrating, and employing field technologies. Technical staff support the cleanup of contaminated sites using state-of-the-art fixed and mobile laboratories, monitoring vehicles, and an extensive collection of calibrated field instruments. They also conduct field studies in radiation-contaminated areas and provide site-specific computer modeling and dose assessments. The laboratory also provides analytical services for testing and monitoring indoor environments for both radiological and chemical contaminants. **www.epa.gov/radiation/rienl**

The ***Superfund Sediment Resource Center (SSRC)*** assists EPA staff on technical issues related to the cleanup of contaminated sediment sites. The center focuses on providing timely and helpful input on site-specific issues for topics related to sediment site characterization, such as data collection and evaluation; sediment stability; modeling (e.g., hydrodynamic, contaminant fate and transport, and food chain); ecological and human health risks; and the efficacy of remedies such as capping, dredging, monitored natural recovery (MNR), and treatment technologies. **www.epa.gov/superfund/resources/sediment/ssrc.htm**

The ***Hazardous Waste Clean-Up Information (CLU-IN)*** Web site provides information about innovative treatment and site characterization technologies to the hazardous waste remediation community. It describes programs, organizations, publications, and other tools drawn from various federal and private organizations to be used by federal and state personnel, consulting engineers, technology developers and vendors, remediation contractors, researchers, community groups, and individual citizens. The site was developed by EPA but is intended as a forum for all waste remediation stakeholders. **http://clu-in.org**

EPA CERCLA Contracting Resources

Contract Laboratory Program (CLP)

The CLP provides analytical services for CERCLA-related projects through a nationwide network of laboratories under contract to EPA. The CLP provides a range of state-of-the-art chemical analytical services of known and documented quality on a high-volume, cost-effective basis to support ongoing Superfund enforcement, emergency response and remedial actions, site investigations, and state-lead assessments. The CLP provides flexible analytical services to support Superfund field activities from a preliminary site inspection to more complex large-scale remedial, monitoring, and enforcement actions. Routine Analytical Services (RAS) are used for standardized services. Specialized analyses may be performed by the Special Analytical Services program (SAS). Samples that require lower than standard detection limits or for different media and analytes than typical may require analysis by an independent laboratory using a standard bidding procedure. Funding for the CLP is generally not allocated to individual projects.

Environmental Services Assistance Team (ESAT)

The ESAT contract was developed to expand EPA's existing capabilities for providing hazardous waste sample analysis and related support to Superfund sites. Although primarily a Superfund vehicle, ESAT also supports EPA's RCRA program and other non-Superfund analytical efforts. ESAT contractors provide multidisciplinary technical teams to each region within their respective areas. The teams perform chemical and biological analysis; field analytical screen project activities, specialized analytical services support and data validation/data review support; review of site-specific quality assurance, site investigation, and sampling plans; support for the development of new analytical methods; and logistical and administrative functions. The ESAT contractor may also provide GIS/mapping support.

Regional Laboratories

The regional laboratories provide a full range of routine and specialized chemical and biological testing of air, water, soil, sediment, tissue, and hazardous waste for ambient and compliance monitoring as well as criminal and civil enforcement activities. The analytical capacity of the laboratories is enhanced by the presence of the ESAT, a dedicated Superfund contractor. In addition to fixed laboratory analytical support, the regional laboratories provide significant field sampling and training and field analytical support.

EPIC—Remote Sensing and Mapping Support Contract

EPA's ORD has established a nationwide contract program to provide remote sensing and aerial imagery acquisition and interpretation support to the Program Offices and each of the ten Regional Offices of EPA. The Environmental Photographic Interpretation Center (EPIC) provides support for site-specific to regional environmental characterization and change analyses, emergency response to hazardous developments, waste site inventories for large geographical areas, and topographic mapping of sites.

Superfund Technical Assessment and Response Team (START)

The START contracts provide technical support for EPA's site assessment, response, prevention, and preparedness activities. This support includes gathering and analyzing technical information, preparing technical reports on oil and hazardous substance investigations, and technical support for cleanup efforts. The scope of the contract involves all types of scientific, engineering, and technical support such as sampling and field analysis, mapping and GIS support, EE/CA preparation, PA/SI/HRS support, and Homeland Security preparedness and readiness activities.

Response Action Contracts (RACs)

The RACs provide professional architect/engineering services to EPA to support response planning and oversight of activities under CERCLA. Services provided by RACs include: program management, RI/FS preparation, remedial action design, EE/CA preparation, issuing and managing subcontracts for construction of selected remedies, and engineering services for construction oversight. RACs services also include enforcement support, community relations, sampling and analytical support, and predesign investigations. RACs contractors may also provide oversight of remedial activities performed by a state, the USACE, or PRPs identified in enforcement actions.

Emergency and Rapid Response Services (ERRS)

The ERRS contracts provide emergency, time-critical removal and quick remedial response cleanup services for the CERCLA, OPA and UST programs. ERRS contractors may also provide cleanup support for natural disasters, such as floods, pursuant to the National Response Plan, and conduct international/transboundary responses. Regionally based contracts are awarded to provide clean-

up personnel, equipment, and materials to contain, recover, or dispose of hazardous substances, analyze samples and provide site restoration.

Response Engineering and Analytical Contract (REAC)

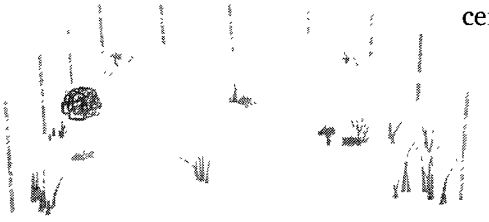
The REAC provides scientific support to EPA's ERT. The primary task is to respond to releases of hazardous materials at spills and abandoned waste sites. Response activities include field investigations and report writing for the following types of studies: multimedia extent of contamination, bioassessment, treatability, contaminant transport, engineering/feasibility, and risk assessment. These studies are conducted to support EPA OSCs and RPMs for removal and remedial actions, respectively. The REAC contractor also performs evaluation or engineering design studies of innovative commercially available technologies to confirm and document their performance. The contractor performs air monitoring studies at hazardous waste sites and incidents of deliberate release of weapons of mass destruction by terrorist groups. To support field and engineering studies, the REAC contractor provides on-site and mobile analytical services, conducts rapid analyses of complex waste mixtures and environmental samples, and develops analytical methodologies for on-site and field laboratory equipment.

Brownfields Resources

EPA provides funding to eligible entities[6] in the form of assessment grants, revolving loan fund grants for cleanups, direct cleanup grants, and job training grants. Additional funds are provided to states and tribes for the establishment or enhancement of state and tribal response programs, as well as to perform Targeted Brownfields Assessments (TBAs). EPA also has the authority to conduct TBAs. Brownfields funding priorities vary from year to year, so current priorities should be investigated by community, industry, local, state, and federal stakeholders. **http://www.epa.gov/brownfields/applicat.htm**

Brownfields Grants

Brownfields grants or loans can be used to pay response costs at a brownfield site for which the recipient of the grant or loan is potentially liable under CERCLA §107. This means that applicants are not eligible for grants or loans at sites for which they are liable parties under CERCLA. Note, however, that CERCLA § 107 does not apply to petroleum sites. In addition, CERCLA provides certain liability protections for owners and prospective purchasers of contaminated properties who are not responsible for the contamination (and not affiliated with a responsible party) and comply with certain specific conditions provided in the statute.



The Brownfields Law clarified the innocent landowner provision and established liability protections for contiguous property owners and bona fide prospective purchasers of contaminated land. Applicants that own or plan to purchase a contaminated site may qualify for one of these landowner liability protections and be eligible for funding. To qualify for the liability protections, landowners must comply with certain obligations to take "appropriate care" after purchasing a property, and prospective landowners must conduct "all appropriate inquiries" prior to purchasing a property. For more information on these liability protections, please refer to the Brownfields Law and the March 6, 2003, EPA guidance entitled "Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA ('Common Elements')." **http://www.epa.gov/compliance/resources/policies/cleanup/superfund/common-elem-guide.pdf**

[6] e.g. state and local governments

To summarize the available Brownfields grant types, criteria, and funding priorities, the 2005 Region 8 Brownfields Revitalization Program Assistance Overview is provided in Table 3-2 on page 99. Please consult the latest proposal guidelines for current information regarding Brownfields Assessment, Revolving Loan Fund, and Cleanup Grants. **www.epa.gov/brownfields/applicat.htm**

Brownfields Assessment Grants (CFDA 66.818) are provided on a site-specific or community-wide basis to conduct inventories, characterization, assessment, and cleanup planning. Up to $200,000 may be granted for a site with hazardous substances, pollutants, or contaminants and up to $200,000 for sites with petroleum-only contamination. A waiver may be granted to allow up to $350,000 per site. No matching funds are required.

Priorities for Brownfields assessment grants, revolving loan grants, and direct cleanup grants include:

- Projects that stimulate the availability of other assessment and cleanup funding[7, 8]
- Projects that stimulate economic development and address or reduce threats to human health and the environment
- Projects that facilitate the reuse of existing infrastructure or create/preserve a park, greenway, undeveloped property, recreational property, or other property for nonprofit purposes
- Projects in small or low-income communities without other resources
- Projects that allow for the fair distribution of funds between urban and non-urban areas and provides for community involvement
- Projects that identify and reduce threats to the health and welfare of children, pregnant women, minority or low-income communities, or other sensitive populations

Brownfields Revolving Loan Fund Grants (CERCLA Section 101(39), Section 104(k)(6), CFDA 66.818) are available to states, local governments, land clearance authorities or similar quasi-governmental agencies under control of local government, government entities created by state legislatures, regional councils, redevelopment agencies chartered by states and tribes. The funds may be used to capitalize a revolving loan fund or to award subgrants to eligible entities or loans to private entities. Up to $1,000,000 may be available per eligible entity. A 20 percent match is required unless a hardship waiver is granted.

Brownfields Cleanup Grants (CERCLA Section 101(39), Section 104(k)(6), CFDA 66.818) are available to states, local governments, land clearance authorities, or similar quasi-governmental agencies under control of local government, government entities created by state legislatures, regional councils, and redevelopment agencies chartered by states, tribes, and nonprofit organizations. Cleanup grants are used to perform cleanup activities on brownfields sites owned by the grant recipient at the time of award. Up to $200,000 is available per site for a maximum of five sites. A 20 percent match is required unless a hardship waiver is granted.

Brownfields Job Training and Workforce Development Grants Section 101(39), Section 104(k)(6), CFDA 66.815) are available to colleges, universities, and nonprofit training centers to bring together affected parties to provide training for residents in communities impacted by brownfields. Projects that facilitate cleanup of brownfields sites contaminated with hazardous materials and prepare trainees for environmental employment are preferred. Up to $200,000 is available with no matching share required.

The Technical Assistance to Brownfields Communities program helps communities clean and redevelop properties that have been damaged or undervalued by environmental contamination. The

[7] The list of entities eligible for Brownfields assessment, cleanup, and revolving loan fund grants can be found at CERCLA section 104(k)(1). Nonprofit organizations are also eligible for cleanup grants.

[8] The list of entities eligible for Brownfields assessment, cleanup, and revolving loan fund grants can be found at CERCLA section 104(k)(1). Nonprofit organizations are also eligible for cleanup grants.

purpose is to create better jobs, increase the local tax base, improve neighborhood environments, and enhance the overall quality of life. The program provides training regarding leadership, risk assessment, brownfields processes, site assessment, and cleanup alternatives. Technical assistance is provided to stakeholders through Hazardous Substance Research Centers, the Interstate Technology Regulatory Council, and the Technology Innovation Program.

Targeted Brownfields Assessments and State and Tribal Response Program Grants

Federal Brownfields funds are also available for TBAs and state and tribal Response Program Grants. States may allocate the funds for site-specific assessments, cleanups of Brownfields, for a revolving fund, or for insurance. **www.epa.gov/swerosps/bf/html-doc/tba.htm**

EPA's TBA Funds (CERCLA Section 101(39), Section 104(k)(6), CFDA 66.818) are available through EPA Regional Brownfields offices for federally led environmental assessments. TBA funds may be used for Phase I and Phase II environmental assessments and establishment of cleanup options and cost estimates from future uses and redevelopment plans. Priority is given to properties that are abandoned or publicly owned, have low to moderate contamination, include issues of environmental justice, suffer from the stigma of liability, have high potential for cleanup and redevelopment, have strong municipal commitment of resources and community support, and for projects that align with other EPA/federal agency initiatives.

State/Tribal Response Program Grants (CERCLA Section 128(a)) are available to states and federally recognized tribes to establish or enhance the state/tribal response program cleanup capacity. TBA funds are available for assessments conducted by states or tribes under cooperative agreement with EPA. States and tribes may also use these grants to capitalize revolving loan funds. Matching funds are required only if the money is to be used for a Revolving Loan Fund, CFDA 66.817. A variety of information to assist tribal governments regarding environmentally related financial assistance programs within EPA is available through the following EPA Web page: **www.epa.gov/indian/tgrant.htm**.

EPA Superfund Redevelopment Initiative provides eligible local governments as much as $100,000 in funds or services to support assessment and public outreach to help determine the future use of a site. This program also encourages partnerships with states, local government agencies, citizen groups, and other federal agencies to restore previously contaminated properties to beneficial use. **www.epa.gov/superfund/programs/recycle/index.htm**

Brownfields Federal Partnerships

The Brownfields Federal Partnership was formed by EPA and other agencies working together to help communities more effectively prevent, assess, safely clean up, and sustainably reuse brownfields. In addition to EPA's commitment to funding the above programs, the following commitments have been made by participants in the Brownfields Federal Partnership:

- Commitments by the U.S. Economic Development Administration, U.S. Department of Housing and Urban Development (HUD), DOI, U.S. Department of Justice, and U.S. Department of Labor to offer funding priority to brownfields communities through their respective grant mechanisms.
- NOAA's commitment to lead an interagency "Portfields" project that focuses on the redevelopment and reuse of brownfields in and around ports, harbors, and marine transportation hubs. There are currently three Portfields Pilots that are well under way—Bellingham, WA; New Bedford, CT; Tampa, FL—and a report and video will be available November 2005.

» USACE's announcement of eight new pilots under its "Urban Rivers Initiative" to address restoration in and around urban rivers. **www.epa.gov/swerosps/bf/partners/federal_partnerships.htm**

Additional EPA Assessment and Cleanup Funding Resources

Targeted Watershed Grants (CWA Section 104(b)(3), CFDA 66.439)

Targeted Watershed Grants are available for groups ready to implement actions to protect critical watersheds valued for drinking water, fisheries, recreation and other important uses. Grants are awarded to watershed organizations and coalitions that are in the best position to make on-the-ground improvements to water quality. Grants range from $600,000 to $900,000, with a 25 percent nonfederal match required, and are subject to an appropriation. **www.epa.gov/owow/watershed/initiative**

Community Action for a Renewed Environment (CARE) Grants

(Clean Air Act, Section 103(b)(3) as amended; Clean Water Act, Section 104(b)(3), as amended; Solid Waste Disposal Act, Section 8001, as amended; Toxics Substances Control Act, Section 10, as amended; Federal Insecticide, Fungicide, and Rodenticide Act, Sections 18 and 20, as amended; Safe Drinking Water Act, Sections 1442(a), and (c)(A), as amended; and Marine Protection, Research, and Sanctuaries Act, Section 203, as amended, CFDA 66.035)

CARE grants provide funding and technical support to communities working to reduce risks from toxics in their communities. In 2005, the Brownfields Program made $600,000 for Targeted Brownfields Assessments available for CARE communities. Under Level I, communities may receive up to $75,000 to establish collaborative partnerships for reducing toxic releases in their environment. Level II offers up to $300,000 to communities that have a broad-based collaborative partnership in place and are ready to implement risk reduction strategies. For additional information on this collaboration between the Office of Air and Radiation (OAR) and OSWER, please contact Stacy Swartwood at (202) 566-1391 or email her at swartwood.stacy@epa.gov or visit **http://cfpub.epa.gov/care.**

Five Star Restoration Program

The Five Star Restoration program of EPA's Office of Wetlands, Oceans, and Watersheds brings together students, conservation corps, other youth groups, citizen groups, corporations, landowners, and government agencies to provide environmental education and training through projects that restore wetlands and streams. The program provides challenge grants, technical support, and opportunities for information exchange to enable community-based restoration projects. EPA funding levels are modest, from $5,000 to $20,000, with $10,000 as the average amount awarded per project. When combined with the contributions of partners, projects that make a meaningful contribution to communities become possible. **www.epa.gov/owow/wetlands/restore/5star**

Environmental Finance Program

The Environmental Finance Program was developed by EPA to assist communities in their search for creative approaches to funding environmental projects. Resources of the Environmental Finance Program include:

The ***Environmental Financial Advisory Board*** focuses on environmental finance issues at all levels of government, particularly with regard to impact on local governments and small communities. The Board seeks to increase the total investment in environmental protection by facilitating greater leverage of public and private environmental resources. **www.epa.gov/efinpage/efab.htm**

The ***Environmental Finance Center (EFC) Network*** is a university-based program that provides financial outreach services to regulated communities. Nonregulated community groups such as watershed groups may qualify for assistance in certain circumstances. EFCs educate state and local officials and small businesses on lowering costs of compliance and pollution prevention, increasing investments in environmental protection, improving financial capacity to own/operate environmental systems, encouraging the full cost pricing of environmental services, and identifying and evaluating financing tools and options. **www.epa.gov/efinpage/efcreg.htm**

The ***Catalog of Federal Funding Sources for Watershed Protection*** Web site is a searchable database of financial assistance sources (grants, loans, cost-sharing) available to fund a variety of watershed protection projects. The Web site provides searches on the type of assistance, eligible organizations, required matching funds, and keywords for the type of problem/project. The database does not contain significant information about small, site-specific federal sources or most nonfederal sources. **http://cfpub.epa.gov/fedfund**

The ***Guidebook of Financial Tools*** is a basic financial reference document for public and private officials with environmental responsibilities and describes financing tools that federal, state, and local governments and the private sector can use to pay for environmental programs, systems, and activities.

Environmental Justice

In many communities, there are individuals and groups of persons who are disproportionately affected by an environmental burden, but who do not know that they have a right to express themselves or are reluctant to make their concerns known for a variety of historical or cultural reasons. The environmental justice (EJ) program in EPA was created to address such circumstances. The program was formally created in 1994 with the signing of Executive Order 12898, titled "Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations." The order directs federal agencies to develop environmental justice strategies to aid federal agencies to identify and address adverse human health or environmental effects of their programs and policies on the nation's populations.

The EJ program operates to assure that no group of persons bear a disproportionate burden of environmental impacts resulting from the execution of environmental programs. EPA considers environmental justice while setting standards, permitting facilities, making grants, issuing licenses or regulations, and reviewing proposed actions of other federal agencies under the authority of EPA's various programs (e.g., CERCLA, RCRA, CAA, National Environmental Policy Act (NEPA), etc). To facilitate and assist in this process, EPA supports a staff of environmental professionals who work with staff from all the programs and also engage directly with communities. Calling on this staff simplifies the process of identifying strongly held, but unvoiced, concerns that, if unaddressed, can have a significant impact on the effective clean up of target watersheds. EJ staff can assist in identifying community concerns early and begin to build trust among what may be disinterested or disaffected members of the community.

The EJ program offers grants annually to communities for addressing environmental problems from an EJ perspective. In addition, the program works with EPA's operating programs to identify technical, human, and financial resources that might be made available to communities interested in addressing environmental injustices.
www.epa.gov/Compliance/environmentaljustice/index.html

Region 10 Serves as a Model for Making Funding Accessible for Coordinated Watershed Programs

The region participates in the national Sustainable Finance Workgroup and has a cooperative agreement with the Environmental Finance Center (EFC) at Boise State University. This agreement includes Web-based and on-the-ground technical assistance on the following projects:

- Online newsletter that describes current funding issues and related topics, which can be found at: http://sspa.boisestate.edu/efc/News/NewsWinter2004.html.
- Online funding workshop to be used for the state of Alaska; advanced workshop in Anchorage, Alaska.
- Directory of Watershed Resources, a searchable database of funding sources in Region 10 states. States from Regions 3 and 4 are also starting to build the directory. This database includes information from federal, state, and private funding sources.
- Plan2 Fund, a tool to create a strategic financial plan to fund watershed plans from start to finish.
- Prioritization Tool—Piloted with the Chehalis Basin Partnership, the EFC moved the group closer to implementation by offering a process and Web-based tool to identify decision rule to prioritize plan objectives.
- Agricultural BMP Cost Analysis—Developed with the partnership of various state and federal agricultural agencies, this tool will add a financial cost component to the Idaho One Plan to help landowners identify the cost of conservation practices and how to fund implementation of these practices.

Department of Interior Assessment and Cleanup Resources

Bureau of Reclamation (BOR)

The BOR stores and supplies water for irrigation and for use in homes and industry. The BOR generates hydroelectric power, provides flood control, and helps meet fish and wildlife needs and compliance with water quality standards. The BOR can assist in watershed cleanups by providing historical and projected stream flow data and by using best management practices during releases to minimize streambank erosion and habitat disruption.

The Water Resources Research Laboratory performs research to improve BOR efforts, including fish protection/screening, fish passage, reservoir release water quality, river restoration, and wetlands. River restoration is an important component of enhancing environmental compatibility of the many BOR structures and activities affecting streams and rivers. Mining, flood protection, land use channelization, and many other factors have altered, to some degree, most of America's rivers. In some cases, these activities have greatly degraded the natural riverine environment. The laboratory is working with other federal, state, and local organizations to revitalize rivers that have been severely impacted. **www.usbr.gov/pmts/hydraulics_lab**

The Sedimentation and River Hydraulics Group provides many levels of analysis ranging from simple technical advice or a field trip, through a multiyear study integrating with other disciplines and project needs. This group provides hydrologic modeling, including dam removal or modification, sediment studies, integrated geomorphic and sediment studies, river restoration analysis and design, river and reservoir surveys, multiple scope analysis, channel maintenance and stability, hazard classification, flood inundation mapping, flood warning and evacuation time, hydraulic modeling (1D, 2D, 3D), sediment transport modeling, and riparian vegetation modeling. The

group also performs sediment transport analysis, development of computer models, manuals and guidelines, geomorphic studies and river restoration plans, reservoir sediment management plans, and flood inundation mapping and emergency planning. **www.usbr.gov/pmts/sediment**

U.S. Geological Survey (USGS)

The USGS provides scientific information and performs scientific studies in many fields, including geologic mapping, contaminant biology, pollution, water quality wetlands, and environmental studies. Departments that may be useful for watershed cleanup include Contaminant Biology; Cooperative Water Program; Geographic Analysis and Monitoring; Fisheries and Aquatic Resources; Hydrologic Networks and Analysis; Hydrologic Research and Development; Mineral Resources; National Cooperative Geologic Mapping; National Streamflow Information; National Water Quality Assessment; State Water Resources Research Institute; Toxic Substances Hydrology; Terrestrial, Freshwater, and Marine Ecosystems; and Wildlife and Terrestrial Resources. USGS science provides comprehensive, high-quality, and timely scientific information about the quantity, quality, and availability of natural resources to decision makers and the public. Because it has no regulatory or management mandate, the USGS provides impartial scientific expertise. USGS scientific efforts include long-term data collection, monitoring, analysis, and predictive modeling. USGS scientists cover a range of disciplines, including hydrology, geology, geophysics, biology, geography, and statistics. Projects within a specific watershed may be funded by grants, interagency agreements, congressional appropriation, or occasionally from internal program funding. Water-quality studies may be initiated with the USGS by contacting a state representative to discuss the USGS cooperative funding program.

Through the ***National Water Information System (NWIS)***, USGS provides water data, including real time water data, surface water flow measurements, ground water measurements, and water quality measurements, from over 1.5 million sites throughout the nation. Since 1991, USGS scientists with the NAWQA program have been collecting and analyzing data and information in more than 50 major river basins and aquifers across the nation to develop long-term consistent and comparable information on streams, ground water, and aquatic ecosystems to support sound management and policy decisions. USGS is available to support development of TMDLs. **www.usgs.gov**, **http://water.usgs.gov/pubs/fs/FS-130-01**, **http://waterdata.usgs.gov/nwis**, **http://water.usgs.gov/nawqa**

In support of the National Forest Plan revisions, which occur every five years, the *USGS* and *USDA/FS* coordinate on an assessment of geological resources on NFS lands.

U.S. Fish & Wildlife Service (USFWS)

The USFWS is tasked to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of people. USFWS is the designated Natural Resource Trustee for certain anadromous fish, certain endangered species, certain marine mammals, and migratory birds. Funding to support efforts related to protection of trust resources affected by contamination is available under the Contaminants Program. USFWS has a wide range of technical expertise and has many agreements in place to support ecological assessment and cleanup efforts. One example is pre-approved permits for support fish shocking or other wildlife collection and evaluation efforts.

Through a national agreement between USFWS and EPA, USFWS supports CERCLA and OPA response, removal, and remedial programs by reviewing documents and plans and providing technical assistance to the regional Biological Technical Assistance Group (BTAG) or other designated ecological risk assessment program personnel. Coordination of USFWS and EPA risk assessment efforts can allow issues to be resolved in advance and reduce the time and effort required for site remediation and restoration. NRDA are conducted under CERCLA authority but are not funded by the interagency agreement. USFWS provides scientific expertise and authority for preparation

of NRDAs plus conduct species and habitat-related research. USFWS may initiate NRDA efforts on behalf of trust resources. USFWS may access funding from the Oil Spill Liability Trust Fund for work related to oil spills.

In addition to CERCLA and OPA responsibilities, USFWS has the authority to act under the Endangered Species Act, the Eagle Protection Act, and the Migratory Bird Treaty Act.

The ***North American Wetlands Conservation Act Grants*** program provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico. The Standard Grants Program provides funds to Canadian and U.S. partners for projects that focus on protecting, restoring, or enhancing critical habitat. Projects must support long-term wetlands acquisition, restoration, or enhancement and partners must minimally match the grant request at a one-to-one ratio. Mexican partners may also develop training and management programs and conduct studies on sustainable use. The ***Small Grants Program*** supports the same kinds of activities as Standard Grants but usually involve fewer project dollars. Except that grant requests may not exceed $50,000, and that funding priority is given to projects that have a grantee or partners that have not participated in an Act-supported project before, criteria for funding a project are the same as for Standard Grants. **www.fws.gov/birdhabitat/nawca/grants.htm**

Partners for Fish and Wildlife is a USFWS program that provides technical and financial assistance for habitat restoration projects on lands not owned by a state or federal government. State, federal, tribal, and private conservation organizations use Partners for Fish and Wildlife to provide watershed management, conservation easements, and river restoration in cooperation with voluntary landowners. Priority is given to projects that most benefit USFWS trust resources. The USFWS develops a cost-sharing agreement with the partner; typically a 50 percent cost share is required and funding from the program is provided after completion of the project. Technical assistance is available. Typically the NRCS, the state fish and game agency, or other conservation agencies participate in project planning. **www.fws.gov/partners**

Office of Surface Mining (OSM)

The OSM regulates coal mining facilities. The Surface Mining Law provides for the restoration of lands mined and abandoned or left inadequately restored before August 3, 1977. The Abandoned Mine Reclamation Fund is used to pay the reclamation costs of AML projects.

AML Grants are provided to states with an approved program, or specific Indian tribes, and are funded from fees paid by active coal mine operators on each ton of coal mined. Funds are used to operate a state AML program, perform construction to reclaim abandoned mine sites, and establish trust funds that may be spent by the state for specific targeted purposes. AML grants are 100 percent federally funded. **www.osm.gov/grantsprograms.htm**

The ***Watershed Cooperative Agreement Program*** awards cooperative agreements to nonprofit organizations, especially small watershed groups, that undertake local acid mine drainage (AMD) reclamation projects. These funds are available as part of the Appalachian Clean Streams Initiative. The maximum award amount for each cooperative agreement will normally be $100,000 to assist as many groups as possible to undertake actual construction projects to clean streams impacted by AMD.

Bureau of Land Management (BLM)

The BLM is responsible for the management of federal lands under the auspices of the Department of Interior. The BLM engages in hazardous material emergency response actions, site evaluations,

and prioritization of cleanups in accordance with laws and regulations. This involves working with EPA, state environmental quality departments, counties, and PRPs (both public and private) to fund and expedite the cleanup of hazardous sites. **www.blm.gov/nhp/index.htm**

National Park Service

The National Park Service aims to protect and restore natural resources. The Fisheries Program provides guidance and support in the implementation of the recreational fisheries program, "A Heritage of Fishing;" develops policy and guidance for the protection of aquatic biological resources; coordinates policy review of the fisheries and aquatic resources-related aspects of environmental compliance documents; provides program guidance and technical support for fish population/habitat restoration; provides guidance and technical assistance in the development of fishery management plans; and coordinates with other agencies on fisheries and aquatic resources-related regulatory matters.

The National Park Service monitors water quality vital signs in parks. Concerns include the use of personal watercraft and snowmobiles in parks, source and NPS contaminants, land rezoning, and identifying impairment thresholds.

Through the Natural Resource Challenge, the Water Resources Division conducts Watershed Condition Assessments system-wide. Watershed Condition Assessment involves applying a set of descriptive or quantitative technical methods to describe the ecosystem health of a watershed. Typically, these methods develop and integrate assessments of discrete ecosystem components at a variety of landscape scales. Researchers and managers have developed numerous assessment methods for use in various ecosystems and for a wide range of purposes.

The Wetlands Program provides policy and guidance pertaining to park wetlands protection and restoration, identifies and assesses existing and potential threats to park wetland and riparian resources, provides technical assistance to parks for wetland and riparian zone restoration and protection, provides wetland regulatory compliance and review, and coordinates with other agencies on wetland-related regulatory matters.

Department of Agriculture Assessment and Cleanup Funding Resources

U.S. Department of Agriculture Forest Service (USDA/FS)

The USDA/FS performs watershed assessment and cleanup efforts related to USDA/FS managed lands. Assessment and cleanup may be conducted under CERCLA authority/responsibility or as part of enhancing and maintaining healthy watersheds and habitat.

The Watershed Program is focused on maintaining healthy watersheds. Data is collected to determine if a watershed within USDA/FS property is impacted, and project implementation is conducted where necessary to ensure watershed health. The Watershed Program is allocated a set budget, and this funding is split among the individual national forests. Funding priorities for watershed program activities are determined by the individual forest managers.

The USDA/FS has established an AML program to support the Watershed Program to clean up and reclaim abandoned mine sites on National Forest lands. The Forest Service has CERCLA authority for investigations and remediation on nonemergency hazardous waste sites on lands that they manage. The Forest Service AML program conducts CERCLA assessment, removal, and remedial actions following the NCP. CERCLA funding is allocated to USDA/FS each year. Funding for specific

projects is designated on a case by case basis—sites compete for funding of each phase of CERCLA action. In addition to the USDA/FS CERCLA allocation, USDA has an allocated budget each year for hazardous waste removal. All USDA agencies compete for that allocation to fund AML and other hazardous waste cleanups. Projects with wide scale interest, such as watershed cleanups with a high level of community involvement, are given priority for funding. Community benefits, family benefits, and ecological benefits are all factors considered in funding decisions.

The USDA/FS Fisheries and Wildlife Programs perform fisheries improvement and wildlife habitat improvement within national forests. **www.fs.usda.gov**

National Resources Conservation Service (NRCS)

Under the 1996 Farm Bill, the NRCS provides assistance for landowners seeking to preserve soil and other natural resources. The Environmental Conservation Acreage Reserve Program (ECARP) authorizes the Secretary of Agriculture to designate watersheds, multistate areas, or regions of special environmental sensitivity as conservation priority areas that are eligible for enhanced federal assistance. Assistance in priority areas is to be used to help agricultural producers comply with NPS pollution requirements of environmental laws. **www.nrcs.usda.gov**

The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides assistance to farmers and ranchers who face threats to soil, water, air, and related natural resources on their land. Through EQIP, the NRCS provides assistance to agricultural producers to promote agricultural production and environmental quality as compatible goals, optimize environmental benefits, and help farmers and ranchers meet federal, state, tribal, and local environmental requirements. EQIP is reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill). Funding for EQIP comes from the Commodity Credit Corporation (CCC). Optimizing environmental benefits is achieved through a process that begins with the definition of national priorities. The national priorities are:

- Reduction of NPS pollution, such as nutrients, sediment, pesticides, or excess salinity in impaired watersheds, consistent with TMDLs where available, as well as reduction of ground water contamination and conservation of ground and surface water resources
- Reduction of emissions, such as particulate matter, nitrogen oxides, VOCs, and ozone precursors and depleters that contribute to air quality impairment violations of National Ambient Air Quality Standards
- Reduction in soil erosion and sedimentation from unacceptable levels on agricultural land
- Promotion of at-risk species habitat conservation
  www.nrcs.usda.gov/programs/eqip

The ***Watershed Protection and Flood Prevention Program*** provides funding to conservation districts, local governments, and state/territorial/tribal agencies for projects in watersheds containing less than 250,000 acres. Up to $10 million is available per project; cost sharing is required. **www.nrcs.usda.gov/programs/watershed**

The ***Conservation Security Program (CSP)*** is a voluntary conservation program that supports ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources. CSP identifies and rewards those farmers and ranchers who are meeting the highest standards of conservation and environmental management on their operations. CSP provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and range land, as well as forested land that is an incidental part of an agriculture operation. **www.nrcs.usda.gov/programs/csp**

Farm Service Agency (FSA)

The FSA ***Conservation Reserve Program (CRP)*** is a voluntary program for agricultural landowners who can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. The CCC makes annual rental payments on the basis of the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years. The program is administered by the CCC through the FSA, and program support is provided by NRCS, Cooperative State Research and Education Extension Service, state forestry agencies, and local soil and water conservation districts.
www.fsa.usda.gov/dafp/cepd/crep.htm

Agricultural Research Service

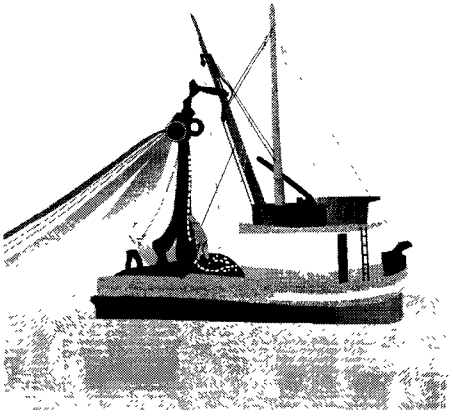
The Agricultural Research Service is USDA's main in-house scientific research agency. They find solutions to agricultural problems, including sustaining soils and other natural resources, and provide research support to other federal agencies.

Department of Commerce Assessment and Cleanup Funding Resources

National Oceanic Atmospheric Administration (NOAA)

NOAA conducts research and gathers data about the global oceans, atmosphere, space and sun, and applies this knowledge to science and service. NOAA Fisheries is the federal agency responsible for the stewardship of the nation's living marine resources and their habitat. **(www.noaa.gov), www.nmfs.noaa.gov/habitat/restoration/funding_opportunities/funding.html**

The ***Community Based Restoration Program*** provides funding to regional governmental bodies and public or private organizations including business, community/watershed groups, nonprofit groups, educational institutions, conservation districts, local governments, and state/territorial/tribal agencies to restore fishery habitat around the coastal United States. The required 1:1 cost match may be cash, salary, equipment, supplies, in-kind services, or labor.



The ***NOAA Fisheries/National Fish and Wildlife Foundation (NFWF)*** Habitat Restoration Partnership funds restoration and educational efforts. Currently, the funding is distributed nationally and regionally through a series of NFWF funding initiatives including: Five-Star Restoration Challenge Grant Program, Chesapeake Bay Small Watershed Grants Program, Living Shorelines Initiative, Pinellas County Environmental Foundation (directed appropriation), Delaware Estuary Program, North Gulf Coast Initiative, and the Pacific Grassroots Salmon Initiative.

Five Star Restoration Grants are available from NOAA for locally-driven, on-the-ground habitat restoration projects that address important habitat issues within communities. The program emphasizes a grass-roots, bottom-up approach to restoring fishery habitat across coastal America. In most instances, NOAA technical staff work closely with concerned communities to strengthen the development and implementation of sound projects. Communities participating in habitat restoration ultimately monitor and maintain these restoration efforts, heightening environmental awareness.

Other Federal Funding Resources

U.S. Army Corps of Engineers (USACE)

The USACE carries out environmental and natural resource management programs at its projects, managing thousands of square miles as forest and wildlife habitat, monitoring water quality at its dams, operating fish hatcheries in cooperation with state wildlife agencies, and, in some cases, restoring the environment at projects built in earlier days. The USACE has significant expertise and experience with water resource related projects such as: planning, designing, building, operating, and maintaining projects that provide river and harbor navigation, flood control, water quality and supply, hydroelectric power, environmental restoration, wildlife protection, and recreation.

The USACE has regulatory authority under the Rivers and Harbors Acts for regulating construction, excavation, or deposition of materials in, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters. USACE also has regulatory authority for permitting construction activities that occur in the nation's waters, including wetlands according to CWA Section 404(d) (See Section 5 for more details).

The ***Water Resources Program*** provides several resources for watershed assessment and cleanup. The ***Institute for Water Resources*** examines water resources problems and offers practical solutions through a wide variety of technology transfer mechanisms. In addition to hosting and leading USACE participation in national forums, technology transfer mechanisms include the production of white papers, reports, training sessions, and manuals; the development of new planning and decision-support methodologies, improved hydrologic engineering methods, and software tools; and the management of national waterborne commerce statistics and other information systems. Water resources projects include ecosystem restoration to reestablish the attributes of a natural, functioning and self-regulating system. Over the last ten years, small ecosystem restoration projects have grown increasingly popular throughout the country. In one of the largest restoration projects ever attempted, the USACE and the National Park Service are cooperating on restoring the hydrologic regime for the Everglades in Florida with funds provided by both agencies. Collaboration has allowed the USACE to expand traditional environmental activities and enhance or restore natural resources at their projects.

The USACE Restoration of Abandoned Mine Sites (RAMS) Program, under authority of Section 560 of the Water Resources Development Act, provides technical, planning, and design assistance to federal and nonfederal interests in carrying out projects to address water quality problems caused by drainage and related activities from abandoned and inactive non-coal mines. Applied engineering and scientific support may be provided to allow the efficient and cost-effective performance of projects intended to manage drainage; restore and protect streams, rivers, wetlands, other waterbodies, and riparian areas; and demonstrate management practices and innovative and alternative treatment technologies to minimize or eliminate adverse environmental effects. Support also includes the development and population of a database of remediation technologies. RAMS projects have included development of a stakeholder design and planning manual, watershed-based cleanup, including prioritization, design, and implementation; evaluation of technologies and successes/failures and lessons learned; and partnering with other federal agencies to combine resources to collectively address pollution created by acid mine drainage.

The USACE Floodplain Management Services Program, under the authority of Section 206 of the Flood Control Act of 1960 as amended, provides a full range of information, technical services, and planning guidance needed to support and promote effective floodplain management. The USACE provides technical services and planning assistance such as flood and floodplain data development and interpretation on all aspects of floodplain management planning. This program can also develop or supply guides and pamphlets associated with floodplain man-

agement. All program services to state, regional, or local governments or other nonfederal public agencies are free of charge, within program funding limits. Program services can also be provided with 100 percent of the funds coming from the requesting entity. Federal agencies and private entities are required to provide funds to cover 100 percent of the cost of services provided.

The USACE Planning Assistance to States Program, under the authority of Section 22 of the Water Resources Development Act of 1974 as amended, can provide technical planning assistance in all areas related to water resources development in which the USACE has expertise. These areas include, but are not necessarily limited to: flood damage reduction; bank stabilization; sedimentation; dredging; hazardous, toxic, and radioactive wastes; navigation; water conservation; water quality; surface water recreation; hydrologic analysis; hydraulic analysis; hydropower; flood hazard mitigation; environmental preservation and enhancement; fish and wildlife; cultural resources; floodplain information; ecosystem and watershed planning; and stream bed degradation. Assistance is available to states, public entities within states, and federally recognized tribes in the preparation of plans for the development, utilization, and conservation of water and related land resources. Assistance is limited to $500,000 in federal funds per state or tribe per year, on the basis of available appropriations. The assistance is reconnaissance level in detail. Most studies are completed within 12 months. Studies are cost shared on a 50-50 basis with one (or more) nonfederal sponsors (a state, a public entity within a state, or tribe).

The USACE Project Modifications for Improvement of Environment Program, under Section 1135 of the Water Resources Development Act of 1986 as amended, may modify the structures or operations of previously constructed USACE water resources projects to improve the quality of the environment in the public interest. The types of work that can be undertaken under this program are structural or operational changes to existing projects for restoration or enhancement of environmental values, especially fish and wildlife values. Any modifications for environmental improvement must be both feasible and consistent with the authorized project purposes. The USACE coordinates with the appropriate federal, state, and local agencies on any actions taken.

If a nonfederal sponsor is interested in cost sharing a project, the USACE will pay all the cost to prepare a study proposal. If the study proposal is approved, the subsequent feasibility study, plans and specifications, and construction costs are cost shared. The sponsor's share is 25 percent of these costs but is not payable unless and until the project enters the construction phase. In-kind services provided during design or construction can be credited toward a sponsor's share. Sponsors are usually public agencies; however, tribes and national nonprofit organizations such as Ducks Unlimited and the National Wildlife Federation may also qualify as sponsors. A private interest may qualify as a nonfederal sponsor if the proposed modifications do not require future operation and maintenance. A sponsor must provide all lands, easements, rights-of-way, relocations, and disposal sites (LERRDs) for required implementation of the proposed modifications. Costs to acquire the LERRDs are credited toward the sponsor's 25 percent share of total costs. The sponsor is responsible for all operation, maintenance, repair, rehabilitation, and replacement costs required for the project, although, by subagreement, a third party can provide these responsibilities for the sponsor. Modification costs cannot exceed $5 million (federal costs) per project, unless specifically approved by USACE Headquarters. No minimum cost per project has been established; however, the planning and design costs should not exceed the costs of the project modifications.

The USACE Aquatic Ecosystem Restoration Program, under authority of Section 206 of the Water Resources Development Act of 1996, restores historic habitat conditions (aquatic ecosystems) at any location to benefit fish and wildlife resources. The types of work that can be undertaken under this program are structural or operational changes to improve the environment. This includes projects that would reconnect old river channels and backwaters, create wetland subimpoundments on the perimeters of reservoirs, improve water quality through the reduction of erosion and sedimentation, manipulate wetlands and vegetation in shallow headwaters of reservoirs, and involve planting woody vegetation in floodplains.

If a nonfederal sponsor is interested in cost sharing a project, the USACE will pay all the cost to prepare a study proposal. If the study proposal is approved, the subsequent feasibility study, plans and specifications, and construction costs are cost shared. The sponsor's share is 35 percent of these costs but is not payable unless and until the project enters the construction phase. In-kind services provided during design or construction can be credited toward a sponsor's share. Sponsors are usually public agencies; however, tribes and national nonprofit organizations such as Ducks Unlimited and the National Wildlife Federation may also qualify as sponsors. A private interest may qualify as a nonfederal sponsor if the proposed modifications do not require future operation and maintenance. A sponsor must provide all (LERRDs) for required implementation of the proposed modifications. Costs to acquire the LERRDs are credited toward the sponsor's 35 percent share of total costs. The sponsor is responsible for all operation, maintenance, repair, rehabilitation, and replacement costs required for the project, although, by subagreement, a third party can provide these services for the sponsor. Modification costs cannot exceed $5 million (federal costs) per project, unless specifically approved by USACE headquarters. No minimum cost per project has been established; however, the planning and design costs should not exceed the costs of the project modifications.

The USACE Support for Others Program, under authority of the Economy Act and the Intergovernmental Cooperation Act, provides the USACE with opportunities to serve the nation and enhance its capability to accomplish its assigned missions. Any work performed must be consistent with USACE organizational purposes and capability. Work under this program is done generally to provide environmental protection and restoration or to provide facilities and infrastructure. Work varies from employing one or several of the USACE's skills to using the whole range of the USACE's planning, engineering, real estate, contracting, construction management, and legal skills. USACE's capabilities include, but are not limited to, the following areas: environmental planning and compliance, economic and financial analyses, floodplain management, cultural resources management and evaluation, and general planning.

Before the USACE can support state and local governments, the requesting government must certify that it cannot obtain the services reasonably and expeditiously from private firms. The technical services that may be provided include studies and planning activities, engineering and design (including plans and specifications), construction management assistance, and training. Construction management assistance is limited to technical advice to improve state or local management capability in contract preparation, negotiation, and evaluation; contract administration; quality assurance; and supervision and inspection. The USACE may not acquire real estate nor can it serve as the contracting officer for project construction for a state or local government. All USACE costs must be provided by the customer agency. Under the program, the customer retains responsibility for program planning, development, and budgeting. **www.usace.army.mil, www.nwo.usace.army.mil/html/pd-p/CivWeb.htm**

U.S. Department of Housing and Urban Development (HUD)

HUD offers a variety of funding opportunities for projects that involve urban area renewal and economic development. The Brownfields Economic Development Initiative (BEDI) is a key competitive grant program that HUD administers to stimulate and promote economic and community development. BEDI funds are used for local governments and private sector parties to commence redevelopment or continue phased redevelopment efforts on brownfields sites where either potential or actual environmental contamination are known and redevelopment plans exist. **www.hud.gov/grants/index.cfm**

EPA and U.S. Army Corps of Engineers Team Up to Restore Contaminated Rivers

EPA and the USACE signed a Memorandum of Understanding (MOU), in July 2002, committing them to a partnership for restoration of degraded urban rivers. As part of this agreement, EPA and the Corps jointly selected eight demonstration pilot projects. A new MOU was signed in 2005 to continue monitoring these projects.

In partnership with state and local governments, tribal authorities and private organizations, the projects focused on water quality improvement, cleanup of contaminated sediments, and human and animal habitat restoration. The projects demonstrated how coordinated government and private sector efforts can not only restore contaminated rivers but also revitalize urban environments.

The MOU aimed to improve coordination of hazardous waste cleanup, water quality improvements, and environmental restoration activities under the CWA, Superfund, the RCRA, and the various Water Resources Development Act authorities. (The Water Resources Development Act is a federal statute that addresses watershed environmental restoration activities under the authority of the USACE.)

Federal Interagency Stream Restoration Working Group

The Federal Interagency Stream Restoration Working Group is an interagency group that has developed a publication (referenced below) to be used as a common technical reference for stream corridor restoration technology. Participating agencies include:

- USDA—Agriculture Research Service, Cooperative State Research, Education, and Extension Service, USDA/FS, NRCS
- United States Department of Commerce—NOAA, National Marine Fisheries Service
- United States Department of Defense—USACE
- HUD
- DOI—BLM, BOR, USFWS, National Biological Service, NPS, USGS Biological Resources Discipline and Water Resources Division
- EPA
- Federal Emergency Management Agency
- Tennessee Valley Authority

Stream Corridor Restoration: Principles, Processes, and Practices. Federal Interagency Stream Restoration Working Group (15 federal agencies of the U.S. government). ISBN-0-934213-59-3. **www.nrcs.usda.gov/technical/stream_restoration**

Nongovernmental Assessment and Cleanup Funding Resources

Voluntary Cleanup Programs

Many states have established Voluntary Cleanup Programs ("VCPs") to help address properties whose contamination (if any) is not believed to be great enough to bring it under an existing federal or state regulatory program, but whose site owners (or prospective owners) want to assess and cleanup a site to facilitate property sale, foster redevelopment, or improve value. While each of these programs is different, the following principles generally apply.

A state's VCP typically requires an applicant to submit Phase I and Phase II site studies, which the state reviews and must approve. The applicant then makes a cleanup proposal, which (upon approval) is carried out. The VCP often allows the applicant to choose one of several alternative cleanup standards, which often include meeting state-wide established cleanup standards, site-specific risk-based standards, or background. Upon successful completion of the cleanup the state issues a "certificate of completion," or similar document, that gives owners and lenders some assurance that no further cleanup will be needed.

A key issue is the extent to which EPA will defer to a state's VCP program in carrying out its own response authorities under federal cleanup statutes. Typically, EPA enters into a Memorandum of Agreement (MOA) with a state in which both governments set forth their expectations with respect to VCP sites. MOAs typically provide that EPA does not expect to undertake response or enforcement action at sites which have successfully gone through a state's VCP program, subject to several reservations. For example, such MOAs typically provide that the following categories of sites are not immune from action by EPA, regardless of their status under a state's VCP: property listed or proposed for the NPL, facilities that do or should fall under RCRA regulation (though certain sites may be allowed under certain circumstances), property subject to corrective action under RCRA, property subject to an order under water quality regulations, and property subject to UST rules. Additionally, EPA typically reserves its right to take action where new information or changed site conditions necessitate its use of authorities to address imminent and substantial endangerments. **www.epa.gov/superfund/programs/reforms/reforms/2-10.htm**

National Fish and Wildlife Foundation (NFWF)

The NFWF is a private, nonprofit organization dedicated to the conservation of fish, wildlife and plants, and the habitat on which they depend. The Foundation meets these goals by creating partnerships between the public and private sectors and strategically invests in conservation and sustainable use of natural resources. The Foundation does not support lobbying, political advocacy, or litigation. ***National Fish and Wildlife Foundation Grants*** fund projects to conserve and restore fish, wildlife, and native plants through matching grant programs. The Foundation awards matching grants to projects that address priority actions promoting fish and wildlife conservation and the habitats on which they depend, work proactively to involve other conservation and community interests, leverage Foundation-provided funding, and evaluate project outcomes. Federal, state, and local governments, educational institutions, and nonprofit organizations are welcomed to apply for general matching grants throughout the year. ***National Fish and Wildlife Foundation Special Grants*** are available with specific guidelines and timelines. **www.nfwf.org**

Volunteer Monitoring Groups

Volunteer Monitoring Groups work under a variety of names including River Watch, River Network, and Watershed Network. Groups have a wide range of involvement in water assessment and monitoring all the way from providing samplers for a single sampling event under direction of state agency personnel to recruiting, sampling, laboratory analysis and data validation, and maintenance of databases and laboratories. Some groups receive state funding through contracts with state agencies, while others must depend on grants. Funding for coordination, laboratory analysis, and supplies may come from state or federal agency grants and allocations.

River Network

River Network helps people establish strong and enduring watershed conservation organizations and programs and provides tools and training they need to be effective. Assistance comes in the form of training and consultation. River Network programs include the following: Partnership Program, Organizational Development, River Watch, River Protection and Restoration, Health and Environmental Justice, RiverSmart, River Rally, and River Heroes. River Network's River Watch

program helps volunteers understand, protect and restore their local rivers, streams, lakes, wetlands, and estuaries. Community-based monitoring programs are carried out by schools, nonprofit organizations, government agencies, and Native American tribes. They monitor local waters, determine conditions and trends, identify problems and their sources, and develop effective and creative ways to solve existing problems and prevent new ones. River Network's River Watch program provides guidance and support by helping these groups plan and carry out their programs and work closely with national, regional, and state service providers—including other nonprofit organizations, government agencies, and academic institutions—to assess the needs of monitoring groups and find the best ways to work together to meet them. **www.rivernetwork.org/index.cfm**

Remediation Technologies Development Forum (RTDF)

The RTDF was established by EPA to foster collaboration between the public and private sectors in developing innovative solutions to mutual hazardous waste problems. The RTDF has grown to include partners from industry, several government agencies, and academia who share the common goal of developing more effective, less costly hazardous waste characterization and treatment technologies. The RTDF is designed to foster public-private partnerships to conduct laboratory and applied research to develop, test, and evaluate innovative remediation technologies. Through the RTDF, companies, government agencies, and universities voluntarily share knowledge, experience, equipment, facilities, and even proprietary technology to address mutual remediation problems. **www.rtdf.org**

Conservation Technology Information Center (CTIC)

The CTIC is a nonprofit, public-private partnership working to equip agriculture with realistic, affordable and integrated solutions to environmental concerns. **www.ctic.purdue.edu**

National Corporate Wetlands Restoration Partnership (CWRP)

The CWRP is a public-private partnership between the federal government, state governments, and private corporations to restore wetlands and other aquatic habitats. The CWRP's objective is to protect, enhance, and restore wetlands and other aquatic habitats by partnering to leverage the collective resources, skills, and processes of the private and public sectors. The CWRP is facilitated by the Coastal America Partnership in Washington, D.C. Corporations contribute funds to a participating private foundation or state trust fund. Funds are matched by federal and state agencies to undertake aquatic ecosystem restoration projects. **www.coastalamerica.gov/text/cwrp.html**

TABLE 3-1 Assessment and Cleanup Financial Resources Summary

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Clean Water State Revolving Fund	C	Varies by state priority list. Generally municipalities and other public organizations. Can be nonprofit organizations or private entity.	Loans for projects that promote water quality. Generally for wastewater treatment facilities, but also for NPS pollution, runoff control, wet weather control, alternative treatment technologies, and water reuse and conservation projects. May also be used to fund Wetlands, Estuaries, Brownfields Remediation, and polluted runoff abatement projects or implement comprehensive coastal management plans.
Drinking Water State Revolving Fund	C	Community	Loans for drinking water system and source water improvements.
[illegible]	[illegible]	[illegible]	[illegible]
Water Quality Cooperative Agreements	A	State water pollution control agencies, interstate agencies, other public or nonprofit agencies, institutions, organizations, and individuals.	$10K—$200K for projects related to NPDES program.
Assessment and Watershed Protection Program Grants and Cooperative Agreements	A/C	States, local government, tribes, interstate associations, intertribal consortia, public or private nonprofit groups, nongovernmental institutions, and individuals.	$5K—$80K to develop and implement effective, comprehensive programs for watershed protection, restoration, and management.
Water Quality Pollution Control Grants	A/C	States, interstate agencies.	Up to $200K to establish and implement ongoing water pollution control programs.
Total Maximum Daily Load Program Grants and Cooperative Agreement	A/C	State water pollution control agencies, Indian tribes, interstate agencies, other public or nonprofit agencies, institutions, organizations, and individuals.	Up to $100K to assist in development of TMDLs, support implementation, or provide additional support in reaching settlements. NOTE: State, Tribal, or interstate agencies may not use these funds for routine TMDL developmental activities.
Wetland Program Development Cooperative Agreements and Grants	A/C	States, tribes, local governments.	Projects must contribute to direct protection of wetlands and be consistent with state/tribal/local government wetlands conservation priorities or strategies. A 25 percent nonfederal match is required.
Source Water Grants	A/C	Communities with highly or moderately susceptible drinking water sources, tribes, federal agencies, and nonprofit organizations working with tribes.	Available periodically for protection of water sources using a resource-based or watershed approach. Projects use the results of source water assessment to implement a water protection policy.

TABLE 3-1 Assessment and Cleanup Financial Resources Summary *(continued)*

Nonpoint Source Funds	A/C	State nonpoint source agencies.	Incremental funds: $100 million to develop and implement watershed-based plans and TMDLs for impaired waters. Base funds: staffing and support to manage and implement state Nonpoint Source Management Program, or support for projects that identify and address NPS problems. Up to 20 percent may be used to develop NPS TMDLs and watershed-based plans to implement NPS TMDLs.
Regional Geographic Initiative	A/C	State water pollution control agencies, interstate agencies, and other public or nonprofit agencies, institutions, organizations, and individuals.	Up to $200K to fund unique geographically based projects that fill critical gaps in EPA's ability to protect human health and the environment.
Watershed and Water Quality Modeling Technical Support Center	A/C/CI	EPA Regions, state and local governments and their contractors.	Technical assistance to support development of TMDLs, waste load allocations, and watershed protection plans.
Volunteer Monitoring Program	A	Volunteer water monitoring groups.	Technical assistance to organize and operate effective volunteer water monitoring networks.
Pre-Remedial Program	A	EPA	Funding and resources for assessment.
Remedial Program	A/C	EPA NPL sites	Funding and a wide array of technical and contracting resources to assess and clean up NPL sites.
Removal/Emergency Response Program	A/C	Sites with hazardous materials that pose a threat to public health.	Up to $6 million in EPA/Potentially Responsible Party funding to perform assessment and cleanup. More funds if additional findings are made.
Technical Outreach Support to Communities	CI	Communities	Technical assistance about contaminated sites. Assist community participation in cleanup decision-making process.
Technical Assistance Grants	CI	Nonprofit community groups in communities with an NPL site or proposed NPL site.	Up to $50K for community groups to hire technical advisors to help the community understand technical information about the NPL site or proposed NPL site in their community. A 20 percent match is required, but may include donated or in-kind services.
Environmental Response Team (ERT)	A/C	Superfund programs	Technical assistance on innovative technologies, land revitalization, revegetation, technology evaluation, and response to environmental emergencies.

TABLE 3-1 Assessment and Cleanup Financial Resources Summary *(continued)*

[illegible]	[illegible]	[illegible]	[illegible]
National Laboratories	A/C	Superfund programs, sometimes other EPA programs.	Technical assistance on assessment, engineering, and implementation.
Abandoned Mine Land Program	A/C	Superfund programs, federal land management agencies, states, tribes, mine owners and operators, and community stakeholders.	Technical expertise in abandoned mine site issues. Coordination with stakeholders on mine research, characterization, cleanup, and redevelopment.
[illegible]			
Contract Laboratory Program	A	Superfund programs	Laboratory analytical services
Environmental Services Assistance Team	A	Superfund programs	Contractor for analytical services and GIS mapping
Regional Superfund Laboratory	A	Superfund programs	Laboratory analytical services
Remote Sensing and Mapping Support Contract	A	Superfund programs	Remote sensing, GIS support
Superfund Technical Assessment and Response Team	A	Superfund programs	Technical support for site assessment, engineering, planning and preparedness, and emergency response.
Response Action Contracts	A/C	Superfund programs	Architect/engineering services, RI/FS, remedial design and actions, EE/CA, construction oversight, and enforcement support.
Emergency and Rapid Response Services	C	Superfund removal programs	Emergency, time-critical removal, and quick remedial response cleanup services. Personnel, equipment, and materials for cleanup and restoration.
Response Engineering and Analytical Contract	A/C	EPA Environmental Response Team	Scientific and emergency response expertise.
[illegible] BROWNFIELDS [illegible]			
[illegible]			
Brownfields Assessment Grants	A	Local governments, land clearance authorities, or similar quasi-governmental agencies under control of local government, government entities created by state legislatures, regional councils, redevelopment agencies charted by states and tribes.	Up to $200K to conduct inventories, characterization, assessment, and cleanup planning.
Brownfields Revolving Loan Fund Grants	A/C	See above	Funding to capitalize a revolving loan fund or to award sub-grants to eligible entities. Up to $1 million per eligible entity with a 20 percent match required unless a hardship waiver is granted.
Brownfields Cleanup Grants	C	See above	Up to $200K to perform cleanup activities on property owned by the grant recipient at the time of award, for a maximum of five sites per owner. A 20 percent match is required unless a hardship waiver is granted.

TABLE 3-1 Assessment and Cleanup Financial Resources Summary *(continued)*

Brownfields Job Training & Workforce Development Grants	A/C	Colleges, universities, and nonprofit training centers.	Up to $200K to provide training for residents in communities affected by brownfields. Projects should facilitate cleanup of brownfields sites contaminated with hazardous materials.
Technical Assistance to Brownfields Communities	CI	Communities	Training and technical assistance to stakeholders.
Targeted Brownfields Assessments	A	EPA Regional Brownfields Offices	EPA Brownfields program performs or directs assessment.
State and Tribal Response Program Grants	A/C	States, tribes	Up to $200K per site to supplement state/tribal response programs' cleanup capacity. May be used for site-specific assessment and cleanup.
Brownfields Federal Partnerships	A/C	Various stakeholders	Grants and other resources from federal agencies to provide support for brownfields assessments and cleanups.
ADDITIONAL EPA ASSESSMENT AND CLEANUP			
Environmental Finance Program	A/C/CI	Communities, agencies	Resources to find creative approaches to funding environmental projects
Targeted Watershed Grants	C	Watershed organizations and coalitions ready to make on-the-ground improvements to water quality.	$600K–$900K to implement actions to protect critical watersheds
Community Action for a Renewed Environment (CARE) Grants	A/C/CI	Communities	Level I—Up to $75K to establish collaborative partnerships to reduce toxic releases. Level II—Up to $300K for communities with collaborative partnerships to implement risk reduction strategies.
Five Star Restoration Program Grants	C/CI	Students, conservation corps, other youth groups, citizen groups, corporations, landowners, and government agencies.	Technical support, education, and up to $20K to complete projects that restore wetlands and streams.
DEPARTMENT OF INTERIOR ASSESSMENT AND CLEANUP RESOURCES			
Bureau of Reclamation	A/C		Stream flow data. Implement best management practices for water releases.
Water Resources Research laboratory	C	Federal, state, and local stakeholders.	Assistance in river restoration
Sedimentation and River Hydraulics Group	C	Federal, state, and local stakeholders.	Scientific and engineering expertise regarding riverine studies and modeling.
Watershed Protection and Flood Prevention Program	A/C	Conservation districts, local governments, and state/tribal agencies. For watersheds of less than 250,000 acres.	Up to $10 million per project, with cost sharing for watershed protection.
U.S. Geological Survey	A		Scientific information and expertise in many natural science fields. Data collection, monitoring, analysis, and predictive modeling. Water flow and water quality databases.

TABLE 3-1 Assessment and Cleanup Financial Resources Summary *(continued)*

U.S. Fish & Wildlife Service	A/C		Scientific expertise for protection of fish, wildlife, and their habitats. May perform projects to protect endangered species and habitat.
Partners for Fish and Wildlife	C	Federal, state, and local stakeholders.	For habitat restoration on lands not owned by state or federal government. Typically a 50 percent cost share. Technical support available.
North American Wetlands Conservation Act Grants Program	A/C	Organizations and individuals.	Funding for wetlands conservation projects that focus on protecting, restoring, or enhancing critical habitat. 1:1 matching funds required. Up to $50K for the Small Grants program. Higher funding for larger projects.
Office of Surface Mining			Regulates coal mining operations.
Abandoned Mine Land (AML) Grants	A/C	States/tribes with approved programs.	To operate a state coal mining AML program, perform reclamation, and establish trust funds.
Watershed Cooperative Agreement Program	A/C	Nonprofit organizations, especially small watershed groups.	Up to $200K for local coal mining acid mine drainage reclamation actions.
Watershed Cooperative Agreement Program	A/C	Nonprofit organizations, especially small watershed groups.	Up to $200K for local coal mining acid mine drainage reclamation actions.
DEPARTMENT OF AGRICULTURE ASSISTANCE AND RESOURCES			
Watershed Program	A/C		
Abandoned Mine Land Initiative	A/C	Mining sites with hazardous waste on USDA/FS land.	CERCLA assessment and cleanup.
[illegible]			
Environmental Conservation Acreage Reserve Program	C	Landowners	Assistance in compliance with NPS pollution requirements.
Conservation Security Program	C	Landowners, communities	Grants to restore fishery habitat. Requires a 1:1 cost share that may be cash, salary, equipment, supplies, in-kind services, or labor.
Emergency Watershed Program	C	Landowners	Cleanup from natural disasters.
DEPARTMENT OF COMMERCE RESOURCES			
Community Based Restoration Program	C	Regional government bodies, business, community/watershed group, nonprofit groups, educational institutions, conservation districts, local government, and state/territorial/tribal agencies.	Grants to restore fishery habitat. Requires a 1:1 cost share that may be cash, salary, equipment, supplies, in-kind services, or labor.
Five Star Restoration Grants	C	Communities	Assistance in developing and implementing sound projects to restore fish habitat.

TABLE 3-1 Assessment and Cleanup Financial Resources Summary *(continued)*

OTHER FEDERAL RESOURCES			
U.S. Army Corps of Engineers (USACE)	A/C		
Restoration of Abandoned Mine Sites (RAMS) Program	C	Communities/agencies	Technical, planning, and design assistance for projects to address water quality problems caused by drainage and related activities from abandoned and inactive non-coal mines.
U.S. Department of Housing and Urban Development (HUD)	A/C	Urban communities	Funding for urban renewal and economic development.
NON-GOVERNMENTAL ASSESSMENT AND CLEANUP RESOURCES			
Voluntary Cleanup Programs	A/C	Landowners	Program allows owner to voluntarily assess and clean up property to facilitate sale or redevelopment or to improve value.
National Fish and Wildlife Foundation	A/C	Federal, state, and local governments, educational institutions, and nonprofit organizations.	Various grants and assistance to conserve and restore fish, wildlife, and native plants.
Volunteer Water Monitoring Groups	A	Communities, agencies	Water monitoring
River Network	A/CI	Communities	Assistance in developing water monitoring networks.
Remediation Technologies Development Forum	C	Public and private stakeholders.	Assists communities in developing innovative solutions to mutual hazardous waste problems. Voluntary sharing of knowledge, experience, equipment, facilities, and technologies to address common problems.
Conservation Technology Information Center		Agriculture stakeholders	Assistance in finding affordable and integrated solutions to environmental concerns.
National Corporate Wetlands Restoration Partnership	C	Federal and state agencies and private corporations partner to leverage collective resources, skills and processes.	Funds to perform aquatic ecosystem restoration projects.

Table 3-2 EPA Brownfields Revitalization Program Assistance Overview

Grant Program	Brownfields Assessment Grants	Revolving Loan Fund Grants	Cleanup Grants	Job Training Grants	Tribal Response Program Grants
Purpose and Definition	**Purpose:** To promote the cleanup and reuse of brownfields and to provide financial assistance for brownfields revitalization. To establish or enhance state and tribal brownfields response programs. **Definition:** Brownfields are real properties, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant as defined in Public Law 107-118.				
Eligibility	Local governments, land clearance authorities or similar quasi-governmental agencies under control of local government, government entities created by state legislatures, regional councils, redevelopment agencies chartered by the state, states, and federally recognized tribes. In addition to the above, nonprofit organizations are also eligible for cleanup grant funding only and *all eligible entities must own the property* in order to qualify for a cleanup grant.		Colleges, universities, nonprofit training centers exempt from taxation under 26 U.S.C. 501(c)(3), community job training organizations, states, cities, towns, counties, U.S. territories, and federally recognized tribes are eligible.		States and federally recognized tribes, Alaska Native Regional/Village Corporation and the Metlakatla Indian Community
Activities	To assess brownfields sites and to test cleanup and redevelopment models (assessments to be done according to ASTM Standards).	To capitalize a Revolving Loan Fund. Also, can be used to award subgrants to eligible entities.	To perform cleanup activities on a property/properties owned by the grant recipient at the time of award.	To provide training for residents of communities affected by brownfields to facilitate cleanup and prepare trainees for future employment in the environmental field.	To supplement state and tribal response programs' cleanup capacity.
Funding	Up to $200,000 per hazardous substance site; $200,000 per petroleum site.	Up to $1,000,000 per eligible entity.	Up to $200,000 per site for a *maximum of* five sites.	Up to $200,000. Additional funding possible.	For FY 2005, approximately $50 million was awarded *nationwide to* EPA regions.
Cost Share	No matching share required.	20 percent matching share required (hardship waiver available)	20 percent matching share required (hardship waiver available)	No matching share required.	Matching share required if money is to be used for a Revolving Loan Fund; otherwise no matching share.
Deadline	September 2005	September 2005	September 2005	September 2005	States and tribes can do some limited site specific work such as assessments and cleanups of eligible brownfields.
Upcoming Solicitation	Fall 2005	Fall 2005	September 2005	Fall 2005	
Contact Information	Spring 2006	Spring 2006	Spring 2006	Spring 2006	Contact EPA region contacts listed below for more information.

Table 3-2 EPA Brownfields Revitalization Program Assistance Overview *(continued)*

[illegible]	[illegible]	[illegible]	[illegible]

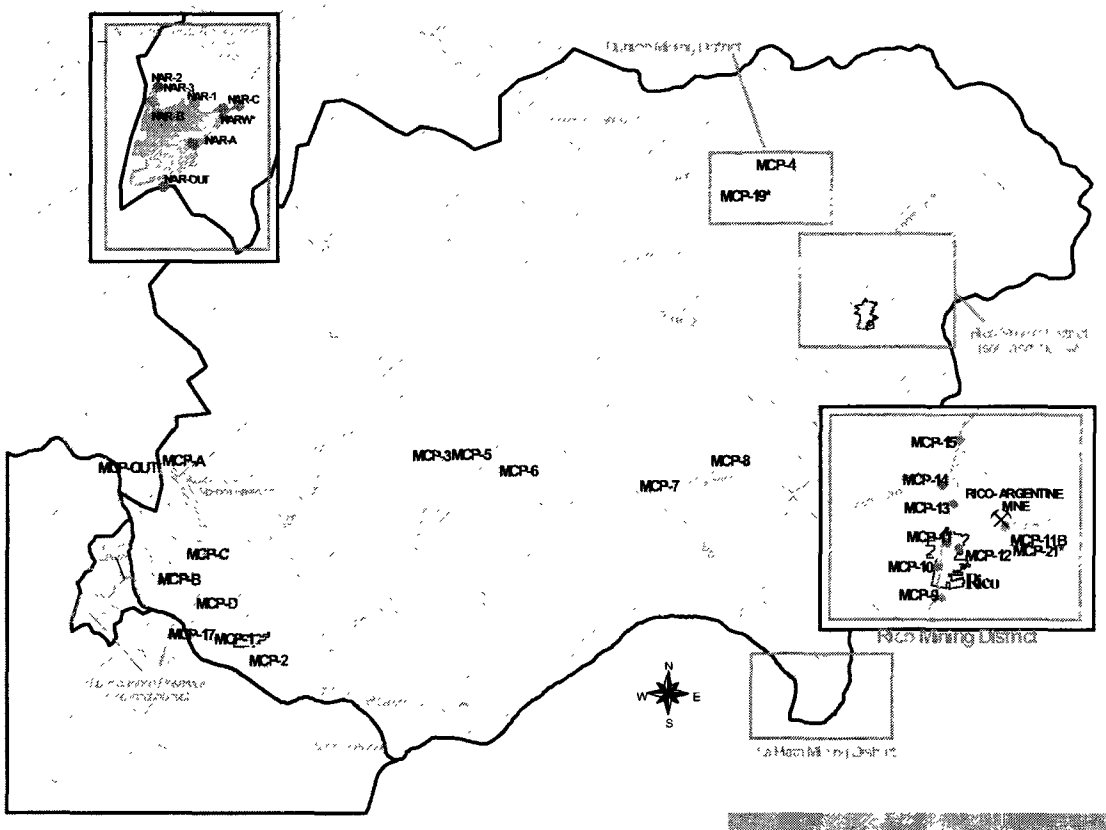
[illegible]	• Projects that stimulate the availability of other funding for assessment, cleanup, and reuse.
	• Projects that stimulate economic development; address, identify, or reduce threats to human health and the environment.
	• Projects that facilitate the reuse of existing infrastructure; create/preserve a park, greenway, undeveloped property, recreational property, or other property for nonprofit purposes.
	• Projects that meet the needs of a community unable to draw on other resources because of the small population or low income of the community.
	• Projects that allow for the fair distribution of funds between urban and nonurban areas; provide for community involvement.
	• Projects that identify and reduce threats to the health and welfare of children, pregnant women, minority or low-income communities, or other sensitive populations.
		Projects that bring together community groups, job training organizations, educators, investors, lenders, developers, and other affected parties to address issue of providing training for residents in communities impacted by brownfields.
		Projects that facilitate cleanup of brownfields sites contaminated with hazardous substances and prepare trainees for future employment in the environmental field.
			• States and tribes with a Voluntary Cleanup Memorandum of Agreement (MOA).
			• State and tribal programs w/out MOA need to establish or enhance the following elements:
			  timely survey and inventory of brownfields sites
			  oversight and enforcement authorities or other mechanisms and resources
			  mechanisms and resources to provide meaningful opportunities for public participation
			  mechanisms for approval of a cleanup plan and verification and certification that cleanup is complete
			• States or tribes need to establish a public record & update annually.

[illegible]	No part of a grant or loan may be used for the payment of: • a penalty or fine • a federal cost-share requirement • an administrative cost • a response cost at a brownfields site for which the recipient of the grant or loan is potentially liable under CERCLA section 107 • a cost of compliance with any federal law (including a federal law specified in section 101 (39)(B)), excluding the cost of compliance with laws applicable to the cleanup		Prohibitions do not apply to Section 128 grants unless recipient uses funding for Revolving Loan Fund activities or if site-specific activities are completed on sites <u>owned</u> by the recipient
[illegible] Con[illegible]	EPA Regional Contact		
W[illegible] E-m[illegible]	Region Web site: **www.epa.gov/region?/brownfields** National Web site: **www.epa.gov/brownfields** E-mail addresses: lastname.firstname@epa.gov		

Multi-Agency, Multi-Program Funding Resources and Cooperation

Dolores Watershed, Colorado

The presence of surrounding mining districts and air deposition of mercury from powerplants throughout southwestern Colorado have potentially effected hundreds of square miles of the Dolores River watershed extending from the San Juan Mountains at an elevation of 14,000 feet in the southwestern part of the state down to McPhee Reservoir. Impacts include residential soil contamination with lead concentrations up to 50,000 ppm, acid mine drainage from numerous mines, and mercury contamination resulting in a fish consumption advisory. The watershed is on



the Colorado list of impaired waters (CWA 303(d) list). A phased TMDL was completed in 2004 for mercury in McPhee and Narraguinnep Reservoirs. A second TMDL is under development for Silver Creek for cadmium and zinc.

Multi-faceted problems and issues have lead the Town of Rico, the state of Colorado, and multiple federal agencies to use nontraditional solutions including community based decision-making and cross-program coordination to assess the various impacts.

- Voluntary cleanup in Silver Creek
- Site Assessment and the TMDL program conducted ultra-clean sampling for mercury throughout the watershed to determine sources and develop a phased TMDL.

Photo: Grand Canyon Trust

(continued)

- State of Colorado modified its Performance Partnership Agreement to encourage coordination between the state Water Quality Division and Air Pollution Control
- USFWS and EPA provided funding for a Mercury Deposition Network (MDN) station at Mesa Verde National Park
- State Air Quality program and TMDL program provided funding to USGS for sampling seasonal snowpack
- USGS collected a core sample from Narraguinnep Reservoir to study the historical pattern of mercury deposition
- USGS, under an Interagency agreement from the TMDL program, conducted a source-receptor study
- Superfund Emergency Response has responded to the potential failure of treatment ponds and an abandoned cyanide heap leach area
- Targeted Brownfields Assessment by the state for facilitating cleanup and potential reuse of contaminated properties
- Water monitoring by local participants through an Environmental Justice grant
- Mercury sampling conducted by EPA National Laboratory at both high and low flows—joint SAP with TMDL program.
- Air Modeling based on MDN, snowpack, and source receptor data funded by the TMDL program and designed by USGS, Colorado Air Pollution Control, and EPA Air program

Assessment and Data Integration

Chapter 4 presents certain fundamental aspects of water and waste programs—what data is collected and why—and presents opportunities for program integration. The chapter begins with two primary opportunities for integration during watershed assessment: coordinating preliminary data compilation and streamlining additional data collection. A tool for preliminary data compilation, the Comprehensive Preliminary Watershed Assessment, is presented first because of its value in the early stages of cross-programmatic watershed cleanup. Coordinated and collaborative data collection saves agencies and programs time and money while reducing the waste of duplicative sampling efforts. A discussion of strategies for collecting additional watershed data follows. Figure 4-1 presents a guide to initial watershed assessment activities.

To integrate data compilation and collection, the Watershed Cleanup Team must consider the data requirements of the various programs. Background information is provided about data quality, data evaluation, benchmarks, and data collection strategies. For the data to be useful, it must be available and accessible to all participants and organized in a consistent manner. Therefore, data management issues that must be considered at the onset of a collaborative watershed effort are presented. This chapter ends with a brief summary of typical program-specific data collection efforts and suggests potential opportunities for integration. An example that compares TMDL, Brownfields, CERCLA Site Assessment, Remedial, and Removal Program data requirements for water samples collected in a typical mining watershed is presented in Table 4-1. Similar comparisons may be appropriate to help evaluate data integration issues with other pollutants, in other types of watersheds, or between other programs.

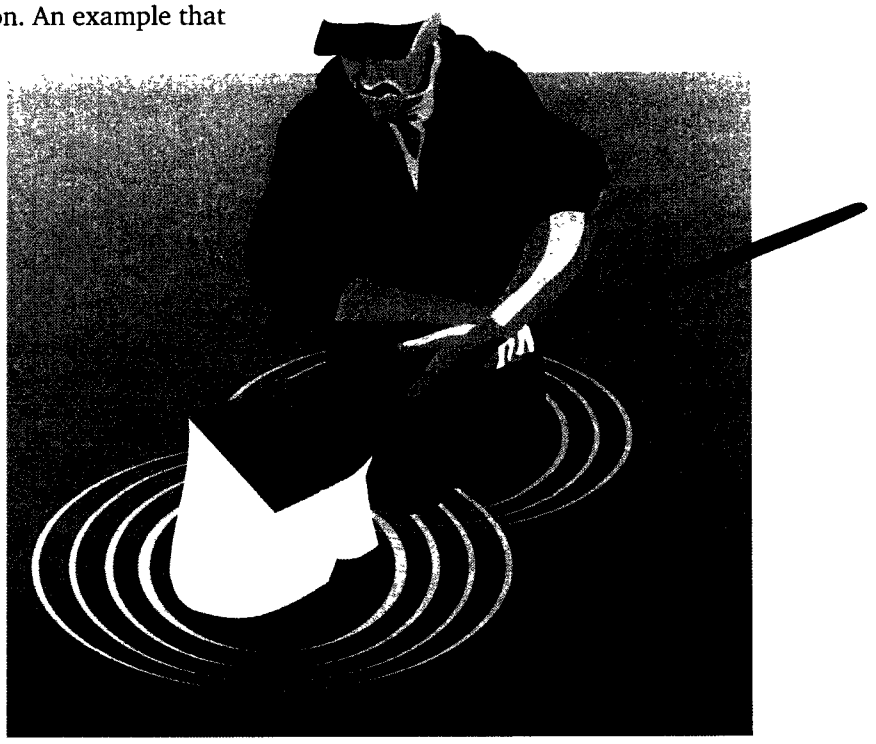


Figure 4-1 Assessment Flow Chart and Overview

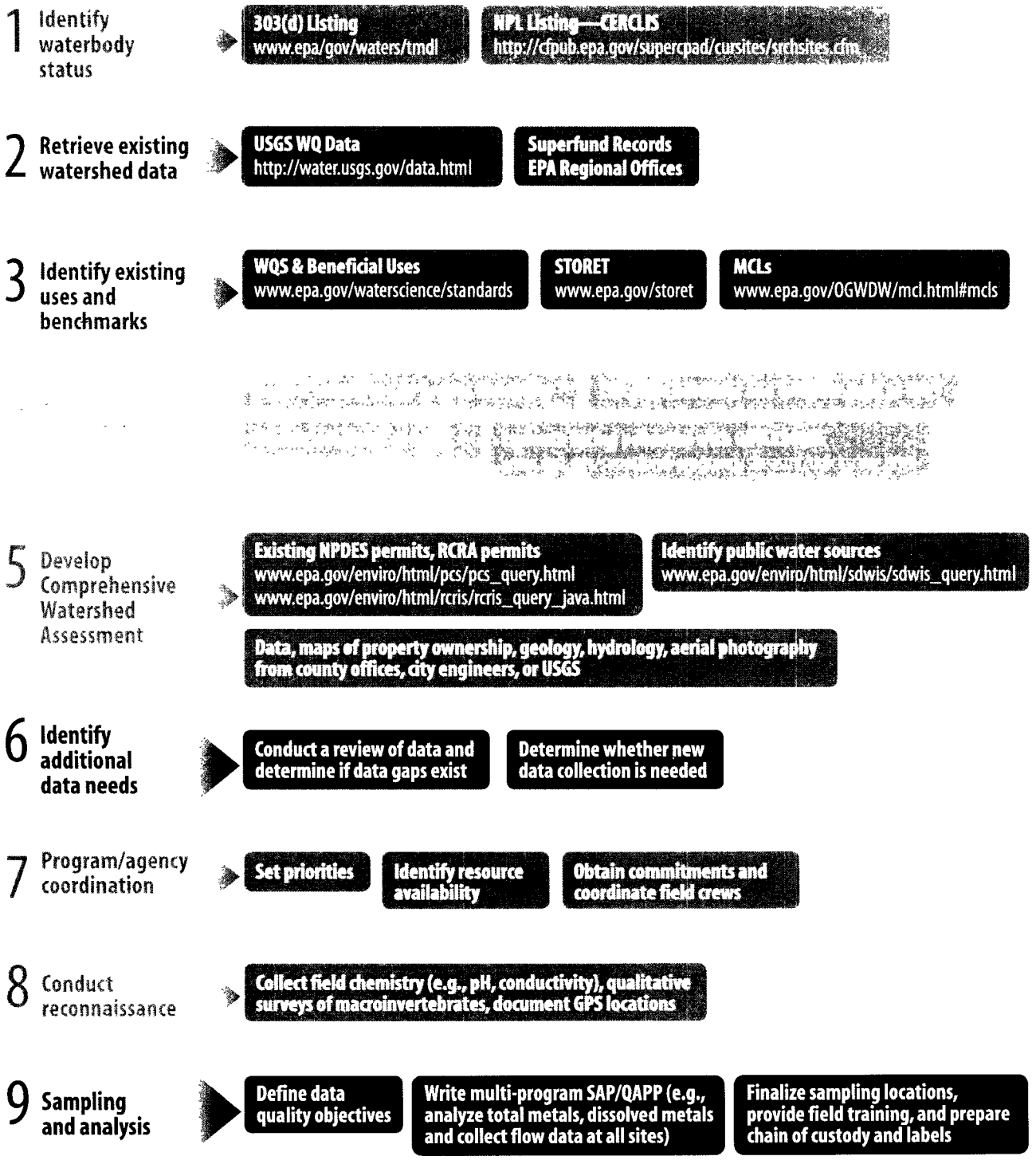


Table 4-1 Comparison of Surface Water Related Data Collection and Analysis Requirements for Mining Watersheds

	TMDL Program	Brownfields	Superfund PA/SI	Superfund Remedial	Superfund Removal
Sample Purpose	Identification of all significant sources. Describe watershed characteristics.	Determination of site risk Site characterization	Only those samples necessary for conclusive determination of whether site scores above 28.5 on HRS. Background samples are required to establish a release and establish ambient conditions.	Site characterization Risk assessment	Identification of human health threat Site characterization Determine removal alternative feasibility.
Sample Analysis	Dissolved metals, total recoverable metals, pH, conductivity, hardness. Depends on water quality standards. Water quality criteria may be expressed as dissolved, total, or total recoverable. Must have associated flow data.	Depends on pathway and receptor. Typically metal concentrations, pH	Depends on pathway and receptor being evaluated. Total metals if values will be compared to human food chain or environmental threat values. Dissolved metals if values will be compared to standards for drinking water threat values.	Flow, pH, temperature, total suspended solids, suspended sediment, salinity, and metal concentration.	Metal concentrations, pH
Detection Limits/ Bench-marks	Below water quality standards.	Dependent on receptors and exposure pathway. Based on standard values for comparison such as SCDMs, Region 3 RBCs, Region 9 Preliminary Remediation Goals (PRGs)	Depends on rationale for sample. Must be adequate to compare results to values in SCDMs. (Samples with high concentrations do not require a low detection limit.)	Varies by factor being evaluated. For Risk Assessment samples, detection limits will depend on toxicity of the contaminant.	Based on standard risk values such as SCDMs, Region 3 RBCs, Region 9 PRGs, or other published values indicating toxicity.

Comprehensive Preliminary Watershed Assessment

The Comprehensive Preliminary Watershed Assessment (see box below) is an effective tool that assists in understanding watershed conditions and the development of a preliminary watershed conceptual model. The conceptual model will be used to help identify interested parties and focus the Watershed Cleanup Team on important issues. The Comprehensive Preliminary Watershed Assessment should include, at a minimum: maps and aerial photographs depicting the entire watershed and displaying any property ownership/zoning; identification of water quality standards for each waterbody within the watershed and current waterbody status in meeting the standards; readily available data (including summaries/references to monitoring data reports collected through various regulatory programs, identification of potential human and environmental receptors (humans, fish, birds, soil community, etc.)); location of historical and current sources of contamination; key findings of previous geological, hydrological, and hydrology studies; NPDES permits (with identification numbers); RCRA facilities and CERCLA/CERCLIS sites within the watershed; and documentation of past, current, or planned cleanup activities. The assessment may also include preliminary scoping studies such as a qualitative macroinvertebrate study or watershed-wide contaminant loading study. A reconnaissance field trip may be the culmination of the assessment and provide information to assist in scoping the need for future study.

Potential sources of information for the Comprehensive Preliminary Watershed Assessment include: EPA PA/SIs, Removal Assessments, Removal Actions, RI/FSs, TBAs, Emergency Response Actions, water quality agencies and databases, state permitting authorities, county/local health/environmental departments, educational institutions, USGS, federal and tribal land management agencies, existing databases (Storage and Retrieval of water-related data (STORET), WATERS, NWIS), and other potential sources discussed in Chapter 3.

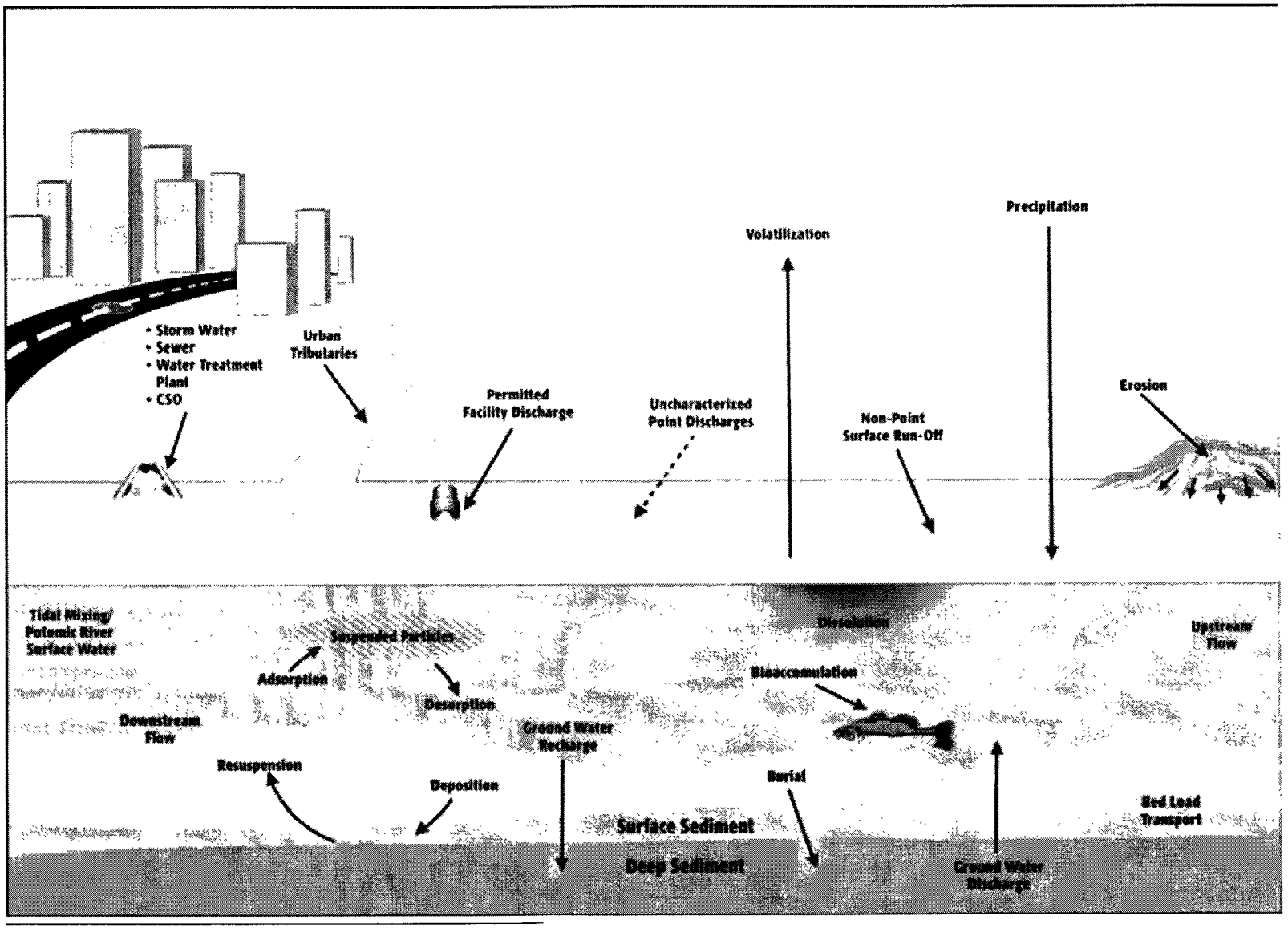
The Comprehensive Preliminary Watershed Assessment should average between 15 and 30 pages, including maps, photos, aerial photography, and land ownership. The Comprehensive Preliminary Watershed Assessment may assist in development of a site conceptual model. Figure 4-2 provides an example of a site conceptual model that was developed for a cross-programmatic watershed cleanup effort in the Anacostia River Watershed in Maryland and the District of Columbia.

Comprehensive Preliminary Watershed Assessment

If a cross-programmatic cleanup approach is indicated, the following information should be collected for the entire watershed (or as much as is practical):

- Aerial photographs
- Property ownership/zoning
- Watershed topographic mapping
- GIS mapping of available data
- Identification of water quality standards
- Determination of waterbody impacts (i.e., exceedance of water quality standards, NPL scoring, etc.)
- Identification of potential receptors
- Key findings of previous studies
- Available data, with GPS locations for all sampling locations
- Relevant background information from previous studies (including all existing data that meets criteria and citing of any other data such as watershed geology or hydrogeology for both a watershed-wide and site-specific basis)
- Hydrologic information (flow data from previous sampling events, and data and associated hydrographs from long term gauging stations)
- Documentation of past, current, or planned cleanup activities by the various agencies/programs
- If the information is not already available, a watershed-wide loading study is essential to determine major contributors to stream contamination.
- Results of field reconnaissance:
  - Confirm preliminary data (land use, source locations, aerial photography, etc.)
  - Collect basic field chemistry (pH, conductivity, temperature, dissolved oxygen)
  - Conduct bioassessment such as qualitative macroinvertebrate surveys, where applicable
  - Identify potential sample locations (GPS and directions to sample locations)
  - Identify additional potential sources

Figure 4-2 Site Conceptual Model, Anacostia River Watershed, Maryland and Washington, D.C.



From: *Charting a Course Toward Restoration: A Toxic Chemical Management Strategy for the Anacostia River*, prepared by member organizations of the Anacostia Watershed Toxics Alliance and the Anacostia Watershed Restoration Commission (AWRC).

Additional Watershed Data Collection

To save time and money, the Watershed Cleanup Team may want to consolidate future data collection efforts. Depending on the participants, overlap of data needs, funding, and other considerations, additional data may be collected by individual programs/agencies (cooperative sampling) or a multiagency/stakeholder sampling effort (collaborative sampling). It is likely that a combination of approaches will be used. No matter how data collection is structured, cooperation between Team programs/agencies will save time and precious resources despite the additional initial planning efforts.

Cooperative Data Collection

In some cases, the Team may decide that individual agencies/programs will conduct future data collection efforts separately. In that case SAP should be available for review by the Watershed Cleanup Team in advance to maximize integration. An example of the benefit of sharing plans in advance might be at an NPL site where the RI contractor will be collecting quarterly surface water samples at three locations to assess seasonal stream gains from a contaminated aquifer. Because surface water quality and stream flow data are important to most programs involved in watershed cleanup, the plan should be reviewed to determine the applicability of the data to the state water quality data set, the NRDA, and the TMDL programs. It might mean that the data collection techniques or analytical parameters are adjusted slightly (i.e., adding flow rate to the field measurements, or collecting samples for both total and dissolved metals concentrations) to accommodate other program needs, but might also prevent unnecessary and wasteful duplicative sampling efforts by another program.

Collaborative Data Collection

The Team may decide to collaborate on some data collection efforts. A common approach and consistent methods should be used to accommodate the needs of the multiple programs involved. A multiagency SAP will be necessary to guide the sampling. Data Quality Objectives (DQOs) will provide the focus for preparing these documents. The SAP should include consensus among stakeholders on site naming conventions, sampling locations, media collected, protocols for sampling and analysis, and detection levels. Preparation of a consolidated SAP may be performed by the Watershed Program Manager if support is not available elsewhere.

Information may need to be gathered on the differences in cost between collecting lower- and higher-level quality data. Discussion will need to occur among all watershed participants who will use the data to be collected regarding what data quality each participant desires and requires, who will pay for higher quality data, and when such data needs to be collected.

Before the final selection of sampling locations, a thorough reconnaissance of the watershed should be conducted utilizing the information summarized in the Comprehensive Preliminary Watershed Assessment. The reconnaissance may include stream measurements for conductivity, pH, dissolved oxygen, qualitative macroinvertebrate analysis, and GPS readings for all potential sampling locations (including any other appropriate field measurements that will indicate potential sources of the pollutants of concern).

Integrating data types and quality assurance requirements can be challenging, both in determining protocols and in obtaining funding for field work and laboratory analysis. Again, a cooperative approach can provide solutions to some of these problems. Given the example of the RI contractor collecting surface water samples in the cooperative sampling section, the TMDL and NRDA programs could send personnel to assist in sampling in exchange for additional sample analysis or lower laboratory detection limits.

While sampling performed by individual programs is often conducted by contractors, collaborative data collection may be performed by program personnel from several programs and agencies to reduce costs. Such an effort will require planning and the acquisition of field measurement devices, sample containers and preservatives, vehicles, and other site-specific tools. EPA Regional Laboratories may be able to provide some of the necessary items and technical support. Prior to sampling, all sampling team members must be trained for the activities they will be expected to perform. For example, personnel doing pebble counts should be instructed on the appropriate methodology, and personnel conducting macroinvertebrate surveys should be taught the method and provided with sketches of the organisms that should be present in that geographical location at that time of year.

In general, surface water sampling designs must include flow measurements to provide calculations to quantify loads and help prioritize sites. Water samples should be analyzed for both total and dissolved metals with detection levels below water quality standards. Sampling should also consider seasonal variations in flow and contaminant loading to determine critical conditions.

Biological Data Collection

In preliminary and subsequent data collection (including SIs and RIs), the importance of biological data collection must be strongly emphasized. Bioassessments can be good indicators of water quality and watershed health. As a preliminary data collection strategy, qualitative macroinvertebrate assessments are simple and quick and may guide selection of potential sampling locations that should be investigated further. Sketches of macroinvertebrate species expected to be found in similar unimpacted sites can be utilized for rapid identification of the species composition in the study area. Bioassessments may include macroinvertebrate, fish, and aquatic vegetation surveys. Rapid Bioassessment Protocols may be used to direct the work. Habitat quality should be evaluated concurrently to determine if any perceived degradation in species number or diversity may be due to habitat limitations rather than contamination.

For more information on this subject, please see:
Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition. EPA 841-B-99-002. **www.epa.gov/owow/monitoring/rbp/download.html**

Data Quality and Evaluation

When integrating data from various sources or when planning additional data acquisition, data quality is an important issue that can greatly influence the usability of data by the various programs. This is one aspect of a cross-programmatic watershed effort that can cause divisions if not carefully addressed, because the various programs often collect data for different purposes. When planning additional data acquisition within the watershed, a QAPP should be prepared specifying all the procedures that will be used to ensure adequate data quality. Development of Data Quality Objectives (DQOs) is part the QAPP. Development and use of DQOs will help ensure that the data is of the type, quantity, and quality useful for all watershed participants. For cooperative data collection, the QAPP should be reviewed by the Watershed Cleanup Team along with the FSP. For consolidated data collection efforts, the FSP and QAPP will be prepared collaboratively. As noted earlier, watershed participants should agree on what data quality is needed for the various purposes of the data, the schedule for data collection, and who will pay for the collection of such data.

After the field and laboratory data are available, it should be compared against the DQOs to ensure it meets these objectives. The reviewed and validated data is analyzed for trends, compared against benchmarks, and/or used to make program decisions.

Data Quality Objectives

The DQO process is a series of planning steps using scientific methods that ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. The EPA has issued guidelines to help data users develop site-specific DQOs. The DQO process is intended to:

- Clarify the study objective.
- Define the most appropriate type of data to collect.
- Determine the most appropriate conditions from which to collect the data.
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the design.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, and data collection requirements and ensures that analytical techniques are used that will generate the specified data quality. The process also ensures that the resources required to generate the data are justified. The DQO process consists of seven steps; the output from each step influences the choices that will be made later in the process. These steps are:

Step 1: State the problem.

Step 2: Identify the decision.

Step 3: Identify the inputs to the decision.

Step 4: Define the study boundaries.

Step 5: Develop a decision rule.

Step 6: Specify tolerable limits on decision errors.

Step 7: Optimize the design.

During the first six steps of the process, the planning team develops decision performance criteria that will be used to develop the data collection design. The final step of the process involves refining the data collection design based on the DQOs.

For more information on this subject please see:
Guidance for the Data Quality Objectives Process, EPA QA/G-4. EPA/600/R-96/055. August 2000.

Data Evaluation

During data evaluation, laboratory data are reviewed and validated to determine its usefulness and applicability for further evaluation (site models, statistical analyses) or decision-making. The reviewer examines sampling dates, locations, depths, and descriptions; sample collection and preparation techniques; laboratory preparation techniques; analytical methods and analytical results; method detection limits or sample quantitation limits; QA/QC samples; and documentation. The data reviewer reviews data reports for transcription and typographical errors, determines if sampling protocols were appropriate, compares data against field and trip blanks to detect cross-contamination, compares field replicate sample results, reviews laboratory QC (laboratory blanks, method standards, spike recovery, duplicates), reviews detection limits, deletes unusable data, attaches qualifiers to usable data, and explains limitations of qualified data. Laboratory analytical packages are validated by a chemist and the laboratory. Validation compares the QA objectives of the user against the laboratory data package. Validation may include evaluation of sample holding times, initial and continuing calibration verification, interference check samples for inorganics, determination of bias (percent recovery), precision (from replicate analyses), detection limits, and field conditions that may have modified sampling procedures. A summary of the review and validation processes is preferably provided to the project manager.

Once the data are validated, data that meets the requirements may be used to evaluate site conditions. Various numerical and graphical analytical methods may be used to evaluate the data based on the study objectives. For example, the user may need to know if data support statistical assumptions regarding the presence or absence of contamination or biological response to the contamination. At other times, the user may want to determine if there is a trend to the data or correlation between two variables. For some studies, mean or median values and standard deviation or another determination of variance are adequate for the purposes of the study. Environmental data may require transformation prior to statistical analysis.

The flow and water chemistry loading data should also be reviewed to ensure they provide enough spatial and temporal variability with regard to high and low flow to determine critical conditions within the watershed.

Benchmarks

Data should be compared against appropriate standards such as those provided in the following table. Values used for comparison will depend on the sample matrix, the contaminant of interest, the contaminant pathway being evaluated, and program requirements. One screening concentrations benchmark of note in the table below are the Superfund Chemical Data Matrix (SCDM), a compilation of values for use in the HRS. Many of the values listed on the SCDM are derived from or applicable to other program benchmarks, so this document is valuable for the determination of benchmarks that will be used by a variety of programs involved in the watershed cleanup. Criteria and standards for dissolved metals are hardness-based and are typically presented as a hardness-based formula. Table 4-2 presents typical benchmarks for comparison.

Table 4-2. Benchmarks for Data Comparison

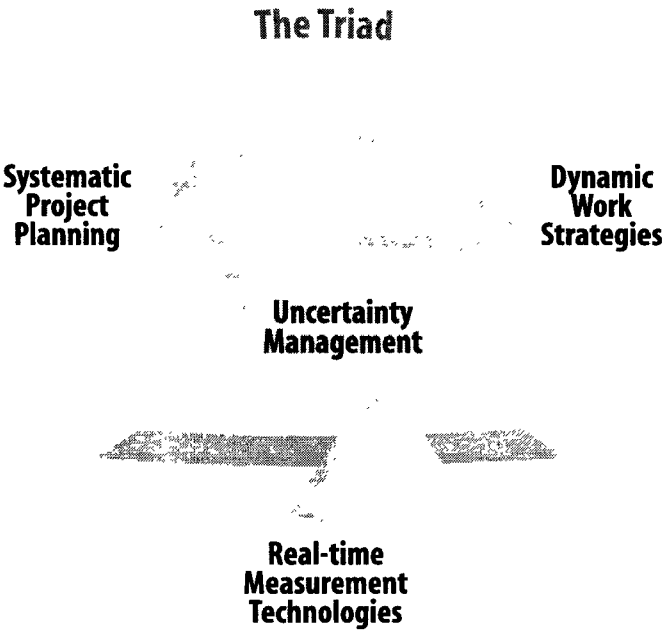
Benchmark	Use	Reference
State and tribal Water Quality Standards under the Clean Water Act (designated uses, water quality criteria, antidegradation policies)	Surface water (some states have also issued ground water standards under state law).	State, tribal and territorial water quality standards. **www.epa.gov/waterscience/standards/states**
Maximum Contaminant Levels (MCLs)	Ground water, surface water, drinking water.	National Primary Drinking Water Standards. **www.epa.gov/safewater/mcl.html#mcls**
Maximum Contaminant Level Goals (MCLGs)	Ground water, surface water, drinking water.	National Primary Drinking Water Standards. **www.epa.gov/safewater/mcl.html#sec**
Screening Concentrations	Ground water, surface water, drinking water, air, soil, biota.	Superfund Chemical Data Matrix. EPA. January 2004. **www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm** Region 3 Risk Based Concentrations. EPA. April 2005. **www.epa.gov/reg3hwmd/risk/human/index.htm** Region 9 Preliminary Remediation Goals **www.epa.gov/region09/waste/sfund/prg/index.htm** Soil Screening Guidance: Users Guide. EPA540/R-96/018. July 1996. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.
Food and Drug Administration Action Levels	Biota	Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed.
National Ambient Air Quality Standards	Air	National Ambient Air Quality Standards. 40 CFR Part 50.
National Emissions Standards for Hazardous Air Pollutants	Air	National Emission Standards for Hazardous Air Pollutants. 40 CFR Part 61.

Data Collection Strategies

Triad Approach

EPA often uses the Triad approach for planning site assessment activities. The Triad approach allows the field work to be conducted cost-effectively and logically. The Triad approach is a three step process that includes systematic planning, dynamic work strategies, and real-time measurement technologies.

- ***Systematic planning*** includes developing a conceptual site model that shows sources, pathways, and receptors. The seven step DQO process is used by the planning team to ensure that project decisions meet the requirements of the project. Stakeholders are identified in a project organization diagram and may include multiple agencies, community groups, tribal organizations, and appropriate experts required for the project, such as a risk assessor. The results of this planning process are documented in the FSP and the QAPP.
- ***Dynamic work strategies*** means using field analytical data generated on-site to determine the direction of subsequent field work, thereby reducing the overall time and cost of site activities and allowing better discretion in sample selection. A combination of less expensive field analytical data and collaborative laboratory analytical data allows for a more cost-effective way to more fully address all of the Data Quality Indicators (DQIs). The three DQIs—precision, accuracy, and sensitivity—must be established to ensure that the data used in decision-making are of acceptable quality by quantifying the acceptable amount of error in the data collection and analytical process. Data Quality Assessment (DQA) criteria are defined as part of the DQO process and documented in the SAP. The results of the inspection/assessment, including qualitative and quantitative evaluations of the DQIs, are documented in the Analytical Results Report.
- ***Real-time measurement technologies*** and tools are used to manage data in the field and provide the information, including statistics, to make real-time decisions in the field where applicable. **www.clu-in.org/triad**



Data Management

Organizing data so it can be easily compiled and retrieved is one of the big challenges for multi-program, multiagency cleanup efforts. The Watershed Project Manager must ensure that data is collected, compiled, and managed so that it allows participants to easily access, query, and view important site information. A data management plan may be prepared with the assistance of regional EPA data management specialists and other Watershed Cleanup Team members. The following issues are some that should be considered in developing a data management plan:

- Who will manage data and who will map data (internal EPA data management, community action group, contractor, USGS, USACE, others).
- Select single data repository (single point of contact).
- Funding for database development and mapping.
- Platform for data management (STORET, other database).
- Standard data submission requirements and tools for all groups submitting data (see Table 4-3).
- Level of effort allowable for existing data compilation.
- Mapping platform (hard copy maps only, mapping application, query and view requirements).
- Data display requirements.
- Mapped coverages (roads, streams, towns, topographic features, aerial photos, site features, data points, etc.).
- Sampling location naming conventions.

Frequently, data will be available from previous monitoring, assessment, and remediation efforts in the watershed. In the best case, all participants will readily contribute all available data, but the data may be provided in a variety of formats with varying degrees of usefulness for the project. The level of effort to compile existing data will depend on the format (text tables, spreadsheet data, laboratory electronic deliverables, and databases) and completeness of data provided by participants. Clear communication of data formatting needs may reduce the cost of data management. It will often be necessary for the Cross-Programmatic Watershed Project Manager to compile the existing data early in the process.

Data collected after the formation of the Watershed Cleanup Team should be provided in the standard format decided upon by the project team to ensure funds are not wasted on unnecessary data conversions and time-intensive discussions between data collection groups and GIS or data conversion specialists. *A consistent sample naming convention should be determined in advance and used by all participants.*

STORET (WQX)

Data mapping may be provided by EPA personnel or contractors or may be performed by other Watershed Cleanup Team members or contractors, depending on funding, agency capability, and data viewing requirements. In some cases, a hard copy of the maps may be provided to participants at the beginning of the projects and at important milestones. In other cases, an easily viewable, queryable GIS application may be needed. Mapping support for Superfund projects is available through EPA personnel and the ESAT contract. Water programs and other programs may access internal GIS personnel or find a mechanism to fund a mapping contractor. Enviromapper is EPA's

standard for mapping, however, the program may not provide all the features desirable for the Watershed Cleanup Team. EPA Region 10 has developed an Arc Internet Mapping Solution (ArcIMS) application for use with STORET. Each EPA region has standardized coverages available for use in mapping applications.

While a variety of platforms may be used to manage data, the EPA standard is the STORET database. STORET is being redesigned into a new system called The Water Quality Exchange (WQX) to facilitate easier flow of data into the data warehouse, and ultimately, greater access to the data. The other major national database of water quality information is the USGS NWIS. Other databases are available with regional or local data. These may be useful but should be compatible with STORET. Table 4-3 presents typical data requirements for using sampling data in a site database.

Table 4-3 Sample Data Requirements

Sample Data Requirements
Project name
Project or watershed ID
Who collected data
Why data was collected
How data was collected
Location ID
Latitude/longitude
Datum
Method to determine lat/long
Sample ID
Data type (water, soil, sediment, air, biota, field data, laboratory data)
Date
Parameter name
Parameter value
Sample fraction (dissolved or total)
Lab and/or validator qualifiers
Analytical method
Detection limit
Sampling method
Additional information may be necessary for specific watersheds and pollutants. The project manager and Watershed Cleanup Team must set up data requirements according to the particular project.

The STORET database is EPA's repository for water quality, biological, physical, soil, sediment, air habitat assessment, and field measurement metadata collected by a variety of sources—from state and federal agencies to volunteer monitors. STORET is primarily used by states to report required water data to EPA; however, it may be used to manage all types of data from a variety of sources. Potential data sources may include EPA programs such as Superfund, RCRA, and Brownfields; other federal agencies; tribes; state water and environmental agencies; and local/regional groups such as communities, municipalities, watershed councils, and volunteer monitoring organizations.

STORET is an ideal way to manage data in a multi-programmatic watershed cleanup effort for several reasons. STORET's data retrieval functions are Web-enabled so the public can use the Internet to query and download data. Data providers can submit data to STORET via data entry modules that operate on personal computers and are available free of charge to monitoring organizations. Web tools are also available to data providers who would like to submit data to STORET but do not want to use the standard STORET software. See the Region 8 case study on managing data and Web tools below. Data in STORET are available to all in a consistent format that allows mapping, sample location identification, and data viewing. **www.epa.gov/storet**

Region 8 Using Web Tools for Data Management

Region 8 requires that data from all samples collected or analyzed using EPA funds be provided in a standardized format for use in STORET. Formatting requirements are presented in: *Standard Guidance to Format Sample Results, Field Measurements, and Associated Metadata.* EPA Region 8. December 1, 2003. (See Appendix B.) Region 8 states use the STORET database to meet CWA requirements. Other EPA programs, including Superfund, RCRA, and Brownfields programs, also provide site data to STORET. Data collected by other organizations using EPA funding must also be reported to STORET.

Several projects are underway or have been completed to simplify data reporting requirements. A Web tool to simplify tribal data submission has been developed. CWA 319 funds were used to create a Web tool and training to facilitate data entry from local groups submitting data from nonpoint source projects. Funding for a Web site to host the WEB SIM Tool along with the STORET database and an ARC IMS application and to provide training on the tool has been approved for the Colorado Water Quality Monitoring Council. Through this project, all watershed groups in Colorado will have access to the Web site and receive training for data input and viewing.

Additional Databases

Safe Drinking Water Information System (SDWIS)

SDWIS is used to meet the requirements of the SDWA. SDWIS is a database designed and implemented by EPA to meet its needs in the oversight and management of the SDWA. The database contains data submitted by states and EPA regions in conformance with reporting requirements established by statute, regulation, and guidance. A "sister" system, SDWIS/State is a database designed by EPA and the states to help states (and EPA regions) run their drinking water programs and fulfill EPA reporting requirements. **www.epa.gov/safewater/sdwis_st/state.htm**

National Water Information System (NWIS)

NWIS is a database of surface water and ground water data from 1.5 million sites around the country. Current and historical surface water characteristics such as streamflow and stage, plus water quality data such as temperature, specific conductance, pH, nutrients, pesticides, and VOCs are included in the database. **http://waterdata.usgs.gov/nwis**

Watershed Assessment, Tracking and Environmental Results (WATERS)

WATERS is an integrated information system for the nation's surface waters. Water quality information must be gathered to fulfill the requirements of the CWA and the SDWA, the two main federal laws that protect our nation's waters. The EPA Office of Water has various programs that store data in associated databases. These databases are separately managed, but under WATERS, the program databases are connected to a larger framework. This framework is a digital network of surface water features known as the National Hydrography Dataset (NHD). By linking to the NHD, one program database can reach another, and information can be shared across programs. Databases linked to WATERS include: Water Quality Standards Database (WQSDB), National Assessment

Opportunities for Integration

- A combined or coordinated database is a crucial tool to ensure coordinated assessment, cleanup, and monitoring. All relevant site information should be available to each stakeholder so assessment needs and priorities can be readily evaluated. The combined effort will require less effort than the development of individual databases for each program. The combined database will have a more complete dataset, providing additional information for decision-making.
- GIS mapping of information in the database allows the watershed team to evaluate data needs, determine focus areas for additional study, see the relationships between sources and stream loads, evaluate cleanup/implementation/restoration alternatives, discuss priorities for site cleanup/implementation/restoration, and develop a comprehensive monitoring plan.

Database (NAD), National Total Maximum Daily Load Tracking System (NTTS), STORET, NPDES PCS, SDWIS, National Listing of Fish and Wildlife Advisories (NLFWA) database, Nutrient Criteria Database, and the Beaches Environmental Assessment Closure & Health (BEACH) Watch database. Section 319 projects have been georeferenced to the NHD and the location of the 319 project can be seen if that layer is "turned on" on GIS maps in Enviromapper for WATERS. Currently you cannot actually link to the Section 319 Grants Reporting and Tracking System (GRTS). **www.epa.gov/waters**

Better Assessment Science Integrating Point & Nonpoint Sources (BASINS) is a multipurpose environmental analysis system designed for use by regional, state, and local agencies in performing watershed- and water quality-based studies. It integrates a geographical information system (GIS), national watershed data, and state-of-the-art environmental assessment and modeling tools into one convenient package. This system makes it possible to quickly assess large amounts of point source and nonpoint source data in a format that is easy to use and understand. Installed on a personal computer, BASINS allows the user to assess water quality at selected stream sites or throughout an entire watershed. This invaluable tool integrates environmental data, analytical tools, and modeling programs to support development of cost-effective approaches to watershed management and environmental protection, including TMDLs. **www.epa.gov/waterscience/basins**

Program Studies

Various programs and agencies conduct studies within contaminated watersheds and of contaminated waterbodies. Primary studies include: CWA Surface Water Monitoring Use Attainability Analyses (UAA) and TMDLs, CERCLA PAs, SIs, RI/FSs, Risk Assessments, and NRDA, RFA, Facility Investigations, CMSs, and Brownfields Assessments. This section describes the objectives and focus of each of the major studies and the typical data collected. It suggests opportunities for integration. Because some of these studies are directed at assessment, cleanup, and/or monitoring the portions of the studies related to cleanup are presented in Chapter 5, where possible.

A variety of other studies may have been or should be conducted within any specific watershed. This section does not intend to be a comprehensive description of all useful studies that might be performed within a watershed.

CWA State Water Quality Monitoring Programs

Water quality monitoring approaches vary from state to state. Degrees of sampling effort and density, and the chemical/physical/biological analyses performed on the samples can vary widely. Efforts are being made to make state monitoring programs more consistent, and states are now required to begin implementation of the strategy described in the recommended *Elements of a State Monitoring Program*. This section describes state water quality monitoring on the basis of this document.

The ten elements of a state monitoring program include:

- Monitoring program strategy
- Monitoring objectives
- Monitoring design
- Core indicators of water quality
- Quality assurance
- Data management
- Data analysis and assessment
- Reporting

- Program evaluation
- General support and infrastructure

Sampling Objective. Monitor state waters to meet state monitoring and assessment objectives.

Sampling Strategy. The most efficient combination of monitoring designs (e.g., fixed station, intensive and screening-level monitoring, rotating basin, judgmental and probability design) to meet state monitoring and assessment objectives are preferred. The state monitoring design should support statistically valid inferences about the condition of all state water types over time.

Samples and Analysis. A core set of indicators (e.g., water quality parameters) should be designated for each water resource type that include physical/habitat, chemical/toxicological, and biological/ecological endpoints as appropriate; that reflect designated uses; and that can be used routinely to assess attainment with applicable water quality standards throughout the state. This core set of indicators is monitored to provide statewide or basin/watershed level information on the fundamental attributes of the aquatic environment and to assess water quality standards attainment/impairment status. Previously, chemical and physical indicators were emphasized; however, biological monitoring and assessment should assume a more prominent role in state monitoring. **www.epa.gov/nerl/research/2004/g2-12.pdf**

Supplemental indicators are used when there is a reasonable expectation that a specific pollutant may be present in a watershed, when core indicators indicate impairment, or to support a special study such as screening for potential pollutants of concern. Supplemental indicators are often key to identifying causes and sources of impairments and targeting appropriate source controls. These supplemental indicators may include each water quality criteria in the state's WQS, any pollutants controlled by the NPDES, and any other constituents or indicators of concern. Table 4-4 lists recommended core and supplemental indicators.

Data Quality. Data may be screening or definitive depending on compliance with QA/QC protocols and the sampling objective. States report data in STORET and also maintain the data in their own database. States also provide appropriate geospatial data to enable the use of current GIS tools. The *2002 Integrated Water Quality Monitoring and Assessment Report Guidance*, Appendix B, asks states to define the geographic location of assessment units using the NHD. **www.fgdc.gov/metadata/metadata.html.**

Data Uses. Data are used to meet the needs of the State Water Monitoring and Assessment Program as required by the CWA. Data are used to compile the Section 305(b) water quality inventory report and the Section 303(d) list, and provide information on monitoring and notification programs for coastal recreation waters. Data may also be used for preparation of triennial reviews,

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Opportunities for Integration

- State water monitoring data may be directly incorporated into the combined watershed database.
- The state program may be integrated with TMDL, NPDES, CERCLA, and other long-term monitoring efforts. For example, surface water monitoring data collected as part of monitoring a NPL site remedy may be used in the state water assessment program, or data from state surface water monitoring may be used to determine the effectiveness of the remedy if the data collected for each sample meets the needs of each agency.
- The watershed effort generally stimulates community interest. Volunteer monitoring programs, when well-managed, may provide data to meet the needs of state and federal assessment and cleanup agencies.
- Monitoring information will be used for assessing the status of the states' waters; determining trends in water quality and contaminant loadings; implementing pollution control strategies, such as TMDLs and NPDES permits; identifying emerging issues; and developing policies and standards.

Table 4-4 Recommended Core and Supplemental Indicators

	[illegible]	[illegible]	[illegible]	[illegible]
Recommended Core Indicators	Condition of biological communities (EPA recommends the use of at least two assemblages) Dissolved oxygen Temperature Conductivity pH Habitat assessment Flow Nutrients Landscape conditions (e.g., % cover of land uses) Additional indicators for lakes: Eutrophic condition Additional indicators for wetlands: Wetland hydrogeomorphic settings and functions	Pathogen indicators (E. coli, enterococci) Nuisance plants Flow Nutrients Chlorophyll Landscape conditions (e.g., % cover of land uses) Additional indicators for lakes: Secchi depth Additional indicators for wetlands: Wetland hydrogeomorphic settings and functions	Trace metals Pathogens Nitrates Salinity Sediments/TDS Flow Landscape conditions (e.g., % cover of land uses)	Pathogens Mercury Chlordane DDT PCBs Landscape conditions (e.g., % cover of land uses)
Supplemental Indicators	Water column toxicity Sediment toxicity Other chemicals of concern in water column or sediment Health of organisms	Other chemicals of concern in water column or sediment Hazardous chemicals Aesthetics	VOCs (in reservoirs) Hydrophyllic pesticides Nutrients Other chemicals of concern in water column or sediment Algae	Other chemicals of concern in water column or sediment

UAAs, standards revisions, water quality-based effluent limits (WQBELs) in permits, TMDLs, NPS programs, and watershed plans.

For more information about this subject see:
Elements of a State Monitoring Program. EPA 841-B-03-003. March 2003.
www.epa.gov/owow/monitoring/elements/elements03_14_03.pdf

Water Quality Standards—Use Attainability Analysis (UAA)

A UAA is a structured scientific assessment of the factors affecting the attainment of a use that may include physical, chemical, biological and economic factors. The factors are evaluated through a waterbody survey and assessment. They address the current uses, causes of impairment, and uses that can be attained on the basis of physical, chemical, and biological characteristics.

A UAA is performed by states to determine if the waterbody is able to support quality when the designated use is not included in CWA Section 101(a)(2), to remove a designated use that is specified in Section 101(a)(2), or to adopt subcategories of a Section 101(a)(2) use that require less stringent

criteria. A generic UAA may also be performed for groups of similar waterbody segments to determine attainable uses.

Sampling Objective. UAA data collection is conducted to determine factors that limit designated uses, determine if waterbody integrity can be restored, determine the feasibility of modifying the physical habitat, and determine if the use can be obtained given the existing limitations.

Sampling Strategy. The sampling approach may be adapted to the waterbody and other state-determined priorities. Available information is evaluated first, then field testing or surveys should be conducted to fill in for lacking or incomplete information and to confirm the existing data. Assessment of factors limiting waterbody use may be simple or complex, depending on the amount of available data, the degree of accuracy and precision required, the importance of the resource, site-specific conditions, and controversy associated with the site. The sampling strategy may be to provide a general survey of conditions, to focus on site-specific problem areas, to assist in evaluating trends, or to determine a cause-effect relationship between factors. Characteristics that may be evaluated include:

- ***Physical Factors.*** In-stream characteristics (channel size, flow/velocity, annual hydrology, total volume, re-aeration rates, gradient/pools/riffles, temperature, sedimentation, channel modifications, and channel stability), substrate composition and characteristics, channel debris, sludge deposits, riparian characteristics, and downstream characteristics. Field measurements and analysis, modeling, and existing information may be used to determine physical factors affecting use. USFWS habitat evaluation procedures (HEP) and habitat suitability indices (HSI) are sometimes used for habitat evaluation.
- ***Chemical Factors.*** Dissolved oxygen, toxicants, suspended solids, nutrients (nitrogen, phosphorus), sediment oxygen demand, salinity, hardness, alkalinity, pH, dissolved solids. Available data, water and sediment samples, or modeling may be used to determine chemical factors affecting use.
- ***Biological Factors.*** Biological inventory for existing use analysis (fish, macroinvertebrates, microinvertebrates, phytoplankton, periphyton, macrophytes), biological potential analysis (diversity indices, habitat suitability indices, models, tissue analyses, recovery index, intolerant species analyses, omnivore-carnivore analyses), and biological potential comparisons with reference reach.

Data quality. Data quality requirements should be based on the site-specific topics being addressed by sampling.

Benchmarks. Data should be compared to existing water quality standards, scientific references and data from reference waterbodies.

Data Use. Data should be used directly for assessment of the applicability of existing water quality criteria and designated uses and to determine if designated uses can be attained by feasible waterbody improvements.

For more information about this subject see:
Water Quality Standards Handbook. Second Edition. EPA 823-B-94-005a. August 1994.
www.epa.gov/waterscience/library/wqstandards/handbook.pdf

Opportunities for Integration

- Biological information exchange between UAA, Risk Assessment, and NRDA efforts can benefit all programs.
- Results of UAA may impact RCRA, CERCLA, and Brownfields cleanup priorities and remedies and TMDL endpoints and Implementation strategy. Partners should work together to align cleanup priorities and ensure cleanup actions complement the UAA.

Technical Support Manual. Waterbody Surveys and Assessments for Conducting Use Attainability Analyses, Volume I. EPA. 1983.

Technical Support Manual. Waterbody Surveys and Assessments for Conducting Use Attainability Analyses, Volume II, Estuarine Systems. EPA. 1984.

Technical Support Manual. Waterbody Surveys and Assessments for Conducting Use Attainability Analyses, Volume III, Lake Systems. EPA. 1984.

TMDL

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still attain water quality standards, and an allocation of that amount among the pollutant's sources. In other words, it is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation includes a margin of safety and accounts for seasonal variation in water quality. TMDLs are prepared for impaired water bodies identified on the state's 303(d) list of waterbodies not attaining WQS.

This section describes the assessment portion of the TMDL. Load allocation, implementation and monitoring are discussed in Chapter 5. Crossprogrammatic assessment and implementation of PCB load reductions is demonstrated in the Delaware Estuary case study at the end of this chapter.

TMDL Tasks Related to Assessment

Problem Identification.

1. Identify the applicable water quality standards (designated/existing use(s) and the numeric/narrative criteria) for the impaired water body listed on the states' 303(d) list. ("Existing uses" are defined as those uses that have occurred on or after November 28, 1975.)
2. Collect all readily available water quality data for the impaired water body.
3. Conduct necessary sampling to determine sources of pollutant(s) and to calculate pollutant loads (flow multiplied by concentration equals pollutant load or mass of pollutant per time).
4. Document waterbody characteristics (geology, hydrology, land use).
5. Identify pollutant(s) preventing the attainment of designated use.

Opportunities for Integration

- The Problem Identification portion of the TMDL is closely related to the CERCLA PA. Development of the Comprehensive Preliminary Watershed Assessment and the Targeted Brownfields Assessment described in Chapter 3 will assist in problem identification.

Target Analysis. Determine benchmarks that will be used to measure success and state how the measure will be used to track progress. This depends on whether the TMDL goal is to meet a numeric water quality criterion, comply with an interpretation of a narrative water quality criterion, or attain a desired condition that supports meeting the designated use. Identify the waterbody's critical conditions such as peak loading seasons or events. Identify appropriate ways to measure progress toward achieving the stated goals. Tie the measures to pollutant loading.

Source Identification and Assessment. List and characterize individual pollutant sources, categories of sources, or subcategories of sources responsible for waterbody impairment. Identify the extent to which each source contributes to the problem: source type, relative location, magnitude of loading, transport mechanisms of concern, and duration and frequency of pollutant loading. Many tools are used including existing monitoring information, air photography analysis, simple calculations, spreadsheet analysis using empirical methods, and computer modeling. Selection of analysis is on the basis of the complexity of the problem, availability of resources, time constraints,

availability of monitoring data, and the management objectives under consideration. Sources may be grouped into categories if appropriate.

Linking Water Quality Targets and Sources. Compare water quality targets (benchmarks) to pollutant loads. If long-term water quality data are available, it is used to associate waterbody responses to flow and loading conditions. When long-term monitoring data is not available, synoptic sampling is used with analytical tools, including models and qualitative information to define such characteristics as baseline water quality conditions, pollutant source loading rates, and waterbody system dynamics.

CASE STUDY

Delaware River Watershed PCB TMDL—Multi-Program Assessment and Implementation

Delaware, New Jersey, and Pennsylvania

The Delaware River presents a set of issues common to many watersheds in the industrialized northeast of the U.S.: a river bordered by many different communities; a long history of residential and industrial uses whose legacy remains in contaminated sediments and runoff; and a myriad of local, state, and regional authorities which share various jurisdictions over it. In response to high levels of PCBs found in fish throughout tidal portions of the River, a tight timeframe for development of a PCB TMDL, and a diverse range of PCB sources, a broad coalition of governments and NGOs has come together to seek innovative, cross-programmatic, collaborative ways to address the problem as efficiently as possible.

Delaware Estuary

3 States

2 EPA Regions

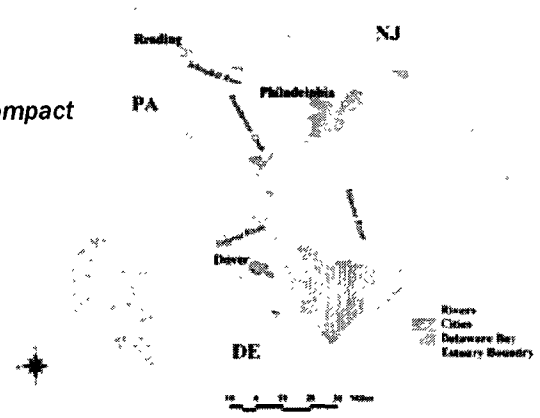
1 Interstate Compact

134 miles long

6 million people

162 industries

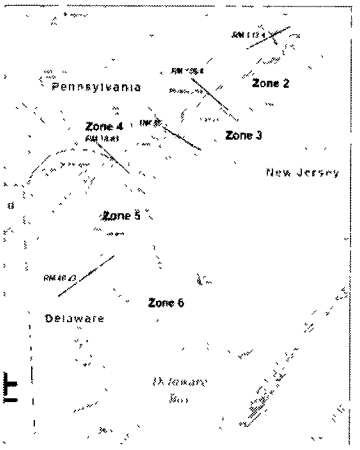
300 CSOs



The Delaware River is the longest undammed river east of the Mississippi, extending 330 miles from Hancock, New York, to the mouth of the Delaware Bay. The basin covers 13,539 square miles, draining parts of Pennsylvania, New Jersey, New York, and Delaware in 236 individual watersheds, including the Schuylkill and Lehigh Rivers in Pennsylvania. Jurisdiction over the Basin is shared by 42 different counties, 838 municipalities, 25 congressional districts, two EPA Regions, the U.S, Army Corps of Engineers, and five USGS offices. The Delaware Bay itself covers 782 square miles. Nearly 15 million people (approximately five percent of the nation's population) rely on the waters of the Delaware River Basin for drinking and industrial use, but the watershed drains only 0.4% of the total continental U.S. land area.

Much progress has been made under the CWA to reduce the loading of conventional pollutants in the Delaware River, and dissolved oxygen levels rose appreciably throughout the 1980s and 1990s. But some pollutants remain a problem, particularly PCBs. *[PCBs are a class of synthetic compounds that were used in hundreds of industrial and commercial applications, including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics and rubber products; in pigments, dyes and carbonless copy paper and many other applications. Although banned from*

manufacture since the late 1970s, PCBs are still in use due to the extended life span of equipment in which they were used. Additionally, PCBs are hydrophobic and thus tend to bind to organic particles in sediment and soils. Because of their chemical stability PCBs tend to persist in the environment. PCBs enter fish and other wildlife through absorption or ingestion, and accumulate in their tissues at levels many times higher than in the surrounding water and at levels unsuitable for human consumption. EPA has determined PCBs to be a probable human carcinogen; they also have been shown to have an adverse impact on human reproductive and immune systems and may act as an endocrine disruptor.]



In the late 1980s the Commonwealth of Pennsylvania (through its Pennsylvania Department of Environmental Protection (DEP)), and the states of Delaware (Delaware Department of Natural Resources and Environmental Control (DNREC)), and New Jersey (New Jersey Department of Environmental Protection (DEP)), began issuing fish consumption advisories for portions of the Delaware Estuary due to elevated concentrations of PCBs measured in fish tissue. In 1996 water quality criteria for toxic pollutants including PCBs were adopted for Zones 2–5 of the river. The criteria generally decrease as one moves down the river, from 44.4 picograms per liter in Zones 2 and 3, down to 7.9 picograms per liter in lower Zone 5. (The criteria in Zone 6 is higher.) The more stringent criterion in the lower estuary reflects the different water uses that are made within the different zones, particularly with respect to fish consumption. As a result, achieving the necessary reductions in the lower zones will require much larger reductions in the upper zones than would otherwise be necessary. Significant reductions are required throughout the estuary as ambient concentrations of PCBs in the water body currently exceed the criteria by two to three orders of magnitude. In 1998 all three states included Zones 2 – 5 on the lists of 303(d) impaired waters under the CWA, requiring establishment of a TMDL for PCBs. Today, the states' fish consumption advisories cover the entire estuary and bay, ranging from a no-consumption recommendation for all species taken between the C&D Canal and the Delaware-Pennsylvania border to consumption of no more than one meal per month of striped bass or white perch in Zones 2 through 4.

Given the variety of government agencies with jurisdiction over the river, in 2000 the relevant states and EPA Regions II and III agreed that the Delaware River Basin Commission (DRBC) should take the lead in developing the PCB TMDL. The DRBC is a federal-interstate compact agency created by the U.S. and the states of Delaware, New Jersey and the Commonwealth of Pennsylvania to jointly manage water resources within the basin. The DRBC, under its independent authority, had issued water quality criteria for toxic pollutants that have been largely adopted by the states. To aid its work the DRBC formed a Toxics Advisory Committee (TAC), a thirteen member group comprised of representatives from the states, the two EPA Regions, municipal and industrial dischargers, academia, agriculture, public health, environmental organizations and fish and wildlife interests. The DRBC also initiated an extensive program of scientific investigations and data collection efforts. Additionally, several coalitions of NPDES permitted dischargers were formed, one of which provided technical support in the development of the water quality model.

A number of factors made the preparation of a PCB TMDL for the Delaware River difficult, including: the different types of PCBs present in the river with varying characteristics (209 PCB compounds can exist, depending on the distribution of chlorine atoms); differences in fish consumption advisories among the states; the large, widely dispersed source load of PCBs in runoff, contaminated ground water, sediments, air and other sources; the particularly diverse group of affected stakeholders (industrial and municipal point and NPSs, most of whom also relied on the basin's waters); extremely low detection limits for PCBs and the ubiquity of PCBs at these levels; the fact that the

original sources of PCBs are often not the same as the Loading Source categories; and questions over the dynamics of tributary loading and sediment redistribution.

Two aspects of the PCB problem in the Delaware River made a cross programmatic, multi-stakeholder approach particularly useful: the short timeframe that was required to develop the TMDL, and the predominance of nonpoint discharge sources of PCBs in the River.

PMPs Rely on Adaptive Management

- While PMP plans must be detailed and cover specific topics, the PMP Rule is not prescriptive.
- Premise: dischargers know their facilities better than regulators
- Ensures that each facility takes a deep look at its operations and conditions
- Wide flexibility for achieving reductions
- Different facilities will have different approaches
- What works for one may not work for another
- Encourage creative solutions
- Periodically reevaluate measures being implemented and advances
- PCB reduction strategies and technologies.

Short Timeframe for TMDL Development

Pursuant to provisions of a 1997 consent decree, the states (or EPA) were required to establish a PCB TMDL by December, 2003. Given the short timeframe, a two phase approach was adopted. In the first stage, TMDLs (for the different zones) were established, comprising individual waste-load allocations (WLAs) for 142 potential PCB point sources; a Load Allocation (LA) for NPSs; and a MOS, based upon a simplified methodology and extrapolations from data and model simulations for one category (or "congener") of PCBs. Because of the predominance of NPSs of PCBs in the river (discussed below) as well as uncertainties associated with the loading calculations, EPA agreed with the NPDES permitting authorities that it was appropriate for the potential PCB point sources to receive non-numeric WQBELs, to be implemented at their five year NPDES permit renewal point. Stage 2 TMDLs, which will include additional individual WLAs (including numeric or non-numeric limits for NPDES permit holders) and Load Allocations (LAs) for non-point sources, will be developed in the future and will be based on all the PCB groups. The Stage I PCB TMDL was the product of extensive collaboration with a number of stakeholders, which resolved conflicts over competing loading models and avoided undue adversarial processes. The December, 2003 Stage I PCB TMDL did not specify how its allocations were to be achieved, and encouraged other agencies such as the DRBC and the states to implement PCB reduction strategies using their independent authorities.

To aid in the implementation of the PCB TMDL, a TMDL Implementation Advisory Committee (IAC) was established by the DRBC. This unique group, again composed of representatives from a variety of governmental and non-governmental agencies and interests, was tasked with developing creative and cost-effective strategies for reducing PCB loadings from all sources to help achieve the PCB TMDLs. The IAC's recommendations are submitted to the DRBC which considers them in consultation with all regulatory agencies whose approval is required to implement them. Each regulatory agency also is also represented on the IAC.

As a result of the IAC's work, in May, 2005 the DRBC issued regulations requiring the preparation of Pollutant Minimization Plans (PMP) for toxic pollutants, and also announced a goal that point and nonpoint source PCB loads be reduced by 50% within the next 5 years. Under the PMP Rule, an identified potential source of PCB discharges is required to describe its facility, identify known and potential sources of PCBs, identify procedures for tracking down unknown sources of the pollutant, and identify and implement strategies for minimizing or preventing releases from all identified sources. Dischargers will measure and periodically report progress made in reducing loadings. A PMP must also contain a "good faith commitment" by a high ranking official to implement the PMP. Initially, 60 point source dischargers will be required to develop and implement PMPs and to monitor their PCB discharges. Recognizing the importance of contributions of PCBs

from nonpoint sources, the rule allows the DRBC to require PMPs for contaminated sites where releases are not being addressed entirely through other state or federal regulatory programs.

The PMP rule embodies the principle of adaptive management, which encourages experimentation, measurement, and readjustment depending on the results of the actions taken. It reflects an awareness that while dramatic reductions in loadings from all source categories will be required to achieve the PCB TMDLs over several decades, uncertainty as to the effectiveness of any particular reduction activity currently remains.

The PMP rule contemplates that as individual NPDES permits come up for renewal on their five year cycle, the requirements of the rule will be incorporated by the various state permitting authorities. The DRBC's PMP Rule also provided that a peer review advisory committee would be established to evaluate the PMPs and advise regulators on their anticipated effectiveness. The committee will also provide advice on additional measures that may be practicable.

Identifying NPS PCB Loading to the Delaware River: Major Collaborative Steps to DelTRiP Implementation

Step 1: DelTRiP will identify contaminated sites in each state within the basin using EPA and state databases, including but not limited to Superfund listings (NPL and CERCLIS), RCRA, EPCRA TRI, and state brownfield and hazardous waste sites. Other listings, such as those developed by fire departments or building inspectors, or through municipal wastewater treatment plant trackdown programs, might also be used to identify sites.

Step 2: Sites identified from "other listings" will be referred to the appropriate federal/state agencies for consideration.

Step 3: DRBC will locate and incorporate identified sites into GIS.

Step 4: State and federal agencies will quantify the PCB loads being released or that have the potential to be released from contaminated sites identified above.

Step 5: DelTRiP will develop criteria to rank each site (i.e.: to determine its significance and to decide if it is to be prioritized for tracking and reporting).

Step 6: DelTRiP will prioritize the contaminated sites that significantly contribute, or have the potential to significantly contribute, to the PCB load to the basin.

Step 7: DRBC will assemble status information for each prioritized site and track the remediation progress and other actions taken to reduce the releases to the Basin from the contaminated waste sites.

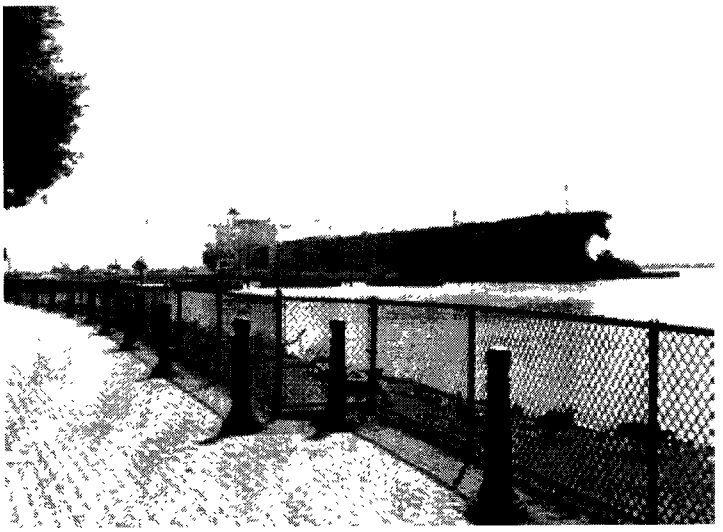
Step 8: DBRC will publish an annual report detailing measurable reductions and the status of implementation activities at each prioritized contaminated site, highlighting key milestones and accomplishments.

There are early signs that the PMP adaptive management approach can work. In Wilmington, Delaware, a rail facility demonstrated an approximate 90% reduction in PCBs in surface runoff after implementing erosion control; and a chemical company demonstrated an initial 22 to 32% load reduction by making changes in its handling of raw materials, processes, and settling and sand filtration, with significantly more reductions expected by 2007. A refinery in southeast Pennsylvania had removed PCB equipment years ago, but after developing a PMP plan identified and removed contaminated sediments in a stormwater drainage ditch.

Nonpoint Sources of PCBs

The second aspect of the Delaware River PCB TMDL that made a cross-programmatic, multi-stakeholder approach important was the fact that much of the PCB load comes from NPSs. Current data suggest that NPSs, including contaminated sites and stormwater discharges, are the largest categories of PCB loadings in the Delaware River. The CWA's NPDES and TMDL programs fall most directly on point discharges; NPSs are typically more difficult to measure and address. There is often a wealth of data which has been gathered by EPA and state programs as part of their assessments of and responses to contaminated lands, yet historically it has been difficult to feed this information into those same governments' water protec-

tion programs for use in restoring waterbodies.



To help identify and prioritize for response contaminated sites and other NPSs which are contributing PCBs and other toxics to the Delaware River, the Delaware River Toxics Reduction Program (DelTRiP) was created in 2004 as a joint effort of DNREC, New Jersey DEP, Pennsylvania DEP, EPA and the DRBC. DelTRiP's goal is to cull information held by federal, state and local programs (CERCLA, RCRA, EPCRA TRI, Brownfields programs, etc.) regarding contaminated sites, and then identify, prioritize, track, and report the status of such sites within the basin that do or could significantly contribute toxic loadings to the Delaware River Basin. EPA and the various state programs each play a role in ensuring that the information held by one program gets to others.

Difficult issues remain with respect to nonpoint sources of PCBs in the Delaware River, because the different EPA, state, and regional environmental programs do not always use the same approaches to achieve their common goals.

TMDL Sample Collection

The preferred method for TMDL development is to use long-term monitoring data; however, adequate data are not always available, especially in watersheds with primarily nonpoint source and background pollutant loading. When data is not available, sampling may be conducted to support any aspect of the TMDL, including determination of benchmarks, loading estimates, loading allocations, and monitoring. Examples of data that may be collected for the TMDL are flow rates, water chemistry/toxicity, physical habitat evaluation, biological community structure, source loading studies such as tracer studies, and qualitative macroinvertebrate studies.

Sampling Objective. Sampling is conducted to determine concentrations of contaminants in the water body, seasonal variation in contamination, and acceptable pollutant loading that protects designated uses; identify sources of pollution and the amount of pollutant each source contributes; and determine mass loading from various sources so pollutant loads may be allocated to sources and limited to achieve water cleanup goals. Samples may be collected to monitor progress toward meeting WQS.

Sampling Strategy for Monitoring. Episodic samples are collected to ensure the waterbody is meeting or is making progress toward meeting water quality criteria. Water quality samples are collected and the flow rate is measured at each sampling point within the watershed. Samples are analyzed for contaminant(s) of interest (dissolved analysis for metals), and the analyses from the sample data and the water flow rate are used to calculate pollutant loads. Samples are collected at appropriate times of the year to determine the seasonal variation in pollutant loading and seasonal

TMDL requirements. Physical and biological samples and data may also be collected as necessary to relate TMDL activities to water quality standards.

Laboratory Analysis: Samples are analyzed for the TMDL pollutant and associated indicators

Data Quality. Data must be shown to be reliable and in accordance with applicable data collection and/or QA/QC program requirements. Data quality requirements are variable; for example, samples collected for water quality analysis generally have a high level of QA/QC, while samples collected for source identification and assessment may have lesser data quality requirements.

Data Uses. Data are used to determine acceptable pollutant loads based on the designated water use, the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards on a seasonal basis, where and how pollutant loading must be reduced, and if the TMDL is achieving the desired goals.

For more information about this subject see:
Guidance for Water Quality-based Decisions: The TMDL Process. EPA 440-4-91-001. April 1991.

Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. Office of Solid Waste and Emergency Response (OSWER) 9355.0-85 DRAFT. January 2005.

Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001. PB-127415. 1991.

Compendium of Tools for Watershed Assessment and TMDL Development. EPA841-B-97-006. 1997.

Protocol for Developing Sediment TMDLs, First Edition. EPA 841-B-99-004. October 1999.

Stressor Identification Guidance. EPA 822-F-00-012. December 2000.

RCRA Facility Assessment (RFA)

RCRA studies are performed at sites that actively manage hazardous wastes. The RCRA process is similar to the CERCLA process, but the responsible party performs the work under EPA and state supervision. To facilitate expeditious site evaluation and cleanup, the assessment requirements are procedurally flexible and only the elements required to make good cleanup decisions are required. The following are elements common to most contaminated RCRA facilities.

Similar to a CERCLA PA, the RFA is performed to determine the existence of continuous or non-continuous releases of hazardous wastes. Information is gathered on solid waste management units and other areas of concern. The information is evaluated to determine the need to proceed to a RFI. The RFA does not generally include sampling and analysis.

Opportunities for Integration

- Developing combined assessment and monitoring programs with consistent sampling and analysis protocols can be useful to multiple programs and agencies.
- Multiple programs and agencies can conduct seasonal basin loading studies to assist in source identification and prioritization, load allocations, and appropriate cleanup/implementation strategies.
- Source identification may identify sites requiring implementation of CERCLA, RCRA, or Brownfields authorities. Conversely, sites already investigated by those programs may be included in the TMDL.

RCRA Facility Investigation (RFI)

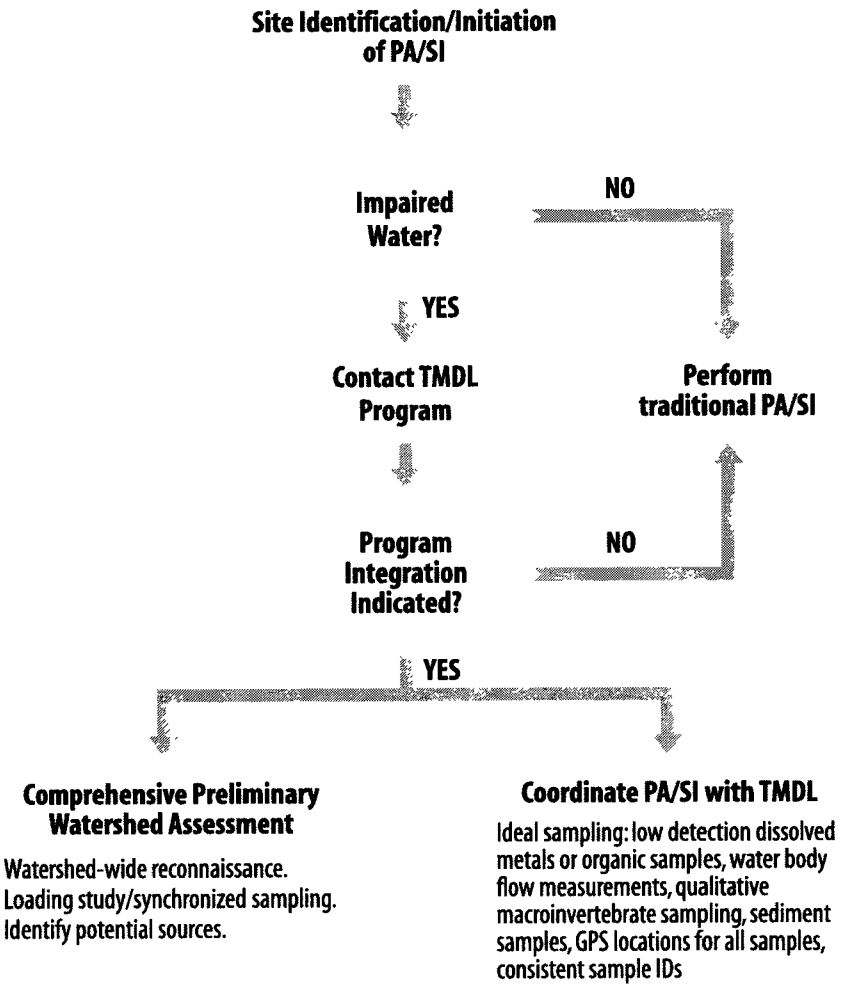
Similar to a CERCLA RI, the purpose of the RFI is to gather data to fully characterize the nature, extent, and rate of migration of hazardous wastes. The agency(s) conducting the investigation use the data to determine the need for corrective measures and to help select and implement the measures.

CERCLA Site Assessment

Preliminary Assessment (PA)

Objective. The purpose of the PA is to determine if a site has the potential to pose a threat to human health and the environment. Information is collected to determine whether a SI is warranted. Figure 4-3 illustrates the decision-making process for conducting a PA/SI.

Figure 4-3 PA/SI decision tree



Data Collected. PA data collection may be limited to desktop research but often includes a brief site visit. Data collected for the PA includes:

- ***General Site Information.*** Location, ownership, type of facility, years of operation.
- ***Source and Waste Characteristics.*** Source types and locations, size of sources, waste types and quantities, hazardous substances present, plant processes.
- ***Groundwater Use and Characteristics.*** General geology, aquifer characteristics, locations of private, municipal, and drinking water wells, wellhead protection area, blended systems.
- ***Surface Water Use and Characteristics.*** Nearest water body and other surface water bodies within 15 miles downstream, flood frequency, sensitive environments, wetlands, fisheries, surface water flow characteristics, and surface water intakes.
- ***Soil Exposure Characteristics.*** Populations, schools, facility workers, sensitive environments.

Information is gathered from searches of federal, state, and/or local records, site sketches, inspection reports, aerial photographs, databases and any other available source. Data are used to calculate a preliminary HRS score to determine the need for further investigation.

Opportunities for Integration

- An amended approach to the UPA may be appropriate for sites within a contaminated watershed. Proposed additions to the Region 3 UPA requirements include identification of existing water flow and water quality data and identification of the CWA 303(d) status of the watershed (available in EPA databases). If the site is within an impaired or potentially impaired watershed and has a potential pathway to surface water, additional data collection should be specified, including collecting land use and ownership data, maps, and aerial photography for the entire watershed.

Unified Phase Assessment (UPA)

EPA Region 3 has developed and tested an initial environmental assessment tool, the Unified Phase Assessment, to organize information about a site in a way that will meet the requirements of CERCLA, RCRA, USTs, and Brownfields PAs (*Unified Phase Assessment Guidance Manual*, EPA Region III. Hazardous Sites Cleanup Division, September 15, 2004). The UPA process allows the site to be referred to the most applicable program without repeating the PA process, thereby increasing the speed and effectiveness of SI and cleanup. The UPA contains three parts:

1. a single page quick reference
2. the primary assessment containing elements common to all initial assessments
3. program-specific data including QC information, large maps, and other data and background information.

Data applicable to individual programs are included in program-specific attachments. The UPA can be completed in two phases, similarly to the PA method: UPA I is an initial assessment of the site and UPA II delineates on-site contamination, possible off-site impact of the contamination, and the impact of contamination migrating onto the site from off-site sources. Additional information is developed for potential purchasers/stakeholders in making further decisions concerning the development potential of the property. UPA II may involve site sampling and possible limited off-site sampling. A limited hydrogeologic investigation may be included in the UPA II.

Site Inspection (SI)

Sampling Objective. The objective of an SI is to gather site-specific information to support a decision about the need for further Superfund attention. Data are collected to determine the nature of contamination, investigate the exposure of potential targets, establish background concentrations, and establish a pathway between the contamination and targets based on data gaps identified during the PA. The full extent of contamination at the site is not investigated, and a risk assessment is not performed. Pathways investigated include ground water, surface water, soil exposure, and air. Targets include wells and surface water intakes supplying drinking water, populations, human food chain organisms, sensitive environments, wellhead protection areas, and resources.

Sampling Strategy. The Triad approach may be used to direct sampling activities. Soil, source material, surface water, ground water, sediment, and air may be sampled, depending on the nature of the site, contaminants and pathways. All media are not sampled for each SI, only those that the PA indicates will be essential to provide a decisive HRS scoring package. Additional sampling may be performed but only as needed to establish a link of the contamination to the site or to support the HRS scoring package. Background samples are required to establish release of a hazardous substance and establish representative ambient concentrations.

Samples. Water samples may be filtered or non-filtered, depending on the contaminant and the HRS factor being evaluated. Filtered samples allow comparison to drinking water benchmarks and unfiltered samples are used to compare with surface water environmental benchmarks. Ground water sampling should be conducted in a manner that minimizes disturbance and turbidity so that filtering is not necessary unless it is specifically required for geochemical speciation modeling.

Laboratory Analysis. Analytical parameters vary significantly depending on source materials and the potential threats of those materials to the identified receptors. Detection levels for each sample/analyte are dependent on the specific HRS factor being evaluated and the benchmark that

will be used for comparison. The detection levels may not match the Contract Required Quantitation Limits (CRQL) or the Contract Required Detection Limits (CRDL).

Data Quality. The minimum data quality requirements for each analysis depend on the chemical and the specific HRS factor being evaluated. Data used to document the site HRS score must be legally defendable. Data used for determining source dimensions, for example, may be screening level data. Proper sample collection and handling procedures are used and quality control samples are collected, including field duplicate, field blank, trip blank, and field rinsate samples. Samples are sent to CLP laboratories or non-CLP laboratory services. Data are validated. Field screening data are used only for discrete source samples that do not require a background sample in the HRS.

Data Uses. Data are used in the HRS models to determine if the site should proceed to a potential NPL listing. Listed sites may then move to the remedial stage where more thorough site investigation is performed (RI) and solutions determined (FS).

Table 4-5 indicates the benchmarks for each exposure pathway threat.

Table 4-5 PA/SI Benchmarks

Pathway/threat	Benchmark
Ground Water	Maximum contaminant levels
	Maximum contaminant level goals
	Screening concentrations
Surface Water	Drinking water threat
	Maximum contaminant levels
	Maximum contaminant level goals
	Screening concentrations
	Human food chain threat
	Food and Drug Administration action levels
	Screening concentrations
	Environmental threat
	Ambient water quality criteria
	Ambient aquatic life advisory concentrations
Soil Exposure	Screening concentrations
Air	National ambient air quality standards
	National emissions standards for hazardous air pollutants
	Screening concentrations

For more information about this subject see:
A Guidance for Performing Preliminary Assessments Under CERCLA. EPA/540/G-91/013, September 1991.

A Guidance for Performing Site Inspections Under CERCLA. EPA 540-R-92-021, Directive 9345.1-05, September 1992.

Hazard Ranking System Guidance Manual. EPA 540-R-92-026. November 1992.

Unified Phased Assessment Guidance Manual, E.S. EPA Region III – Hazardous Sites Cleanup Division. September 15, 2004.

CERCLA Remedial Investigation/Feasibility Study (RI/FS)

The RI/FS is conducted to characterize the nature and extent of risks posed by NPL sites and to evaluate potential remedial options. The objective of the RI/FS process is to gather information sufficient to support an informed risk management decision regarding which remedy (combination of treatments) appears to be most appropriate for a site. The RI includes site characterization and risk assessment. The FS provides an evaluation of potential remedial alternatives. The following

discussion presents the site characterization portion of the RI/FS. Risk Assessment is discussed in the following section and the FS is discussed in Chapter 5.

Site Characterization

The site characterization portion of the RI/FS includes collection of a wide range of information regarding the site, setting, contaminants, source areas, and contaminant fate and transport. Treatability studies may be performed to help select and evaluate remedial alternatives. Developing the RI/FS may be an iterative process, and data collection may be performed throughout the process, becoming increasingly refined as the understanding of the site conceptual model is refined. The following data may be collected, depending on site-specific conditions:

- ***Site Geology Information.*** Unconsolidated soil/sediment and bedrock geology, including the influence on aquifers and contaminant fate and transport. Data are collected from available information, site reconnaissance mapping, and subsurface explorations.
- ***Soil and Vadose Zone Information.*** Soil characteristics (type, holding capacity, temperature, biological activity, and engineering properties), soil chemistry characteristics (solubility, ion speciation, adsorption coefficients, leachability, cation exchange capacity, mineral partition coefficients, and chemical and sorptive properties), and vadose zone characteristics (permeability, variability, porosity, moisture content, chemical characteristics, and extent of contamination). Data are collected from existing information, borehole sampling, laboratory analysis and measurements, aquifer tests, tracer tests, leaching tests, laboratory experiments, and other specialized testing.
- ***Surface Water and Sediment Information.*** Drainage patterns (overland flow, topography, channel flow pattern, tributary relationships, soil erosion, and sediment transport and deposition), surface water body information (flow, channel width, water depths, channel elevations, flooding tendencies, and physical dimensions of surface water impoundments), water structures, surface water/ground water relationships, and surface water quality (pH, temperature, total suspended solids, suspended sediment, salinity, and specific contaminant concentrations). Numerous samples of surface water and sediment are generally collected directly downgradient of the site as well as upstream to evaluate the site's impact on the surface waterbody. In tidally-influenced sites, sampling should be conducted at different stages of the tidal cycle. The number of samples collected should be enough to calculate the background concentration with a specified Upper Confidence Limit (e.g., 90 percent). Data are collected from existing information including aerial maps, ground surveys, topographic maps, data from public agencies, water level measurements, and modeling.
- ***Ground water Information.*** Occurrence (aquifer boundaries, locations, and ability to transmit water), ground water movement (direction and rate of flow), recharge/discharge (locations and rates), and ground water quality (pH, total dissolved solids, salinity, and contaminant concentrations). Data are collected from existing literature, pumping and injection tests, monitoring well installation and testing, water level measurements, geophysical studies, modeling, slug tests, tracer tests, pump tests, calculations from soil and geological data, and field mapping.
- ***Atmospheric Information.*** Local climate (precipitation, temperature, wind speed and direction, and presence of inversion layers), weather extremes (storms, floods, and winds), release characteristics (direction and speed of plume movement; rate, amount, and temperature of release; and relative densities). Data are collected from existing information and on-site measurements.
- ***Ecological Information.*** Land use characteristics, water use characteristics, ecosystem components and characteristics, critical habitats, and biocontamination. Data are collected from existing information, agency reports, ground and aerial surveys, and sample collection.
- ***Source Information.*** Facility characteristics (source location, type of waste/chemical containment, integrity of waste/chemical containment, drainage control, engineered structures, site security, known discharge points, mapping, and surveying) and waste characteristics (type,

quantities, chemical and physical properties, and concentrations). Data are collected from existing information, previous studies, site surveys, remote sensing, surveying, and sampling and analysis).

Additional data may be collected to evaluate potential remedial actions. Treatability studies are conducted to provide sufficient data to allow complete evaluation of treatment alternatives and to reduce the cost and performance uncertainties of a specific treatment alternative.

Sampling Strategy. Samples are collected for a variety of purposes and the strategy used to determine the type, quantity, and locations of samples will vary accordingly. For example, the location of samples collected to determine the nature of source material may be determined judgmentally, while the locations of samples collected to determine the extent of ground water contamination may be determined using a stratified random approach. Data may be collected in multiple sampling efforts to use resources efficiently—the level of accuracy may increase as the focus of sampling is narrowed and depends on the use of the data.

Laboratory Analysis. Chemical analysis will include contaminants of potential concern and degradation products plus characteristics that may affect contaminant fate and transport or potential remedial alternatives.

Benchmarks. Remediation goals are media-specific and site-specific and developed either in conjunction with, or following completion of, the Risk Assessment. Standardized criteria, such as those listed in the Superfund Chemical Data Matrix (SCDM), Soil Screening Levels (SSLs), or Region 3 Risk-Based Concentrations (RBCs), may also be used.

Data Quality. Data quality requirements for RI sample analysis may vary according to data uses. Data that will be used to support enforcement and/or cost-recovery actions or establish risk will require a higher level of confidence than data collected for planning, monitoring, or implementation activities. The data quality objective process is followed for all samples collected to ensure the sampling and analysis protocols meet the data use requirements. Data quality objectives are revised as the site model is refined.

Opportunities for Integration

- Data linking ground water and surface water interactions will be helpful to identify and assess sources and to link sources to loads in the TMDL.
- The RI/FS may provide mapping and aerial photography that includes the site plus areas upgradient and downgradient of the site.
- Integration between programs and agencies can streamline collection of the extensive site characterization information required for the RI. Conversely, RI data can be useful for several aspects of TMDL development.

For more information about this subject see:
A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents. EPA 540-R-98-031. July 1999.

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA – Interim Final. OSWER Directive 9355.3-01. October 1988.

Hazardous Waste Cleanup Information (CLU-IN) Web site, **www.clu-in.org**

Superfund Policies and Guidance, **www.epa.gov/superfund/action/guidance**

CERCLA Human Health and Ecological Risk Assessment

Baseline Human Health and Ecological Risk Assessments are part of the RI; they determine how threatening a hazardous waste site is to human health and the environment and help determine appropriate cleanup strategies. Risk assessment is performed to facilitate defensible site-specific risk management decisions, including identification and characterization of current and potential

threats from a hazardous substance and identification of cleanup levels that would protect human health and the environment. Risk assessors seek to determine a safe level for each potentially dangerous contaminant present. For humans, this is a level at which health effects are unlikely and the probability of cancer is very small. For ecological receptors, determining the level of risk is more complicated and is a function of the receptors of concern, the nature of the adverse effects caused by the contaminants, and the desired condition of the ecological resources.

Risk Assessments are conducted on a site-by-site basis. The process is conducted in four steps: data collection and analysis, exposure assessment, toxicity assessment, and risk characterization. The exposure assessment includes analysis of contaminant releases, identification of exposed populations, identification of potential exposure pathways, estimation of exposure concentrations for each pathway, and estimation of contaminant intakes for each pathway. The toxicity assessment includes collection of qualitative and quantitative toxicity information and determination of appropriate toxicity values. Risk characterization investigates the potential for adverse effects and the related uncertainty. Standardized assumptions may be used to streamline the assessment. These are very conservative assumptions and are not applicable to every site, so site-specific information is often required to provide the most reasonable estimation of risk to determine the most appropriate cleanup strategy.

Note: The Risk Assessment process requires experienced personnel with specialized knowledge and a thorough understanding of contaminant fate and transport, ecosystem structure, receptor biology, risk evaluation methods, and many other topics. For the purposes of this manual, only portions of the Risk Assessment process directly related to the watershed assessment and cleanup efforts of other programs and agencies are presented. For more detailed presentation of the Risk Assessment process, please see references from this section. Regional BTAGs are available to provide guidance and support to Remedial Project Managers. The BTAG will communicate with Trustees to ensure continuity between the remedial and restoration processes.

Opportunities for Integration

- Risk Assessment personnel should be included in RI/FS scoping meetings to ensure integrated data collection and reduce duplication of effort.
- Ecological Risk Assessments and Natural Resource Damage Assessments (NRDA) have several common components. A Risk Assessment does not complete the requirements of a NRDA, but it might establish the causal link between site contaminants and specific adverse ecological receptors, and thereby might be useful in the NRDA process. If a NRDA might be performed at the site, NRDA personnel should be included in Risk Assessment site decisions to prevent duplicative efforts. For an example of integrating Risk Assessment and NRDA efforts, please see Integrating Natural Resource Damage Assessment and Environmental Restoration Activities at DOE Facilities, Office of Environmental Guidance, Washington DC, October 1993.
- Risk Assessment and TMDL may integrate efforts for water sampling, toxicity testing, accumulation and tissue residue studies, and population/community evaluations.

Sampling Objective. Samples are collected to identify and characterize the toxicity and levels of hazardous substances present in relevant media; environmental fate and transport mechanisms within specific environmental media; potential human and environmental receptors, potential exposure routes and extent of actual or expected exposure, extent of expected impact or threat and the likelihood of such impact of threat occurring; and the level of uncertainty associated with each element.

Sampling Strategy. A site conceptual model is prepared and used to identify which points or assumptions in the risk assessment include the greatest degree of conservatism or uncertainty. Field sampling is performed to quantify the risk model parameters that have the most important effects on the risk estimates. Samples may be collected to establish a pathway to the receptor (determine exposure) or to determine effects of exposure on specific populations; therefore, soil, water, air, sediments, or biota samples may be collected from on-site, upgradient, and downgradient locations. The number,

type, and locations of samples are determined using the type and duration of possible exposures, potential exposure routes, and key exposure points for each medium, and the relative importance of each. Sample quantity is determined by the size and complexity of the site and the need to perform a statistical evaluation of risk. The Ecological Risk Assessment frequently includes field studies for bioaccumulation and tissue residue studies, population/community evaluations and toxicity testing.

Laboratory Analysis. In addition to analysis of physical and chemical characteristics such as temperature, pH, and chemical concentrations, field sampling and/or laboratory analysis may be performed to determine such information as biological community structure, toxicity to various organisms, and impacts on growth or reproduction. Laboratory detection limits must be low enough for comparison with toxicity reference values. Required detection limits are generally based on the SCDM but must also account for additive values and carcinogenic and noncarcinogenic effects. Reference values may be lower than CRDLs or CRQLs, so pre-planning for the appropriate level of analysis is essential. Field screening techniques are used only to streamline the sampling and risk assessment process by indicating if and where more detailed sampling should be performed.

Data Quality. Data collection and analysis techniques are very specific. Definitive data are required for use in the risk assessment. QC samples are collected. Data are validated using strict criteria.

Benchmarks. Benchmarks or measurement endpoints are specific to the site contaminants, potential receptors, and likelihood of exposure. Risk assessment endpoints are based on statutory mandates and are specific to the receptor, contaminant, and other site-specific criteria. Typical benchmarks are from the SCDM, SSLs, Region 9 TMDL, or Region 3 RBCs.

Data Uses. Data are used to determine the statistical risk to human health and environmental receptors. The results of the risk assessment are used to determine what level of cleanup is required to achieve an acceptable level of risk from the site.

For more information about this subject see:
Risk Assessment Guidance for Superfund (RAGS), Volume I — Human Health Evaluation Manual, Part A. EPA/540/1 - 89/002. December 1999.

Risk Assessment Guidance for Superfund (RAGS), Volume I — Human Health Evaluation Manual, Part B. EPA/540/R - 92/003. December 1991.

Risk Assessment Guidance for Superfund (RAGS), Volume I — Human Health Evaluation Manual, Part C. OSWER/9285.7-01C. October 1991.

Risk Assessment Guidance for Superfund (RAGS), Volume I — Human Health Evaluation Manual, Part D. OSWER/ 9285.7-47. December 2001.

Risk Assessment Guidance for Superfund (RAGS), Volume I — Human Health Evaluation Manual, Part E DRAFT. EPA/540/R/99/005. September 2001.

Human Health Toxicity Values in Superfund Risk Assessments. OSWER/9285.7-53. December 2003.

Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA 540-R-97-006. June 1997.

Guidance for Data Useability in Risk Assessment. EPA/540/G-90/008. September 1990.

Natural Resource Damage Assessment (NRDA)

Under the CWA, OPA, CERCLA, and other environmental laws, trustees perform an NRDA to determine compensation for injuries to natural resources that have not been nor are expected to be addressed by response actions conducted pursuant to the NCP. As stated in Chapter 2, DOI and NOAA each have regulations for NRDA preparation.

DOI NRDA Process

DOI's regulations provide a framework and standards for the NRDA process in coastal and marine environments (Type A) and other environments (Type B). The Type A process involves the use of a computer model to assess damages in a standard and simplified manner that result from chemical or oil discharges in coastal and marine environments. The Type B process is used in situations that require an individual approach. Because the Type A process does not include additional site assessment activities, the following descriptions are for Type B NRDAs. The regulations require trustees to coordinate the assessment efforts, including the pre-assessment screen, with the lead response agency in any situation where response activity is planned or underway at a site [40 CFR 11.23(f)].

Data collected in the pre-assessment screen determine whether an injury has occurred and a pathway of exposure exists. This determination is often made using existing information. The Assessment Plan/Implementation Phases include data collection necessary to quantify injuries and determine damages. Laboratory and field studies are used to quantify injuries by identifying the functions or "services" provided by the resource, determining the baseline level of such services, and quantifying the reduction in service levels that result from the impacts. In the post-assessment phase, the results of the assessment are presented and a reasonable number of restoration alternatives, including natural attenuation, are proposed. A preferred alternative is selected on the basis of technical feasibility, relationship of costs to benefits and consistency with response actions.
www.epa.gov/superfund/programs/nrd/nrda2.htm
www.darp.noaa.gov

NOAA NRDA Process

In the preliminary assessment, the trustees determine whether injury to public trust resources has occurred. Their work includes collecting time-sensitive data and reviewing scientific literature about the released substance and its impact on trust resources to determine the extent and severity of injury. If resources are injured, trustees proceed to the next step. During Injury Assessment/Restoration Planning, trustees quantify injuries and identify possible restoration projects. Economic and scientific studies assess the injuries to natural resources and the loss of services. These studies are also used to develop a restoration plan that outlines alternative approaches to speed the recovery of injured resources and compensate for their loss or impairment from the time of injury to recover. The final step, Restoration Implementation, is to implement restoration and monitor its effectiveness. Trustees work with the public to select and implement restoration projects. Examples of restoration include replanting wetlands, improving fishing access sites and restoring salmon streams. The responsible party pays the costs of assessment and restoration and is often a key participant in implementing the restoration.

Although the concept of assessing injuries may sound simple, understanding complex ecosystems, the services these ecosystems provide, and the injuries caused by oil and hazardous substances takes time—often years. The season the resource was injured, the type of oil or hazardous substance, and the amount and duration of the release are among the factors that affect how quickly resources are assessed and restoration and recovery occurs. The rigorous scientific studies that are necessary to prove injury to resources and services—and withstand scrutiny in a court of law—may also take years to implement and complete. But the NRDA process described above helps to ensure an objective and cost-effective assessment of injuries and that the public's concerns and resources are fully considered.

Integration Example: Whenever possible, NOAA works cooperatively with the parties responsible for the injury. By working with responsible parties and co-trustees to collect data, conduct assessments and identify restoration projects, NOAA avoids lengthy litigation and achieves restoration of injured resources more efficiently.

Removal Assessment and Cleanup

A removal site evaluation consists of a removal preliminary assessment and, if necessary, a removal site inspection. Provided that there is a substantial threat at a site and a removal action is necessary, the PA and the SI may be combined into a removal site evaluation. The removal PA is done using readily available information such as source identification, nature of the release or threatened release, and an assessment of the threat to public health including the magnitude of the threat and the factors necessary to determine the need for a removal action. The PA determines if there is a need for additional data. A removal preliminary assessment of releases from hazardous waste management facilities may include collection or review of data such as site management practices, information from generators, photographs, analysis of historical photographs, literature searches, and personal interviews conducted, as appropriate.

If there is a need for additional information, a removal SI is performed to help determine the need for and urgency of response. The evaluation determines if a release has occurred. If such a release of a CWA hazardous substance has occurred, the OSC shall determine whether the release results in a substantial threat to the public health or welfare of the United States. Factors to be considered by the OSC in making this determination include, but are not limited to, the size of the release, the character of the release, and the nature of the threat to public health or welfare of the United States. Upon obtaining relevant elements of such information, the OSC shall conduct an evaluation of the threat posed, on the basis of the OSC's experience in assessing other releases, and consultation with senior lead agency officials and readily available authorities on issues outside the OSC's technical expertise.

The following are examples of information presented at the conclusion of a removal site evaluation:

- Identification of the nature and source of the release
- Evaluation of the threat to public health
- Evaluation of the magnitude of the threat
- Evaluation of factors necessary to make a determination of whether a removal is necessary
- Determination of whether a nonfederal party is undertaking a proper response

If the lead agency determines that a removal action is appropriate, action begins as soon as possible. Not all actions considered to be removal actions will be equally urgent. For example, situations involving risk of fire or explosion or contamination of a drinking water reservoir may require more prompt and expeditious attention than certain drum removals or cleanups of surface impoundments. The three categories of removals are classic emergencies, time-critical removals, and nontime-critical removals.

Removal Assessment Sampling Objectives. Samples may be collected to determine site characteristics, nature and extent of contamination, contaminant properties, targets affected by site, and information required for risk evaluation. In some cases, a treatability study may be performed to evaluate one or more treatment alternatives. In that case, samples may be collected to test the ability of the technology to meet treatment objectives.

Sampling Strategy. Samples are collected to meet sampling objectives; this may not provide a comprehensive evaluation of all site characteristics.

Data Quality. DQOs should be established to ensure the data provide the information necessary for effective site decisions. Data that may be used in subsequent site studies or evaluations should be of a quality that sampling and analysis need not be duplicated.

Data Uses. Data are used to evaluate site risk, determine removal objectives, and evaluate treatment alternatives.

For more information about this subject see:
Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. OSWER Directive 9360.0-32. EPA. August 1993.

Brownfields Assessments

Brownfields assessments focus on evaluation of a property to determine the needed actions to allow redevelopment and reuse without unacceptable risk to the community.

Phase I Site Assessment. A Brownfields Phase I site assessment is similar to a Superfund PA, but the investigation is tailored to site-specific conditions. Intended land use and exposure scenarios are considered, as are community acceptance of the resulting environmental conditions, applicability of government oversight programs, and factors that may impede redevelopment and reuse. A conceptual site model is prepared to assist in a Phase II assessment (i.e., site investigation) if it is deemed necessary.

Phase II Assessment Site Investigation. A Phase II assessment site investigation is performed to confirm if contamination exists at the site, locate the contamination, characterize the nature and extent of contamination, and determine if there are unacceptable environmental conditions at the site that would be cost-prohibitive to eradicate. Possible threats to the environment or to any people living or working nearby are important. The results can be used to determine cleanup goals, quantify risks, determine acceptable and unacceptable risk, and develop effective cleanup plans. The investigation takes into account any issues the community has raised regarding site contamination or reuse. If contamination is found that may pose significant threat to local residents, compliance with other programs such as RCRA or CERCLA may be required if the site is not cleaned up voluntarily by the site owner.

Sampling Strategy. Samples are collected to determine the nature, extent, source, and significance of contamination, and to assess physical, geophysical, and ecological site conditions. Samples may also be collected for a site-specific risk assessment. Efficient, innovative sampling and analysis methods are encouraged. The Triad approach to sampling is preferred but is not always applied at brownfields sites.

Typical Samples. Soil, soil gas, ground water, surface water, sediment, and air. Migration pathways are examined. A baseline risk assessment may be performed. Samples collected depend on the site-specific DQOs.

Sample Analysis. Alternative analytical technologies that expedite field work are encouraged, but should meet the site-specific data quality requirements. Screening level data are collected to facilitate site decisions. Collaborative samples are collected and submitted for definitive analysis to confirm the results of screening level data for critical samples.

Benchmarks. Data is compared against an accepted source of cleanup standards such as the Region 3 Risk Based Concentrations or the Region 9 Preliminary Remediation Goals, or are used in the site-specific risk assessment to determine site-specific goals.

Data Quality. DQOs are site-specific—the DQOs process is a key component of the "systematic planning" portion of the Triad assessment approach to brownfield investigations. High quality screening level data are generally acceptable for the intended use, and real-time analysis or field testing is performed where appropriate to streamline field sampling. The type of data collected is dependent upon the conceptual site model developed and planned end uses for the site.

Data Uses. Data are used to identify and evaluate the applicability of various site assessment and cleanup technologies and to help determine whether the property can be cleaned up to the level necessary for the intended reuse. Samples collected for a site-specific risk assessment may be used to identify site-specific cleanup levels if there are no existing standards or alternative cleanup stan-

dards also may be appropriate. Also, each state has developed voluntary cleanup programs where specific cleanup standards may be designated, and to eliminate any future risks, property owners may receive assurance from the state that the site has been cleaned up.

For more information about this subject see:
Tool Kit of Information Resources for Brownfields Investigation and Cleanup. EPA 542-B-97-001.

Soil Screening Guidance: Users Guide. EPA540/R-96/018. July 1996.

Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.

Superfund Chemical Data Matrix. EPA. January 2004.

Region 3 Risk Based Concentrations. EPA. April 2005.
www.epa.gov/reg3hwmd/risk/human/index.htm

Region 9 Preliminary Remediation Goals
www.epa.gov/region09/waste/sfund/prg/index.htm

Abandoned Mine Land Initiative Assessment

An interagency task force of federal land management agencies (BLM, NPS and USFS) and the Interior Science Bureaus (USGS and staff of the former Bureau of Mines (BOM)) has developed a risk-based watershed approach to achieve mitigation of water quality problems from AMLs on federal lands. The watershed approach fosters collaborative work across federal and state government administrative boundaries, facilitates solutions to the problem of mixed ownership of sites within watersheds, addresses important problem sites first, and greatly reduces the total cost of mitigation compared to cleaning up every mine site. The watershed approach focuses on cooperation among federal land managers in partnership with the science bureaus; prioritizes, watershed by watershed, specific waterbodies within each state that are affected by discharges from AMLs; and allows cleanup to proceed on a risk-based priority.

The land management agencies provide overall program management, determine land status, coordinate with state and federal agencies, facilitate public participation, and ensure compliance with environmental laws. Land management agencies coordinate efforts with other federal agencies and states. The science bureaus provide technical support to land management agencies, develop technology and apply engineering principles, and perform risk/economic benefit analyses in support of water quality improvement. A description of tasks performed in each phase of the watershed process is provided below.

Statewide Analysis/Watershed Prioritization. Land management agencies collect information relevant to the risk prioritization of watersheds with support from science agencies and states and set priorities for characterization of watersheds. The science bureaus compile and analyze existing data on statewide AML sites, stream sediment and mine dump geochemistry, mineral deposit locations, and water quality; develop a regional environmental geology map portraying units with varying acid neutralization and acid generation potentials; and with state and federal agencies, develop a statewide GIS including locations of mineral districts, AML sites, mineral deposit types, environmental geology features, precipitation and storm event data, and water quality characteristics.

Watershed Characterization. The land management agencies set objectives, protocols, and performance criteria for watershed characterization in cooperation with science agencies; provide oversight of the watershed characterization work performed by science agencies; on completion of watershed characterization, select sites for mitigation with input from other federal land managers and science agencies; and develop mitigation plans with support in research and engineering performed by science agencies. The science bureaus conduct total watershed monitoring to iden-

tify contaminant sources and sinks, relative source contributions, and contaminant budgets on the basis of ambient, storm, and seasonal events; conduct remote sensing surveys of the watershed to characterize contaminant sources and their distribution and to identify stressed ecosystems; conduct AML site-specific field analyses including geochemical, geophysical, and hydrologic surveys of sources and pathways to identify environmental impacts; conduct site-specific geologic mapping and subsurface geophysical and mineralogical characterization of host and waste rock materials; identify technologically feasible options for site-specific water quality improvement, including the possibility of re-mining; and develop benefit and cost analyses of options. These analyses will identify the potential environmental and economic benefits of the mitigation options on the basis of environmental risk technical feasibility and cost.

Site Characterization and Mitigation. The land management agencies implement AML mitigation with technical assistance from science bureaus. The science bureaus prepare mineral-related scientific, engineering, and economic information to meet the land management agencies' requests for proposals, and assist in technical monitoring of mitigation contracts. Where economically or technically feasible mitigation options do not exist, the science bureaus define the research that might result in such options and include an evaluation of the potential benefits and costs of the research. In consultation with the federal land managers and states, they mitigate various sites to demonstrate mitigation options and new technologies. Where appropriate, the science of bureaus identify and evaluate potential re-mining sites; participate in the review of the scientific, engineering, economic, and policy efficacy of the watershed permitting approach; and model ambient chemical conditions and effects of mitigation efforts on surface water quality in the watershed.

Monitoring. The land management agencies monitor the post-construction site and, in cooperation with the state and with technical assistance from science agencies, monitor the effectiveness of site-specific mitigation and watershed quality improvement. The science bureaus help land management agencies develop technically sufficient and cost-effective monitoring plans, provide monitoring training, and provide analytical support for interpretation of monitoring results.

Table 4-1 on page 95 provides a comparison of surface water data collection and analysis requirements in mining watersheds for the TMDL program, Brownfields Assessments, and several Superfund actions.

Implementation and Monitoring

This chapter encourages a cross-programmatic approach to selecting and implementing watershed remediation/restoration activities and providing long-term monitoring. It discusses integrated watershed cleanup topics such as WFAs, the "3-Rs" Approach, and Watershed Cleanup Team task assignments. It also discusses integrated monitoring and program requirements for determining remediation and restoration actions and for long-term monitoring of watershed conditions, and concludes by addressing additional topics that should be considered in a watershed cleanup. Three case studies demonstrate the use of integrated remediation, restoration, reuse, and monitoring.

Integrating Watershed Cleanup

Integrating cleanup efforts requires both cross-program cooperation and careful allocations of funding. Coordination between agencies and programs provides the potential for streamlining and reducing the cost of watershed cleanup, restoration, and (where appropriate) redevelopment. This section discusses some of the practical aspects of integrating cleanup implementation and post-remediation monitoring. Because regions and states operate with different priorities and programmatic tools, the ideas presented here may not work for all watersheds, but similar coordination and careful planning can allow the stakeholders to utilize various programs, laws and resources to successfully fulfill program requirements and achieve efficient, effective, and comprehensive results.

The Watershed Cleanup Team should cooperatively set remediation, restoration, and re-use goals. If feasible, the team should ensure that the goals are met by project implementation by using applicable authorities and available funding mechanisms within the various schedule, budget, and other constraints of the programs that will address the watershed contamination. Goals should be consistent with the overall Watershed Management Plan, where applicable.

CASE STUDY

Utah DEQ: Prioritizing 319 Spending

The Utah Division of Water Quality (DWQ), part of the Department of Environmental Quality, administers the TMDL Program in conjunction with its watershed planning program. Utah uses 106 funding to provide contractual support in the development of the 319 watershed management plan and the TMDL, which includes an implementation plan. Utah then prioritizes the expenditure of its 319 NPS funds towards implementation projects or activities identified in the TMDLs. In addition, DWQ has used 319 NPS funding to support establishment of locally sponsored watershed coordinators to not only enhance the planning effort but to initiate and implement projects identified in the approved TMDLs or 319 plans.

Watershed Feasibility Assessment

Cleanups under CERCLA and RCRA, as well as TMDL allocations and implementation plans, share a common element: an evaluation of alternative strategies for reducing pollutant loading and risks to human health and the environment. In the watershed approach, it will be beneficial to all programs if a watershed-wide feasibility assessment is conducted to accomplish this same goal. EPA Region 8 developed a "WFA" protocol as part of its coordinated watershed restoration efforts that is proving to be broadly applicable. The WFA can be a natural part of an NPS Watershed Management Plan; it can also be conducted during the development of the TMDL. TMDL program funds, NPS funds, and RGI funds may all be potential sources of funding for a WFA.

The WFA uses the three screening criteria used by the Superfund program to assess remedial alternatives: effectiveness, implementability, and cost. For each source category, potential cleanup alternatives are evaluated and compared according to feasibility, cost, anticipated reduction in load, and a rough cost/benefit analysis. The WFA may not fulfill all the requirements of the various programs (i.e., a CERCLA FS or EE/CA, TMDL wasteload allocation, or a 319 NPS implementation plan), but could provide an initial, common framework to guide the data needs for each of these documents. Fine-tuned assessment and design would be performed in subsequent steps according to the processes of the program facilitating cleanup/implementation at each location. For example, Superfund remedies within the watershed will need to be chosen on the basis of a detailed alternatives analysis under each of the nine Superfund remedial action selection criteria described in Chapter 2.

A WFA provides critical information regarding significant sources that have been identified and quantifies their associated loads to surface water. The analysis suggests remediation alternatives and assigns costs associated with specific load reductions. Typically, a feasibility study conducted under CERCLA applies only to individual sites or operable units. Thus, a WFA may cover a much broader geographic area and includes alternatives for all categories of sources.

Significant value can be leveraged by applying various programs' funds to conduct a WFA. With this approach, the Watershed Cleanup Team will be able to effectively rank sources by their impacts to human health and the environment on a scale much larger than is typically accomplished under individual programs. Quantitative comparisons may then be made of the potential effectiveness of the proposed cleanup alternatives for sites throughout the watershed.

The WFA provides a tool that federal and state programs and local watershed groups can use to review and prioritize cross-programmatic cleanup opportunities in the watershed. The assessment would be used by the Watershed Cleanup Team to help determine which organization may be best suited to address the contamination from each source and to set priorities for the allocation of cleanup resources. For example, if the necessary estimated load reduction to meet water quality standards is 12 tons per year, and Project A costs $100,000 and reduces loading by 5 tons per year, Project B costs $1.1 million and reduces loading by 5.1 tons per year, and Project C costs $200,000 and reduces loading by 7 tons per year, the cleanup priorities may be Project A and Project C. Such watershed-wide considerations are often more difficult to undertake under other, more facility-specific programs such as RCRA and CERCLA.

The WFA can also be used to maximize available funding sources. The ability to implement projects concurrently to reduce contaminant loading would increase as the cost is shared by several applicable programs/agencies, and funding sources would be maximized by spreading the cost over several programs and agencies and by collaborating to provide documentation required to access funding. Additionally, if cleanup activities in the basin are coordinated, there is potential for consolidating waste, establishing joint waste repositories and minimizing the disturbance to the community by accelerating the cleanup. The WFA can also be the basis for TMDL load allocations. The study can be used to prepare grant applications (Brownfields and 319 NPS) and as the frame-

work for programmatic documentation requirements (TMDL allocations and implementation plan, CERCLA EE/CA or FS, RCRA CMS), thus streamlining the efforts of all programs. Projects that are supported by a variety of stakeholders and agencies and implement TMDLs frequently receive priority for grant and program funding. The WFA and subsequent prioritization of projects by the Watershed Cleanup Team requires the participation and concurrence of the stakeholders, which will improve the likelihood that a project will be funded. This may also increase the level of technical support provided by agencies such as USGS, BOR, and USACE, and help identify non-traditional funding sources.

Opportunity for Integration

- The Watershed Feasibility Assessment can provide the preliminary costs and alternatives for a variety of programs and agencies to estimate remedial costs and prepare grant applications for funding. The analysis provides the necessary data to allow program managers to prioritize and coordinate cleanup activity.

CASE STUDY

Little James Creek Feasibility Assessment

How a Subbasin Study Can Lead to Watershed-wide Cleanup

A WFA was conducted for Little James Creek Subbasin of the Left Hand Watershed in Colorado as part of the TMDL development. The study included surveying, mapping, and evaluating a limited set of alternatives to remediate specific sources in the watershed. Specifically, the assessment included the following elements:

1. A description of the individual sites (e.g., mine waste volume and surface area, topographic mapping showing relationship of mine waste piles, adits and other features).
2. Feasibility level plans illustrating the application of the alternatives at each site.
3. Cost sheets providing feasibility level estimates (+50 percent to -30 percent) for each alternative. Costs included capital costs and long-term operation and maintenance costs (O&M), where applicable.

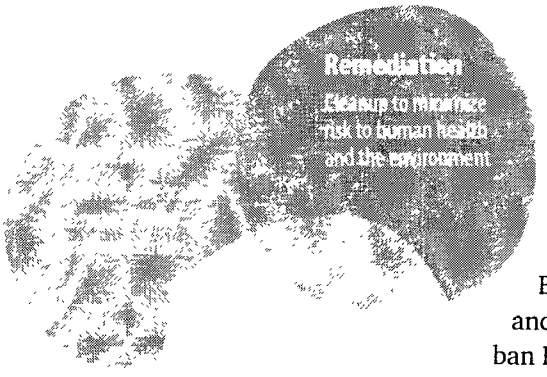
The Little James Creek feasibility assessment has already been used to:

- Prioritize sites for coordinated USFS/EPA removal projects and to expand the previously identified scope of work.
- Apply for Brownfields cleanup grants for Argo and Evening Star Mine sites.
- Assist the Left Hand Watershed Oversight Group in making decisions regarding cleanup priority and approach.
- Develop the TMDL Implementation Plan.

The findings may be used to develop a cleanup/implementation approach for the entire watershed, not only the Little James Creek Subbasin.

Remediation + Restoration + Reuse = Revitalization

Watershed cleanup can be summarized by the 3-Rs: **R**emediation, **R**estoration, and **R**euse. These 3 Rs were coined for EPA Region 8's Land and Water Revitalization Initiative, but they also fit with national EPA priorities and are applicable to watersheds throughout the nation. Under the 3 Rs, a set of criteria guides resource decisions and identifies the most important steps to fully realizing revitalization goals. They include:



- Early, planned multiprogram integration of cleanup activities
- Innovative approaches for revitalizing sites, communities, watersheds, and ecosystems
- Planning for reuse at the beginning of projects
- Measurable environmental and human health benefits

Programs most likely to be included are: NPDES, Wetlands, Superfund, Brownfields, RCRA, UST, Federal Facilities (including Base Realignment and Closure and Formerly Used Defense Sites), One Cleanup Program, Urban Rivers Restoration, and Ecosystem Protection. Each of these programs has its own specific roles and responsibilities, but the actions conducted under the individual programs can be tailored to meet the needs of cooperating programs in a watershed cleanup. Some examples of integrated site activities are presented in the following paragraphs. These are only examples and should not be considered a comprehensive listing. With a little planning and cooperation between programs and agencies, watershed remediation, restoration and re-use may be accomplished in innovative ways.

Superfund-Restoration Integration

Superfund's goal is to reduce contamination to acceptable levels, (which may or may not be "background" or a pristine condition), not necessarily to perform "restoration" activities. Nonetheless, CERCLA response actions can still be performed with an eye toward complementing subsequent restoration. The following discussion reviews opportunities for integrating Superfund and restoration activities, from data gathering through cleanup implementation.

Reviewing the status of the watershed assessment early in the CERCLA process at a site within the watershed may identify opportunities for sharing information. For example, the watershed cleanup team may collect information in the area of the CERCLA cleanup that can help identify additional sources. Conversely, early coordination during CERCLA's Site Assessment and RI efforts (especially with regard to ecological impacts) can ensure that resulting data will be useful for subsequent watershed restoration efforts.

EPA CERCLA guidance provides that reasonably anticipated future land use should be considered during the risk assessment phase of the RI/FS and reflected in the site-specific human health and ecological risk assessments. Thus, it is appropriate to consider prospective reuse plans as part of the RI/FS. The remedial action must meet or waive ARARs, and if WQS are considered ARARs for the selected remedy, the remedial action must be designed to support of the designated use (i.e., recreational use, aquatic life, industrial). Toward this end, the ROD may include selection of remedial actions to support the designated use and may also provide for administrative "institutional" controls. For example, land use restrictions that ensure BMPs, wildlife easements, and compliance with a particular zoning classification may be used as institutional controls that support ecological recovery or community revitalization within the bounds of Superfund.

Prior to NTCRAs or remedial actions, the EE/CA or FS must evaluate ARARs, and the ROD or Action Memo must state how they have been met or waived. The RPM, to assure protectiveness and comply with ARARs, can utilize Superfund dollars for remediation of ecological resources. For example, Superfund may mitigate wetlands and riparian buffers to comply with the CWA 404 ARAR.

Tasks that the Watershed Cleanup Team determines are appropriate but that are not required under CERCLA (i.e., not required to achieve protectiveness or meet ARARs) that are nevertheless "restoration" may be conducted with Brownfields (at qualifying sites), 319 NPS, and NRDA funding. Tasks that are necessary to promote redevelopment may be left for actions funded by local redevelopment agencies, private developers, and Brownfields loans and state grants. Note that identifying proposed restoration and redevelopment tasks during the RI/FS stage can allow for synchronization with remedial tasks.

Finally, it may be appropriate to consider use of ecologically friendly remedial alternatives when determining the technology that will be used for remediation. Ecologically friendly remediation can often result in lower O&M costs. With careful thought and communication with specific Watershed Cleanup Team members and other scientific resources, including the NRCS and the BTAG, the RPM could coordinate the Superfund cleanup with other in-stream and riparian zone restoration activities while still meeting program requirements.

Opportunity for Integration

- Watersheds with Superfund activities often include waters listed as impaired due to parameters not related to the Superfund site. Typical pollutants found include dissolved oxygen, nutrients, and/or sediment. The remedy selected by the RPM at his or her Superfund site or operable unit can potentially complement the instream restoration of the waterbodies necessary to achieve WQS. For example, alternatives to achieve bank stabilization can include reestablishment of riparian geomorphology or riprap. The first alternative will provide habitat, the other will take it away. Coordinating remediation with the TMDL implementation activities often will not increase costs but will complement the watershed activities, provide ecological restoration, and reduce the overall cost of the project, resulting in a value added to the overall watershed revitalization.

The selection of removal or remedial alternatives that result in a restored natural habitat may benefit both the remedial and restoration goals, especially for riparian zones. Remediation that leaves natural soil and vegetation habitat in riparian zones may mitigate flooding, be cost-effective, generate and preserve soils, create self-sustaining ecosystems, meet Executive Order 13112 to use native species and control invasive species, and minimize management needs and costs. Soils

CASE STUDY

Stabilizing Streambanks on the Upper Arkansas River

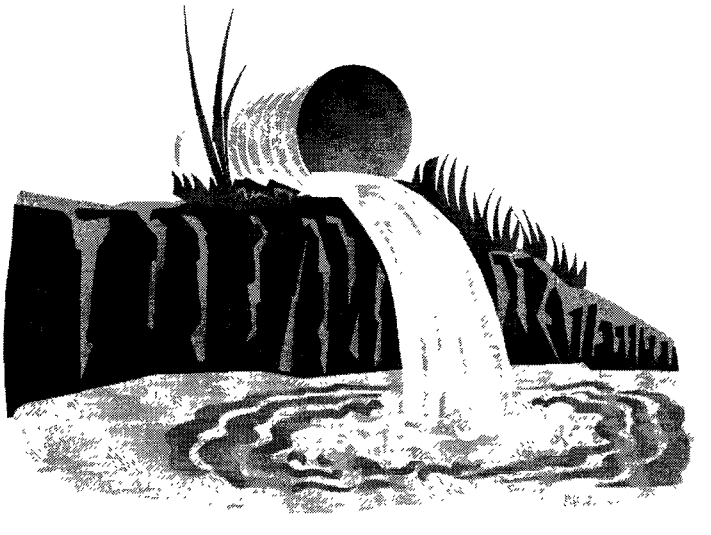
Fluvially deposited tailings from historic mining operations were capped using soil amendments and revegetation as part of a Superfund removal action in the Upper Arkansas River. The project required streambank stabilization in some locations to prevent erosion of the existing banks that might expose tailings that could then be washed downstream. State Division of Wildlife personnel were concerned that the projects would do more to reduce riparian habitat than improve it because of the planned riprap bank stabilization designs. Division of Wildlife personnel suggested alternative techniques that were then incorporated into the designs used for bank construction. Root wads were used in one location to redirect flow away from the bank. At another location, bendway weirs were used to stabilize the banks. These methods improved aquatic habitat and were less expensive to implement than the proposed riprap methods.

at contaminated sites are often of poor quality. If remediation includes capping, the soil quality above the cap is a critical first step to establishing a natural habitat. Use of composted biosolids can increase fertility and reduce metal toxicity. Recycled wastes such as municipal biosolids and wood ash are readily available at low or no cost and can provide a fertile barrier. The NRCS office of the USDA and the Cooperative Extension can provide information on soil profiles, native plants, etc., to help achieve ecological restoration. The West Page Swamp wetlands project described in the Coeur d'Alene case study presented in this chapter is an example of selecting an alternative that leaves natural soil and vegetation habitat. Remediation that protects or enhances in-stream habitat may also benefit both remediation and restoration processes. Bank stabilization or in-stream structures required for other remedy components may be designed to enhance fisheries or reduce pollutants downstream. An example of this approach is shown in the Upper Arkansas River case study below. The possibilities of conducting remedial actions in ways that enhance or facilitate restoration are numerous and should be considered when selecting remedial actions within a watershed.

TMDL Restoration Integration—Point Source Trading

Point source trading may be used to integrate TMDL requirements for NPDES facilities, NPSs and assist in watershed restoration. EPA's current trading policy is focused on nutrients and sediments. Trading programs for bioaccumulative and other toxics are discouraged, although they may be considered on an individual basis. During the allocation phase of the TMDL development, the necessary load reductions for point sources in the watershed are identified. Under trading, NPDES facilities may elect to achieve the needed pollutant load reductions by treating sources or causes of the pollutant other than their own effluent. Offsetting point source pollutant loading by reducing other sources, both point and NPSs, is a form of water quality "trading." Such trading can reduce the overall pollutant load to the watershed more economically and efficiently. Such mitigation can be a more cost-effective alternative than additional chemical treatment or facility upgrades that would be necessary to meet the TMDL. For example, offsetting can be accomplished by restoring impaired in-stream habitat, as it has been shown that restoring habitat may offset the impacts of certain pollutants.

The entity/facility responsible for a point source discharge may potentially choose to implement a program of trading in which it would pay for various NPS improvements rather than capital upgrades, which are often less environmentally effective than investing in a holistic strategy that addresses all environmental stressors through a combination of more modest capital improvements, streambank stabilization, riparian corridor improvements, rerouting irrigation return flow through constructed/treatment wetlands and other measures. Further information about EPA's effluent trading policy can be found at **www.epa.gov/owow/watershed/trading.htm**.



Trading Improves Boulder Creek Ecology

The City of Boulder is relying on a combination of in-stream restoration efforts and capital improvements at its municipal wastewater treatment plant to address ammonia toxicity problems in Boulder Creek. A more traditional approach to the water quality problem would have called only for plant upgrades, in this case, to full nitrification. Instead, the City traded ecological improvements for some point source pollutant load reductions.

The 15.5-mile section downstream from Boulder was suffering from degraded physical habitat, high water temperature, and high pH. Conditions were such that plant upgrades alone would never return Boulder Creek to a viable biological condition, according to the City's engineers and scientists. Studies indicated that a program to restore the stream's physical integrity also would be necessary to achieve water quality standards and a fully functional aquatic system. In addition, fencing off livestock from the riparian zone was critical to the success of the restoration effort. The creek passes through the center of several ranches. Fencing and specially designed crossings now protect a 120-foot wide buffer between grazing land and the creek.

Types of Restoration Treatments Applied in Boulder Creek

- Streambank stabilization
- Riparian restoration
- Development of pool habitat
- Narrowing/deepening the channel
- Returning natural sinuosity
- Restoring wetlands habitat
- Rerouting irrigation return flows through developed wetland

Since 1990, the City has been implementing restoration in phases over a total of 4.6 river miles: Phase I involved installation of BMPs along a 1.3-mile reach; Phase II extended restoration efforts along another 1.1 miles; Phase III added an additional 0.5 miles to the project; and Phase IV involves 1.7 miles. Monitoring results has been an important aspect of the overall effort, and the restoration plan has been modified between phases on the basis of interim results. The City of Boulder and nearby Longmont, along with EPA Region 8, the USGS, and the Colorado Water Quality Control Division have conducted monitoring or contributed existing data.

To date, the restoration efforts have resulted in overall improvements to the creek's ecology at substantial cost-savings over an approach that would have focused only on treatment plant loading reductions. The stream restoration project has cost $1.4 million to date (excluding donated consulting time, labor, and materials) and saved between $3 and $7 million in capital costs over the cost of upgrading the plant to full nitrification. Both pH and temperature measurements have improved, un-ionized ammonia has decreased, and the creek now attains ambient water quality standards with improved aquatic life.

Supplemental Environmental Projects

A supplemental environmental project (SEP) is an environmentally beneficial project that a respondent in an enforcement action voluntarily agrees to perform as part of a settlement of the matter. In return, EPA or the state may agree to reduce the monetary penalty that it would otherwise seek as a result of the violation(s). Most enforcement actions against businesses or individuals for failure to comply with the environmental laws are resolved through settlement agreements. SEPs are designed to give companies charged with environmental violations an alternative to standard fines otherwise potentially available. These projects can provide a positive outcome for the company and the community. Acceptable SEP categories may include: public health, pollution prevention, pollution reduction, environmental restoration and protection, emergency planning and preparedness, assessments and audits, environmental compliance promotion, and other approved projects that might benefit human health or the environment. Restoration SEPs may involve restoring natural environments (ecosystems) or creating conservation land (e.g., transforming a former landfill into wilderness land). Within certain legal constraints, EPA has broad discretion to settle environmental enforcement cases including discretion as to the level of penalties the Agency will accept and whether to include SEPs as an appropriate part of a settlement. Under EPA policy, guidance, the amount of penalty mitigation EPA may consider is based on a number of factors. These include the cost of the SEP and whether or how effectively the SEP:

- Benefited the public or the environment
- Was innovative
- Considered input from affected community
- Factored in environmental justice issues
- Reduced emissions to more than one media (e.g. air, land, water); and
- Implemented pollution prevention program techniques and practices.

Generally, the value of the SEP should be greater than the amount of fine forgiven. The actual percentage of penalty mitigation granted is within EPA's discretion; however, EPA policy suggests that generally it should not exceed 80 percent of the cost of the SEP unless the violator is a small business, a government agency/entity, or a nonprofit organization, or the SEP implements pollution prevention. Furthermore, in all cases, the final settlement penalty should equal or exceed: a) the economic benefit of noncompliance plus at least 10 percent of the gravity component; or b) 25 percent of the gravity component only, whichever is greater, regardless of the cost or environmental value of the SEP. For more information about EPA's SEP policy, see **http://cfpub.epa.gov/compliance/resources/policies/civil/seps**. For examples of potential SEPs, see **http://www.epa.gov/compliance/resources/policies/civil/seps/projectsideas42004.pdf**.

A SEP Improves Health and Revitalizes Granite City, Illinois

For nearly 70 years, the NL/Taracorp facility in Granite City, Illinois, was a secondary lead smelter that exhausted lead, deposited crushed battery casings in the community and created a 250,000-ton slag/waste mountain on-site. This Superfund facility operated next to a residential community where, in 1991, the blood lead concentrations of one in four children exceeded the Centers for Disease Control's (CDC) health-based threshold.

The NL/Taracorp Team successfully negotiated three major consent decrees valued at over $63,000,000 and assured the cleanup of 1,600 lead-contaminated residential yards. The decrees also called for the defendants to fund a $2 million lead paint abatement program in homes near the site through an SEP. The defendants were not legally liable for lead paint or responsible for hiring of trained workers, but the NL team creatively addressed the overall problem of lead contamination in the area, including the need for street sweeping. The lead paint abatement SEP program was established through outreach in the community. Early on, Madison County Community Development Agency showed interest in managing the program and eventually received SEP funding to manage the lead paint program. Madison County was then able to leverage additional funding through grants and by using a revolving fund program to start a comprehensive lead abatement and education program in the various environmental justice (ES) communities that suffered from numerous environmental impacts, including the NL Site and others. This collaboration was very successful.

The settlements achieved penalties amounting to approximately $3.5 million for failure to comply with a CERCLA Unilateral Administrative Order, including the $2 million SEP. The cleanup activities increased the value of area properties that will help the region redevelop, created job opportunities in an EJ community, and required that the responsible parties fund a community lead-paint abatement program.

Identification of Implementation Resources and Assignment to Programs/Stakeholders

Cross-Programmatic Cleanup Plan

The Watershed Cleanup Team should identify the existing and potential sources of funding available to perform each implementation task and assign responsibilities for the high priority tasks, including voluntary, mandatory, and educational efforts that will help attain and maintain goals. This information should be memorialized in the **Cross-Programmatic Cleanup Plan**. This decision document should include a clearly laid out plan for action including a list of the tasks required to complete each project and the milestones that will be used to measure progress. During the implementation phase, communication between participants should remain high and include frequent status updates, sharing of work plans, remedial designs and recommended BMPs. The plan should include an annual schedule that will allow the team to revisit milestones and make any necessary revisions.

Preparation of a worksheet similar to the Left Hand Watershed example in Table 5-1 and a Watershed Cleanup Fact Sheet that clearly states project background, cleanup goals and objectives, the plan for action, progress to date, and a high level of interest in the project will allow cleanup partners to demonstrate to their agencies or grant sources the high level of support and priority being given to the project by others. This may increase the amount of funding that will be allocated to the project by government regulatory and support agencies, industry, communities, and environmental action groups. A public outreach program is a critical component to the success of the project. Stakeholders should participate in the selection of cleanup alternatives and implementation of the NPS controls.

The results of this planning effort should be included in the TMDL Implementation Plan and in the larger 319 NPS Watershed Management Plan.

Table 5-1 Left Hand Watershed Implementation Draft Worksheet

[illegible]	[illegible]	[illegible]	[illegible]
Evening Star Remediation	Brownfield cleanup grants	$200,000	Improved macroinvertebrate diversity
Argo Remediation	Brownfields cleanup grants	$200,000	Improved macroinvertebrate diversity
Streamside Tailings Cleanup	USFS and EPA removal	$200,000	Improved macroinvertebrate diversity
Bueno Tails Cleanup	USFS and EPA removal	$300,000	Turbidity less than 100 NTU
Burlington Mine Cleanup	PRP—voluntary cleanup	$1,500,000	Reduced zinc and manganese load
JRT Tailings	319 NPS funds	$100,000	Improved macroinvertebrate diversity

Integrated Watershed Monitoring

Under the CWA Section 106(e), states, territories and authorized tribes implement monitoring programs that allow them to report on the attainment of WQS and to identify and prioritize waters not attaining standards. Monitoring can also be an element of NPDES permits, TMDL assessments and confirmation sampling. Cleanup programs such as RCRA and CERCLA typically require monitoring as an integral part of their implementation. State game and fish agencies perform stream monitoring and assessment as part of their programs. Local environmental groups also have an interest in tracking the health of their local ecosystems and often organize ongoing stream monitoring projects. Some watersheds will have other parties (e.g., owners of lakefront or streambank property, local schools, and universities) interested in regular monitoring. The Watershed Cleanup Team should ensure that a comprehensive watershed monitoring plan is prepared and implemented to coordinate these efforts, where appropriate, and to ensure that interested parties have access to all the data that may affect their interests. Typically sampling undertaken for individual programs or facilities addresses specific sites rather than cumulative impacts across the watershed. By coordinating the sampling efforts across multiple programs the data will provide a more complete picture of the significant sources of pollutants in the watershed and will streamline resources to allow for more extensive field work.

A comprehensive watershed monitoring plan and QAPP should be prepared as part of the Watershed Management Plan and/or other regulatory requirements. The watershed monitoring plan should identify:

- Monitoring locations
- Monitoring parameters
- Field and laboratory analyses/evaluation
- Benchmarks/detection limits
- Standard operating procedures for sample/data collection and evaluations
- Data quality requirements
- Monitoring frequency
- Monitoring responsibilities (who, where, for what period of time)
- Data management and distribution

- Funding for all aspects of monitoring

The Watershed Cleanup Team should go through the DQO procedure to ensure the requirements of all programs are met.

Developing a watershed monitoring plan may present challenges. Key questions include: what data are essential and to what degree of precision, what are the indicators of success, who will do the work, and who will pay for it. Cleanup programs such as RCRA and CERCLA frequently require only limited water quality monitoring with respect to both location and time. NRDA restoration efforts are monitored, but the timespan and scope of monitoring will depend on the type and scope of restoration efforts and Trustee priorities. State water quality assessments are ongoing but often have limited funding. TMDLs that include a monitoring plan are generally carried out by the state monitoring program. Even if more samples are collected or more analyses performed than an individual program requires, overall cost savings are realized by reducing the field effort required.

Program Cleanup Processes

TMDL

TMDL components related to implementation and monitoring are described here.

Allocating Pollutant Loads: TMDL allocations should account for point sources, NPSs, and background sources of pollution. The allocation should demonstrate that water quality standards will be met and maintained and that the load reductions are technically achievable. Factors such as technical and programmatic feasibility, cost-effectiveness, relative source contributions, equity, and the likelihood of implementation may be considered. Allowable loads may be expressed in many ways and may divide up the allowable total load by percent removal, concentrations at points of compliance, total mass per time, reduction of load, or percent removal proportional to raw load. The process quantifies the necessary reductions in pollutant loads to meet the in-stream water quality target. The technical analysis should demonstrate a reasonable assurance that the WLA and LA in the TMDL will achieve WQS when implemented. When determining TMDL allocations the following factors should be considered:

- ***Wasteload Allocation:*** Allocations assigned to point sources are frequently expressed as numeric effluent load or concentration. These allocations are generally implemented by use of the NPDES program using numeric standards that are incorporated into individual NPDES permits. States developing WLAs should look at the cumulative affects of multiple dischargers.
- ***Load Allocation:*** LAs include NPSs, stormwater sources for which NPDES permits are not required, atmospheric deposition, ground water and background sources of pollution. NPS LAs are implemented through a combination of federal, state, and local programs that include regulatory, nonregulatory, and voluntary efforts. The TMDL should include a description of the pollution control BMPs that will need to be implemented to achieve the specified load reductions. They may be expressed as numeric maximum allowable load, numeric reductions in pollutant load, and/or narrative statements of desired conditions regarding habitat or biology.

Opportunity for Integration

- Studies and assessments performed by all cleanup programs may help determine reasonable load allocations. CERCLA RI/FS and EE/CA documents often provide the information required to make reasonable estimation of load reduction expected from planned cleanup efforts.
- The evaluation of cleanup technologies identified for a site may be applicable to similar sites in the watershed.

- ***Margin of Safety:*** The MOS is assigned and depends on the uncertainty in load, waterbody response and reduction feasibility.
- ***Seasonality:*** Seasonality is considered in the TMDL to ensure WQSs will be met and maintained throughout the year. Variations occur due to variations in the waterbody (assimilative capacity caused by seasonal changes in temperature and flow or sensitive periods for aquatic biota) and variations in loading (seasonal industries, snowmelt, precipitation events).
- ***Future Growth:*** Future growth or changes in land use may impact threatened or impaired waters. A reasonably foreseeable allocation may be allotted to future growth. If so the TMDL should explain how evaluation of future growth was made and the implications for local planning processes and landowners.

Opportunity for Integration

- The Implementation Plan may adopt documentation from other programs to provide reasonable assurance that the designated load reductions will occur.

Opportunity for Integration

- For Watershed-based cleanup, the Monitoring Plan should describe a comprehensive monitoring effort that meets the needs of all stakeholders. The plan should describe what will be performed to ensure WQS are being met and that specific cleanup actions (Superfund cleanups, RCRA Cleanup Actions) are performing to the standards set in decision documents.

- ***Implementation Plan:*** The Implementation Plan may be developed for one or multiple TMDLs in the watershed. The plan should include a description of the implementation actions or management measures required to meet the allocations and a description of the effectiveness of the actions; a timeline of when activities will occur including interim milestones; reasonable assurance that the activities will occur; legal or regulatory controls; the time required to attain WQSs (by source or source category); a monitoring plan (including interim milestones); a description of milestones for attaining WQSs; and TMDL revision procedures and triggers for revisions.
- ***Monitoring Plan:*** A Monitoring Plan is prepared to determine the effectiveness of control measures, whether the TMDL is working, and a procedure for TMDL revision if standards are not being met. The plan should be based on DQOs and should include sampling parameters, locations, frequency, methods, schedule, and who is responsible for implementing it. Watershed stakeholders may participate in developing and carrying out the Monitoring Plan.

RCRA

EPA's goal is to facilitate timely, efficient and effective cleanups focused on results. Recent guidance encourages RCRA project managers to use a flexible approach that allows innovative technical approaches and focused data collection to speed the RCRA process while still ensuring that a remedy that will protect human health and the environment, prevent future releases, and properly manage waste is implemented in a timely manner. The flexible approach may allow the following steps to be conducted in a less formal atmosphere. Public participation in decision making is still required, so it is recommended that public opinion be sought early and often when using the results-based approach.

RCRA Corrective Measures Study (CMS)

A CMS is performed when the potential need for corrective measures is verified by an RFI. EPA sets action levels that may be based on existing standards such as those found in the SCDM, Region 3 Risk Based Concentrations or Region 9 PRGs, state Water Quality Criteria, or other appropriate

levels. The facility may request that no further action be required on the basis of a determination that no release poses a threat to human health and the environment. If EPA requires further action, the CMS is prepared to analyze potential remedies. The number of remedies evaluated may vary from site to site. Potential remedies are evaluated for performance, reliability, ease of implementation, and potential adverse impacts. The effectiveness, time required for implementation, estimated costs, and administrative or institutional requirements are also considered. EPA sets target cleanup levels against which the alternatives are measured. The final *media cleanup standards* may be more stringent than the target cleanup levels.

EPA has determined *presumptive* remedies applicable to specific categories of sites. EPA has already compared these alternatives against other alternative remedies generally applicable to that type of site, reducing the number of alternatives that must be considered in the CMS.

RCRA Corrective Action

Site-specific media cleanup standards are set that depend on reducing risk to an acceptable level for the current and anticipated future land use. Points of compliance are set that determine at what location the cleanup standards must be met. For example, for ground water, the point of compliance may be where the release enters surface water or the nearest well used for drinking water. Using the CMS, the remedy is selected that is protective of human health and the environment and achieves media cleanup standards set by EPA, controls the source of the release and prevents further releases to the extent practicable, and properly manages wastes generated by the remediation. EPA also considers the long-term reliability and effectiveness of the remedy, the effectiveness of the remedy in reducing the toxicity, mobility, or volume of contaminants; the short-term effectiveness of the remedy; ease of implementation; and cost. A compliance schedule is set and the facility proceeds to implement the remedy. Corrective action may be conducted as a result of permit requirements, a corrective action order, or voluntary corrective action. Long-term monitoring may or may not be required.

Interim measures may be required to address immediate threats to human health and the environment.

For more information on this subject see:
Results-Based Approaches and Tailored Oversight Guidance for Facilities Subject to Corrective Action Under Subtitle C of the Resource Conservation and Recovery Act. EPA 530-R-03-012. September 2003.
www.epa.gov/epaoswer/hazwaste/ca/resource/guidance/gen_ca/reslt-bse.pdf

CERCLA Removal Actions

EPA conducts or supervises Removal actions at sites when contamination poses an immediate threat to human health and the environment. Removals are classified as emergency, time-critical, or non-time-critical, depending on the time in which a response must be taken. Generally, the more time available, the more detailed the analysis of alternatives.

CERCLA Remedial Alternatives

The processes related to selection and implementation of remedial alternatives are presented below.

Feasibility Study

The FS is conducted to develop and evaluate remedial alternatives. FS activities are fully integrated with the RI. FSs can include an alternatives screening step to select a reasonable number of alternatives for detailed analysis. To develop and screen alternatives, identify remedial action ob-

jectives that specify contaminants of concern, potential exposure pathways, and remediation goals. Remediation goals establish the extent to which the site should be cleaned up to protect human health and the environment. The factors to be considered include the following:

- For known or suspected carcinogens, the remediation should achieve an upper-bound lifetime cancer risk level of between 10^{-4} and 10^{-6} for high-end receptors.
- For noncarcinogenic hazardous substances, a safe exposure level should be established. This level should represent a dose below which no adverse health effects are expected.
- For ground water, MCLs and non-zero MCLGs established under the SDWA (applicable to certain public water supplies) are expected to be met.
- Ecological risks should be reduced to levels that are acceptable, with special attention paid to sensitive habitats and critical habitats of species protected under the Endangered Species Act.
- Other ARARs must be met or waived.

Potential remedial technologies are developed and screened. CERCLA requires that EPA consider alternatives that reduce toxicity, mobility, or volume of contaminated material through treatment; alternatives which call for off-site transport and disposal or containment without treatment are the least-favored. CERCLA also requires that a "no-action" (or "no further action") alternative be considered to provide a baseline for comparison. For categories of treatment options, a representative process option is chosen for detailed analysis.

Remedial alternatives are screened to reduce the number of alternatives that will undergo detailed analysis and ensure that the most promising alternatives are considered. The screening criteria are:

- ***Effectiveness:*** The degree to which an alternative reduces toxicity, mobility, or volume through treatment; minimizes risks and provides long-term protection; complies with ARARs; minimizes short-term impacts; and achieves protection quickly.
- ***Implementability:*** The technical feasibility and availability of the technologies each alternative would employ.
- ***Cost:*** Alternatives providing effectiveness and implementability similar to that of another alternative, but at a greater cost, may be eliminated.

The alternatives retained after the screening process are subjected to detailed analysis and comparison to nine criteria:

(1) overall protection of human health and the environment

(2) compliance with ARARs

(3) long-term effectiveness and permanence

(4) reduction of toxicity, mobility, or volume

(5) short-term effectiveness

(6) implementability

(7) cost

(8) state acceptance

(9) community acceptance

The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to the others. These nine criteria can be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

CERCLA Criteria for Selecting Remedial Action

Threshold Criteria

Overall Protection of Human Health and the Environment addresses whether a remedy provides adequate protection and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether or not a remedy will meet all federal and state environmental requirements, standards, criteria, and limitations that are applicable or relevant and appropriate.

Primary Balancing Criteria

Long-term Effectiveness and Permanence refers to expected residual risk and the ability of the remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of the management controls (e.g., institutional controls).

Reduction of Toxicity, Mobility, or Volume through Treatment addresses the degree to which treatment will be used to reduce the mobility, toxicity, or volume of contaminants causing site risks.

Short-Term Effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and operation of the remedy until cleanup goals are achieved.

Implementability addresses the technical and administrative feasibility of the remedy, including the availability of materials and services needed for a particular option.

Cost includes estimated capital (construction), O&M, and net present worth costs. (The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the current year. This analysis allows the cost of the remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the basis year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life.)

Modifying Criteria

State Acceptance indicates whether the Commonwealth concurs with, opposes, or has no comment on the selected remedy.

Community Acceptance considers whether the community agrees with the proposed remedy. This is assessed in detail in the ROD responsiveness summary which addresses public comments received on the Administrative Record and the PP.

Threshold criteria must be satisfied for a remedial alternative to be eligible for selection. Primary balancing criteria are used to weigh trade-offs between alternatives. State acceptance and community acceptance are modifying criteria formally taken into account after public comment is received on the proposed plan.

A variety of alternatives may be considered for a site. For example, remedial alternatives for a site containing soil contaminated with solvents might include excavation and on-site or off-site treatment, capping combined with ground water pumping and treatment, and in-situ treatment. Special rules apply to sites where off-site transport and disposal are the selected alternative, to ensure

that the ultimate waste repository is in compliance with applicable laws. Generally, any alternative that does not allow unlimited use of a site after the remedial action is implemented must include institutional controls to restrict land usage.

CERCLA Removal Engineering Evaluation/Cost Analysis (EE/CA)

For NTCRAs, the lead agency must conduct an EE/CA, an analysis of removal alternatives for a site. The EE/CA presents definitive information on the source, nature, and extent of contamination and risks presented by the site. The EE/CA also presents an analysis of removal alternatives. If an RI has been completed (because the removal is related to an NPL site), risk assessment data from the RI may be used to support the removal action objectives and only limited data collection will be required. The goal of the EE/CA is to identify the objectives of the removal action and to analyze the effectiveness, implementability and cost of various alternatives that may satisfy the objectives. For TCRAs, a similar but less formal process is conducted.

The EE/CA contains:

- ***Site characterization:*** Site description and background (location, type of facility and operational status, structures/topography, geology/soil/aquifer information, surrounding land use and populations, sensitive ecosystems, and meteorology); previous removal actions; source, nature, and extent of contamination (locations of contaminants, magnitude of contamination, physical and chemical properties of the contaminant, and targets potentially affected by the site); analytical data (existing data and data collected during the EE/CA); and streamlined risk evaluation (focused on the source of contamination the removal action will address).
- ***Identification of Removal Action Objectives:*** Statutory limits on removal actions, determination of removal scope, determination of removal schedule and planned remedial activities.
- ***Identification and Analysis of Removal Action Alternatives:*** Effectiveness (protection of human health and the environment; compliance with ARARs and other criteria; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness), implementability (technical feasibility, administrative feasibility, availability, state acceptance, and community acceptance); and cost (direct capital costs, indirect capital costs and post-removal site control costs). Presumptive remedies may be used to speed selection of an alternative.
- ***Comparative Analysis of Removal Action Alternatives:*** Comparison of the alternatives.
- ***Recommended Removal Action Alternative:*** Treatment is preferred over containment or land disposal and permanent solutions are preferred over temporary.

The state and the public are given the opportunity to comment on the EE/CA and recommended removal action. An action memo is prepared that documents the need for a removal response, the proposed action, the rationale for the proposed action, and how state and public comments were considered. The action memo must be approved prior to commencement of the work.

CASE STUDY

Cooperatively Working in the Left Hand Watershed

An MOU between EPA Region 8 and USFS Region 2 was developed for the Left Hand Watershed project to describe the roles each program will play in assessment and cleanup of mixed ownership sites. The MOU will apply to other mixed ownership sites within the regions. One lead agency will be designated for each site, but work will be cooperative unless the agencies prepare an Interagency Agreement to transfer funding for a single agency to perform the cleanup.

Proposed Plan, Public Comment, and Record of Decision

The selection of the remedial action is a two-step process, requiring first the development of a PP that is put out for public comment, followed by a ROD. The state agency and the community are given the opportunity to participate in the remedy selection activities. The remedy selection process may be initiated at one operable unit (OU) at a site while other OUs are still undergoing investigation or are in other stages of the cleanup process.

The lead agency (typically EPA at private sites; the owning federal agency at federal facilities) in conjunction with the support agency prepares a PP that summarizes the remedial alternatives that were analyzed, proposes a preferred remedial alternative, and summarizes the information used to make the decision. The PP is presented to the public and revised in response to state and public comment as appropriate.

After evaluating all comments received on the PP, the lead agency makes the final remedy selection decision. This decision is documented in the ROD, which must be signed by the Regional Administrator. The ROD contains significant facts, analysis of facts, and site-specific policy determinations considered in the remedy selection process and explains how the nine evaluation criteria were used to select the remedy. The ROD is based on an administrative record and is made available for public inspection. RODs for Superfund-financed actions should include formal written concurrence from the state.

The ROD should address the watershed cleanup goals and objectives to the extent possible. For example, when determining ground water cleanup levels for the ROD, special attention should be paid to assessing the site's impact on surface water quality and drinking water sources in the entire watershed. Extra efforts should be made to ensure that the proposed remedy is congruent with restoration and redevelopment actions that will be conducted by other Watershed Cleanup Team partners.

Remedial Design/Remedial Action

The remedial design (RD) is the engineering plan used to guide implementation of the selected remedy. Remedial action (RA) is the physical implementation of the ROD and RD. All RD/RA activities must conform to the remedy set forth in the ROD and other decision documents. The NCP does provide mechanisms through which changes can be made to remedies selected in ROD. If the lead agency determines that some changes should be made to the selected remedy, but the changes do not fundamentally alter the remedial selection analysis set forth in the ROD, it publishes an explanation of significant differences (ESD). Fundamental changes to a ROD must be documented in an amended ROD.

Operation and Maintenance

Typically, a RA will require O&M measures to continue at the site to ensure effective remedy implementation. O&M measures are initiated after the remedy is constructed and is determined to be operational and functional. At Fund-lead sites, EPA pays 90 percent of CERCLA remedial activities, the state 10 percent, until 1 year after the commencement of O&M measures, after which the

state must agree to assume 100 percent of O&M. Federal funding (90 percent) of actions involving measures to restore ground water to beneficial use may continue for up to 10 years after the remedy becomes operational and functional.

Five-year reviews are performed to ensure the remedy continues to be protective of human health and the environment.

NRDA

The NRDA process is described earlier in Chapters 2 and 4. The goal of the NRDA process is to restore resources—those actions undertaken to return an injured resource to its prerelease condition as measured in terms of the injured resource's physical, chemical, or biological properties or the services it would have provided.

During settlement negotiations or after a settlement is reached, a Restoration and Compensation Determination Plan (restoration plan) is developed. The restoration plan specifies the necessary actions to restore the injured resources. The restoration plan documents the process to select restoration/replacement actions and assign costs. It lists a reasonable number of possible alternatives for restoration, rehabilitation, replacement, or acquisition of equivalent resources and the related services lost to the public associated with each; selects one of the alternatives and the actions required to implement that alternative; gives the rationale for selecting that alternative; and identifies the methodologies that will be used to determine the costs of the selected alternative and the compensable value of the services lost to the public associated with the selected alternative. Possible alternatives are limited to those actions that restore, rehabilitate, replace, or acquire the equivalent of the injured resources and services to no more than their baseline. The restoration plan may be expanded to incorporate requirements from procedures required under other portions of CERCLA or the CWA or from other federal, state or, tribal laws applicable to restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured resources or may be combined with other plans for related purposes as long as the requirements of this section are fulfilled. The actions can be carried out on the lands where the contamination occurred or, if appropriate, at an alternate site that, when restored, provides a suitable replacement for the injured or lost resources.

When selecting the alternative to pursue, the trustee considers following factors:

- Technical feasibility
- The relationship of the expected costs of the proposed actions to the expected benefits from the restoration, rehabilitation, replacement, or acquisition of equivalent resources
- Cost-effectiveness
- The results of any actual or planned response actions
- Potential for additional injury resulting from the proposed actions, including long-term and indirect impacts, to the injured resources or other resources
- The natural recovery period
- Ability of the resources to recover with or without alternative actions
- Potential effects of the action on human health and safety
- Consistency with relevant federal, state, and tribal policies
- Compliance with applicable federal, state, and tribal laws

The public is provided the opportunity to comment on the restoration plan during a public comment period. Once a settlement is reached with the responsible party, the restoration plan is imple-

mented by the Trustees or the responsible party under the supervision of the Trustees. The Trustees monitor restoration projects to assure that they continue to be properly operated and to determine whether the efforts are successful over the long run in restoring the injured resources.

Brownfields

Brownfields cleanups must protect human health and the environment and be conducted in accordance with federal and state laws. Cleanup levels that protect human health and the environment are determined by EPA and state agencies and may be based on existing standards such as those found in the SCDM, Region 3 Risk Based Concentrations or Region 9 PRGs, state Water Quality Criteria, or other appropriate levels. Cleanup levels depend on the intended use of the property. The approach to selecting a cleanup alternative that will meet the cleanup levels is flexible. Innovative cleanup technologies are encouraged, but must meet the site-specific cleanup standards. Public participation is required prior to remedy implementation.

Opportunity for Integration

- Coordination among Trustees and between Trustees and other agencies participating in the assessments and cleanup is required by law and will help all agencies present reasonable, consistent cleanup alternatives to the community. This will improve community participation and support and reduce the hostility that occurs when several agencies present conflicting solutions to the contamination problems in their community.
- Monitoring may also be integrated between TMDL, CERCLA Remedial, CERCLA Removal, and NRDA programs.

Additional Topics Related to Watershed Cleanup and Monitoring

Applicable or Relevant and Appropriate Requirements (ARARS)

CERCLA requires that on-site remedial actions must attain or waive federal and more stringent state ARARs upon completion of a remedial action. The NCP also requires compliance with ARARs during remedial and removal actions to the extent practicable. ARARs are identified during the EE/CA and RI/FS studies and are considered in the selection of alternatives. ARARs may be chemical-specific (such as WQS), action-specific (such as workplace safety), or location-specific (such as wetlands and floodplain management restrictions). The six circumstances under which ARARs may be waived are: the action is an interim measure, the action would cause greater risk to human health and environment, technical impracticability, equivalent standard of performance, inconsistent application of state requirements, or fund-balancing.

Opportunity for Integration

- In an effective watershed cleanup effort, non-CERCLA programs will clearly identify their requirements to CERCLA participants, and the programs will work together to ensure that effective, economical remedies are implemented to meet the goals of all participating programs. Early and frequent communication between programs is key to identifying and meeting ARARs.
- When a waiver from ARARs is necessary for on-site remedial action, the WQS program and the Trustees can help the RPM develop targets that may still protect the existing use.
- The target for the TMDL represents the existing numeric standard or a translation of the narrative criteria/use classification into a quantifiable criterion that is relevant to the specific sites and applies to a specific point of compliance on a stream/segment/reach. These standards or translation of standards are ARARs.
- Collaboration between CERCLA and TMDL programs may be necessary to quantify the needed load reductions on a source-by-source basis within the watershed to achieve the desired TMDL targets. This should include an analysis linking the controls to the environmental indicators (e.g., water quality standards).

Wetlands Protection

At CERCLA sites containing wetlands, wetlands protection and restoration issues should be considered during the PA/SI, EE/CA, RI/FS studies, and during RD/RA. Wetlands are considered in the ecological risk assessment and the FS where the response action may impact the wetlands. Impacts to wetlands from remedial actions should be avoided or minimized. Even though CWA Section 404 permits are not required for on-site Superfund actions in wetlands, the substantive requirements must be met, and unavoidable impacts to wetlands must be mitigated. Prior to initiating any action that might impact wetlands, regional wetlands staff and the BTAG should be contacted for advice on Section 404 compliance and watershed protection priorities.

CASE STUDY

Setting Site-Specific Water Quality Standards/ARARs in Eagle River and French Gulch

Eagle River

At the Eagle Mine Superfund Site in Colorado, it was technically impracticable to achieve the existing state WQS, so the RPM worked with EPA and state WQS programs and the community to determine appropriate biological metrics to support a brown trout fishery. The biological criteria were used to define a "healthy biological community." When compliance with the biological criteria is achieved, the water quality will be measured and used to define new WQS for the Eagle River.

French Gulch

At the Wellington Oro Superfund site, metal-laden water from abandoned mine workings was discharged both at a discrete seep and through dispersed subsurface flow into ground water. Most of the water was discharged at the on-site seep so it could be treated and released to the Blue River; however, it was suspected that additional mine pool water was being discharged at unknown locations within the alluvial aquifer. Despite several hydrogeological studies, the underground discharge locations were difficult to identify due to the complexity of the mine workings and the dredge mining-disturbed stream bed. To determine the need to conduct additional costly investigations that might allow for capture and treatment of this water, a UAA was conducted for the Blue River to determine appropriate water quality criteria downstream of the mine. The UAA provided documentation for site-specific WQS in the Blue River and concluded that the aquatic habitat in the Blue River was severely impacted by historic dredge mining and, despite restoration of portions of the river, habitat is limited to supporting adult brown trout. The WQS for the Blue River 2 miles downstream of the French Gulch inflow were adjusted to reflect the adult brown trout criteria. The revisions to the WQS were approved by the Colorado Water Quality Control Commission and used in the final determination of the final remediation alternative. Working together, both Water and Superfund Program goals were met, plus the property was available for reuse. A subsequent consent decree, agreed to by the DOJ, DOI, EPA, State of Colorado, and B&B Mines, provided the level of comfort needed to allow the sale of the property to Summit County and the Town of Breckenridge for use as open space.

Coeur d'Alene River Basin, Idaho and Washington

The Bunker Hill Mining and Metallurgical Complex NPL site is in northern Idaho's Coeur d'Alene River Basin. It was listed on the NPL in 1983. The Coeur d'Alene River Basin is one of the largest areas of historic mining operations in the world. Since the late 1880s, mining activities in the Upper Coeur d'Alene Basin contributed an estimated 100 million tons of mine waste to the river system. Communities in the upper basin were built on mine wastes. Until as late as 1968, tailings were deposited directly in the river. Over time, these wastes have been distributed throughout more than 150 miles of the Coeur d'Alene and Spokane Rivers, lakes and floodplains. The Coeur d'Alene Basin is in northern Idaho and covers approximately 3,700 square miles. The area is characterized by high, massive mountains mantled with coniferous forests and deep, inter-mountain valleys, as well as high prairie rangeland and palouse agricultural land. The waters were too toxic for fish spawning, and Ninemile and Canyon Creeks were devoid of fish and other aquatic life. Tundra swans experienced lead poisoning. This site encompasses a large geographic area and, therefore, is divided into OUs for manageable cleanup. OU-1, known as "the Box," is a 21-square-mile area surrounding the historic smelter area and includes the cities of Kellogg, Wardner, Smelterville and Pinehurst, all in Shoshone County. Residential, community and smelter area cleanups have been ongoing since the 1980s. A significant portion of these cleanups has been completed. There are plans for upgrading the Bunker Hill Mine Central Treatment Plant, which treats acid mine drainage.

Contaminants from mining operations in the Silver Valley spread harmful levels of heavy metals down the South Fork of the Coeur d'Alene River and into the flood plains. The area addressing mining contamination outside the box is called "the Basin." A plan for cleaning up residential and recreational areas in the Basin was developed in coordination with the community members, federal and state (Idaho and Washington) organizations. The common goals are reducing heavy metals, improving fisheries, reducing downstream migration of contaminated sediments and providing safe feeding habitat for waterfowl.

EPA has been working at this site with federal, state, and tribal partners to protect humans and wildlife from harmful exposures to heavy metals. Other cleanup actions have been completed in the Basin by federal agencies, states, tribes, and PRPs.

The site was divided into three OUs for cleanup:

- Operable Unit 1 designates the populated area in the Bunker Hill Box. Homes and residential yards within the box have been cleaned up to reduce the human health risk.
- Operable Unit 2 designates the nonpopulated area of the Bunker Hill Box. The Superfund ROD required actions to minimize human contact with contaminated materials, reduce hillside erosion, reduce windblown dust, reduce suspended sediment and contamination loading to surface water, minimize migration to ground water, and consolidate waste materials in repositories with engineered controls. The ROD and subsequent 5-year review required compliance with ARARs, including water quality criteria or standards and the Idaho TMDL.
- Operable Unit 3 designates the areas of mining-related contamination outside of the Bunker Hill Box. A ROD was issued in 2002 that describes how the Basin will be cleaned up over the next 30 years. The primary goal of cleanup work is to protect human health in the community, residential, and recreational areas. Actions to protect human health include education, residential soil removals, and interior cleaning and drainage controls. Commercial rights of way and recreational areas will be cleaned and private drinking water wells will be tested and a safe source of water provided when necessary. Other actions were selected to protect the environment, including removing and relocating tailings piles, capping tailings piles, stabilizing stream banks and installing a surface water treatment pond.

Coeur d'Alene River Basin, Idaho and Washington

TMDL

A TMDL for dissolved cadmium, lead, and zinc was completed in 2000 for portions of the Basin in Idaho. The TMDL designates National WQS for all except a small segment of the South Fork Coeur d'Alene River headwaters have site-specific criteria for lead and zinc. It is expected that operating facilities will be able to meet final TMDL allocations using water management controls and conventional treatment technologies. Superfund must coordinate RI/FS evaluations and RODs with TMDL goals.

Natural Resource Damage Assessment

The DOI, USDA, and the Coeur d'Alene Tribe (collectively, the Trustees) conducted a NRDA to assess injuries resulting from releases of hazardous substances from mining and mineral processing operations in the Basin in Idaho. The NRDA report summarized the data and analysis of information obtained by the Trustees during the Phase I and II injury determination studies combined with a comprehensive review and analysis of previously existing information concerning the natural resources in the Basin. Authorized Trustee representatives adopted the report and its findings in September 2000.

Basin-wide Monitoring

A Basin-wide Environmental Monitoring Program was established under the ROD for OU-3. The plan was developed collaboratively with EPA, Idaho Department of Environmental Quality, Washington Department of Ecology, Coeur d'Alene Tribe, Spokane Tribe, USFWS, USGS, and the BLM. Media-specific workgroups were established to focus on the specific monitoring needs for surface water, soil/sediment, biota, and Coeur d'Alene Lake.

The goals of monitoring were to:

- Assess the long-term status and trends of surface water, soil, sediment, and biological resource conditions in the Basin
- Evaluate the effectiveness of the selected remedy
- Evaluate progress toward cleanup benchmarks
- Provide data for 5-year reviews
- Improve understanding of Basin processes and variability to improve the effectiveness and efficiency of subsequent remedial action implementation

Environmental indicators selected for evaluation include:

- Dissolved and total metals and nutrients in surface water
- Metals and sediment in riverine, riparian, lacustrine, and palustrine environments
- Fish, macroinvertebrates, and aquatic habitat in riverine environments
- Songbirds, riparian vegetation, and invertebrates in riparian environments
- Waterfowl in wetland environments
- Waterfowl and fish in lake environments

This monitoring effort is integrated with other monitoring done in the area under other programs and will be performed by EPA and the USGS and USFWS under Interagency Agreements with EPA.

(continued)

Coeur d'Alene River Basin, Idaho and Washington

West Page Swamp Wetland Restoration Project at Bunker Hill Combining Remediation and Restoration

The West Page Swamp (WPS) is an 11-hectare wetland that was used for direct tailings deposition for the Hayes Company Mill from 1918-1929, resulting in lead (up to 30,000 mg/kg), zinc (up to 15,000 mg/kg), cadmium (up to 100 mg/kg), and arsenic contamination. The primary ecosystem risk associated with elevated lead levels in wetlands is to the migratory fowl that use these wetlands as a seasonal feeding and nesting area. As part of a closure agreement with EPA Region 10, the mining companies involved with the site excavated a 2-hectare portion of the swamp. Tailings were removed in 1997 to a depth of 0.7 m to reduce the potential for exposure of wildlife to metal contamination.

To restore the wetland, EPA's Environmental Response Team decided to test application of waste materials such as biosolids composts, wood ash and log yard debris. Biosolids composts are fertile, primarily organic materials that are similar in many respects to the organic horizon commonly found on the surface soil of a fully functional wetland. Composts have successfully been used to build wetlands. Wood ash is a high calcium carbonate residual that also provides potassium for plant growth. Log yard debris is a woody material that is a by-product of the lumber industry. It has a high carbon:nitrogen ratio and can limit release of excess nitrogen. All these materials were used to create a new surface horizon at the WPS.

Previous work in lead-contaminated soils has shown the potential of these soil amendments to reduce the bioaccessibility of lead. This reduction can be achieved by altering lead mineralogy and through a physical separation of the contaminated sediments from edible plant tissue. By adding approximately 15 cm of fertile surface to WPS, plant species should be able to rapidly reestablish, with rooting concentrated primarily in the compost surface horizon. For waterfowl, this suggests that the bulk of ingested sediment will be from the newly created soil horizon, so that the risk associated with the elevated lead concentrations in the underlying horizon will be reduced.

The goal of this project was to test the feasibility of using biosolids compost in combination with other residuals to accelerate revegetation and to limit the ecosystem impact of metals—contaminated wetlands. If successful, this remediation strategy could be used in the approximately 25,000 hectare of tailings-affected wetlands downstream of the mining area. Compost/logyard waste/wood ash mixture was applied to the wetland using a loader and a bulldozer where practical. A blower system was used to apply the mixture to inaccessible wetland locations.

CASE STUDY

(continued)

Coeur d'Alene River Basin, Idaho and Washington

Monitoring parameters included physical changes, water chemistry (suspended solids, pH, total lead, zinc, cadmium, and arsenic, and nitrogen speciation), and plant establishment.

A vegetative cover began within one year of treatment and flourished within one years. River otters once again inhabit the wetland.

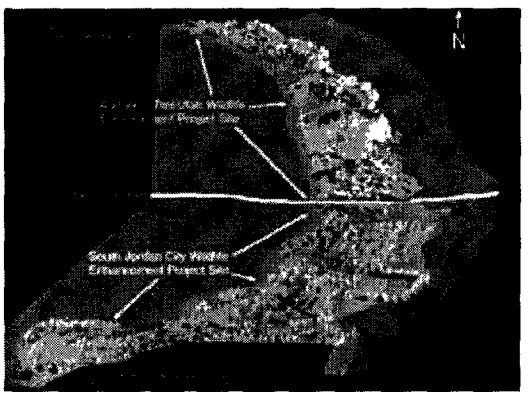
CASE STUDY

Working Together for Remediation, Habitat Restoration, and Reuse

Jordan River, Salt Lake County, Utah

The Jordan River, in Salt Lake County, Utah, is a highly urbanized and degraded river that has been dewatered, channelized and polluted. Five Superfund sites on the Jordan River have been or are in the process of being remediated. In 1991, the USFWS received a $2.3 million settlement from the responsible parties of one of the Superfund sites known as the Sharon Steel Superfund site. The funds were for restoring threatened and endangered species, migratory birds, and wetlands affected by the release of heavy metals from the site. In 1997, the USFWS embarked on three long-term projects to restore damaged natural resources and restore 274 acres of habitat on the Jordan River. Other federal, state, municipal, and nonprofit organizations including Utah Reclamation Mitigation and Conservation Commission, EPA, USACE, Utah Division of Wildlife Resources, West Jordan City, City of South Jordan, National Audubon Society, Great Salt Lake Audubon Society, Tree Utah, and Trust for Public Lands have contributed both funds and in-kind services to match the $2.3 million with $7.4 million for a total of $9.7 million. This partnership of state and federal agencies and local organizations has begun work on properties that have been acquired for the restoration project. Efforts are underway to contour highly erodible banks, remove nonnative invasive vegetation and to plant trees and shrubs that are native and provide quality habitats for migratory birds. As property values continue to rise, it becomes a race to acquire the remaining acreage with the secured funds, and the USFWS is now looking for new partners to join the effort to preserve and protect a riparian corridor on the Jordan River. These projects represent immense planning, negotiating and vision from many agencies of various jurisdictions as well as nonprofit organizations, municipalities, and private citizens that have come together to make these projects a reality.

Jordan River, Salt Lake County, Utah



Map of South Jordan City Wildlife Enhancement Project, USFWS

The Jordan River is listed as impaired on the Utah 303(d) list for dissolved oxygen and total dissolved solids. In early 2005, work began on a TMDL for the Jordan River from Utah Lake to Great Salt Lake. Utah Department of Environmental Quality (DEQ), Salt Lake County, and the towns along the Jordan River are working together to coordinate the TMDL development, CERCLA remediation, and revitalization activities along the river. At the request of the Utah DEQ, EPA and other agencies are consolidating efforts to develop the Jordan River TMDL, identify opportunities for cross-program collaboration, and coordinate the various implementation projects. The EPA TMDL coordinator will work with the group by examining ecological issues in a broader scale and reestablishing communication with the primary stakeholders regarding riparian restoration. This project is expected to be one of the most complex TMDLs that Utah will develop with a significant component for permitting, stormwater, and wetlands, which will provide opportunities for instream mitigation.

An initial scoping meeting was held with USFWS, Salt Lake County, Utah DEQ, Utah Division of Water Quality and EPA about compiling existing data, current and upcoming activities, TMDL assessment, and the benefits of coordination. The parties agreed to expand the TMDL assessment from the lower segment of the Jordan River to the entire reach. Additionally, work at the Midvale Slag NPL site where a consent decree has recently been signed and cleanup work initiated, will be modified to ensure it fits with multiagency and community objectives. EPA Superfund contractors will provide modifications of stream restoration renditions to include hydraulic and hydrologic modeling. On-site contractors will delay the bank stabilization project until after high flow, which will allow for potentially more significant restoration. Midvale has agreed to review the renditions and consider more extensive in-stream restoration that may extend beyond the existing 50-foot open space.

The following projects are ongoing along the Jordan River:

- USFWS—Natural Resource Damage Award from Sharon Steele—three projects are on hold (Audubon Society, Tree Utah, USACE Water Resources Redevelopment)
- USACE—2004 Water Resources Redevelopment Project for the Jordan River $7,000,000 redirected to Iraq, so activities are on hold, currently lobbying through legislature for restoration of funds
- TMDL development is now extended to the entire Jordan River:
  - Dissolved oxygen, phosphorus
  - Total dissolved solids
  - Fecal coliform
- Current TMDL development for Utah Lake, which contributes significant TDS loading to the Jordan River
- CERCLA—Midvale Slag NPL Site activities continue
  - Erosion control, April-June
  - Additional remediation/restoration requires more funding. Any Superfund dollars require ten percent match from state.
  - Removal of sheet pile
- 50 feet along stream bank have been donated by the owner to cities for open space

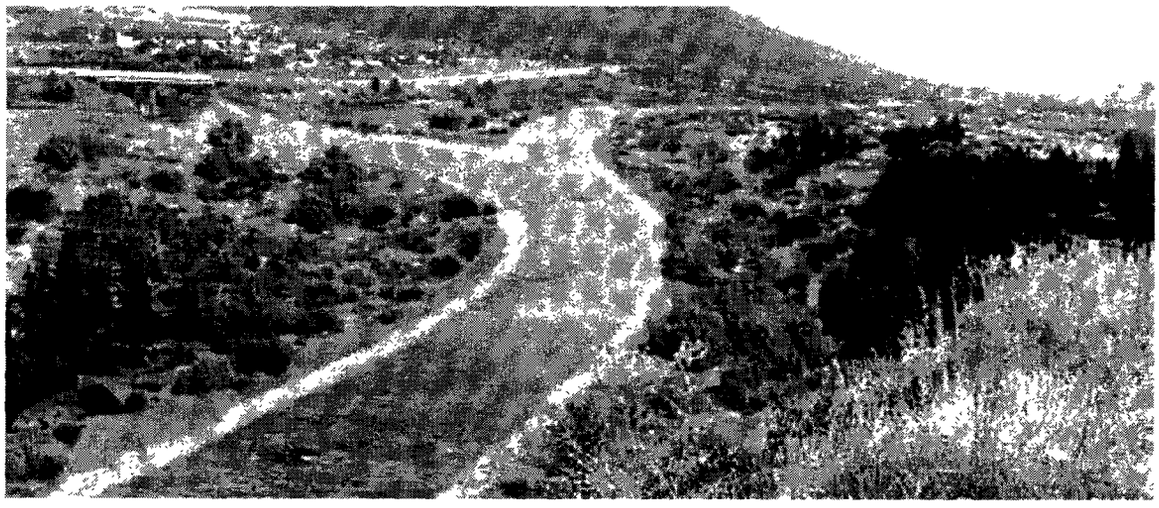
Jordan River, Salt Lake County, Utah

The following items are considered the next steps to collaborative cleanup:

- Collection of all existing data to be shared by contractors:
  - Historical data—two long-term monitoring sites (Narrows, Lower End)
  - USGS NAWQA data, 2000-2005 (Kid Wadell)
  - EMAP/REMAP data
- Superfund restoration plans will include the following:
  - Geomorphic analysis
  - Data acquisition
  - Site reconnaissance
  - Hydraulic/hydrologic analysis—model high and low flows
  - Geomorphic analysis—channel stability, sediment transport
  - Habitat analysis—structural enhancement, riparian corridor enhancement
  - Implementation plan (phasing plan/ schedule)
  - Passive re-aeration, wetlands, etc.
  - Water quality modeling—metals, sediment, perchloroethylene

- Jurisdictional Wetlands on OU-1 between slag piles are not currently on redevelopment plans; potential restoration proposed by Salt Lake County for Midvale (significant financial benefits)
  - NRCS—wetland habitat improvement project funding
  - Enjoin Midvale and Salt Lake into discussion
- Salt Lake County is providing engineering support for removal of sheet pile and potential installation of cascading dissolved oxygen structure to be funded by Superfund
- Investigate Brownfields funding opportunities (restoration/revitalization in Midvale and West Jordan)
- Investigate EJ funding opportunities
- Light Rail Crossing draft Environmental Impact Statement (EIS), possible mitigation funds
- Stormwater Part II permit Sandy City
- Limiting stakeholder participation during early phase due to historic problems with unwieldy size and municipalities refusing to participate
- Midvale and West Jordan redevelopment plans currently in development

Milltown Reservoir/Clark Fork River Superfund Site, Western Montana



The Milltown Reservoir Sediments Site (Milltown Site) is an OU within the larger Milltown Reservoir Sediments/Clark Fork River Superfund site. There are Superfund cleanup activities ongoing throughout the Clark Fork Basin. The Milltown Dam and Reservoir are at the confluence of the Clark Fork and Blackfoot Rivers, a few miles upstream of Missoula, in western Montana. Behind the dam are approximately 6.6 million cubic yards of contaminated sediments, the result of historical mining operations upstream in Butte. Arsenic in the sediments has polluted the local drinking water aquifer and release of copper in the sediments threatens downstream fish and other aquatic life. EPA issued a ROD calling for removal of the Milltown Dam and the most highly contaminated sediments. There is broad public support for this cleanup plan—98 percent of the nearly 5,000 comments received during the public comment periods supported EPA's proposed plans.

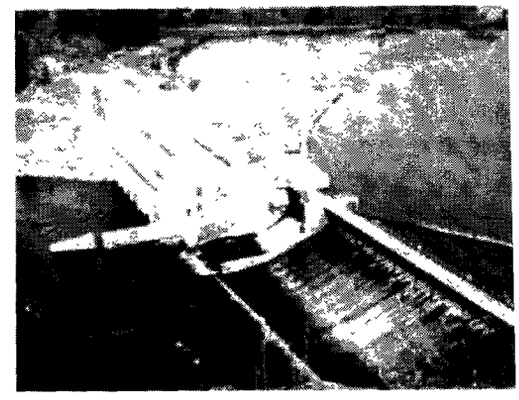
The Milltown Site is adjacent to the unincorporated communities of Milltown and Bonner. Missoula, 6 miles west of the site, is home to the University of Montana and is one of the fast-growing areas of Montana, boasting world-class whitewater, fly-fishing, and other recreational opportunities. The Milltown area communities are poorer, predominantly white, English-speaking, and lower-middle class. People in the Milltown area are proud of their community, school, and families and want to maintain their quality of life. A couple dozen community members are participating in a Redevelopment Community Action Group (funded by a Superfund Redevelopment Initiative award) and their aim is to provide EPA with a vision of what the community would like to see in terms of future site development. EPA and the natural resource Trustees are working to integrate remediation and restoration so they are compatible with desired local future land use.

Remediation and Restoration Goals

Remediation goals (Remedial Action Objectives) are:

- Restore the ground water to its beneficial use within a reasonable time period using monitored natural recovery
- Protect downstream fish and macroinvertebrate populations from releases of contaminated reservoir sediments, which occur with ice scour and high-low events
- Provide permanent protection against dam failure and the subsequent catastrophic release of contaminated sediments

Milltown Reservoir/Clark Fork River Superfund Site, Western Montana



- Provide compliance with the Endangered Species Act (bull trout fish passage) and wetland protection through consultation with USFWS, the Confederated Salish and Kootenai Tribes, and state agencies

Restoration goals are:

- Restore the confluence area of the Blackfoot and Clark Fork Rivers to be naturally functioning and self-maintaining
- Use natural, native materials, to the extent practicable, for stabilizing channels, banks, and floodplain
- Improve water quality by reducing the rate of release of contaminated sediments through bank erosion outside the area covered by the remediation plan
- Provide high-quality fish and wildlife habitat
- Improve aesthetic values in the area by creating a diverse, natural setting
- Provide recreational opportunities such as river boating, fishing, and trail access for hiking and biking in addition to the remedial and restoration goals set as part of the Superfund process. The community-based redevelopment group has the following goals, believing the cleanup efforts should:
  - Contribute to redevelopment of a desirable community where people of all ages and income levels can and want to live
  - Build on current community character and strengthen roots and sense of community pride
  - Protect a riparian buffer area and community open spaces that enhance community appeal
  - Be compatible with and promote a stable, mixed economy with opportunities for commercial, industrial, retail, and service interests
  - Foster diverse, free public, river access and recreational opportunities compatible with the natural environment of the area
  - Promote infrastructure necessary for community development, maintenance and growth
  - Maintain and enhance the quality of the existing school district
  - Provide educational opportunities and facilities that allow people of all ages to learn about the history of the area and redevelopment efforts

Streamlined Remediation and Restoration

EPA, the State of Montana, the Trustees, and the responsible parties (Atlantic Richfield Company/BP and NorthWestern Energy) have worked together, negotiating how the remediation and restoration would be integrated. The idea is that if the remedial program is going to move dirt, it should be put back in a way that literally lays the groundwork for planned restoration activities. Restoration and remediation have been streamlined in many ways, including:

- Modifying the remedial design process to accommodate restoration elements (e.g., wetlands, natural channel, floodplain, and vegetation designs)

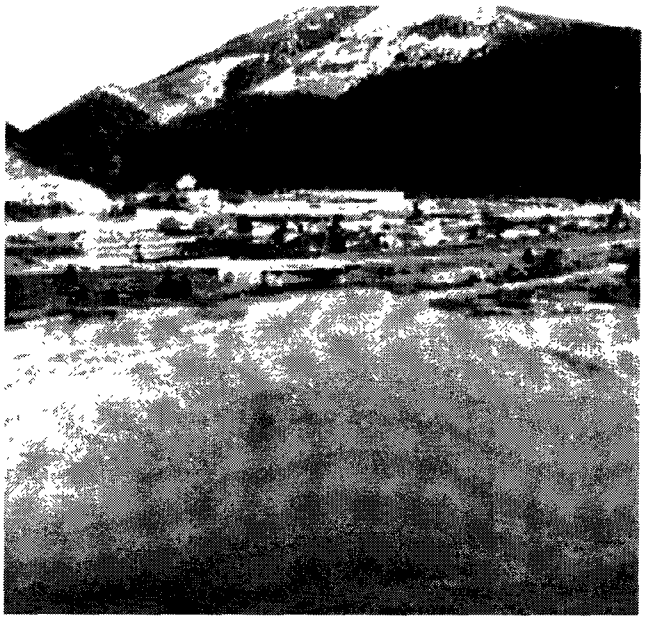
Milltown Reservoir/Clark Fork River Superfund Site, Western Montana

- Integrating restoration construction activities into the remedial process (e.g., removal of the powerhouse, radial gate and right abutment associated with the Milltown Dam; channel, floodplain, and wetland construction)

Remedial and Restoration Funding

The Superfund remediation costs, estimated by EPA to be approximately $106 million, are being borne by the responsible parties. The details of the cleanup costs and activities will be finalized in the Consent Decree among the various parties (DOJ, EPA, the State of Montana, Confederated Salish and Kootenai Tribes, and USFWS).

Restoration funds are being provided by NorthWestern Energy ($23.9 million in cash and land donations) and the State of Montana's Natural Resource Damages program. The courts approved the State of Montana's Natural Resource Damages claim against Atlantic Richfield Company in 1999 for $135 million. The settlement provides funds to be used for restoration of natural resources in the Clark Fork River Basin (not only for the Milltown Reservoir area). Accordingly, about $5 million will be spent by the state from this fund.



The State of Montana and the other Trustees will collectively contribute approximately $8 million for restoration of the Milltown Reservoir area. There has been substantial cost-savings by integrating remediation and restoration. Through close coordination and careful planning, around $2.5 million in remediation costs will have been saved. The responsible parties have agreed to perform about this same amount for restoration activities. In addition, by keeping in mind the community's vision for the area, remediation and restoration activities were coordinated to allow for planned community uses such as wildlife observation points, additional fishing and boating access points, a swimming beach, skating pond, and interpretive center.

There are five appendices in this document:

Appendix A: Lefthand Watershed Collaborative Sampling Documents

Appendix B: Standard Guidance to Format Sample Results, Field Measurements, and Associated Metadata

Appendix C: Lefthand Watershed Fact Sheet

Appendix D: Coeur d'Alene Basin-Wide Monitoring Plan

Appendix E: USFS/EPA Memorandum of Understanding

Due to their size they are only available online and can be accessed at
http://intranet.epa.gov/osrti/ard/spb/wwintegration/index.htm