

Chapter 4

Setting Goals and Measuring Success

4.1 *Introduction*

This chapter outlines considerations in setting goals for mine site cleanup and in assessing the success of mine site cleanup initiatives. It covers the coordination between federal and state agencies in determining the goals that need to be met and resolving conflicts between different goals in different agencies. The chapter further discusses how a site manager can “measure” the success of meeting the goals that were set for the site.

4.2 *National and Regional Goals.*

Mining activities have been an integral part of the economy and culture of our nation since the mid-1800's. Mining and mineral beneficiation operations continue today at numerous locations, largely under the auspices and environmental control of State regulatory agencies and the purview of federal land managing agencies (EPA National Hardrock Mining Framework, 1997). The largest mining-associated environmental response task faced by governmental agencies today involves the tens of thousands of abandoned mine sites which stem from the intense mining and industrial development activities that occurred largely between the 1860's and post-World War II. Since the early 1970's a broad mix of EPA, state and federal natural resource and land managing agencies have been involved in addressing threats to human health and the environment at a variety of sites where hardrock mining, milling and smelting activities have occurred.

Under the auspices of the Superfund program, states and EPA began to address a number of the largest and most environmentally serious sites (e.g., Bunker Hill, ID; Butte-Silver Bow Creek, MT; California Gulch-Leadville, CO; Iron Mountain, CA). Many of these sites were slated for cleanup because the presence of toxic levels of heavy-metal residues generated by mining and industrial operations were a health threat, not only to significant population centers, but were also severely impacting the surrounding watersheds and drainages where cold-water fishery resources are highly valued aspects of recreation and tourism.

In addition to the NPL-site activities over the past one and a half decades, site assessment and inventorying efforts by states, federal land managing agencies and the EPA continue to identify abandoned mine sites and features consisting of smaller smelter and milling operations, draining mine adits, impounded and alluvial tailings, waste rock piles, and related contaminated stream reaches. Comprehensive information has not yet been compiled to completely ascertain the nature and extent of the environmental problems posed by abandoned mine sites, but information is being assembled and reviewed by involved agencies and impact indicators are emerging. Historical databases such as the Minerals Availability System and Mining Industry Locator System compiled by the former U.S. Bureau of Mines, now maintained by the U.S. Geological Survey, as well as water quality assessment reports conducted by states under the Clean Water Act indicate the presence of more than 200,000 abandoned mine sites located within hundreds of watersheds affecting hundreds of miles of streams and fisheries throughout the western U.S. While comprehensive qualitative and quantitative abandoned mine sites site data and impact information is not yet available, experienced professionals estimate, based on inventory efforts, remediation studies, cleanup activities and experience to date, that less than ten percent (10%) of the sites that were actively mined are expected to cause significant adverse impacts to riparian zones and aquatic habitats of receiving streams. Determining which sites are the significant sources of metal-leachates and understanding the range of

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impacts, as well as judging the relative priority, need and basis for response activity, will be an important aspect of goal-setting for abandoned mine site work at state and local levels.

Under a variety of land management and environmental protection statutes at the federal level, the U.S. Department of the Interior (through the Bureau of Land Management, the Bureau of Indian Affairs, the Fish and Wildlife Service, and the Geological Survey), the U.S. Department of Agriculture (through the Forest Service, and the Natural Resource Conservation Service), the Environmental Protection Agency, and the U.S. Army Corps of Engineers have significant responsibilities in coordinating and implementing the activities necessary to accomplish environmental response to the abandoned mine site problem across the country. States also play a major role in managing releases from abandoned mine sites through implementation of federally delegated programs or specific state authorities. The programs and budgets these federal agencies bring to bear on the abandoned mine site activities will largely occur through the regional, state and local offices and staffs of the agencies. This will enable and assure that as environmental response planning and remediation projects occur, they are done in close collaboration with state and local governments, and meet the goals and needs of the states and local areas.

4.3 State and Local Goals

While the Environmental Protection Agency, the Department of Interior, and the Department of Agriculture work to coordinate their respective efforts, dialogue with state natural resource agencies and local governments needs to be constantly focused on projects which provide the earliest and most tangible environmental benefits to ecosystems and communities. Under the auspices of EPA's National Hardrock Mining Framework policies, EPA regional offices will be participating in discussions between federal, state and local governments to understand the needs, priorities and objectives of abandoned mine sites activities within states and at particular localities and watersheds. These discussions will focus attention on short-term and long-term needs for addressing human-health and ecosystem issues, including adverse impacts to:

- Homesite and municipal water supplies,
- Aquatic resources and improvements,
- Recreational uses and improvements,
- Agricultural water users,
- Industrial water users,
- Residences,
- Workers, and
- Wildlife.

4.3.1 Human Health Impacts

Completion of the current NPL-listed sites will have addressed the most serious human health threats at population centers. However, rising populations and urbanization (both residential and commercial) underway throughout the western U.S. brings new concerns about mine waste exposures to new residents, workers, and recreational users as land redevelopment occurs. States and local governments are becoming increasingly concerned about human health impacts derived from locally-impacted headwater aquifers which are being utilized as well-water sources for mountain homesites, metal-contaminated surface waters which serve as municipal water supplies for larger population centers, new development of commercial/industrial sites, as well as the increased frequency of direct exposures to metal-laden mining residues as people use these sites and watersheds during recreational activities.

4.3.2 Environmental Impacts

As mentioned above, much of the concern with abandoned mine sites impacts are related to recreation and fishery resources and downstream agricultural activities. Abandoned mine sites studies and response actions can occur in the context of drainage basins and watersheds, beginning in the uppermost and often alpine headwaters, extending through lower reaches of valley floodplains, and continuing down into mainstem river drainages where agricultural lands and municipal-industrial users occur. Water quality standards which have been developed by states are the initial targets for meeting clean water objectives; however, in some cases protecting human health and meeting environmental improvement goals can mean going beyond established standards. The process of making these decisions requires considerable input and can result in a very dynamic and sometimes contentious debate and dialogue between a variety of resource users and stakeholders. The values and choices of each of these stakeholders is a very important and necessary part of the goal-setting and decision-making process as determinations regarding the merits, cost-effectiveness and implementing of studies and remediation are made.

4.3.3 Getting it Done

An excellent publication is available to support goal-setting efforts, entitled "Watershed Partnerships: A Strategic Guide for Local Conservation Efforts in the West," prepared for the Western Governors Association, 1997. The report states:

Watersheds serve as a useful unit of focus for a number of reasons. They can be aggregated to include large streams and even major rivers or separated into small, local areas. A watershed is a natural integrator of issues, values, and concerns which are clear to see as the stream flows along its course. It exhibits clear evidence of consequences.

Watersheds are a good starting point for people to understand the relationship of people and natural resources in a management system. The current institutional boundaries are generally mismatched to the hydrologic, ecologic, geographic, and economic scope of natural resource problems and the affected communities and interests. Watershed partnerships can help match societal interests to the resource base. Over time, watersheds enhance participants' shared knowledge to increase the collective competence for anticipated and responding to changes in resource goals... By working together, everyone with an interest in the watershed can solve problems, ensuring healthy land and water. Typically, partners represent wide interests: local communities, various groups, and government agencies.

The report was developed to serve existing as well as new and emerging partnerships. The report includes "collective wisdom from those who have pioneered watershed partnership concepts" and addresses areas of interest in the following sections:

- Foundations for Getting Started,
- How to organize
- What to Think About -- Sooner or Later
- External Factors

4.3.4 Values and Choices

Indirectly, processes for decision-making about what abandoned mine site work to address already have been underway for some time. Under the Clean Water Act (CWA), state water quality regulatory programs have established stream classifications and use attainability designations for most waterways. Accompanying these stream use and classifications are water quality standards that establish the goals and requirements for contaminant concentrations. The CWA also requires the development of Total Maximum Daily Load (TMDL) calculations to meet water quality standards where ongoing impairments are occurring. Similar regulatory procedures and standards exist for air, soil, and groundwater contamination. At NPL sites where CERCLA responses are occurring, not only do projects strive to meet the above regulatory standards (referred to as Applicable or Relevant and Appropriate Requirements, or ARARs), but also site-specific data is used in risk assessments to formulate risk estimates. Subsequent cleanup and remediation decisions are based on selected levels of human health and environmental risk reduction. Whether associated with CERCLA actions or other regulatory and non-regulatory activities occurring in watersheds, agencies and programs undertake a process of reassessing and modifying existing environmental standards.

Modifications to the above “regulatory processes” take considerable effort and are time-consuming. While these regulatory processes will need to be engaged to varying degrees, these are probably not the most efficient or productive forums through which Federal and State agencies and local governments should work to make the strategic environmental response priorities and decisions for the universe of abandoned mine sites at watershed and drainage-basin levels.

As mentioned earlier, collaborative watershed partnerships are more likely to be an effective sounding board for determining the values and choices which will focus abandoned mine site efforts. Closely related to the WGA watershed partnership strategy mentioned earlier, EPA strives to accomplish its efforts through a “Data Quality Objectives Process.” The data quality objectives (DQO) process is a systematic planning effort for ensuring that environmental data will be adequate for their intended use. This process is key to abandoned mine site work in order to integrate the desired goals and objectives with information appropriate for the necessary decisions, and lastly the ability to measure success towards established goals. These discussions and activities will provide an adequate foundation for planning and making defensible abandoned mine site project decisions, and will also provide a basis for measuring success.

4.4 Measuring Success

Much has been said above about establishing national, regional, state, tribal and local goals. The planning and communication described above establish a basis for determining degrees of progress towards the stated goals and a means to identify techniques that will be used to know when the objectives have been met. These results and value-added measurements can include a variety of discrete indicators, including:

- Number of sites or acres that have been addressed,
- How many sources or volume of contaminated media have been remediated,
- Water quality measurements,
- Biological or aquatic toxicological indicators, and
- Budget or schedule compliance.

4.5 Sources of Additional Information

For additional information on setting goals and measuring success at mining and mineral processing sites, see the following documents:

- USEPA, OSW. 9-97. EPA's National Hardrock Mining Framework. EPA 833-B-97-003
- Western Governors' Association. 2-97. Watershed Partnerships: a Strategic Guide for Local Conservation Efforts in the West
- Western Governors' Association. 1998. Abandoned Mine Cleanup in the West: A Partnership Report (1998)

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