

ITRC – IMPROVING REGULATORY ACCEPTANCE FOR NEW APPROACHES TO MINE WASTE ISSUES¹

Paul Eger² Cherri Baysinger, and Steve Hill

Abstract: Mining practices and the lack of mine land reclamation and restoration have led to sites with significant environmental and human health issues. Historical and current practices have led to operating sites with mine waste issues that must be addressed when operations cease. Typical remedial solutions are often lengthy and expensive, and are unacceptable to the mining community, the regulatory community and to the public. Some mined sites contain enough residual mineralization that further development, re-mining and subsequent reclamation may be economically feasible. Some current operations may even have the infrastructure in place to co-manage the cleanup of legacy waste while in operation. However, current regulations often provide barriers to these approaches. Innovative approaches and technologies need to be developed and implemented at current and former mining projects that solve our environmental issues and remove existing regulatory barriers. To help achieve this goal, the Interstate Technology and Regulatory Council (ITRC) started a team to address mine waste issues in 2007.

The ITRC is a state-led, national coalition helping regulatory agencies, site owners, and technology developers and vendors achieve better environmental protection through the use of innovative technologies. Through open communication among the 50 member states, federal, industrial, and stakeholder partners, ITRC is streamlining and standardizing the regulatory approval process for better, more cost-effective, environmental technologies. ITRC receives funding from the Departments of Defense and Energy, as well as the US Environmental Protection Agency.

ITRC conducts its work by establishing teams to address the major environmental problems facing the states. ITRC teams contain at least 5 state members as well as representatives from federal agencies, industry (owners and operators), community stakeholders, academia, and American Indians. The mine waste team has written a white paper and is currently collecting case studies focused on the treatment of mining influenced water and solid waste.

The team will evaluate technologies and produce a technical and regulatory guidance document and a related free internet training on the document. To avoid duplication, the ITRC is establishing a memorandum of understanding with the Acid Drainage Technology Initiative (ADTI) to cooperate and coordinate activities.

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² Paul Eger is a Principal Engineer, Minnesota Dept. of Natural Resources, St. Paul, MN 55155. Cherri Baysinger is Chief, Bureau of Epidemiology, Missouri Dept. of Health and Senior Services, Jefferson City, MO 65102. Steve Hill, President of RegTech, Nampa, ID 83686.

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Introduction

Mining is essential to the economy of the United States. However, historical mining practices and the absence of routine mineland reclamation, remediation, and restoration have led to legacy sites with significant environmental and human health impacts. Typical remedial solutions are often lengthy and expensive, and are unacceptable to the regulated and regulatory community, and to the public. Gaining acceptance of new and more cost effective remedial methods is often difficult and requires lengthy review.

Although standard approaches exist to solve many mine influenced water and mine solid waste problems, the high cost and long-term maintenance are often prohibitive. At Superfund sites, EPA provides 90% of the funding for remedial activities. The states must provide 10% of the cleanup costs and 100% of the funding for operations and maintenance after the remedy is completed. These cost and resources issues for long term O&M are major concerns for the states, particularly since legacy sites can contain multiple sites and range up to hundreds of square miles. In 1993, the Mineral Policy Center estimated it would take from \$33-\$72 billion to address mine waste issues in the 32 western states (Lyons and others, 1993). Problems related to mine influenced water can last for tens to hundreds of years, with long-term costs in the millions of dollars.

Innovative approaches are needed to solve environmental problems related to mining, but how can they be thoroughly evaluated in a reasonable time? For example, if you are a regulator, how do you tell if a new technology is legitimate or just “snake oil”? Will it really perform as described and will it meet regulatory standards? If you are a technology vendor or a site owner; how can you get regulatory acceptance of your new approach within a reasonable amount of time? Innovative technologies are generally not well understood and considerable effort is required to gain acceptance.

Standard water treatment processes exist to deal with most contaminants. For example, the conventional method to treat acid mine drainage is to collect the water and neutralize it with lime. While effective, this approach requires a large initial capital investment and incurs substantial annual operation and maintenance costs. For groundwater pollution the standard approach has been “pump and treat”. Contaminated water is pumped from the aquifer, treated and discharged. Surface and groundwater in many historic mining areas remain contaminated. Serious environmental problems also exist at many Department of Energy (DOE) and Department of Defense (DOD)

installations. Estimated cleanup costs using available technology at these sites are in the billions of dollars (GAO, 1985).

Once an innovative approach is developed to treat a specific problem, it can often be applied at many sites. In the past, new technologies were not readily transferred since each state had specific regulatory requirements and varying interpretations of common statutes. Each application would often have to replicate testing previously conducted because the state was not familiar with the new technology. The ITRC teams bring multiple state, federal agencies, site owners, consultants (practitioners) and community stakeholders together to evaluate the performance and application of new technologies and then prepare a guidance document specific to the technologies and application, with the goal of increasing acceptance and shortening review.

Background

ITRC has increased state membership from the original ten states in 1995, to currently every state in the nation. Each member state designates a Point of Contact (POC). These POCs help distribute information about ITRC and its reports and programs to various staff within the state's environmental agencies. Each state reviews final guidance documents in an effort to concur with its content and accept it as their own guidance. The POCs also prioritize technical areas relating to projects each year. Projects are managed and completed by technical teams with the proper blend of perspectives from the various ITRC partners. The technical teams are always led by state regulatory personnel and must include at least five separate states as team members.

There are currently 16 technical teams (www.itrcweb.org). Anyone with an interest in a specific team can join by agreeing to commit 10% of their time to the team. The teams rely on broad-based participation from federal agencies, industry, academic, and other stakeholders to develop guidance documents and internet based training courses. If there is interest and need, teams may develop a 1-2 day classroom training. This type of training has recently been developed for Vapor Intrusion. EPA adopted the guidance document and supported the development of classroom training.

ITRC has published about 80 documents in 30 topic areas, including 36 technical/ regulatory guidance documents on 18 topics. Free internet training has been conducted on each guidance document and since 1999; ITRC has trained over 35,000 people. Through guidance documents development and training, ITRC has been able to facilitate the acceptance of new approaches, reduce permitting time and reduce the overall cost of remediation projects.

In 2007, a team was formed to address issues related to mine waste problems. The goal is to research and gather information on emerging and innovative technologies to address the large volume and types of wastes and other releases, including the physical hazards, and off-site environmental and ecological impacts, associated with mining and process operations. Team members include states from all over the country, universities, industry, federal agencies and public stakeholders (Table 1).

The Mine Waste team began work on a white paper in 2006 with States providing an overview of their issues. Although some of these problems were present at active sites, most of the major problems occurred at abandoned sites. These issues have been collected in the White Paper appendices (http://www.itrcweb.org/teamresources_56.asp).

Two general problem areas emerged:

- a. Mine Influenced Waters (MIWs) – These are difficult to treat cost effectively to levels protective of human health and the environment. Generally treatment is required for decades.
- b. Solid Mining Waste – This involves enormous volumes of material. The volume of material alone makes some of the techniques for minimizing the risk unreasonably costly. However, the exposure posed by direct and indirect ingestion to some of this waste is a major health and ecological concern.

Table 1. Mine Waste Membership

States	Universities	Federal Agencies	Industry ¹	Others ²
Alaska	Colorado School of Mines	US Army Corp of Engineers	Arcadis	Center for Promotion of Sustainable Technologies
California	University of Georgia	USEPA Washington Region 8, Region 3 Office of Research and Development, Cincinnati	Doe Run	Desert Research Institute
Maine	Penn State	US Fish and Wildlife Service	ERM	Initiative to Clean up Chattanooga
Minnesota	Texas Engineering Experiment Station	Sandia National Laboratories	Freeport-McMoRan	Marquette County, Michigan
Missouri			JRW Bioremediation	Mountain Area Land Trust
New Jersey			Kennecott - Ridgeway	
Oklahoma			Kleinfelder	
Oregon			North Wind	
Pennsylvania			Shaw Environmental	
South Carolina			TRC Solutions	
Utah			TriHydro	
Vermont			Western Research Institute	

¹Mining Companies, Consultants, Vendors

²Stakeholders, Local Government, Non-governmental organizations.

Note: Some stakeholders are private citizens and are not affiliated with a specific organization.

Results

The white paper concluded that the ITRC Mine Waste team should:

- Identify and evaluate, emerging and innovative technologies that can cost effectively and successfully be used to treat mine influenced water and to characterize, remove, treat, reuse or stabilize mining, milling, processing, and smelting wastes.
- Identify state or federal regulatory obstacles to deployment of conventional or innovative environmental technologies at mine influenced properties.
- Identify approaches and/or solutions to overcome regulatory barriers.
- Identify innovative environmental solutions to solve legacy mine waste issues.

The white paper contained an initial table with general description of some technologies that warranted further study. These include, but are not limited to:

Solid Waste

- Reuse/remining
- Backfilling
- Alternate covers
 - Evaporative
 - Water
- In situ Chemical Stabilization
 - Phosphate
 - Biosolids
- Passivation of sulfide minerals

Mining Influenced Waters

- Source treatment
 - *In situ* treatment
- Permeable reactive barriers
- Chemical treatment
 - Pulsed limestone bed
 - Rotating cylinder
 - Aqua Fix
 - Anoxic Limestone Drains
- Biochemical reactors
 - Constructed Treatment Wetlands
 - Sulfate Reducing Bioreactors
 - Sequential Alkalinity Producing Systems (SAPS)
- Constructed Microbial Mats

The ITRC Mine Waste Team will collect case studies and search the literature to provide examples and evaluate technologies for treating, stabilizing, reclaiming and re-using solid mine waste and mine influenced water and evaluate their performance. For technologies that may contribute solutions to the problems, the team will develop a guidance document that will assist the user to properly evaluate and apply each technology. The ITRC Mine Waste team will also identify regulatory barriers or impediments and recommend specific flexibility when there is a net environmental benefit.

In order to avoid duplication and compliment existing efforts, the ITRC is developing a Memorandum of Understanding with the Acid Drainage Technology Initiative (ADTI). ADTI has already collected important technology information that will be needed for the ITRC project. The ITRC Mine Waste Team is also pursuing a partnership with the Society of Mining Engineers (SME) to provide the state perspective to their draft Environmental Management System. It is clear that improved environmental management at active mining operations can prevent legacy issues from continuing to develop.

The mining team currently has 56 team members for 2008. By mid-year the team will evaluate the suite of case studies and prioritize their efforts on an achievable issue, (e.g., mining solid waste or mining influence water). The detailed process of evaluation and development of the guidance would then begin. The first guidance is scheduled for release in 2009.

For more information about ITRC please go to www.itrcweb.org. To join the ITRC mining team Click on the 2008 Membership Registration Form on the ITRC home page.

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