ITRC - What Does It Mean For Me?[1]

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Abstract. The Interstate Technological Regulatory Council (ITRC) was formed in 1995. The primary objective of the group was to provide assistance to state regulatory personnel so they could better understand innovative technologies and permit them more quickly, thereby providing less expensive alternatives to standard treatment techniques. Assistance is provided in the form of technical documents and classroom and internet training.

Since 1995, ITRC has grown from 10 to 40 actively participating states. With major funding from the Departments of Defense and Energy (DOD, DOE), much of the initial work focused on problems associated with site remediation at military bases and energy producing facilities. Technical and regulatory documents have been produced and hundreds of state regulators have been trained in topics ranging from natural attenuation of contaminants to the use of permeable reactive barriers to treat mine drainage. The time required to permit innovative approaches has been reduced by 20 - 50%, and DOE alone has saved millions of dollars in treatment costs.

Membership in ITRC is open to all who are willing to commit a minimum of 10% of their time to work on a particular problem area. Each year the ITRC selects topics to be addressed, and teams are formed to develop guidance documents.

A constructed wetland team began work in the fall of 2001 and plans to have a guidance document done by the fall of 2002. Potential future topic areas of particular interest to the mining community include mine waste and TMDLs.

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Introduction

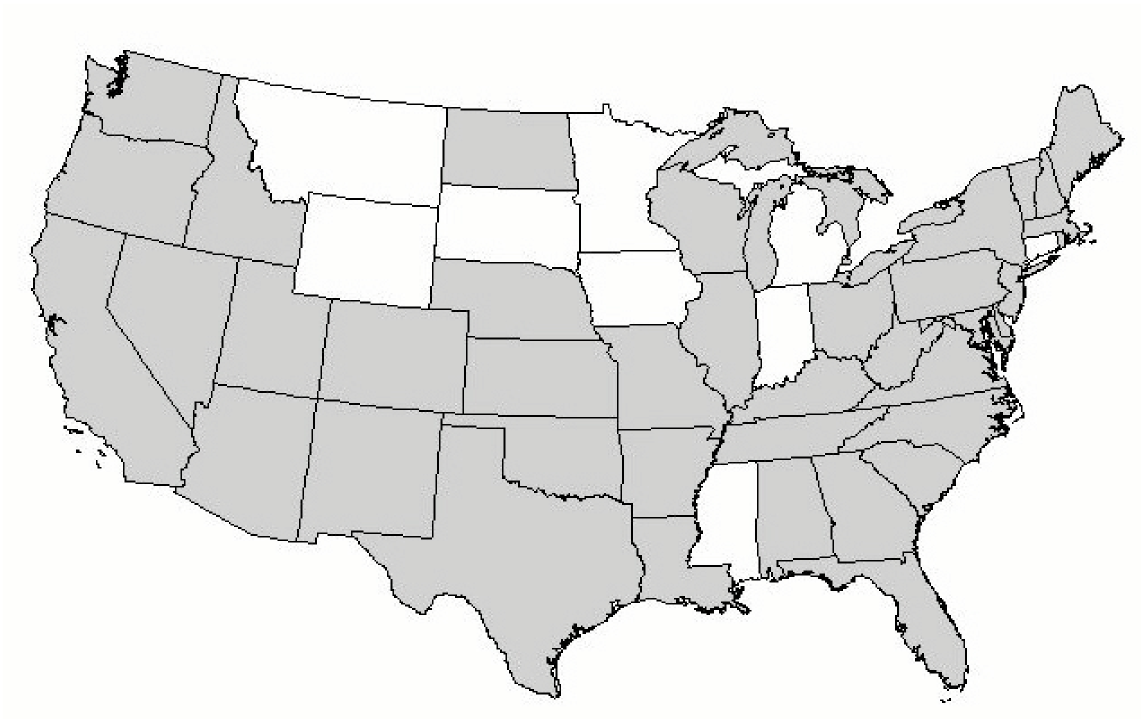
Innovative approaches are needed to solve environmental problems. If you are a regulator, how do you tell if a new technology is legitimate or just "snake oil?" If you are a developer, how can you get regulatory acceptance of your new approach within a reasonable amount of time? Innovative technologies 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 are 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.

It was clear that innovative, cost effective approaches were needed to tackle these large problems. Just as acid mine drainage is a common problem in mining areas throughout the world, problems at military bases and at energy related facilities are also similar throughout the country. Once an innovative approach was developed to treat a specific problem, it could be applied at many sites. But how could this technology be transferred easily when each state had their own regulatory program. Was there some way to avoid the tedious task of convincing different regulators every time the technology was to be applied? Was there a better forum in which to discuss innovative approaches than in an adversarial environment? The desire to find positive answers to these questions led to the formation of the ITRC in 1995.

Approach

The ITRC originally began with ten states, but by the fall of 2001 membership had increased to forty states (Figure 1). The ITRC is devoted to reducing barriers and speeding interstate deployment of better, more cost-effective, innovative environmental technologies. Although the ITRC is a state-led organization, it also includes personnel from the District of Columbia; three



Note: Alaska (off map) is also not an active member of the ITRC.

Figure 1. Shaded states are active members of the ITRC.

federal agencies; and tribal, public, and industry stakeholders. The ITRC is funded primarily by the DOE and the DOD, with additional funding from the U.S. Environmental Protection Agency. It receives regional support from the Western Governors Association and the Southern State Energy Board. In January 1999, it became affiliated with the Environmental Research Institute of the States, which is a non-profit educational subsidiary of the Environmental Council of the States.

Each member state designates a Point of Contact (POC). These individuals help distribute information about ITRC and its reports and programs to various staff within the state's environmental agencies. They also decide what project areas should be initiated in the upcoming year. Project areas are handled by technical teams, which are led by state regulatory personnel and include regulatory personnel from at least five different states.

There are currently 14 technical teams. The teams rely on broad-based participation from federal agencies, industry, academic, and other stakeholders to develop guidance documents and training courses. Anyone with an interest in a specific team can join by agreeing to commit 10% of their time to the team.

This paper will discuss the importance of ITRC to the mining community and present results from some of the ITRC projects.

Results

Since most of the funding for the ITRC was from DOE and DOD, many of the initial areas were related to the types of problems encountered by these agencies.

The number of teams has grown from a handful in 1995 to 14. These teams have produced guidance documents and supporting documentation for 16 subject areas, and developed seven training courses in both classroom and internet format (Tables 1, 2). To date, ITRC has trained over 10,000 people.

By developing guidance documents and training for innovative technologies, ITRC has been able to facilitate the acceptance of new approaches, reduce permitting time and reduce the overall cost of remediation projects. One specific example, which has application to mining, is the use of a permeable reactive barrier (PRB).

Permeable Reactive Barrier (PRB)

One of the original project teams was established to address the use of a PRB to treat contaminated groundwater. A treatment media is placed in the flow path of the contaminant and the groundwater is treated *in situ* instead of being pumped and treated on the surface (Figure 2). The first barriers were constructed to treat chlorinated solvents using zero valent iron. The general reactions can be represented by:

$$Fe^0 \rightarrow Fe^{2+} + 2e^-$$

$$\underline{RC1 + 2e^- + H^+ \rightarrow RH + Cl^-}$$

$$Fe^0 + RC1 + H^+ \rightarrow Fe^{2+} + RH + Cl^-$$

Table 1. ITRC training courses.

ITRC Training Course	Status
Permeable Reactive Barriers for Chlorinated Solvents	Currently offered
Advanced Permeable Reactive Barriers for Chlorinated Solvents	Currently offered
Phytotechnologies	Currently offered
Natural Attenuation	Currently offered
Diffusion Samples	Currently offered
Enhanced In Situ Bioremediation of Chlorinated Solvents	Currently offered
In Situ Chemical Oxidation	Currently offered
Historical Case Analyses of Chlorinated Volatile Organic Compounds	Currently offered
Constructed Treatment Wetlands	Planned for Fall 2002
Small Arms Firing Range - Characterization and Remediation	Planned for Fall 2002
Systematic Approach to In Situ Bioremediation	Planned for Fall 2002

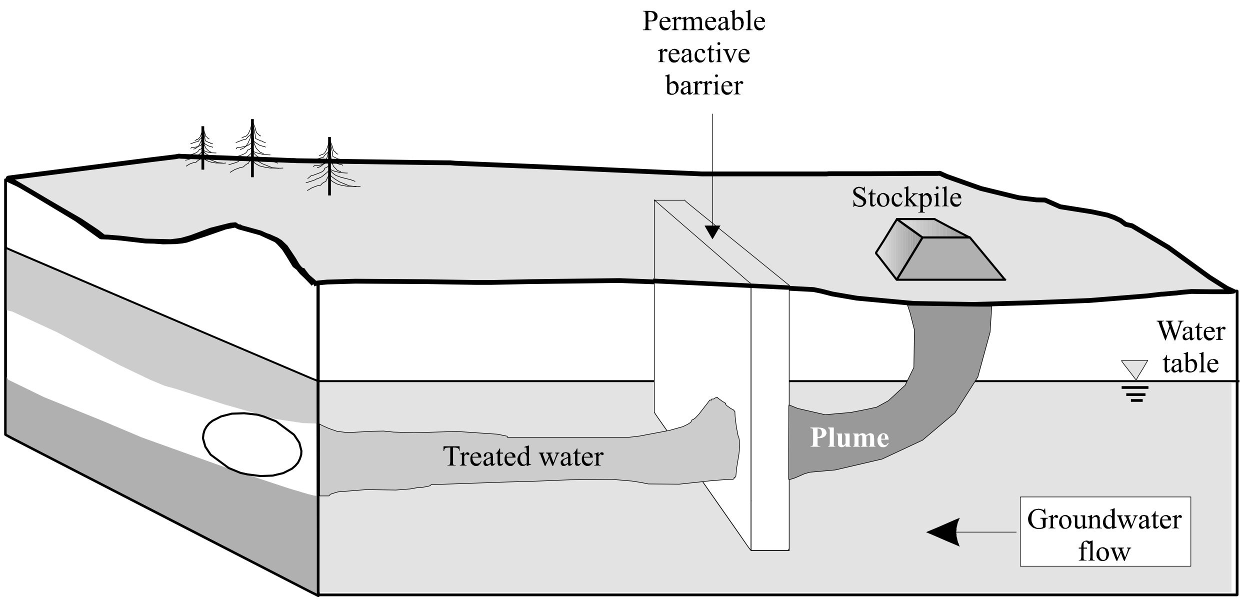


Figure 2. Permeable reactive barrier (schematic).

Table 2. ITRC technical documents, page 1 of 2.

Accelerated Site Characterization: · ITRC/ASTM Partnership for Accelerated Site Characterization Summary Report (Dec 1997) · ITRC/USEPA Consortium for Site Characterization Technology Partnership - FY97 Summary Report · Multi-Sate Evaluation of an Expedited Site Characterization Technology: Site Characterization and Analysis Penetrometer System - Laser-induced Fluorescence · Multi-State Evaluation of the Site Characterization and Analysis Penetrometer System - Volatile Organic Compounds (SCAPS-VOC) Sensing Techniques
In Situ Bioremediation: · Case Studies of Regulatory Acceptance of ISB Technologies (Feb 1996) · ISP Protocol Binder and Resource Document for Hydrocarbons (re-released Sept 1998) · Natural Attenuation of Chlorinated Solvents in Groundwater: Principles and Practices (reprinted Sept 1999) · ITRC/ISB Closure Criteria Focus Group Report (March 1998) · Cost and Performance Reporting for In Situ Bioremediation Technologies (Dec 1997) · Technical and Regulatory Requirements for Enhanced In Situ Bioremediation of Chlorinated Solvents in Groundwater (Dec 1998) · Five-Course Evaluation Summary for the ITRC/RTDF Training Course: Natural Attenuation of Chlorinated Solvents in Groundwater (Sept 1999)
Phytotechnologies · Phytoremediation Decision Tree (Dec 1999) · Online Decision Tree · Phytotechnology Technical and Regulatroy Guidance Document (April 2001)
Technology Acceptance and Reciprocity Partnership (TARP): · Tier 1 Guidance (Dec 2000) · Strategy for Reciprocal State Acceptance of Environmental Technologies (Dec 2000)
Dense Non-Aqueous Phase Liquids (DNAPLs): Review of Emerging Characterization and Remediation Technologies
Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater (June 2001)
A Regulatory Review of Plasma Technologies (June 1996)
Thermal Desorption: · Technical Requirements for On-Site Low Temperature Thermal Desorption of Non-Hazardous Soils Contaminated with Petroleum/Coal/Tar/Gas Plant Wastes (Dec 1997) · Technical Requirements for On-Site Low Temperature Thermal Desorption of Solid Media Contaminated with Hazardous Chlorinated Organics (Sept 1997) · Technical Requirements for On-Site Low Temperature Thermal Desorption of Solid Media and Low Level Mixed Waste Contaminated with Mercury and/or Hazardous Chlorinated Organics (Sept 1998)
User’s Guide for Polyethylene-based Passive Diffusion Bag Samplers to Obtain VOC Concentrations in Wells (March 2001)

Table 2. ITRC technical documents, page 2 of 2.

<u>Metals in Soils:</u> · Technical and Regulatory Guidelines for Soil Washing (Dec 1997) · Fixed Facilities for Soil Washing: A Regulatory Analysis (Dec 1997) · In Situ Stabilization/In Place Inactivation (Dec 1997) · Electrokinetics (Dec 1997) · Phytoremediation (Dec 1997) · Metals in Soils 1998 Technology Status Report: Soil Washing and the Emerging Technologies of Phytoremediation, Electrokinetics, and In Situ Stabilization/In Place Inactivation (Dec 1998)
Policy: · An Analysis of Performance-Based Systems for Encouraging Innovative Environmental Technologies (Dec 1997) · Case Studies of Selected States' Voluntary Cleanup / Brownfields Programs (Sept 1997)
Breaking Barriers to the Use of Innovative Technologies: State Regulatory Role in Unexploded Ordnance Detection and Characterization Technology Selection (Dec 2000)
Enhanced Technologies for Enhanced In Situ Biodenitrification (EISBD) of Nitrate-Contaminated Ground Water (June 2000)
<u>Permeable Reactive Barriers (Walls):</u> · Regulatory Guidande For Permeable Reactive Barriers Designed to Remediate Chlorinated Solvents, 2nd Edition (Dec 1999) · Design Guidance for Application of Permeable Barriers for Groundwater Remediation (March 2000) · Regulatory Guidance for Permeable Reactive Barriers Designed to Remediate Inorganic and Radionuclide Contamination (Sept 1999)
Radiation Reference Guide: Relevant Organizations and Regulatory Terms (Dec 1999)
Multi-State Evaluation of Elements Important to the Verification of Remediation Technologies, 2nd Edition (Dec 1999)

Barriers have also been built to treat mine drainage using sulfate reducing bacteria. In place of zero valent iron, an organic substrate is used to construct the barrier. In an anaerobic environment, the sulfate reducing bacteria can reduce sulfate to sulfide, precipitate trace metals and generate alkalinity.

$$SO4^{-2} + 2\ CH_2O \rightarrow H_2S + 2\ HCO_3^-$$

$$H_2S + M^{+2} \rightarrow MS + 2H^+$$

PRBs to treat mine drainage have been built in Sudbury and in Vancouver, while over 20 full-scale walls have been built throughout the country to treat chlorinated solvents (Blowes et al., 1995, www.rtdf.org).

As a result of the ITRC process, approval time and costs for cleanup using PRBs were reduced. Some specific examples include:

- The time needed to approve Massachusetts' first PRB was reduced by several months; a saving of about 200 to 300 hours of staff time (50% reduction; www.rtdf.org)
- New Jersey approved the state's first PRB with 20% less staff time (www.rtdf.org).
- Installation cost of a PRB at the Mound Site Plume at Rocky Flats in Colorado was $300,000, compared to the life-cycle cost of $3 million for a pump-and-treat solution (www.rtdf.org).
- A PRB installed in Fairfield, NJ saved Dupont $10 million over a pump-and-treat alternative (www.rtdf.org).
- Rockwell forecasted a $1.8 million savings over a 30-year period using a PRB instead of pump and treat (www.rtdf.org).
- Massachusetts found that PRBs have lower operation and maintenance costs than mechanical systems (www.rtdf.org).

Discussion

Although PRBs can have direct application to mining problems, many of the initial technologies focused primarily on organic contamination. Currently there is interest in topics which could have a more direct impact on the mining community. A new technical group was formed in 2001 which will address constructed wetlands, both from a treatment and a restoration perspective. In addition, several new technical teams have been proposed to address mine waste and total maximum daily limits (TMDL).

ITRC vs ADTI

But we already have the ADTI, why do we need another group? The Acid Drainage Technology Initiative (ADTI) was initiated in 1995 by federal agencies, the National Mining Association and the Interstate Mining Compact Commission to identify, evaluate and develop cost-effective and practical acid drainage technologies. In 1999, ADTI was expanded through the addition of the metal mining sector group, which focused on drainage quality issues related to metal mines. ADTI addresses drainage quality issues from all abandoned, active, and future coal and metal mines.

While ADTI has developed excellent technical manuals for both coal and metal mining, its stated objective is technology transfer. Only about 10% of the ADTI members work for regulatory agencies and a large-scale training program has not been developed.

In contrast, 30-60% of the ITRC teams are from state regulatory agencies, and acceptance of innovative technologies by state agencies is one of the most important goals of ITRC. To help achieve acceptance, ITRC provides both internet and classroom training throughout the country. Over 10,000 people have attended ITRC training sessions. ITRC members also provide assistance when new technologies are proposed. Members from other states can often provide independent data and unbiased opinions on the success of a specific technology that has been used in their state.

Information developed by ADTI can be used by work groups of the ITRC. This will not only avoid duplication of effort but will also reach a wider regulatory audience. Becoming involved and encouraging your state regulatory agencies to actively participate in the ITRC process should lead to shorter review times and more cost effective remediation.

Literature Cited

Blowes, D. W., Ptacek, C. J., Bain, J, G., Waybrant, K. R. and W. D. Robertson. 1995. Treatment of mine drainage using *in situ* permeable reactive walls. In Proceedings of Sudbury 95 - Mining and the Environment. Volume 3.

Interstate Technology Regulatory Council web site (www.itrcweb.org)

United States Environmental Protection Agency, Remediation Technology Development Forum web site (www.rtdf.org)