

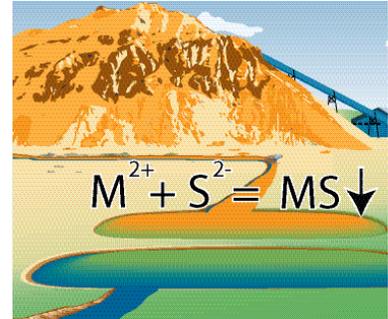


# ITRC Guidance Information

## Product Announcement | January 2014

### ***Biochemical Reactors (BCR) for Treating Mining-influenced Water (MIW)***

Biochemical reactors are engineered treatment systems that use an organic substrate to drive microbial and chemical reactions to reduce concentrations of metals, acidity, and sulfate in MIW. This ITRC web-based guidance describes how a BCR works, contaminants treated by a BCR, various designs, monitoring and maintenance requirements and schedules, and troubleshooting. Challenges are identified, as well as solutions (see Table 7-1). Fifteen case studies present real-world examples, and include details such as volumes of MIW treated, substrates used, pH and metals concentration of the MIW, and BCR size (most are full scale). You can access this new guidance at <http://itrcweb.org/bcr-1>.



## Background

Mining-influenced water (MIW) is a major environmental water quality problem in mined areas throughout the U.S. and around the world. MIW includes aqueous wastes generated by ore extraction and processing, as well as mine drainage and tailings runoff. MIW generally contains elevated concentrations of metals, metalloids, and sulfates. The pH of MIW can be acidic, basic or circumneutral. BCRs offer an effective means to treat a wide variety of MIW conditions.

## How ITRC Guidance Can Help You

This ITRC guidance is an easy-to-use, web-based resource for assessing the applicability, advantages, and limitations of using BCRs to treat mining-influenced water and includes:

- ▶ a decision tree to assist in assessing the applicability of a BCR
- ▶ a process for substrate selection and testing
- ▶ calculations for sizing a BCR and the design strategy for applying these calculations
- ▶ pre- and post-treatment options for BCRs (also see ITRC MW-1, <http://www.itrcweb.org/miningwaste-guidance/>)
- ▶ an example Construction Quality Assurance (CQA) plan for a BCR
- ▶ a list of protocols for monitoring BCR system start-up, operation, and maintenance
- ▶ a list of parameters used in troubleshooting BCR performance
- ▶ case studies that illustrate real-life BCRs applications and lessons learned

For existing or planned BCRs, you can gain maximum benefit from this guidance as follows:

- ▶ Use the decision tree to evaluate BCR applicability given the, location, available space, accessibility, and substrate availability, and whether pre- or post-treatment is needed given the influent concentrations and flow rate
- ▶ Understand the chemical reactions and equilibrium in BCRs.
- ▶ Evaluate and optimize your BCR performance using troubleshooting parameters in this guidance.
- ▶ Review the case studies and site contacts to understand potentially applicable site-specific challenges.



**Advancing Environmental Solutions**

Documents, free Internet-based training, contact information: [www.itrcweb.org](http://www.itrcweb.org)

- ▶ Attend the FREE Internet-based training (<http://www.itrcweb.org/Training>) and share this guidance (<http://www.itrcweb.org/BCR-1/>) with your co-workers, site owners, and consultants.
- ▶ Promote the use of BCRs with this guidance when speaking at conferences and meetings.
- ▶ Report to ITRC any successes or concerns related to this guidance, training course, or the application of BCRs at sites at: <http://www.itrcweb.org/feedback.asp>.

## Resources

Other ITRC documentation may be applicable for understanding technologies to address mine waste (including MIW). Consider reviewing the following:

- ▶ Mine Waste Treatment Selection Guidance, MW-1, 2010. <http://www.itrcweb.org/miningwaste-guidance>
- ▶ Constructed Treatment Wetlands WTLND-1, 2003. <http://www.itrcweb.org/Guidance/GetDocument?documentID=106>
- ▶ Characterization, Design, Construction and Monitoring of Mitigation Wetlands, WTLND-2, 2005. <http://www.itrcweb.org/Guidance/GetDocument?documentID=107>
- ▶ Phytotechnologies Technical and Regulatory Guidance and Decision Trees. Revised (Phyto-3) 2009. <http://www.itrcweb.org/Guidance/GetDocument?documentID=64>

## FREE Internet Training Course

The BCR training course (<http://www.itrcweb.org/Training>) and associated web-based document (<http://www.itrcweb.org/BCR-1/>) explains the fundamental concepts of biochemical reactors. Through this training course you will:

- ▶ learn how to assess the applicability of a BCR for a particular site;
- ▶ understand the chemical, physical and biological treatment mechanisms in a BCR;
- ▶ learn how to test potential substrates and develop a conceptual design for a BCR;
- ▶ become oriented to a typical construction sequence and steps for a BCRs; and
- ▶ understand recommended start-up, operation, and maintenance/monitoring of a BCR.

You will also be provided with links to additional resources related to BCRs. The training uses case studies to illustrate pertinent BCR concepts.

### **BCR Contacts**

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For additional Team Member contacts, see in Appendix E of the guidance document (<http://itrcweb.org/bcr-1/>).



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